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Location of Placenta and Clinical Course of Labour*

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(Received: February 6, 1985)

The results of studies on 2396 women are presented. Relations were found between location of placenta and 'ripeness' of uterine cervix, duration of labour, prognostic value of intrauterine pressure, complications of the third stage, fate of the newborn and success of induction of labour. The authors arrived at the conclusion that attachment of the placenta to the fundus uteri may be considered an unfavourable location causing an increase in the number of different deviations from normal labour.

Introduction

An extensive use of ultrasound diagnostic instruments allowing the determination of the site of the placenta with a high precision, simplicity, and without any harm to the mother and foetus, has enabled us to study certain peculiarities of the course of labour in a large number of pregnant women and parturients with different sites of placenta.

The results of studies on 2396 women are presented in this paper. It was revealed that in 19.5% of cases the placenta was located in the fundus of the uterus, in 74.9% on the uterine wall, and in 5.6% in the lower uterine segment. It was also found that in the primiparae the placenta was attached somewhat more often (up to 24%) to the fundus uteri.

No connection was found between the site of placenta and the frequency of toxæmia of pregnancy as reported by Bieniarz [1]. Neither did the frequency of breech presentation correlate with the site of placenta as reported by Stevenson [11], Whitehead [12] and Flanu and Vaclavinkova [5]. As to breech presentation, we confirm Järvinen's point of view [6] that placental location does not affect its frequency.

We were particularly concerned with the relationship between placental location and the clinical course of labour. Some investigators have shown a certain correlation between placental location and the contractile activity of the uterus. Thus Csapó et al. [2], having studied 36 parturients, established

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the conclusion that with a fundal location of the placenta, labour acquires a prolonged character on cessation of contractions.

In further investigations [3, 7, 4, 9, 10] it was found that location of the placenta influences the clinical course of delivery in different ways.

Clinical Material and Results

The following variables were subjected to analysis:

Placental site and 'ripeness' of the uterine cervix

Localization of the placenta and duration of labour

Localization of the placenta and prognostic value of intrauterine pressure

Localization of the placenta and complications of the third stage of labour

Localization of the placenta and fate of the newborn

The correlation of placental localization and degree of 'ripeness' of the uterine cervix revealed, during the 39th and 40th weeks of pregnancy at a fundal localization a 'ripe' cervix in 67.3% of the cases, and an 'unripe' one in 32.7%. Being located on the uterine wall, a 'ripe' cervix was established in 86.1%, and an 'unripe' one in 13.9%; with a localization in the lower segment, there was a 'ripe' uterine cervix in 92.7%, and an 'unripe' one in 7.3%. Thus, the impression prevails that the lower the placenta is localized, the quicker the uterine cervix ripens. Indeed, if at a fundal placental site an 'unripe' cervix was found in 32.7%, in cases of uterine wall localization, the 'unripe' cervixes were found in 13.9%, and with a lower segment localization only in 7.3%, i.e. almost five times less frequently than in the fundus of the uterus.

It is known that the maternal organism during delivery depends on interactions of several hormonal, neurohumoral and enzymatic factors. It is possible that the steroid hormones produced by the placenta exert a local effect upon the uterine cervix (Table I).

In our opinion, the above observation confirms the theory of progesterone block, since localization of the placenta in the fundus of uterus may, according to this theory, weaken the action of the uterus due to a decreased activity of the most powerful muscular uterine section located at the fundus.

Intrauterine pressure according to the period of labour is presented in Table II.

Uterine activity expressed in Montevideo units, was 3 times less at the beginning of labour in cases of the placenta being localized in the fundus of uterus as compared with its localization in the body.

It is of interest that this difference was marked during the first stage of labour (prior to effacing the external orifice) while later a levelling took place and this difference almost disappeared.

TABLE I

Duration of labour depending on localization of the placenta

Site of placenta	Duration of labour (hrs) mean \pm S. D.
Fundus of uterus	14.5 \pm 0.8
Uterine wall	10.8 \pm 0.2
Lower uterine segment	8.9 \pm 0.7

TABLE II

Intrauterine pressure (mm Hg) according to stages of labour

Site of placenta	Opening of the cervical orifice, cm			Second stage
	2-4	5-7	8	
Fundus	22.9	32.2	36.4	109.8
Uterine wall	42.6	45.8	50.9	129.1
Lower segment	36.3	44.8	50.06	121.3

TABLE III

Site of placenta and necessity of labour stimulation

Site of placenta	Frequency of labour stimulation (%)
Uterine fundus	36.1
Uterine body	16.9
Lower uterine segment	14.5

No difference was found in the contractile activity of the uterus during the second stage of labour.

In this aspect, our analysis also showed that in case of a fundal placenta, we had to resort, more often than with any other localization, to different labour-stimulating agents during labour (Table III).

The analysis showed that application of oxytocin more frequently used with the placenta localized in the fundus of uterus and in the body, as compared to its attachment to a segment.

Thus placental location in the fundus of uterus resulted in a longer duration of labour and a decrease in the force of uterine contractions during the first stage leading to a more frequent application of labour-stimulating drugs.

There is a unanimous opinion about the relationship between placental location and pathologic bleeding during labour: the lower the placenta was attached in the cavity of the uterus the greater the blood loss was during the

third stage. Considering a blood loss, which exceeds 0.5% of body weight of a pregnant woman, to be pathological at fundal localization such a blood loss occurred in 10.2% with a localization in the uterine body, in 3.8%, and with that in the lower uterine segment in 10.4% of the cases.

Although our data confirmed a well-known regularity concerning the higher incidence rate of pathological blood loss at a placental location in the lower uterine segment there are also a considerable number of such complications at one in the uterine fundus, however, the mechanism of an increased bleeding in these cases being different.

To reveal the general regularities of a possible influence to placental localization on the condition of the newborn baby, a comparative study on the indices of the condition of the newborn at different placental locations in 2200 women was made, using the Apgar scores (Table IV).

It was disclosed that severe cases of asphyxia (1-4 scores) in the newborn were encountered in parturients with a placental location in the fundus of uterus, while in those with one in the lower uterine segment not a single child was born in a state of serious asphyxia.

Although the development of asphyxia does not seem to be directly related to placental location, it is obvious that a delivery of a longer duration more frequently leads to an unfavourable condition of the newborn. The duration of labour, as shown in this paper, depends on the placental site. This fact is indirectly reflected by the condition of the newborn.

TABLE IV
Site of placenta and condition of the newborn

Site of placenta	Percent distribution by Apgar scores		
	1-4	5-7	8-10
Fundus of uterus	2.4	12.2	85.4
Uterine body	0.6	10.0	89.4
Lower uterine segment	0	8.4	91.6

TABLE V
Relation of placental location to the amount of oxytocin and speed of oxytocin infusion during delivery

Placental location	Oxytocin requirement (IU)	Speed of infusion (IU/hr)
Fundus	8.23	0.95
Body	4.94	0.85
Lower segment	3.36	0.74

TABLE VI
*Relation of cervical ripeness to the duration of labour
 and site of placenta*

Ripeness of cervix (Bishop score)	Duration of labour (hrs)		
	Lower segment	Body	Fundus
0—3	5.4 ± 1.05	7.66 ± 0.63	8.72 ± 0.54
4—6	4.27 ± 0.39	6.02 ± 0.47	7.85 ± 0.69
7—10	4.53 ± 0.6	5.13 ± 0.5	8.77 ± 1.68

The labour process in 156 women was the subject of a special study; the premature rupture of the foetal membranes was observed in this group and labour was induced by oxytocin.

Regular labour activity was the last to appear in cases given the same quantity of oxytocin when the placenta was localized in the fundus, and different quantities and speed of administration were necessary for the completion of labour (Table V).

In 17 women, labour was terminated by caesarean section; in 14 of them the placenta was found in the fundus.

When comparing the various effects influencing the course of labour, i.e. the condition of the uterine cervix ('ripeness' or 'unripeness') and site of the placenta, the major influence was found to be the location of the placenta (see the Tables).

Conclusions

Thus, one may state that the "higher" the placenta is situated in the cavity, the more frequently an 'unripe' uterine cervix, weakness of labour activity, and different deviations from a normal course of labour occur. This permits consideration of the fundal attachment of the placenta as an unfavourable one involving higher risk as to the outcome for the mother and foetus. An explanation of these facts can be the theory of progesterone block, according to which, in cases of fundal attachment of the placenta, a considerable mass of myometrium is cut out with all the resultant consequences.

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Haftstelle der Plazenta und klinischer Geburtsverlauf

S. N. DAVYDOV, V. M. ORLOV, L. A. SAMORODINOVA
und S. V. KHRUSTALKOV

Im Laufe einer 2396 Frauen umfassenden Studie wurden zwischen der Haftstelle der Plazenta, der Reife des Muttermunds, der Entbindungsdauer, der prognostischen Wert des intrauterinen Drucks, den in der dritten Entbindungsphase beobachteten Komplikationen, dem Zustand der Neugeborenen sowie der Wirksamkeit der Geburtsinduktion Korrelationen gefunden. Die Untersuchungen führten zur Folgerung, daß die fundale Haftstelle der Plazenta als ungünstig zu betrachten ist, weil dadurch der normale Geburtsverlauf auf unterschiedliche Weise schädlich beeinflußt wird.

Плацентарная площадка и клиническое протекание родов

Ш. Н. ДАВЫДОВ, В. М. ОРЛОВ, Л. А. САМОРОДИНОВА и Ш. В. ХРУСТАЛЬКОВ

Авторы сообщают результаты огромного количества (2396 женщин) наблюдений. Они выявили зависимость между плацентарной площадкой, зрелостью маточного зева, продолжительностью родов, прогностическим значением внутриматочного давления, отмеченными в третьей фазе родов осложнениями, состоянием новорожденных, а также успешностью начале родов. Авторы пришли к выводу, что фундальное прикрепление плаценты можно считать неблагоприятным, так как это может по-разному повлиять на нормальное течение родов.

Contraction Stress Testing for Primary Foetal Surveillance by Stimulated Endogenous Oxytocin Release

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(Received: February 6, 1985)

A test for uteroplacental insufficiency based on the idea that a given maternal-foetal unit could be tested by decreasing intervillous space blood flow, offers an individual test for each foetus. Clinically, the use of uterine activity to decrease intervillous space blood flow is the most practical. Following Freeman's suggestion, authors use an endogenous oxytocin test, where the oxytocin discharge is induced by nipple stimulation (EOS).

In the late 1960s and early 1970s the perinatal mortality rates were halved by the introduction of foetal monitoring [3].

Perinatal foetal monitoring was the first (and remains the principal) area of clinical medicine in which heart rate variability is used as an important clinical variable. The techniques of continuous registration of the beat-to-beat heart rate (FHR), employed by the pioneers of clinical cardiotocography, led relatively early to the recognition that a certain degree of irregularity is a normal feature of foetal heart rate tracing, and that changes in the degree and pattern of this irregularity were often associated with suboptimal foetal outcome.

The most important mechanism immediately involved in producing heart rate variability is the autonomic innervation of the heart. Parasympathetic cardiodaccelerator activity (impulses reaching the heart via the cardiac branches of the vagus nerve) is of primary importance in producing beat-to-beat variability. Present evidence suggests that fluctuations in sympathetic cardioaccelerator activity play at best a modest role in FHR variability. The immediate mechanisms involved in producing such variability may be summarized tentatively as rapid fluctuations in parasympathetic (vagal) cardiodaccelerator activity and more slowly fluctuating sympathetic cardioaccelerator activity, each superimposed on the tonic activity level of the respective cardiac innervations. The factors contributing to foetal heart rate variability are blood pressure and vascular resistance to achieve proper distribution of foetal cardiac output. It is also related to the activity of the foetal central nervous system.

Prenatal detection of chronic uteroplacental insufficiency is an important problem in obstetrics since it implies that a given maternal-foetal unit is not able to meet the foetal needs. Therefore, a test capable of evaluating the status of an individual foetus under the circumstances where it is dependent on the integrity of its own specific maternal-foetal unit is mandatory. A temporary innocuous stress to the foetus which does not exceed its margin of reserve would induce a specific response. If the margin of reserve was adequate, there would be no foetal response. There are indications that the specific FHR changes of extreme tachycardia and deceleration are early indicators of foetal compromise, therefore may be useful for this purpose.

A test for uteroplacental insufficiency based upon the idea that a given maternal-foetal unit could be tested by decreasing intervillous space blood flow, is attractive, since it offers the possibility of an individual test for each foetus. Clinically, the use of uterine activity to decrease intervillous space blood flow is the most practical. Following Freeman's suggestion, we use an endogenous oxytocin test, where the oxytocin discharge is induced by nipple stimulation (EOS) as described earlier [9].

Method

All gravidae are routinely checked by ultrasound and non-stress CTG around the 36th week and weekly afterwards. Suspected dysmaturity or suspect non-stress CTG indicates hospital admission and EOS. If the latter was negative it was repeated three days later.

EOS: The patient is placed in the lateral tilt position. Foetal heart rate and uterine contractions are recorded for a suitable baseline observation period (10 to 30 minutes). If uterine contractions are occurring at a frequency of 3 per 10 minutes or greater, with a duration of longer than 40 seconds, no contraction stimulation is necessary. If baseline uterine activity is insufficient, a warm moist wash cloth is placed on both breasts for several minutes. The patient is then instructed to massage and/or roll her nipple for 10 minutes on one breast. If this is insufficient, both breasts are stimulated for 10 minutes. Once contractions begin, the nipples are stimulated intermittently to titrate the contraction response.

A negative result is defined as no late deceleration with a contraction frequency of 3 contractions in 10 minutes (Fig. 1). Negative results are almost always associated with accelerations in foetal heart rate. A positive contraction stress test is indicated by late deceleration with the majority of contractions (Fig. 2). It is often necessary to continue stimulation and monitoring for 10 or 15 more contractions to determine if the late deceleration is persistent. For purposes of clinical management, negative contraction stress tests are classified as reactive if there are one or more accelerations during the entire test.

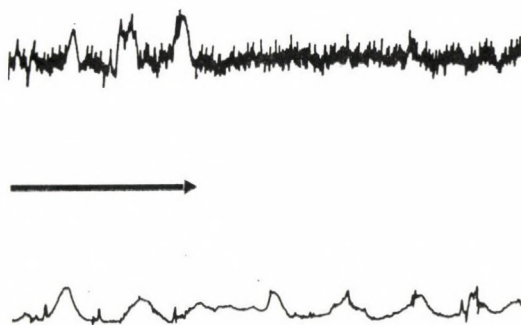


FIG. 1. Decreased variability indicated EOS. Stimulated contractions evoked early acceleration with sufficient variability. Negative, reactive EOS

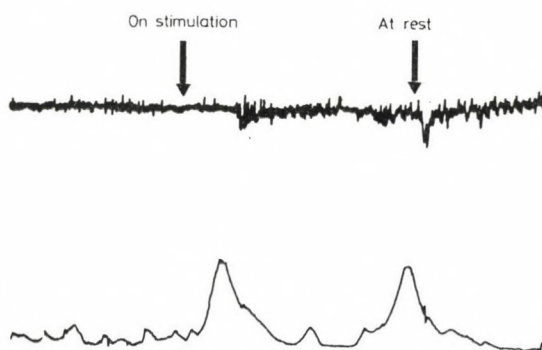


FIG. 2. Decreased variability indicated EOS. With stimulated corrections early deceleration was observed. Positive result indicated close observation

If there are no accelerations during the test, a negative contraction stress test is classified as non-reactive.

In the last 12 months we observed 927 pregnancies, and performed about 100 EOS.

Results

Out of 927 pregnancies 64 were declared to be 'high risk' according to the above criteria. Three EOS were performed on 8, two on 33, one on 12 patients. Positive tests occurred six times (4 associated with low urinary oestriol and/or severe dysmaturity). Two out of six delivered vaginally following labour induction, four cases proved to be severely affected and needed surgical intervention (caesarean section). The Apgar scores of those were below 6.

Discussion

In clinical practice, foetal asphyxia has most often been associated with decreased or absent variability in FHR. In the absence of acute accidents (such as abruptio placentae or cord prolapse) or iatrogenic factors, the human

foetus becomes hypoxic before or during labour after a period of failing or chronically inadequate placental function. Of the stresses to which the foetus can be subjected safely, uterine contractions seem to be the most promising. The relationship between the uterine activity and resultant foetal responses may be considered a system for evaluating the margin of foetal reserve. If the foetus is not able to tolerate infrequent mild contractions, its margin of reserve is low. The EOS functional test seems to be the most physiological both for mother and foetus. However, one must be careful not to overlook small late decelerations which, when combined with a smooth baseline foetal heart rate, can indicate substantial foetal acidosis and depression. Decreased foetal heart rate variability in combination with late or variable deceleration patterns means an increased risk of foetal pre-acidosis (pH 7.20 to 7.25) or acidosis (pH less than 7.20) and the possibility that the infant will be depressed at birth. Only 10–40% of ominous foetal heart rate patterns will be associated with foetal acidosis [5, 11]. The combination of later or severe variable deceleration with loss of variability is particularly ominous.

The occurrence of deceleration patterns in the presence of normal FHR variability generally means that the foetal distress is either of mild degree or recent in origin.

We found about 6% FHR abnormality, being candidates for EOS. Four of those proved to be really indicative. Non-reactive positive contraction stress tests are always associated with foetal distress in labour and with a high foetal mortality rate if intervention does not occur. For this reason, if the pregnancy is beyond 36 weeks' gestation, and there is no rapidly reversible maternal condition that may result in improvement of the test, delivery must be carried out even by caesarean section. For this intervention it should be emphasized that the definition of a positive contraction stress test is one with persistent late deceleration, with the majority of the contractions and with no acceleration during the entire test. Recent work by Brown and Patrick [2] has indicated that, if a foetus remains non-reactive for longer than 80 minutes, there is very little chance that it will not be significantly compromised. This prolonged period of non-reactivity would appear to be most ominous finding of an antepartum test.

With the introduction of the nipple stimulation test, the contraction stress test has become much simpler, less time-consuming, and less expensive. Since the risk of antepartum foetal death in high-risk patients is 8 times higher (3.2 vs. 0.4%) than in the controls, it would appear that contraction stress test would be the current choice in the management of these pregnancies.

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Kontraktions-Streßtest zur primären fötalen Observation mit endogener Oxytozinstimulation

I. S. MARTON und E. BARAKONYI

Die Untersuchung der ureteroplazentaren Insuffizienz, die in einer gegebenen maternofötalen Einheit durch Verringerung der Durchblutung des intervillösen Raumes durchgeführt werden kann, bietet brauchbare Informationen über den Zustand der Früchte. Klinisch kann die ureteroplazentare Durchblutung mittels Ureterusmuskulatur-Kontraktionen verringert werden. Zur Anwendung kam, anhand der Empfehlung von Freeman, ein endogener Oxytozin-Stimulationstest, in dem die Oxytozinausströmung durch Mamillenstimulation erzielt wurde.

Тестирование сократительным стрессом путем стимуляции эндогенным окситоцином для первичного наблюдения за плодом

И. Ш. МАРТОН и Э. БАРАКОНИ

Исследование утероплацентарной недостаточности в данном матerno-фетальном единстве можно произвести путем уменьшения кровотока в межворсинчатом пространстве, благодаря чему мы получаем информацию о состоянии плодов. Клинически утероплацентарное кровообращение мы можем снизить сокращениями миометрия. На основании рекомендации Фримена авторы пользовались тестом стимуляции эндогенным окситоцином, в котором выход окситоцина вызывали раздражением соска грудной железы.

The Cerclage in 1983

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During a 10-year period in the authors' Hospital 246 cerclages have been performed for treating uterine cervix insufficiency (UCI). Their findings have confirmed that previous mid-trimester abortion is an indication for cerclage, and in patients with "silent opening" of the cervix five times better results are expected than in open uterine cervix as a result of contractions.

Insufficiently functioning uterine cervix shows decreasing ability of holding the foetus with an increasing weight during pregnancy. This phenomenon is caused by physical vectors of strength. Due to local cervical tension, prostaglandins (PG) are released. PG transforms the refracter uterus to a reactive organ. This is initially manifested in a long-lasting increase in uterine tone. Later it is a further stimulus to the insufficient UC resulting in excessive PG release.

The Hungarian premature delivery ratio was 4.3% in 1938, as opposed to 10.8% in 1968, and 10.9% in 1980 [4]. Hormonal and mechanical substitution were suggested to reduce this high incidence. Palmer and Lacomme [7] suggested mechanical substitution for the correction of cervical incompetence, which is usually either congenital or traumatic in origin. Congenital cervical hypoplasia is due to the defective development or function of the connective tissue [5]. Incompetence can be the consequence of cervical dilatation (in Hungary mainly due to termination of first trimester pregnancy) and/or unattended birth injury. The latter is particularly frequent after prolonged or instrumental delivery of a large foetus.

The first operative reconstruction of cervical incompetence was published by Shirodkar in 1955 [8]. Thereafter numerous varieties of this operation have been described [6]. However, expectations to reduce the incidence of premature delivery were not realized. The operation and its indication is still argued. Many authors give preference to bed rest and mild sedation, while other obstetricians recommend a cerclage suture of the significantly dilated cervix.

Materials and Method

The following indications were accepted:

- Prophylactic operation—two or more mid-trimester abortions or premature delivery in past obstetric history.

- Therapeutic operation—the cervical canal and internal orifice are patent for digital examination at 16–20 weeks' gestation without any complaints.

Over a period of 10 years, 246 pregnant women have been subject to cerclage of the incompetent cervix at the Hungarian State Railway Hospital. Considering a total of 12,658 deliveries, this figure corresponds to an incidence rate of 1.94%. The operation was declared to be successful if the newborn weight was above 2500 g. The modified Horn-Gimes method was used [3], a double, thick silk thread was applied around the cervix.

For comparison patients were divided in three groups:

1. Prophylactic group (P)—the operation was performed on the basis of past obstetric history without cervical dilation.

2. Cervical dilatation without contractions (NC)—free of symptoms and complaints.

3. Sporadic contractions (C)—objective symptoms (effacement or dilatation) and subjective complaints were present without regular contractions.

The operations were performed after 4–5 days' bed rest and in patients being free of the above complaints.

For statistical evaluation the chi-square test was used. The significance of the difference in the proportion was studied. Our zero hypothesis was described as follows:

$$H_0 : P_{P, NC} - P_C = 0, \text{ i.e.}$$

$$H_0 = P_{P, NC} = P_C$$

which means that the probability of a successful delivery in groups P and NC equals group C.

Discarding of the zero hypothesis confirms our assumption of the existing difference.

The chi-square value was established as follows:

$$\chi^2 = \sum_{i=1}^3 \frac{(f_i - f_i^*)^2}{f_i^*}$$

where

f_i is the number of patients having been observed in the different groups

f_i^* the expected frequency based on the breakdown by basic set

$i = 1, 2, 3$ the differentiated groups, number of which amounts to $r = 3$

χ^2 at degree of freedom $r-1 = 2$.

Results

The outcome of the previous pregnancies of the 246 operated patients are demonstrated in Table I. There were no significant differences in the frequency rate of extrauterine pregnancies and caesarean sections. Premature deliveries referring to earlier pregnancies amounted to 37.4%. The distribution according to grouping did not show any substantial difference. Grouping of the operated patients according to the mentioned distribution is shown in Table II. The operations in group P were performed, on an average, on week 19 ± 0.9 , in group NC on week 21 ± 0.5 and in group C on week 24 ± 0.2 . Estimation of the efficacy of the operations revealed that results in groups P and NC substantially exceeded those of group C. The proportion of premature deliveries was also more favourable in the former groups.

In groups P and NC, 6 operations were unsuccessful and 142 newborns survived the perinatal period (168 hours) and 10 out of the 142 newborns were prematures (7%).

According to our studies, $\chi^2 = 32.7 > \chi^2_{0.05} = 5.99$: this result indicates significant difference between groups P vs. C and NC vs. C.

TABLE I

The outcome of the previous pregnancies of the 246 operated patients

	No. of cases	Abortion		Deliveries		Infant survival	Total pregnancies
		artif.	spont.	premature	term		
P	92	52	74	32	57	58	215
NC	56	37	88	21	23	29	169
C	98	53	112	26	52	69	243
Total	246	142	274	79	132	156	627

TABLE II

Grouping and outcome of the 246 surgically treated patients

	Unsuccessful		Successful			
			premature		term	
	No.	%	deliveries			
			No.	%	No.	%
P	3	3.2	5	5.4	84	91.4
NC	3	5.3	5	8.9	48	85.8
C	25	25.5	15	15.3	58	59.2
Total	31	12.6	25	10.1	190	77.3

Discussion

In some cases the advancing pregnancy leads to the inability of the weakening internal orifice to retain the concept. It is due to the mechanical effect of weight increase and results in cervical dilatation. The event is called 'silent dilatation' and is produced unequivocally by physical force vectors. Early bed rest and careful observation would help to reduce this effect and dilatation could be prevented or reduced to a minimum, thus pregnancy would be postponed without operation. Due to this mechanical incompetence, the pregnant women have to be hospitalized for 4–5 months. As a result of cervical stimulation, local prostaglandins (PG) are released [1]. The stimulation is less intensive during bed rest. The refractory uterus is reactivated by the PG release. In compliance with Pascal's law and Laplace's theory [2], quantitative uterine physiology explains that the initial response of the gravid uterus to PG is not cyclic labour pain but prolonged tonic increase ($AP = 2wT/R$, AP being active pressure, wT wall tension, R the radius). Increased AP may act as a new stimulator and even result in additional PG release by a positive feedback regulation. The stretch-induced PG release associated with PG released during operation, increases the risk of the above-mentioned effect [1]. Moreover, it has been confirmed that PG increases the oxytocic sensibility as well [2].

According to our opinion, cervical incompetence operations have to be considered in modern obstetrics. Timing of the operation is most important. Previous unsuccessful pregnancies might call the attention to cervical incompetence. Repair of true incompetence during, or before further, pregnancy is highly recommended, when it is possible in cases of the dilated cervical canal.

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Cerclage in 1983

G. KUSNYERIK, P. SZALÓCZY und I. MARTON

Im Laufe der vergangenen 10 Jahren wurden zur Behandlung der Muttermundinsuffizienz 246 Cerclage-Operationen durchgeführt. Die Ergebnisse lieferten Beweise dafür, daß der Mittelzeit-Frühabort eine Indikation zur Durchführung der Cerclage bedeutet, ferner daß im Falle der «stummen Öffnung» des Muttermundes die Ergebnisse fünfmal besser als im Falle von durch Kontraktionen bedingten Muttermundöffnungen sind.

Der insuffizient funktionierende Muttermund kann den mit dem Fortschreiten der Schwangerschaft stets ansteigenden Belastungen immer weniger widerstehen. Der Muttermund öffnet sich unter Wirkung der physikalischen Kraft. Durch die konsekutive Muttermundspannung wird das Freiwerden der Prostaglandine herbeigeführt, worauf bereits im Frühstadium der anhaltende Anstieg des Uterustonius hinweist. Durch diese letzterwähnte Erscheinung werden PG-Freiwerden und konsekutiv die Verschlechterung des Muttermundzustands verursacht.

Cerclage в 1983

Г. КУШНЕРИК, П. САЛОЦИ и И. МАРТОН

За последние 10 лет авторы произвели в больнице 246 операций *cerclage* для лечения недостаточности маточного зева. Полученные ими результаты подтверждают, что прежний аборт среднего времени означает показание для произведения *cerclage*, а также, в случае «тихого раскрытия» маточного зева, результаты были в пять раз лучше, чем когда маточный зев раскрывается под действием сокращений.

Неудовлетворительно функционирующий зев матки в меньшей степени может противостоять усиливающейся с развитием беременности нагрузке. Последовательное напряжение маточного зева вызывает высвобождение простагландинов. Ранним признаком этого является стойкое повышение тонуса матки. Это последнее вызывает высвобождение простагландинов и, вследствие этого, ухудшение состояния маточного зева.

Treatment of General Uterine Spasm with a Beta-Sympathomimetic Tocolytic, Fenoterol Hydrobromide (Partusisten®)*

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Premature separation of the placenta is, in most cases, accompanied by tetania uteri. In this situation caesarean section is generally the right choice of treatment. The authors present five selected and carefully monitored cases where intravenous use of a beta-sympathomimetic drug (fenoterol) eliminated the uterine spasm and rhythmic uterine contractions developed. Accordingly, this therapy is a realistic alternative to caesarean section in the treatment of tetania uteri if the patient is in good general condition not necessitating emergency surgery.

The decrease of uterine activity by means of medical treatment is one of the greatest achievements in obstetric therapy during the recent years. The beta-sympathomimetic drugs are the most important of the tocolytics. With their use it is possible to abolish premature labour and hyperactivity of the uterus.

In our paper five cases of tetania uteri are presented which followed abruptio placentae and which were treated successfully with Partusisten® (fenoterol hydrobromide).

Case 1

F. F., 24 years old, gravida 2, para 1, was transferred from another hospital because of premature labour 30 weeks following the last menstrual period. She was in active labour of 3 hours' duration (she felt continuous uterine contractions but no foetal movements, and there was no vaginal bleeding). The cervix was 3 cm dilated and 70% effaced, with intact membranes, and with the vertex at station 0. The abdomen was elevated, and the wall of the abdomen was as hard as a stone, tight and bright. RR: 140/90 mm Hg, P: 112/min.

Intravenous fluid intake was started at once (500 ml 5% glucose). Ultrasound examination: BPD: 78 mm; there were no FHR and foetal movements.

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Dg.: Grav. s. 30. Foetal death in utero. Uterine tetany. Premature separation of the placenta.

On artificial rupture of the membranes, 100 ml of blood-stained amniotic fluid was drained off.

Fenoterol (Partusisten®), 2 µg/min, was given in intravenous infusion until the end of the stage of dilatation. The uterine tetany stopped, and rhythmic contractions began. During this time blood transfusion was given. 1.5 hours after admission, a dead girl, 1350 g in weight and 45 cm long, was delivered. The placenta was delivered together with the foetus, covered by a fist-sized blood clot.

Heavy bleeding followed the delivery of the placenta. Manual revision of the uterus and bimanual massage were performed. The fenoterol infusion was stopped and oxytocin administration was begun intravenously with a Cardiff Infusion System (32 mU/min). The puerperium was uneventful.

Case 2

K. É., 28 years old, gravida 3, para 2, presented in the 39th week of gestation. Profuse haemorrhage had begun 1 hour before her admission. She had the sensation that her abdominal wall had become hard and she did not feel foetal movements. The cervix was 4 cm dilated and 100% effaced, the foetal membranes were ruptured and the vertex was at station -1. The haemorrhage from the uterus was minimal. Ultrasound examination: BPD: 94 mm; there were no FHR and foetal movements. Haematoma retroplacentare was observed.

Dg.: Grav. s. 39. Foetal death in utero. Premature rupture of the membranes. Premature separation of the placenta. EPH gestosis. Uterine tetany.

Fenoterol (1 µg/min) was given intravenously until the end of labour. The uterine tetany stopped and rhythmic contractions began with a slight uterine hypertonia. After craniopuncture, a dead girl, 3450 g in weight and 52 cm long, was delivered. The placenta was delivered immediately after the foetus. Atonic uterus was observed, with a blood loss of about 1000 ml. Manual revision of the uterus and bimanual massage were performed. The fenoterol infusion was stopped and oxytocin administration was begun intravenously, as well as blood transfusion. The puerperium was uneventful.

Case 3

J. Gy., 32 years old, gravida 10, para 7, came to our Department in premature labour in the 34th gestational week. Profuse haemorrhage and continual uterine contractions had begun 2 hours before her admission. Foetal move-

ments were not felt from this point of time on. The cervix was 4 cm dilated and 100% effaced, with intact membranes, and with the vertex at station 0. The vaginal haemorrhage was of medium degree. The uterus was in tetany. We did not find symptoms of foetal life on ultrasound examination.

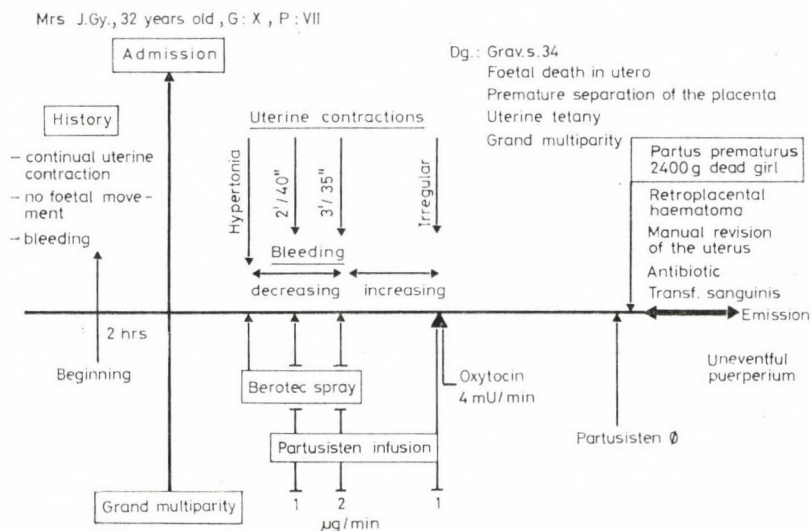


FIG. 1

Dg.: Grav. s. 34. Foetal death in utero. Premature separation of the placenta. Uterine tetany. Grand multiparity. At the time of admission the amniotic membranes were ruptured. 200 ml blood-stained amniotic fluid was drained off. Berotec aerosol (fenoterol hydrobromide) was used as initial beta-mimetic treatment. As the uterine tetany did not decrease, fenoterol administration was begun ($1 \mu\text{g/min}$) intravenously. The effect of this dose was not sufficient, and the dose of fenoterol was therefore increased to $2 \mu\text{g/min}$. Rhythmic uterine contractions began. 1 hour later, the bleeding from the uterus increased and the contractions became irregular. Oxytocin infusion was started with a Cardiff Infusion System (4 mU/min) in addition to the beta-mimetic therapy. Rhythmic uterine contractions returned. A dead girl 2400 g in weight and 47 cm long was delivered. The placenta was delivered immediately after the foetus, with a fist-sized blood clot. We performed manual revision of the uterus and bimanual massage. 1300 ml blood transfusion was given and antibiotic therapy was begun. The puerperium was uneventful (Fig. 1).

Case 4

B. Gy., 28 years old, gravida 2, para 2, presented in the 36th gestational week. She was in active labour of 1.5 hours' duration (she felt continuous uterine contractions, but no foetal movements, and there was a moderate degree

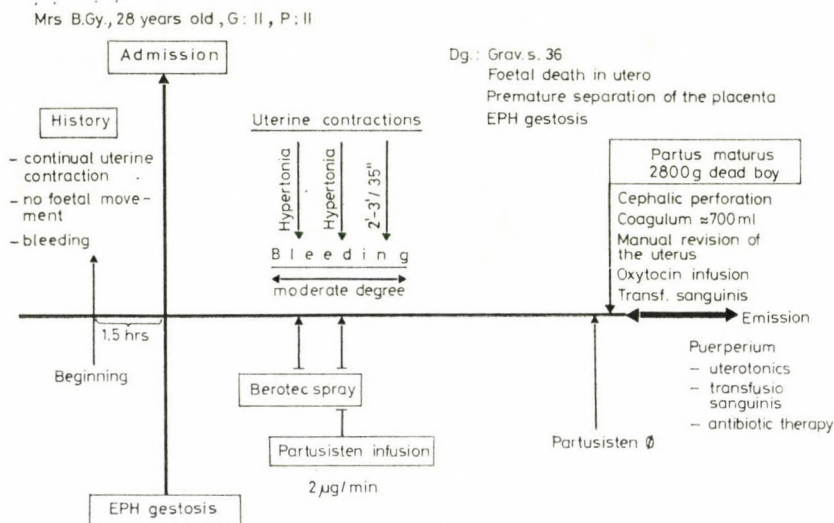


FIG. 2

of vaginal bleeding). The cervix was 1 cm dilated and 70% effaced, with intact membranes, and with the vertex at station -1.

Cerclage was palpable, and was removed. The cervix became 3 cm dilated and 70% effaced. FHR was not observed.

Dg.: Grav. s. 36. Premature separation of the placenta. Foetal death in utero. EPH gestosis.

On admission, Berotec aerosol inhalation was used at once, but the effect was not satisfactory. On artificial rupture of membranes, 200 ml blood-stained amniotic fluid was drained off. Fenoterol ($2 \mu\text{g}/\text{min}$) was given intravenously until the end of the first stage of labour. The uterine tetany stopped and rhythmic contractions began. A dead boy 2800 g in weight and 50 cm long was delivered after cephalic perforation. The placenta was delivered 30 sec. after the foetus, with a double fist-sized blood clot. Uterine haemorrhage was begun. We made manual revision of the uterus and bimanual massage at once. The patient received oxytocin by infusion, Ergometrin intravenously and blood transfusion as well. In the puerperium, uterotonics, antibiotic therapy and blood transfusion were necessary. The patient was discharged in good health 10 days after the delivery (Fig. 2).

Case 5

B. L., 27 years old, gravida 2, para 2, presented in the 35th gestational week. Continuous uterine contractions had begun 3 hours before her admission, and from that time on she had not felt foetal movements. The cervix was 4 cm dilated, 100% effaced, with intact membranes, and the vertex was at station -2.

The vaginal haemorrhage was of moderate degree. The uterus was in tetany and FHR was not observed.

Dr.: Grav. s. 35. Foetal death in utero. Uterine tetany. EPH gestosis.

On rupture of the amniotic membranes, 50 ml of moderately blood-stained amniotic fluid was drained off. 100 mg of pethidine was given intramuscularly, but the effectiveness of this treatment was not satisfactory. Partusisten® (0.5 µg/min) was given intravenously until the end of the stage of dilatation. Rhythmic uterine contractions began.

Three hours after the commencement of the therapy, a dead boy, 2180 g in weight and 46 cm long, was delivered. The placenta was delivered at once with 700 ml of blood. Two-thirds of the surface of the placenta were covered with a two-inch thick blood clot. The uterus was in contraction and there was no appreciable bleeding from the uterus. Blood transfusion and uterotonics were given. The puerperium was uneventful.

Discussion

In our five cases the intravenous use of fenoterol alleviated the tetania uteri. Rhythmic uterine contractions were induced and in this way the course of delivery succeeded per vias naturales. Fortunately, the condition of our patients allowed conservative treatment and the avoidance of caesarean section. We found that neither the inhalation of fenoterol aerosol nor the use of pethidine intramuscularly was successful in the treatment of tetania uteri. In two cases the decrease in uterine activity was so explicit that, beside fenoterol, we had to use oxytocin as well.

In our opinion, beta-mimetic tocolysis is a realistic alternative to caesarean section in the treatment of selected and carefully monitored cases of tetania uteri. The tocolytic therapy may be recommended only if the patient is in a good general condition without any signs of circulatory disturbances or of haemorrhagic diathesis (DIC). The attempted conservative treatment should be abandoned following any symptoms of deterioration, and caesarean section should be performed.

We wish to direct attention to this therapeutic possibility, for in the immense literature dealing with the application of beta-mimetic drugs in obstetrics we have not found any recommendation of beta-mimetic tocolysis—even among the indications of acute tocolysis in intra-partum emergencies—for the treatment of uterine tetany following abruptio placentae.

Behandlung des generalisierten Gebärmutterkrampfes mit dem Beta-Sympathikometikum Phenoterol-hydrobromid (Partusisten®)

A. PÁL, L. KINCSES und L. KOVÁCS

Durch die vorzeitige Plazentalösung wird in den meisten Fällen das Krankheitsbild der Tetania uteri herbeigeführt. In diesen Fällen ist im allgemeinen der Kaiserschnitt die Methode der Wahl. Dargestellt werden 5 ausgewählte und sorgfältig monitorierte Fälle, in denen auf Wirkung der i. v. Verabreichung eines Beta-Sympathikometikums (Phenoterol) die Muttermundkrämpfe aufhörten und rhythmische Kontraktionen zustandekamen. Diese Erfahrungen lassen darauf folgern, daß die Behandlungsmethode eine echte Alternative gegenüber dem Kaiserschnitt darstellt, vorausgesetzt, daß sich die Patientin in gutem Allgemeinzustand befindet und sich kein dringlicher chirurgischer Eingriff als erforderlich erweist.

Лечение генерализованного спазма матки бета симпатомиметиком гидробромидом фенотерола (Partusisten®)

А. ПАЛ, Л. КИНЧЕШ и Л. КОВАЧ

Преждевременное отделение последа в большинстве случаев вызывает маточную тетанию. Правильным выбором в этом положении является обычно произведение кесарева сечения. Авторы сообщают о собственных пяти случаях, тщательно отобранных и мониторируемых, в которых пациентов лечили внутривенным введением бета-симпатомиметика (фенотеролла), под влиянием которого прекращались маточные спазмы и наступали ритмические сокращения. Следовательно, этот метод лечения является настоящей альтернативой по отношению к кесареву сечению, если у больного хорошее общее состояние и нет необходимости в немедленном оперативном вмешательстве.

Two Different Methods of Prostaglandin Administration for Cervix Priming before Interruption of the First Trimester Pregnancy*

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Priming of uterine cervix with $\text{PGF}_{2\alpha}$ has been applied to 253 primigravidae before interruption of first trimester pregnancy. Of them, 140 patients were treated with intracervical $\text{PGF}_{2\alpha}$, while 113 other patients with extraamniotic $\text{PGF}_{2\alpha}$.

Spontaneous abortion or complete dilatation occurred in 65% of cases in the first group and in 68% in the second one. Side effects were observed less frequently with intracervical application but no serious complication occurred in either of the groups. Intracervical application of $\text{PGF}_{2\alpha}$ gel is recommended because of its effectiveness and low rate of side-effects.

It is widely accepted that interruption of the first pregnancy has deleterious effect on later reproduction as a consequence of muscular damage during mechanical dilatation of the cervix [7, 8, 9, 12]. Prostaglandin administration in order to ripen the cervix seems to be an appropriate treatment to avoid such damage.

Since PGs and PG derivatives have been introduced in obstetrics, several methods for their application have been developed [4, 5, 14].

As extraamniotic application may frequently result in side-effects, we have tried to find a method of administration with diminished side-effects, without reduced effectivity. Lippert and Modly were the first to publish PG administration in viscous gel [10], which type of application has been used by several investigators [1, 2, 3, 6]. In our study the effectivity and the incidence of side-effects during extraamniotic and intracervical routes of administration are compared.

Material and Methods

253 interruptions were accomplished on primigravidae with gestational age less than 12 weeks, from January 1, 1982 to July 31, 1983 at the Department of Obstetrics and Gynaecology, Pécs University Medical School, Hungary. The mean age of the patients was 20 years, ranging from 13 to 33 years.

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The patients were randomly divided into two groups. In the first group (140 cases) 5 mg $\text{PGF}_{2\alpha}$ (Enzaprost F®) dissolved in 2 ml methylcellulose gel (prepared by the Pharmacy of the University Medical School) was administered intracervically with a thin Nelaton catheter, under sterile conditions. In the second group (113 cases) 15 mg $\text{PGF}_{2\alpha}$ dissolved in 10 ml 0.9% NaCl solution was administered extraamniotically under similar conditions, regardless of the gestational age. Both groups were premedicated with 0.5 mg of atropine sulphate and 50 mg of promethazine. In those cases where spontaneous abortion did not occur in 24 hours, the dilatation grade of the cervical canal was ascertained with Hegar probe and the uterine cavity was evacuated by vacuum aspiration.

Results

The effectivity of the two methods is compared in Table I. The proportions of spontaneous abortions proved to be the same, either prostaglandin was applied intracervically (24%) or extraamniotically (24%). The mean induction period was 14 hours in the first and 12.5 hours in the second group. The uterus could be evacuated without the dilatation of the cervical canal in 58 cases

TABLE I

The frequency of spontaneous abortion and the dilatation of cervical canal after intracervical and extraamniotical administration of prostaglandin $\text{F}_{2\alpha}$

	PGF _{2α} gel intracervically			PGF _{2α} extraamniotically		
Spontaneous abortion	33	24%	65%	27	24%	68%
Complete dilatation	58	41%		50	44%	
Dilatation \geq 2 Hegar	14	10%		16	14%	
Dilatation $>$ 2 Hegar	35	25%		20	18%	
Total	140	100%		113	100%	

TABLE II

Side-effects after intracervical and extraamniotical administration of prostaglandin $\text{F}_{2\alpha}$

	PGF _{2α} gel intracervically		PGF _{2α} extraamniotically	
Nausea, vomiting	20	14%	53	47%
Painful contractions	24	19%	74	66%
Headache	3	2%	14	12%

(41%) in the first and in 50 cases (44%) in the second group. In those cases where mechanical dilatation was needed the cervical canal proved to be ripened and easily dilatable. The cervical canal was opened up to the diameter of Hegar N° 7 in 90% in the first and in 91% in the second group, respectively. The side-effects that occurred with the different methods of administration were compared in Table II.

Complications were less frequently seen with intracervical administration of the drug. No severe complications or signs of infection occurred in either group.

Discussion

The intracervical application of prostaglandin containing viscous gel is a simple and effective method for priming the cervix before interruption in primigravidae. The gel has a depot function in the cervix, prostaglandin is released slowly, therefore its blood level is lower and complications are milder and rarely observed [1, 2].

The proportions of the spontaneous abortions after prostaglandin treatment vary between 24% and 60% according to the literature [1, 11], while in the present study it proved to be 24%. If cases not requiring the dilatation of the cervical canal are also considered, the effectivity of the method proved to be essentially the same with a success rate of 65% and 68% in both categories.

Some investigators observed shock [11] or cervical complications [13] after gel administration. Neither of these complications occurred in our material.

In our opinion, this method is appropriate to interrupt the unwanted first pregnancy without cervical damage and thereby improving the outcome of subsequent pregnancies.

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Zwei verschiedene Methoden der Prostaglandinanwendung zur Muttermund-Vorbereitung vor der Schwangerschaftsunterbrechung im ersten Trimester

B. VESZPRÉMI, L. HALVAX und I. F. CSABA

Vor der Schwangerschaftsunterbrechung im ersten Trimester erhielten 253 Primigravide zwecks Vorbereitung der Cervix uteri PGF₂ Alpha. 140 der Patientinnen erhielten das Präparat intrazervikal und 113 extraamniot.

Spontanabort oder totale Muttermunderweiterung waren in der ersten Gruppe in 65% und in der zweiten in 68% der Fälle zu verzeichnen. Im Falle der intrazervikalen Anwendung waren weniger Nebenwirkungen zu beobachten, ernste Komplikationen kamen in keiner Gruppe vor. Angesichts ihrer Effektivität und der geringen Zahl der Nebenwirkungen wird die intrazervikale Applikation empfohlen.

Два разных способа применения простагландина для подготовки маточного зева перед прерыванием беременности в первом триместре

Б. ВЕСПРЕМИ, Л. ХАЛВАКС и И. Ф. ЧАБА

Авторы выполнили подготовку шейки матки, применяя простагландин F_2 алфа. Подготовку провели у 253 первобеременных, перед прерыванием беременности в первом триместре. Среди них 140 получили PGF₂ алфа. интрацервикально, 113 других — экстраамниально.

В первой группе у 65% женщин наблюдался спонтанный аборт или полное расширение маточного зева, во второй группе — у 68%. При интрацервикальном применении простагландина отмечали меньше побочных явлений, но серьезных осложнений не наблюдали ни в одной из групп. Авторы рекомендуют интрацервикальный способ, из-за его эффективности и редкости побочных явлений при его применении.

Prostaglandin Gel for Cervical Ripening before Induction of Labour*

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In cases with a low pelvic score (Bishop) before induction of labour a gel was locally applied consisting of 1 mg prostaglandin $F_{2\alpha}$ in 2 ml. The single dose was 1.5 to 2.5 mg prostaglandin $F_{2\alpha}$. In cases with insufficient effect this therapy was repeated once up to three times. This method reduced the duration of delivery. No maternal side-effects were observed in a total of 220 cases.

It is a clinical experience that a ripe or favourable uterine cervix is of great importance for a successful outcome of induced labour [1, 7].

The cervix undergoes significant biophysical and biochemical changes during late pregnancy which result in an increased cervical compliance facilitating dilatation at term [7, 11]. These changes, however, do not seem to occur in all pregnant patients. About 10% of them will reach term with unripe or unfavourable cervix [13].

In these women it is difficult to induce labour, and the outcome of induction may be hazardous, resulting in a high frequency of operative deliveries including caesarean sections [1, 6]. Different authors reported about results of induction of labour in patients at term with unripe cervix, using prostaglandin E_2 in a viscous gel applied extraamniotically [2–4, 9, 11, 13, 14].

The present study was performed with prostaglandin $F_{2\alpha}$ -gel in cases with unripe cervix and indication for induction of labour in the third trimester of pregnancy.

Material and Methods

In the last five years we have made this treatment in 220 pregnant patients in the 30th to 42th weeks. There were 143 primiparous and 77 multiparous women. In a group of 190 women the indications for induction of labour were prolonged pregnancy for more than 10 days, EPH-gestosis, suspected intrauterine growth retardation, rhesus-immunization, breech presentation and patients with problems in their obstetrical history.

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In the other 30 patients there were different problems in the 30th to 37th weeks of gestation, for example missed labour hydrocephalus, anencephalic foetus and in two cases malignant tumor of the mothers.

Patients with very low implanted placenta were excluded by ultrasound scanning from the treatment with prostaglandin-gel.

In all cases the state of the uterine cervix was estimated according to the Bishop-score [1].

The prostaglandin-gel was applied transcervically above the internal orifice by means of a feeding sound of a diameter of 3 mm. After application the sound was removed and the patients were instructed to stay in bed for two hours.

Cardiotocogram was taken for a period of 30 to 90 minutes.

The single dose was 1.5 to 2.5 mg prostaglandin $F_{2\alpha}$ of the gel consisting 1 mg prostaglandin $F_{2\alpha}$ in 2 ml. The gel was produced by the pharmacist of the Department of Medicine at Humbolt University, Berlin.

Composition of the gel:

Hydroxyethylcellulose	87.0 g
Chlorhexidine gluconate	0.2 g
Sodium acetate	5.0 g
Minprostin $F_{2\alpha}$ (5.0 mg per ml)	100.0 ml
Distilled water	ad 1000.0 ml

If there was a small effect on the cervix after 24 hours, this therapy was repeated once or three times. In most of the cases with a low dose of prostaglandin $F_{2\alpha}$ and pelvic score below 2 or 3, the treatment was repeated. The total dose of prostaglandin $F_{2\alpha}$ did not differ significantly among the treated groups (Table I).

Results and Discussion

There was no case of bleeding or of an accidental rupture of membranes after gel application. Gastrointestinal side-effects or changes of pulse rate and blood pressure were not observed. We had registered a favourable effect on the cervix with increased pelvic score in more than 85% of the cases (Table II).

During two days of observation a change of the pelvic score from 2.1 to 7.0 was observed.

The delivery time for these patients was 405 ± 91 minutes (mean \pm S.D.) The number of caesarean sections was 38 (17.3%). The indication for the caesarean section was in most cases an abnormal foetal heart rate in the late second stage. Only 7 patients had signs of cervical dystocia.

In a control group 80 patients without gel application and indication for induction of labour with a low pelvic score from 3.2 on the average, we regis-

TABLE I

The number of applications in different dosages of prostaglandin F_{2α}

Dose PGF _{1α}	No. of applications			Total dose
	1	2	3	
	%			
1.5 mg	33	19	48	3.3 mg
2.0 mg	60	24	16	3.4 mg
2.5 mg	85	8	7	3.5 mg

TABLE II

The number of applications and change of pelvic score

No. of gel applications	Cases %	Pelvic score	
		before	after
		treatment	
1	64.3	2.7	7.3
2	19.2	2.0	7.0
3 and more	16.5	0.5	6.0

tered a delivery time from 654 ± 118 minutes. The caesarean section rate was 30% (24 patients).

We observed a good effect of cervical ripening in cases with the local use of F_{2α} prostaglandin-gel.

No maternal or foetal side-effects were observed. In all cases with living foetus a control with cardiotocogram is necessary.

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Über die Anwendung von Prostaglandin-Gel zur Förderung der Muttermundreife vor der Entbindungsinduktion

H. HALLE

Schwangere mit niedriger Bishop-Punktzahl (mit unreifem Muttermund) bekamen vor der Entbindungsinduktion lokal Prostaglandin enthaltendes Gel (1 mg Prostaglandin F_2 Alpha in 2 ml Gel).

Die einmalige Prostaglandindosis betrug 1.5-2.5 mg. Im Falle eines unzureichenden Erfolgs wurde die Medikation ein- bis dreimal wiederholt. Die Methode bewirkte die Verkürzung der Entbindungsdauer. Mütterliche Nebenwirkungen meldeten sich in keinem der 220 Fälle.

Применение простагландинового геля для созревания маточного зева перед индукцией родов

Х. ХАЛЛЕ

Беременным с низким числом баллов Бишопа (незрелая шейка матки), перед началом родов, автор давал локально гель, содержащий простагландин (в 2 мл геля 1 мг простагландина F_2 альфа).

Однократная доза простагландина составляла 1,5-2,5 мг. В случае неудовлетворительного результата эту дозу повторяли еще 1-3 раза. Благодаря этому методу продолжительность родов укорачивалась. Ни в одном случае из 200 побочных действий на материнский организм не отметили.

Inhibition of Premature Labour with Indomethacin*

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Indomethacin has been tested, in addition to betasympathicomimetic therapy, in cases with an insufficient inhibition of premature labour. An oral dose of 200 mg indomethacin per day was given for two days, 150 mg for additional two days and, subsequently, 100 mg for the subsequent days. The mean duration of therapy was 8 days. No maternal or foetal side-effects were observed.

The generally used inhibitors of premature labour Buphenin and Fenoterol belong to the group of betasympathicomimetics. In cases of sufficient control, not even a combination of these drugs has a better effect because they have the same mechanism of action.

Dosage can be increased only up to a limit, since side-effects may arise in the cardiovascular system, e.g. tachycardia of the mother or decrease in her blood pressure. Different authors have reported that indomethacin and aspirin may control premature labour by inhibition of prostaglandin-biosynthesis [1–7, 9–11, 14].

Material and Methods

We have tested indomethacin only in addition to betasympathicomimetic therapy [5, 8].

If a complete control of labour could not be achieved by intravenous administration of betasympathicomimetics in a period of 5 to 8 hours, the patients received indomethacin in an oral dose of 200 mg per day, i.e. 4 single dose of 50 mg (Fig. 1).

Once labour had been controlled, we administered a daily dose of 200 mg for two days, 150 mg for further two days and subsequently 100 mg for six to ten days.

Haemoglobin, leucocytes, thrombocytes, transaminases and other liver function tests were checked twice weekly. 280 women in the 26th to 35th

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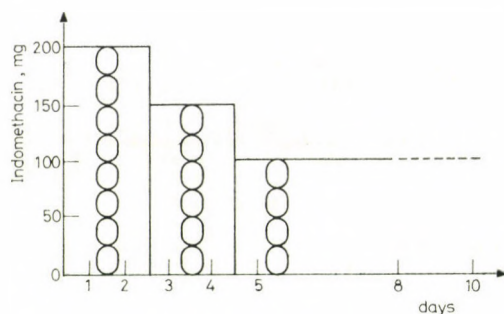


FIG. 1. Dosage of indomethacin as an additional inhibitor of premature labour

weeks of pregnancy received indomethacin. 190 patients received primary Fenoterol and 90 Buphenin.

There were 163 primiparous and 117 multiparous women. A premature rupture of membranes was observed in 26 cases. The time of treatment with indomethacin ranged between two and 20 days, on an average, eight days. The mean total dose was 1100 mg indomethacin.

Results and Discussion

An effect of inhibition of labour was registered by external tocometry 3 to 6 hours after the first administration of indomethacin (Fig. 2).

Complete inhibition was achieved 7 to 10 hours after beginning of therapy.

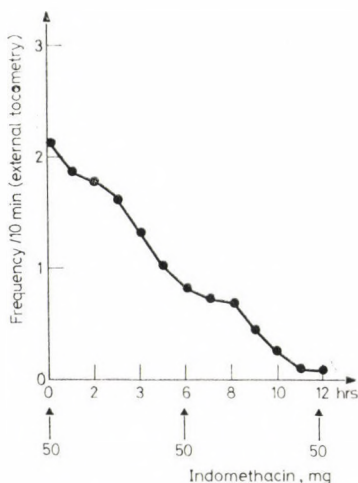


FIG. 2. The frequency of uterine contractions after administration of indomethacin

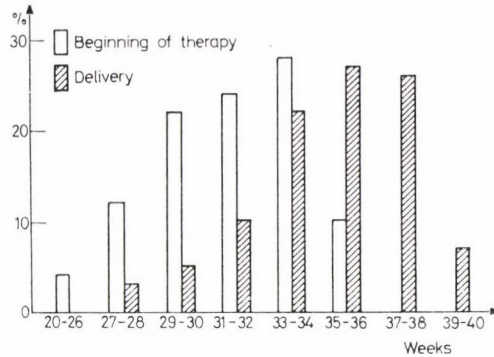


FIG. 3. Results of inhibition of premature labour with indomethacin

The average of the prolongation of pregnancy was 23 days. In cases with premature rupture of membranes only 6 or 8 days (Fig. 3).

All 303 children were live-born, in 23 cases they were twins. Of them 23 newborns died in the postnatal period, in the first seven days. Fifteen children had a pulmonary immaturity and a birth weight below 1500 g. Eight babies had signs of severe infections, five of them premature rupture of membranes.

No maternal or foetal side-effects were observed. Increased transaminases between 3000 and 5000 nmol/s/l were observed in eight women, thrombocytopenia ($< 100 \times 10^9/l$) was seen in three cases. A connection with the administration of indomethacin cannot certainly be excluded. All the other results of blood and liver function tests were normal.

Indomethacin was effective as an additional inhibitor of premature labour. We have not tested indomethacin alone for tocolysis.

In cases with premature rupture of membranes this therapy is not recommendable. No early sign of amnion infection syndrome was found [8, 12].

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Vorbeugung der Frühgeburt mit Indomethacin

H. HALLE

In Fällen, in denen sich die beta-sympathomimetische Behandlung zur Vorbeugung der Frühgeburt als unzureichend erwies, kam als ergänzende Medikation Indomethacin zur Anwendung. Dosierung: 200 mg oral verabreicht 2 Tage lang, sodann 150 mg ebenfalls 2 Tage lang und schließlich 100 mg bis zum 8. Tag. Mütterliche oder fötale Nebenwirkungen waren nicht zu verzeichnen.

Предупреждение преждевременных родов индометацином

X. ХАЛЛЕ

Автор изучал действие индометацина в качестве вспомогательного средства при бета-симпатомиметической терапии, если последней было недостаточно для предупреждения преждевременных родов. Индометацин давался в течение двух дней перорально по 200 мг, затем в течение двух дней по 150 мг и наконец ежедневно по 100 мг, в течение 8 дней.

Nasal Sarcoidosis — a Review and a Case Report

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The literature relating to the diagnostics and therapy of Boeck's sarcoidosis is reviewed. A patient with sarcoidotic alteration of the nasal mucosa is reported, and in connection with this case attention is drawn to the diagnostic importance of the otorhinolaryngological manifestations of the disease. For the treatment of sarcoidosis lasting administration of prednisolone in a single oral dose early in the morning every other day is recommended.

Sarcoidosis is a multisystemic granulomatous disorder of unknown origin, most commonly affecting women of middle age [15, 22]. The first sarcoidotic lesion of the skin was termed lupus pernio by Besnier in 1889 [3, 44]. In 1898 Hutchinson called the syndrome Mortimer's disease after a female patient [14, 44]. In 1899 Caesare Boeck discovered its multisystemic character and reported the histopathological features of the disease under the name multiple benign sarcoid [6]. In 1905 he reconsidered his opinion of the disease, postulating a close connection with tuberculosis, and changed the name to benign miliary lupoid. In 1904 cystic alterations in the bones of the hand were found by Kreilich [4, 23]. In 1920 the same phenomenon was reported by Jüngling as osteitis fibrosa multiplex cystica [4, 20]. In 1914 Schaumann emphasized the multisystemic character of the disease and named it benign lymphogranulomatosis [37]. In 1934 Pautrier proposed that the disease be named after the pioneer authors Besnier-Boeck-Schaumann [33]. The publications of Mándi drew attention to the importance and increasing incidence rate of sarcoidosis in Hungary [29].

Aetiology

The aetiology of sarcoidosis still remains to be elucidated. The disorder is characterized by widespread epithelioid cell granulomas. The granulomatous alterations cannot be considered pathognomonic symptoms, as they may equally well be secondary consequences of various infections, e.g. due to

mycobacteria, leprosy, fungi, viruses and protozoa [15]. The aetiopathogenetic role of Epstein-Barr virus in sarcoidosis was presumed by Hirsaut et al. [13], while others emphasized the importance of chemicals (beryllium, zirconium), the inhalation of pine pollen, neoplasms, immune deficiencies and inherited enzyme defects [39].

Immunology

Although the aetiology is unclear, the involvement of the immune system is beyond dispute:

1. Depression of delayed hypersensitivity is indicated by cutaneous anergy against tuberculin and dinitrochlorobenzene. When patients recover from sarcoidosis, tuberculin sensitivity is normalized.

2. The concentration of immunoglobulins (IgA, IgG, IgM) increases in the circulation [19].

3. Noncaseating granuloma formation is possible in all organ systems. Phagocytic cells aggregate into epithelioid and giant cells, which are the hallmarks of a sarcoid granuloma. Within these cells, three types of inclusion bodies may be found: Schaumann, asteroid and residual bodies. The fibrous structure of the granulomas remains intact [8, 9, 15, 35, 43].

The Symptoms

The antigenic agent enters the organism presumably in the upper respiratory tract (Fig. 1). This is indicated by the involvement of the nose, paranasal sinuses, parotid, tonsils and throat [34]. Subsequently, the pathogen can be transmitted by the blood stream to the neighbouring structures: the eyes and the central nervous system. It is distributed predominantly in the perivascular spaces of the highly vascularized regions of the brain, e.g. in the hypothalamus, the pituitary, the floor of the 3rd ventricle, and at the sites of cerebrospinal fluid secretion, the basal meninges and the brain stem [26]. Hepato- and splenomegaly may also occur. Lupoid lesion, erythema nodosum and keloids can be observed in the skin. Bone cysts develop, most frequently in the fingers, resulting in hypercalcaemia and hypercalciuria. An increased plasma 1,25-dihydroxy-vitamin D concentration has been suggested as a possible cause of hypercalcaemia in sarcoidosis. The association of hypercalcaemic sarcoidosis with hypoparathyroidism and an elevated 1,25-dihydroxy-vitamin D level has recently been reported [32]. Myocardial sarcoidosis should be considered if a patient with multisystem sarcoidosis develops heart block on ECG [10]. Ninety per cent of the patients display intrathoracic involvement. Bilateral hilar lymphadenopathy is the most frequent intrathoracic change,

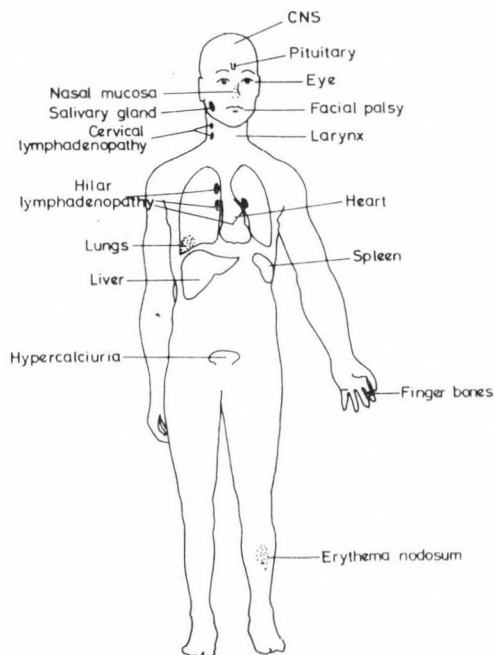


FIG. 1. Clinical manifestations of Boeck's sarcoidosis

whereas unilateral adenopathy has been reported only as a rarity. Pulmonary involvement is the most important manifestation of sarcoidosis. A classification based on the chest X-ray has been suggested [18, 22, 26, 29, 45]:

Stage I: Hilar lymphadenopathy without parenchymal changes of the lung.

Stage II: Hilar lymphadenopathy with parenchymal alterations of the lung.

Stage III: Chronic parenchymal alterations with pulmonary fibrosis.

These stages are of prognostic significance.

Diagnosis

Sarcoidosis has to be differentiated from tuberculosis, Hodgkin's disease, primary biliary cirrhosis, Crohn's regional ileitis, extrinsic allergic alveolitis, berylliosis, silicosis and mycosis of the lung. The Kveim-Siltzbach reaction is regarded as a crude, but most useful biological test in the diagnosis of the disease: a suspension of human sarcoid tissue prepared from the spleen or a

lymph node is injected intradermally, and the test is evaluated as positive if the injected antigen produced a sarcoid granuloma in three to six weeks [5, 31]. The tuberculin test is negative in 60% of the patients. Laboratory analyses may give evidence of enhanced alkaline phosphatase and angiotension-converting enzyme activities [1, 21, 25, 41, 46], hypercalcaemia and hypercalciuria. These signs normalize after steroid treatment. The IgG level is frequently elevated, while the increase of IgA and IgM occurs rarely [15, 19]. The lymphocyte transformation rate is decreased: a macrophage inhibition factor induced by Kveim suspension can be demonstrated in vitro [38, 43, 45].

Radiological investigation of the lung and mediastinum is mandatory [29, 30, 31, 34], as are combined ophthalmological, medical, dermatological, neurological and otorhinolaryngological examinations. The diagnosis is established when the clinical and radiological symptoms are supported by histological evidence of noncaseating epithelioid cell granulomas [34].

Therapy

Corticosteroid preparations are the therapy of choice in Boeck's sarcoidosis [36]. An argument could be made for prophylactic isoniazide along with corticosteroids in countries where there is considerable tuberculosis [15, 17, 18, 29, 35]. When corticosteroid therapy has proved fruitless, it is proper to consider treatment with oxyphenbutazone in acute forms of the disease, and chloroquine or potassium para-aminobenzoate in chronic pulmonary fibrosis [15]. Recently, good results have been reported in the treatment of sarcoidosis with Aldactone [42], d-penicillamine [2] and old-tuberculin [7]. The therapeutic trials with levamisole have not fulfilled the earlier expectations.

Case Report

H. L., a 35-year-old woman, presented at the Department of Otorhinolaryngology in Szeged in 1978. She had complained of nasal obstruction, anosmia and a yellowish nasal discharge for a year. She had slept with her mouth open and had awoken with a dry throat every morning. Nasal drops had been used without benefit. Her history did not contain any pathognomonic medical, ophthalmological or dermatological symptoms. The main otorhinolaryngological findings were as follows: The nasal mucosa was pale, swollen and granular with a cobblestone-like structure. The swelling of the mucosa was hardly influenced by vasoconstriction treatment. A mucous discharge was observed in the nasal cavity. Painless, nonfixed lymph nodes could be palpated on both sides in the submandibular regions and the axillary fossae.

No pathologic findings were discovered in her mouth, throat, larynx or ears. Medical examination did not reveal enlargement of the liver or spleen. The physical findings of the lungs were also normal. The ECG showed signs of right ventricular overload. The results of routine laboratory analyses were not pathognomonic: BSR 23 mm/h, leukocyte count 4.4 G/l, with moderate lymphopenia; serum Ca 2.5 mmol/l; serum cholesterol 8.89 mmol/l; serum protein concentration: 70 g/l, with IgA and IgM levels moderately elevated (2.9 and 1.6 g/l); the Hb, haemat., alkaline and acid phosphatase and liver tests gave normal values. A decreased rate of lymphocyte transformation could be demonstrated with phytohaemagglutinin. The Mantoux reaction was negative, even with a tuberculin concentration as high as $1 : 10^4$. The pulmonary fields were normally transparent in the X-ray. The upper part of the mediastinum and both hili were extended. Bilateral hilar lymphadenomegaly was detected, with a predominance on the right side (Fig. 2). The radiogram displayed normally-shaped, translucent paranasal sinuses with intact bone contours. No cysts were visible in the roentgenographs of the finger bones. The state of the nasal mucosa and the radiological picture of the chest led to a tentative clinical diagnosis of Boeck's sarcoidosis. For confirmation, a specimen was taken from the mucosa of the middle of the nasal septum for histological investigation. Only partially confluent epitheloid cell granulomas with some non-Langhans type multinuclear giant cells were surrounded by lymphocytes. Although the nuclear stain was incomplete in the middle of the granulomas, there was no definite necrosis (Fig. 3). These histological data support the diagnosis of tuberculosis just as well as that of a tuberculoid granulomatous reaction. For a more exact histological decision, a lymph node was removed from the left submandibular region and submitted to further histological anal-

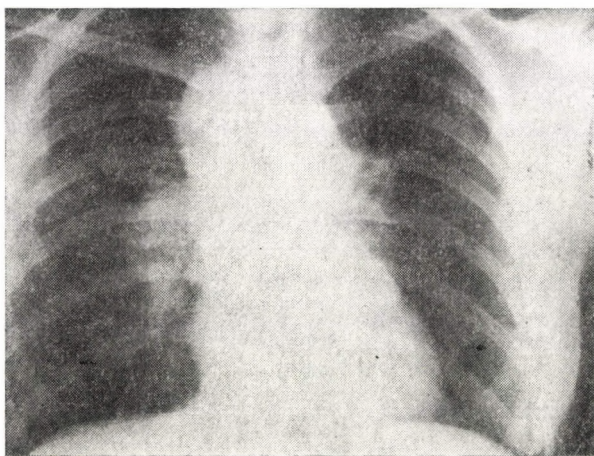


FIG. 2. X-ray of the chest before treatment

yses. The structure of the lymph node had become blurred. Lymphocytes were visible only in some places. The major part of the picture was occupied by a granulomatous epithelioid cell proliferation without any sign of necrosis (Fig. 4). When investigated with Gomori's silver staining technique, the fibrous structure of the lymph node proved intact. The fibrous network could be detected even in the epithelioid cell granulomas, and this phenomenon differentiates the condition adequately from that of tuberculosis (Fig. 5). These histological examinations confirmed the diagnosis of Boeck's sarcoidosis. A positive intradermal Kveim's test yielded further evidence. The therapy consisted of 40 mg prednisolone every other morning in one dose, supplemented with 300 mg isoniazide daily for six months, as prophylaxis against tuberculosis.

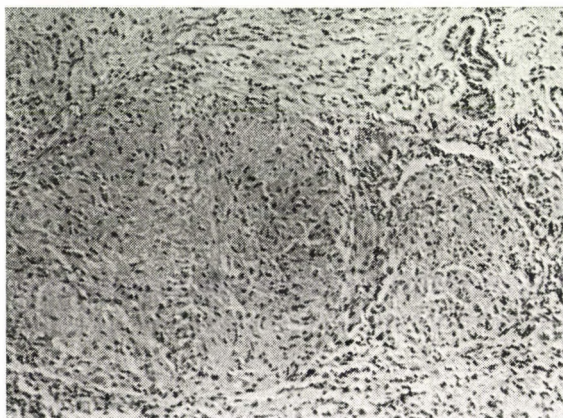


FIG. 3. Histology of the nasal mucosa (H & E $\times 500$).
Granulomatous alterations without necrosis



FIG. 4. Histology of a submandibular lymph node (H & E, $\times 300$). Typical sarcoidotic features

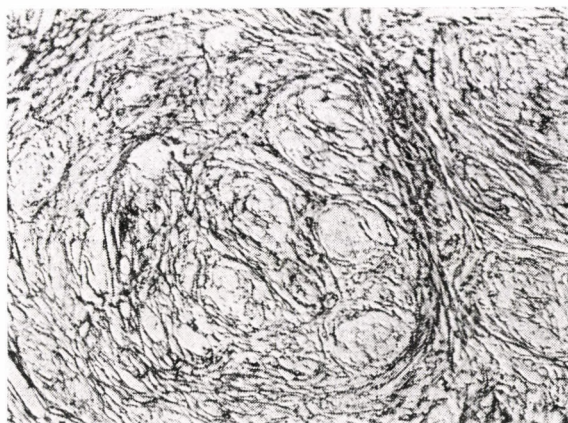


FIG. 5. The intact fibrous structure of a sarcoidotic lymph node (Gomori's silver staining technique, $\times 300$)

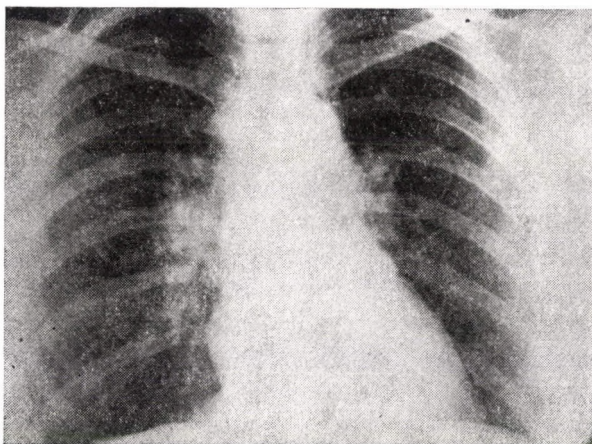


FIG. 6. Chest X-ray one year after the beginning of the therapy

The nasal obstruction disappeared in 3 months. One year after the beginning of therapy the X-ray revealed a significant improvement. Moderate lymphadenomegaly was seen only in the hiluses (Fig. 6).

Temporary withdrawal or decrease of the steroid medication resulted in relapse. The medical treatment and observation of the patient are continuing.

Discussion

The otorhinolaryngological manifestation of Boeck's sarcoidosis have scarcely been reported so far [4, 12, 16, 26, 27, 28, 34]. We have demonstrated

that the first subjective symptoms of the disease may originate from the involvement of the nose. Establishment of the diagnosis is then the responsibility of the otorhinolaryngologist, since specimens for histological examination can easily be taken. Acute sarcoidosis and its forms localized to a single organ have a high spontaneous remission rate and a good prognosis. However, untreated chronic, multisystemic sarcoidosis progresses inexorably and leads to a fatal outcome via pulmonary fibrosis and severe cor pulmonale. Although monosystemic otorhinolaryngological manifestations can conclude with spontaneous remission, and local steroid treatment has also been reported as effective [11, 26, 44], multilateral consultations are required. Resolution of multisystemic sarcoidosis can be expected only if systemic therapy is started in due time.

The treatment scheme we applied has been described in the sarcoidosis literature [18]; our experience is favourable with it. The administration of glucocorticoid every second day is justified by the fact that the immunosuppressive and anti-inflammatory effects are exerted for up to 48 hours; at the same time, the possibility of the development of iatrogenic Cushing's syndrome is lower than in the event of daily drug taking [24]. The administration of prednisolone only in the early morning does not suppress the physiological diurnal rhythm of ACTH production by the pituitary; accordingly, atrophy of the adreanal cortex should not be reckoned with, despite the chronic treatment.

Acknowledgements

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Sarkoidose der Nase — Schrifttumüberblick und Kasuistik

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und O. RIBÁRI

Nach Zusammenfassung der die diagnostischen und therapeutischen Fragen der Boeck-Sarkoidose behandelnden Literatur, werden die Krankengeschichte eines, an Nasenschleimhaut-Sarkoidose leidenden Patienten dargestellt, und damit im Zusammenhang auf die diagnostische Bedeutung der otorhino-laryngologischen Manifestationen des Krankheitsbildes hingewiesen. Zur Behandlung der Krankheit wird die Verabreichung von Prednisolon, zweitäglich in einer Dosis am Morgen, empfohlen.

Саркоидоз носа — литературный обзор и казуистика

Э. САБАДОШ, Я. КОЧИШ, М. КАРАЧОНИ, Э. НАДЬМАЙТЕНИ и О. РИБАРИ

Настоящее сообщение обобщает литературу по диагностике и терапии саркоидоза Бёка (*Boeck*). Авторы знакомят с историей болезни их больного, страдающего саркоидозными изменениями слизистой оболочки носа. Обращают внимание на диагностическое значение ЛОР-проявлений данной патологии. Для лечения этой болезни они рекомендуют хронический прием преднизолона по утрам, через день.

Abdominosacral Coloanostomy Made by Invagination

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An abdominosacral 'closed' rectum resection is reported which, at the same time, enables the preparation of a provisional anal stoma for protection of the orifice.

Surgeons have been concerned for a long time with the problem of the tumours of the rectum. The intricate anatomical structure and the fairly complex function of the rectum account for its prominent role in surgery. It is impelled by logical necessity to extirpate the tumour but, at the same time, the closing function of the anus should be preserved for the patient's sake. The reconciliation of these two factors has prompted the development of several solutions regarded to be of temporary or permanent benefit. It seems to be almost impossible to survey the relevant literature. Attempting their classification in more simple terms, four types of solutions can be considered in operating the malignant tumours of the rectum.

1. Abdominal (anterior) resection
2. Abdominoperineal extirpation of the rectum
3. Abdominosacral coloanostomies
4. Abdominosacral (pull-through) operations

The anterior resection would be an ideal solution but it is technically not easy to perform at the bottom of the sacral cavity: the deeper the resection, the more frequent are the septic complications and the tumour recurrences.

Abdominoperineal extirpation constituting the second group is performed by preparing a final preternatural anus, the rectum is eradicated and thus if we were to make progress, this procedure would have to be the most repressed of all the available alternatives.

A good comparison can be drawn between the results of the two groups by using the statistical figures of Slanetz et al [9]. Comparing the results of 277 abdominoperineal extirpations of the rectum and of 247 anterior resections, there was no significant difference in the 5-year survivals and in the recurrences. Moreover, even if minimally, it turned the scales in favour of the latter, despite

the fact that the number of patients within one group operated by these different methods in the same period was strikingly similar to that in the other. In most of the institutes the number of extirpations was two or three times higher than that of the anterior resections. This is in support of the fact that Slanetz et al. [9] solve even more deeply harboured tumours of the rectum by anterior resection and thus their data are also of particular value to surgeons of a more active approach.

If it is about a combination of conservation of the sphincter and eradication of the tumour, we can resort to the solutions belonging to groups 3 and 4. We should, however, take care to avoid possible pitfalls [1, 2, 4, 5].

Although the cist will be definitely fragmentary, the names of Finsterer (1941), Gotze (1944), d'Allaines (1956) and of Donaldson (1965) should be mentioned in the field of abdominosacral resections. After abdominal mobilization of the tumorous rectum, it is removed from a sacral incision and an anastomosis is established between the proximal colon, the rectum and the anus.

The abdominoanal techniques were introduced by Hochenegg (1888) followed by various modifications by Maunsell (1892), Weir (1901), Lockhart-Mummery (1934), Babcock (1939), Bacon (1945), Swenson (1948) and Turnbull (1960). These methods construct anastomoses, without a sacral incision, by pulling the intestines through the anal orifice and turning them inside out, or by preparing a colostomic opening in the anal orifice without constructing an anastomosis. If an anastomosis is prepared through a sacral incision, it can readily be made by exposing the lower third of the rectum and by carefully extirpating the peripheral lymph nodes.

The procedures working purely by pull-through do not make an anastomosis, they are not associated with suture insufficiency, but, by extirpating the anal mucosa, continence becomes altogether doubtful.

For the sake of radicality, attempts have to be made to create the anastomosis through a sacral incision, however, with this open orifice forming techniques, there is a risk of infection and tumorous inoculation of this sensitive region of complex structure [2, 5, 6, 8]. In the period between 1970 to 1979, several colectomies were made by the KC automatic stapler gun. A definite rise in the number of anastomosis recurrences was found despite that resection had been performed outside the prescribed safety zone, i.e. at 3 to 5 cm from the palpable edge of the tumour. In seeking the cause it was found that the smear taken preoperatively from the ampullary mucus contained numerous tumour cells. There is an essential rise in the tumour cell-count after the abdominal manipulation. The exfoliated tumour cells can be implanted into the intestinal wall when creating open anastomoses and mainly those constructed by application of an automatic stapler [6, 10, 11].

Description of Our Method

The abdominal phase of our operation is performed like in the abdominoperineal extirpation. In this way, we have the opportunity during operation, to adapt to the given circumstances and to resort either to resection or extirpation. The sigmoid colon and occasionally also the descending colon, are mobilized leaving a little longer the stretch of its mesentery, then an U-slit is made in the peritoneum of the pelvic floor and the superior rectal artery is ligated as high as possible. The internal iliac artery is, however, not ligated. A 20 ml 2% 5-fluorouracil solution is injected intraluminally into the intestine adjacent to the tumour [2, 8, 10]. The rectum is mobilized from the sacral sulcus, the middle rectal arteries are ligated and the incision is posteriorly carried beyond the tip of the coccygeal bone, and anteriorly beyond the lower edge of the prostate, while in women, beyond the midportion of the vagina. It is measured whether the mobilized proximal intestinal stump can be sutured to the skin. The sacral cavity is drained by a drainage tube introduced retroperitoneally into the abdominal wall. The peritoneum of the pelvic floor is widely opened, creating a sac to which the mobilized colon is pulled down and with gentle downward traction it is anchored at the level of the promontory. Then it is covered by the omentum and the abdominal wall is closed.

While performing an exploration through a sacral incision, the patient is fixed in the Sims' position. Incision is made through the lower third of the sacrum approaching the anal orifice at 3 to 4 cm. The subperiosteal coccygeal bone is disjoined and the levator fibres are divided in the middle. Entering the sacral cavity, one hand of the surgeon is introduced, with fingers wide apart, up to the peritoneum, letting air into the peritoneal cavity, while the rectum and the colon are slowly pulled by his other hand. No vacuum should be created, to avoid tearing of the peritoneum. The space beside the rectum being pulled forward allows a clear insight into the sacral cavity and thus the lower third of the rectum can be checked for being tumour-free or not. The intestinal segment to be resected is then marked out. Underneath the tumour 20 ml of a 2% 5-fluorouracil solution is injected into the ampulla. The intestinal clamps are placed on the resection lines, then an additional clamp is inserted between and immediately beside them. It is important that the tip of the clamps should not reach beyond the intestinal wall clamped by them, because it would impede invagination. Resection is subsequently made with a diathermic knife. The tissues of the remaining intestinal stumps grasped by the jaws of the clamps are carefully coagulated in order to destroy the tumour cells occasionally attached here. From the mesenterial surface of the proximal intestinal stump the adipose tissue is completely removed at a length of 6 cm. The muscular wall of the distal intestinal stump is dissected from its environment at a length of one-and-a-half centimetre. The stitches are placed first by

inserting the sutures into the anal stump longitudinally approaching it submucosally at about one-and-a-half centimetre from the resection line at a stretch of one centimetre. The needle is transversely introduced into the proximal stump pulled downwards, approaching the upper margin of the area deprived of adipose tissue. Then a stitch is again placed parallel to the first one into the anal wall at a distance of 4 to 5 mm. Suturing is then carried on both the right and left sides continuing with rows of sutures at 4 to 5 mm from each other. Alternately on the right and left side, first the pairs of silk ligatures being farther from us are knotted, slowly and evenly without too much traction [5, 6]. As a result of knotting, the intestinal clamps sink into the anal stump. After knotting of the two or three pairs of silk ligatures lying farther from us, the distal clamps are removed releasing the proximal stump. Prior to knotting the stitches lying near to us, the oral intestinal clamp is also removed, completing thereby the anastomosis. If we had a good estimate of the length of the

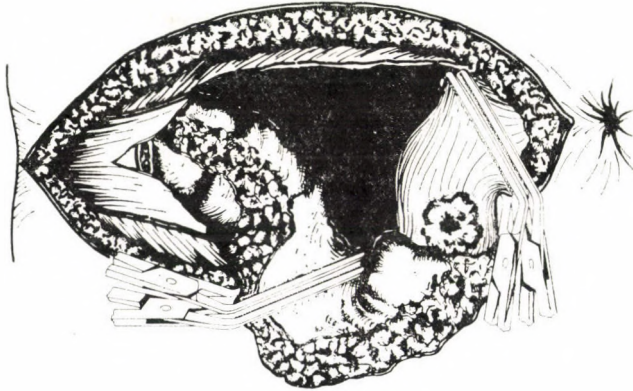


FIG. 1. Tumorous intestinal segment removed through a sacral incision before resection. The coccygeal bone has been removed

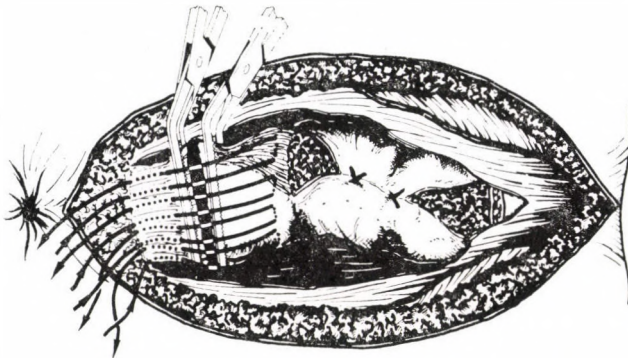


FIG. 2. After removal of the tumorous intestinal segment, placing of stitches on the right side. The mesenterial adipose tissue has previously been removed from the portion of the colic stump pulled down at a length of 6 cm below the anastomosis line marked out

intestinal segment pulled down, it will loosely occupy its place in the sacral cavity. Then the position of the drainage tube introduced into the abdominal wall is controlled and the periosteum of the coccygeal bone is sutured. The levator muscles are apposed in a way that the stitches should take a bite of the mesenterial peritoneum united by some stitches with the oral stump while avoiding the damage of the Riolan's arch. The layers should be carefully sutured because perfect reconstruction of the pelvic floor will also contribute

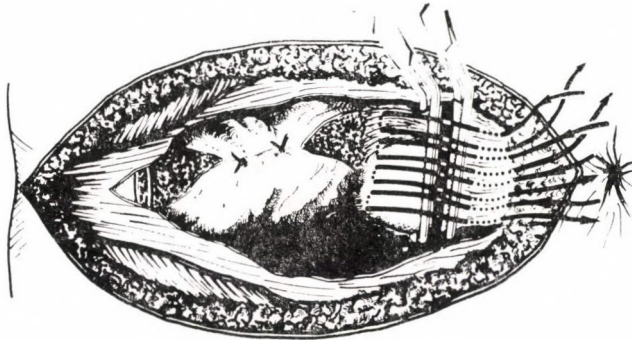


FIG. 3. Placing of the left-side sutures

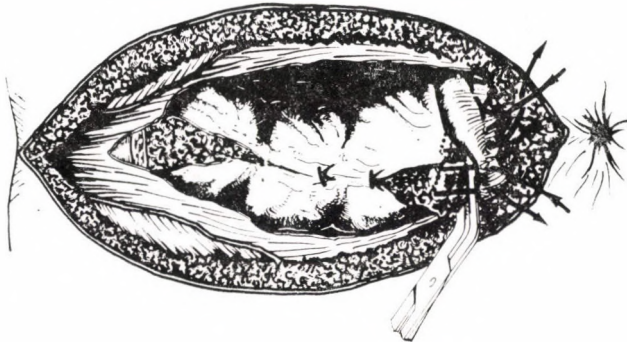


FIG. 4. Process of invagination. The aboral intestinal clamp has already been removed

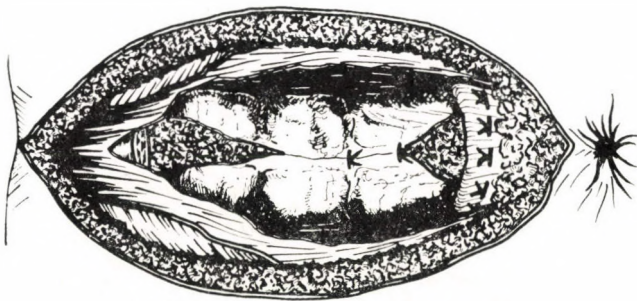


FIG. 5. The resulting anastomosis in the sacral wound

to preserving continence. Then after lavage of the anal orifice the invaginated intestinal wall going beyond the line of the anastomosis is pulled out, without being dilated, by intestinal clamps and it is sutured by 4 to 6 stitches to the skin around the anal orifice (Figs 1 to 7).

Anoscopy of the anastomosis is performed every other day. The 4 to 5 cm intestinal wall forming the anal stoma gradually shows a greyish discolouration,

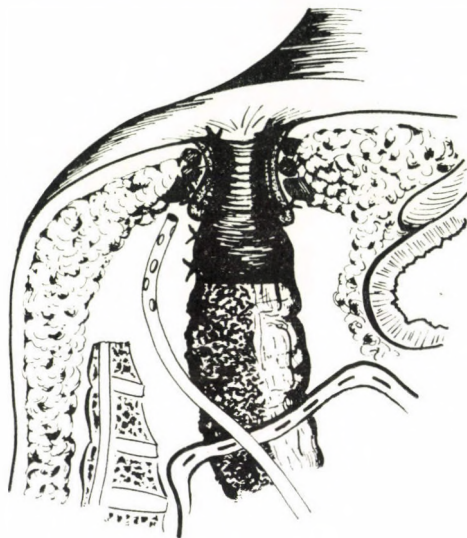


FIG. 6. Section of the coloanastomy and of the anocolonic opening. The pulled-down colic segment underneath the anastomosis is necrotized and is expelled spontaneously due to the lack of blood supply



FIG. 7. The intestinal clamp used by us grasps the affected portion of the intestinal wall only over a very narrow surface and thus electrocoagulation is easy to perform. The densely serrated jaws ensure perfect closure and fixation of the intestinal stumps

it becomes thinner and is sharply demarcated from the bright pink line of the anastomosis. Looking through the orifice the intestinal segment pulled down can be judged to be healthy or not. On days 8 to 12, the orifice becomes demarcated by about one centimetre under the suture line and the intestinal segment constituting the anal stoma is spontaneously expelled.

In pretreating the patients, a fibre-free diet for 5 or 6 days, daily 3×1 tablet of sulphomethoxydiazine started preoperatively, 3×2 tablets of metronidazole and purgation by 3 daily doses of sorbitol are administered with ample fluid consumption and fluid replacement.

From the third postoperative day onwards, loosening of stools by paraffin and from the fifth day, in addition to pulpy food, mild purgatives were given. After the first passing of stools, paraffin oil was administered for additional two weeks to enable easy defecation.

After moderate suction by the sacral drainage tube introduced onto the abdomen, the tube was removed on the 3rd or 4th day.

There was a total of 7 patients 3 women and 4 men operated by this method. Their age ranged from 55 and 74 years. All of them had easily palpable tumours of the mid-third of the rectum. In a 70-year-old men multiple liver metastases and, in a 71-year-old woman, liver metastasis were detected and in the latter case, also lung tumour was suspected. In these patients resection was performed as a palliative measure. In 5 patients the intervention was curative, distant metastases were not present. Two days after the operation of a 55-year-old patient a faeculent discharge emptied through the sacral drainage. On exposure of the sacral cavity, above 8 cm of the anastomosis, a lentil-sized, probably operative injury was found in the pulled-down segment of the colon. Therefore, we were compelled to perform a relieving transversostomy with double opening. A Foley catheter was inserted into the aboral opening of the transversal opening to ensure daily lavage of the left colon. The sacral wound healed within two weeks and within additional two weeks, the transversal opening could be eliminated. In this patient a rectum with a 9 cm long tumorous infiltration and the tumour tissue, the size of a man's fist were removed. The patient had had a history of defecation complaints and he refused an operation having been suggested 7 months earlier. In spite of this, the lymph nodes of the removed intestinal segment were tumour-free histologically and thus the initially palliative operation turned out to be curative.

No postoperative disorders in continence, tumour recurrence or stenoses were found.

In our opinion, this method combines the advantages of abdominosacral resections and of those of pull-through colon anastomosis, with virtually eliminating all its shortcomings. Donaldson found sacral septic reaction and stercoral fistula in 6 out of 22 of his patients having undergone abdominosacral operation despite the simultaneously performed transversostomy with double open-

ing. This risk seems to be precluded by making a 'closed' anastomosis by invaginating sutures not involving the lumen and by maintaining the continuity of the lumen up to the skin surface for 10 to 12 days. The duration of the intervention does not reach that of abdominosacral extirpation and the method always ensuring good exposure is a reliable technique for removing tumours of the upper and middle thirds of the rectum [1, 3, 4, 7].

According to the statistical data of Linder, 61% of rectum carcinomas are localized between the sigmoidectal junction and the anus, and five-sixths of these, in the mid and upper thirds of the rectum, that means that abdominosacral resection must be given preference over extirpations in order to ensure a more human life, i.e. one without a preternatural anus, to a growing number of patients.

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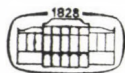
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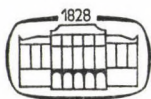
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Diagnosis and Treatment of Epidural Haematomas in Infancy and Childhood in the recent 8 years

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Age-dependent characteristics of the clinical course of traumatic epidural haematomas of the infant and child have been summarized in a survey of 34 cases. Establishing the diagnosis of epidural haematoma is not an immediate indication for surgery in the infant, because there are cases of spontaneous drainage of the haematoma from the intracranial spaces (3 cases), when after 2–3 days of observation surgery can be carried out in an improved paediatric condition (8 cases) and, as in the presented survey, there were only 9 cases when an immediate surgery had to be done.

For the children over the age of 2 years the indication for an immediate surgery was not different in nature from that for the adults.

Traumatic haematoma is known to result from the rupture of the middle meningeal artery in adults and children, while in the infant it may have a venous origin [19]. The classical picture following a traumatic head injury is as follows: loss of consciousness, often followed by a lucid interval, then intracranial hypertension (bradycardia, vomiting), anisocoria and deepening comatose state. Without surgery, this may have a lethal outcome.

Epidural haematoma cases constitute 1–5% of the head injuries in childhood [2, 4, 7, 9, 25]. In the literature there is a significant predominance of incidence in males, the rate being 4/5 to 1/5.

The clinical course of the disease is not typical in the infant as pointed out by Matson [19]. Because of the small volume of circulating blood in the infant, the loss of even a small amount of blood leads to a decompensation of the peripheral circulation instead of causing bradycardia. The arterial pulse is frequent, easily suppressible and the systemic blood pressure is falling. According to Choux et al. [4], the mind is not typically disturbed, since in 52% of 104 epidural cases there have been no signs of troubled mental functions.

In the present paper, 34 cases with epidural haematoma are described. There have been specific features in their course that made us to change our previously established attitude concerning treatment and the indication for surgery. In the majority of cases, surgery has been performed only when the condition of preshock or shock had already been successfully treated. In some cases, surgery could be avoided.

Clinical Material

Sixteen patients with epidural haematoma were treated in our ward between 1977–1980 and 18 between 1981–1984. Twenty of them were younger than two, while 14 of them were between four and twelve years of age. The youngest infant was 2 months old. All the patients suffered some kind of trauma. In our material there were 25 males and 9 females.

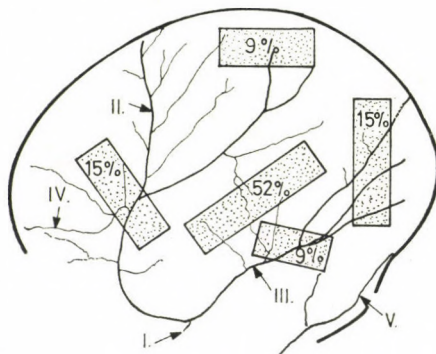


FIG. 1. The site and localization of the haematoma as related to the source of bleeding. Most of them are localized in the region of the posterior branch of the middle meningeal artery. I: Middle meningeal artery; II: Anterior branch of the middle meningeal artery; III: Posterior branch of the middle meningeal artery; IV: Anterior meningeal branch; V: Posterior meningeal branch

Computed tomography (CT) has routinely been used only in the last five years therefore, we divided the children into two groups.

The source and localization of bleeding are represented in Fig. 1. The site of haematoma and the source of bleeding are revealed at operation or by CT.

Results

The hospitals sending these patients to our ward established the diagnosis of intracranial haemorrhage on the following basis: proven or suspected trauma in the case history, subgaleal haematoma, fracture line on the cranial X-ray, development of focal neurological symptoms and deteriorating mental functions.

The most common cause of head injuries under the age of 2 years is the falling-off from an object or from the mother's lap [4, 6, 9, 19]. There were only 9 cases of traffic accident in our recent survey. Among these patients 3 were polytraumatic cases. Usually these cases were admitted to our department 4 to 12 hours following the accident. In some cases, the increasing intracranial pressure became evident only 1–2 days after hospitalization on the basis of the accompanying neurological symptoms. The status provided by the sender

TABLE I
Signs of epidural haematoma in infants

Trauma	20
Deteriorating mental conditions	18
Neurological signs	18
Subgaleal haematoma	16
Anaemia	16
Tachycardia	18
Fracture	14
Bulging fontanella	14

hospitals could be supplemented by the following: Most of the infants were in preshock, anaemic condition and a subgaleal haematoma could be observed at the site of the trauma or over the fracture of the skull (scalp reaction). Tachycardia and sometimes bradyarrhythmia was observed in the majority of cases. The presence of tense and bulging fontanella, as a sign of increased intracranial pressure could hardly be identified because of the subgaleal accumulation of excess fluid. The frequency of these findings in infants is summarized in Table I.

The frequency of the neurological symptoms of 34 infants and children at several authors are summarized in Table II.

TABLE II
Symptoms of epidural haematoma

	Brief loss of con- scious- ness	Coma	Lucid interval	Abnor- mal motor signs	Unequal pupils	Vomit- ing	Brady- cardia	Convul- sions	Dece- rebra- tion
Ingraham et al. [13] 20 cases		10/20	16/20		10/20			2/10	5/20
Campbell and Cohen [2] 20 cases		10/20		13/20	10/20			2/20	5/20
McKissock et al. [21] 27 cases	8/27	16/27							
Hawkes and Ogle [10] 10 cases		3/10	3/10	5/10	2/10	4/10	0/10	2/10	
Matson [19] 44 cases	11/44	27/44		30/44	22/44	35/44	1/44	0/44	
Goutelle et al. [8] 25 cases	10/25	12/25	20/25	5/25	12/25	15/25	5/25		3/25
Choux et al. [9] 104 cases, %	22	52	66.5	41	37	50	9	11	18
Gutierrez et al. [9] 23 cases	—	7/23	6/23	5/23	11/23	12/23		1/23	5/23
Pásztor A. et al. [24]	14/34	19/34	17/34	26/34	23/34	23/34	24/34	6/34	5/34

Diagnosis

CT and carotid angiography play the most important role in establishing the diagnosis of epidural haematoma. These examinations require an adequate hardware without which they cannot be carried out. In cases, when these instruments are lacking, the scoring of data in Tables I and II, the echo-encephalography in trained hands may be of some help. The EEG, picture of the eyes' fundus, lumbar, subdural or epidural punctures have minor importance since their negativity does not exclude the presence of disease.

When an epidural haematoma was suspected, our patients have been given a treatment according to the following guidelines:

(1) When minor subgaleal haematomas have been observed in the infant with the signs of preshock but without that of a brain compression directly being a threat to life, first the treatment of preshock was carried out rather than the carotid angiography.

(2) In those case, when the signs of markedly elevated intracranial pressure dominate the picture—in spite of prevalent shock—CT and carotid angiography have to be done under the protection of blood-transfusion, then surgery follows. In the group under the age of 2 years, we had only four cases. AG—CT revealed a large space occupying haematoma. The urgency of the operation was not questionable (Figs 2 and 3).

In three infants the clinical course of the disease took a surprisingly new turn. While the treatment described under point (1) was being undertaken and the extension of the intracranial haematoma could be verified, an improvement in intracranial compression took place. Surgery was not urgent in view

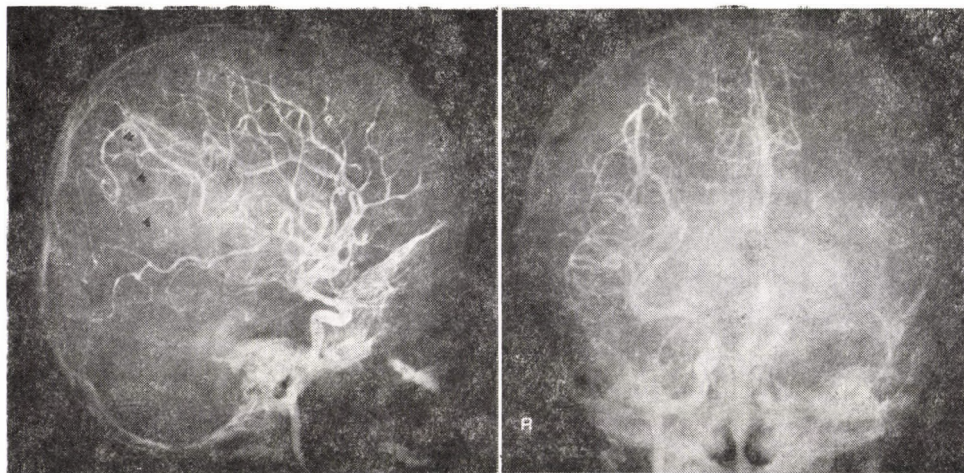


FIG. 2. Carotid angiography of a 2-year-old boy. The space-occupying haematoma is well demonstrated by angiography (R) of the right side. Arrows show the fracture. Urgent surgery followed the examination

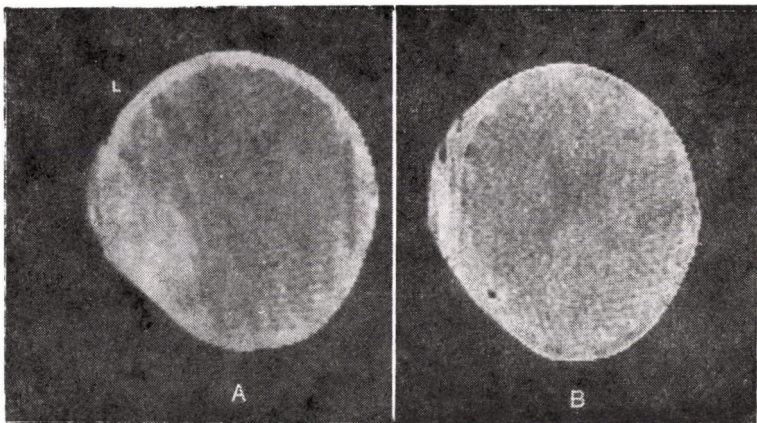


FIG. 3. CT of a 3-year-old boy. The big, left temporal haematoma is well demonstrated by CT. Urgent surgery followed the CT. A. Before surgery, B. After surgery

of the clinical picture, therefore conservative therapy was continued. In the meantime, the epidural haematoma stopped to increase and a couple of days later it was eliminated spontaneously. The clinical status of these infants showed a continuous improvement and the control CT also proved the disappearance of the haematoma from the intracranial space. Consequently, surgical solution of the disease could be avoided (Fig. 4).

In 13 other cases, the disappearance of the epidural haematoma was only partial, so that craniotomy could not be avoided. It was done only after 2-3 days in a much better paediatric status of the patients. We suppose that in these cases the source of bleeding was of venous origin.

For elder children, principles well known in the treatment, indication and timing of surgery of epidural haematomas were followed. Eight children of this age were admitted to our department 6-8 hours following the trauma.

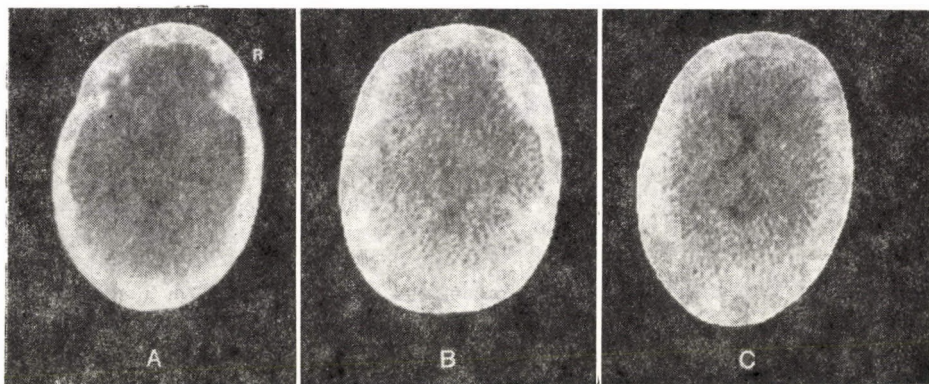


FIG. 4. CT was made in a 2-year-old girl after a car accident. (A) 3 hours after the accident, (B) 2 days later; (C) 5 days later. The course of development and elimination of the haematoma are demonstrated. It is the type of disease where operation was avoided

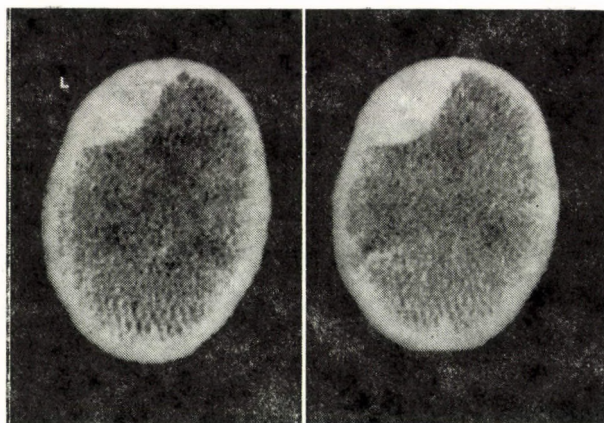


FIG. 5. The eight-year-old boy suffered a bicycle accident. He was taken to our Hospital in a decerebrated state 8 hours after the injury. We supposed an associated haematoma in the skull, there were lateralizing signs of the disease. A big left frontal haematoma was the cause of the state. The boy died after the operation

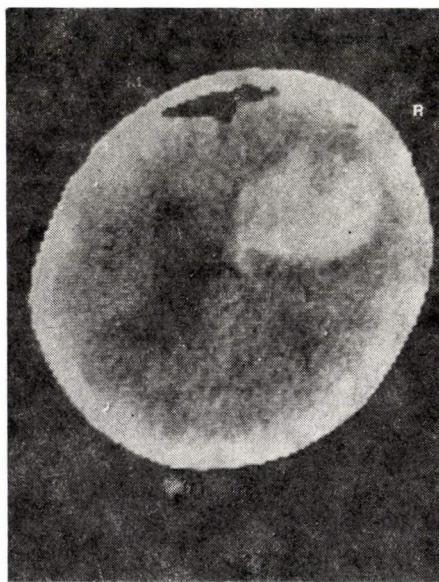


FIG. 6. Two and half-year-old boy. Right frontal intracerebral haematoma with thin left epidural haematoma. Boy died three days after the operation

Immediate CT or angiography was done in all cases. According to the results, surgery was promptly indicated (Fig. 5). Among the elder children who had suffered a serious traffic accident, three were admitted to our department with respiratory paralysis in a decerebrated state and died. They suffered multiple fractures and had associated lesions. One of them had had intracerebral haematoma and the other two intracerebral and subdural haematoma (Fig. 6).

It is well known that in such cases the mortality rate is about 80–95%. Four children were transferred only after 3 days to our institution, when the unambiguous picture of increased intracranial pressure had been developed. In these cases, immediate angiography or CT and subsequent surgery were done.

In the group of children younger than 2 years there were no lethal cases and only one did not show a complete recovery with some mental and motor defects resulting from a serious intraventricular haemorrhage and subsequent shunt operation.

Treatment

The operative removal of the haemorrhage had to be done within the shortest possible time and under circumstances with a minimal strain on the patient. Only small craniectomy or craniotomy was made depending on the localization of the haematoma. Following removal of the subgaleal and epidural haematomas, the source of the bleeding was localized and blocked. A short incision was made in the dura in order to drain any possible subdural accumulation of fluid or to examine the cortex.

Discussion

The age-dependent features characteristic of the mechanisms of the development of the disease are as follows:

(1) The skull of infants and children can withstand larger traumatic forces than the rigid bones of adults.

(2) Because of the elastic properties of the infant skull, the neurologic symptoms of the increased intracranial pressure appear later than in the adult. The duration of increased intracranial pressure and the consequent neurological symptoms depend on the vessels involved, on the elasticity of the skull, the site of the haematoma, the type of fracture and the age-dependent possibilities of compensation.

According to our experiences, more attention should be paid to the specific features of the clinical symptoms of epidural haematomas and their treatment in the infant, that are different from those of the child and the adult. Factors determining the consequences of the extradural haematoma are connected with the mobility of the supratentorial fluid. These factors are the volume of the haematoma, the rate at which it has developed, its localization, the anatomical variations and the different compensatory mechanisms. If the fracture is wider in the skull, the haematoma can be drained into the subgaleal space. The loose connective tissue within this space can give room even for 150–200 ml of blood. Losing that amount of blood from the circulating volume could produce shock in infants.

The further tasks are determined by the course of the disease. When there is a possibility of the extracranial drainage of the epidural haematoma into the subgaleal space via a wide fracture, craniotomy, can be temporarily or finally avoided. The diagnosis established during the anti-shock treatment does not mean an immediate indication for surgery. In case of any improvement in the status of the infant, it is recommended to wait with the surgery. The extracranial drainage of the haematoma can be solved by punctures or an incision, but in those cases, when the blood leaves the vessels at a higher rate than that of the intra- or extracranial compensation, it will lead to a serious compression of the brain, therefore an immediate surgery is indicated.

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Diagnose und Behandlung des epiduralen Hämatoms im Säuglings- und Kindesalter in den vergangenen 10 Jahren

A. PÁSZTOR

Im Verlauf der vergangenen 10 Jahren wurden an der Kinderabteilung unseres Instituts 34 Patienten wegen eines epiduralen Hämatoms behandelt. 20 Kinder waren im Alter unter 2 Jahren. In der Erstellung der Diagnose spielte früher die Angiographie und in den letzten 6 Jahren die Computer-Tomographie (CT) die leitende Rolle. Im Gegensatz zur allgemeinen Auffassung bedeutet die Diagnose des epiduralen Hämatoms — unseren früheren Erfahrungen gemäß — nicht unbedingt eine sofortige Operationsindikation. Bei 3 Säuglingen hat sich das Hämatom spontan resorbiert, in 8 Fällen konnte die Operation 2–3 Tage — bis sich der Zustand der Kinder etwas besserte — verzögert werden, in 9 Fällen erwies sich indessen der unverzügliche chirurgische Eingriff als erforderlich. Bei 2 Jahre älteren Kindern bedeutete die Diagnose des epiduralen Hämatoms gleichzeitig die sofortige Indizierung der Operation.

Zur konservativen Behandlung des epiduralen Hämatoms sind strenge neurologische Kontrolle und CT-Hintergrund vonnöten.

Диагноз и лечение эпидуральной гематомы в грудном и детском возрасте за последние 10 лет

А. ПАСТОР

За истекшие 10 лет мы лечили 34 больных с эпидуральной гематомой в детском отделении Государственного института нейрохирургии. 20 детей были младше двухлетнего возраста. В установлении диагноза прежде решающую роль играла ангиография, в последние 6 лет ведущая роль принадлежит компьютерной томографии (СТ). В противоположность обычному представлению — в соответствии с нашим предыдущим опытом — диагноз эпидуральной гематомы не во всех случаях означает показывание к срочной операции. У трех грудных детей гематома рассосалась спонтанно, в 8 случаях можно было подождать с операцией два-три дня — пока состояние детей не улучшилось. В 9 случаях пришлось срочно произвести операцию. У детей старше двух лет диагноз эпидуральной гематомы в то же время означал показание к срочной операции.

Для консервативной терапии эпидуральной гематомы необходимы строгий неврологический контроль и данные компьютерной томографии.

Proximal, Selective Vagotomy for the Management of the Complications (Bleeding, Perforation, Stenosis) of Duodenal Ulcer

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Analysing the 5-year material including 164 cases (35 haemorrhages, 50 perforations and 79 stenoses), the authors express their preference for extensive proximal selective vagotomy—in some cases—over traditional operations in treating the complications of duodenal ulcer. Operative mortality was 0.6%, while the frequency of recurrences 5.4%. Excellent or good results were observed in 92.3% of the controlled patients.

In the last decades, there has been a worldwide increase in the number of ulcer patients. This statement is particularly valid for the inhabitants of the economically developed countries, although with the spread of civilization, and with urbanization more and more ulcerous patients emerge from the rural population. Despite the use of a great variety of drugs and diets, recurrences are fairly frequent which may lead to a decrease of the patient's working capacity as well as to the development of some high-risk complications (haemorrhage, perforation, stenosis). Complications associated with ulcer can be expected in 10 to 12% [10, 25, 26], the mortality of which is fairly high, i.e. 20 to 30% [18, 23].

Currently, proximal selective vagotomy (PSV) is being more extensively used in the surgical treatment of duodenal ulcer. The well-founded physiological basis, the benignity and the excellent functional results of the operation are well known [8, 11, 13]. Therefore, this operation is being preferred as an elective one by surgeons experienced in duodenal surgery.

There is still, however, no sufficient experience on PSV applied in the treatment of the complications of duodenal ulcer (i.e. haemorrhage, perforation, stenosis), and there is a number of contradictory opinions on this topic [3, 4, 13, 14, 22]. The majority of surgeons perform traditional operation, resection and truncal vagotomy, respectively, supplemented by some intervention on the ulcer. The known advantages of PSV (i.e. minimal mortality, infrequency of postoperative complications, outstanding functional results) have still not been proved in the management of complications, although about 50% of ulcer operations are performed due to some complications [15].

Haemorrhage: Bleedings from gastroduodenal ulcers amount to 80 to 85% of the haemorrhages in the gastrointestinal tract [19]. Complications associated with ulcer may appear in 10 to 20% [10, 27]. The mortality of acute, massive bleeding due to ulcer is still high at present, despite the intensive therapy, anaesthesiology and the development of surgical procedures. The exsanguinated patients tolerate the operation badly, shock during operation is more liable to occur even if the lost blood is replaced quantitatively. Post-operative complications, too, are more frequent [14].

Surgical procedures: Two definitive surgical solutions are known: resection vagotomy. Local excision of the ulcer, ligation of the bleeding vessel, i.e. the so-called minimal operations have not been extensively performed, partly because of their high mortality rate (40–50%) and partly because of the frequently (30%) recurring bleeding due to the subsisting underlying disease [9]. They are justified only in patients with a severe condition.

1. A good surgical solution in treating bleeding duodenal ulcers is the two-thirds-to-three-fourths gastric resection. Presently, even with the increasing popularity of vagotomy, the majority of surgeons gives preference to this operation. Undoubtedly, resection means a radical solution both in arresting haemorrhage as well as in treating the ulcer. However, the mortality rate of resections performed during haemorrhage is very high. Data of some authors in comparison to the mortality rates of vagotomies are shown in Table I.

TABLE I

Comparison of the mortality rates of resections and vagotomies performed in haemorrhage due to ulcer (for references see Bátorfi J. [1])

Authors	Year	Mortality, %	
		Resection	Vagotomy
Boles	1957	1.6	22
Kelly	1965		12
Foster	1965–1966	32	12
Dorton	1967		0
Giesendorfer	1968	23.5	
Nielsen and Amdrup	1969	23	
Williams	1969	25	9
Bauer	1972		4.7
Cocks	1972	17	
Cox	1973	15	
Johnston et al.	1973		0 (PSV)
Hedenstedt	1975		5 (PSV)
Holle	1976		3.9 (PSV)
Stone	1978	20–30	10
Bromfield	1979	44	12
Cuilleret	1979		0 (PSV)
Pancürev	1979		10
Kuzin	1981	10–25	5–7
E. Szabó	1982	22.5	3.5
Total		22.4	7

2. The first successful vagotomy in bleeding due to duodenal ulcer was performed by Weinberg in 1952 by ligating the bleeding vessel and by performing pyloroplasty. Pancürev and Grinberg [20] consider the tasks of performing an operation during haemorrhage to be twofold: (i) Arresting of bleeding, and overcoming of life-danger; (ii) Solution of the ulcer. According to our opinion, these two requirements are best fulfilled by the excision or ligation of the bleeding ulcer combined with vagotomy and pyloroplasty.

Proximal selective vagotomy was first performed by Johnston et al. [13] for treating bleedings due to ulcer. There were no deaths and secondary haemorrhages in their material evaluating 10 cases. Favourable results were also reported by Hedenstedt [8], who believed that the mortality rate of bleeding cases can be considerably reduced by PVS. Based on their own clinical results, Holle [11] and Cuilleret et al. [2] have found PSV to be effective in haemorrhage.

Perforation: One of the most frequent and most severe complications of peptic ulcer is free, intraabdominal perforation which absolutely calls for operation. According to statistical data of a large population, duodenal ulcer perforates in 15 to 17% [5, 26]. The following procedures for surgical treatment are applied:

1. The most often used operation is simple suturing of the perforated opening. This operation is short and technically simple to perform and is directed to saving the patient's life. Kuzin et al. [16] have defined it to be a palliative operation, since it does not influence the pathogenesis of the development of ulcers. That is why, in a great number of patients treated by a simple suturing, ulcer recurrence will follow as shown in the literature to be 30 to 35% [4, 23, 24].

2. For preventing ulcer recurrence after suturing, primary resection was suggested by Haberer [7]. The mortality rate of the operation ranges between 0.7 and 23%. This mortality rate, being more favourable than that of suturing, can be ascribed to the fact that the definitive operation is performed in selected patients in a less serious condition, while suturing also in patients in a critical state. This, operative mortality is higher even in spite of the smaller surgical intervention [23].

3. The various forms of vagotomy are increasingly used for surgically treating perforated ulcers. Its advantage is that it is more than suturing, because it attempts to give a definitive solution with a lower mortality rate than that of resection [12].

The spreading of PSV has imposed the task of proving the effectiveness and known advantages of this operation in the management of perforated ulcers. In this complication this operation was first performed by Johnston et al. [13] in 1973. The highest number of cases was reported by Nacciero

et al. [17]. Based on the analysis of almost 100 operations, they considered PSV combined with suturing to be the operation of choice in perforation.

Stenosis: Pancürev and Grinberg [20] ascribe stenosis developing as a complication of ulcers in a greater part (90%) to the scarring of duodenal, while in a smaller part (10%), to that of pyloric ulcer. Based on the autopsy data of Samsonov [25], this ulcerous complication was found to be 10.7%.

Classification of stenoses: This is always a bit arbitrary, since there are transitional types as well. This may partly account for the overlaps in the classifications in the literature [21, 27]. Clinically, the following basic types can be distinguished:

1. *Functional stenosis.* Passage disorders are due to the inflammatory tissue accumulation around the ulcer and to oedema and, eventually, to spasms associated with the acute stage. In such cases, anti-ulcer conservative therapy may be effective. Functional stenosis in itself is a surgical indication.

2. *Organic stenosis.* It is consequential to the scarring associated with the healing of the ulcer. Depending on the degree of impairment of gastric emptying, it has the following grades: compensated, subcompensated, decompensated and complete stenosis.

Surgical solution: In order to employ the adequate surgical strategy, the degree of severity of the stenosis and of the impairment of the gastric muscles should be assessed. The majority of surgeons finds organ-preserving vagotomy justified to perform if the contractility of the gastric musculature has not been irreversibly damaged. It is only in this case that normalization of the functioning of the gastric muscles and of the reservoir and dosing functions of the stomach can be expected. In irreversible impairment of the motorium, gastric resection is advisable applying the optimal solution of antrectomy combined with truncal vagotomy and Billroth I resection [15, 20].

Five years ago the study of the usability and preference of SV in complicated cases was set as an aim at the Department of Surgery of the Semmelweis University Medical School. Confirming the experiences of other authors, we wished to prove that PSV was a suitable procedure being better than the traditional operations for the surgical management of bleeding due to duodenal ulcer, perforation and stenosis.

Material and Method

Between 1 January, 1980 and 1 January 1985 (5 years), a total of 402 PSVs were performed in treating selected cases of complication-free (i.e. free of haemorrhage, perforation and stenosis) duodenal and gastric ulcers. Distribution of the 402 PSVs according to indications and types of operation is shown in Table II.

TABLE I

*Distribution of 402 PSVs according to indications and types of operation
(January 1, 1980 to January 1, 1985)*

Indication		No. of cases	Type of operation	
			PSV	PSV + drainage
Ineffectiveness of treatment <i>n</i> = 238	Chronic duodenal ulcer	220	220	—
	Gastric ulcer	18	18 excised ulcers	—
Complication of duodenal ulcer	Haemorrhage	35	2 (1 longitudinal duodenotomy)	33 (H-M pyloro- plasties 20 excisions, 13 ligations)
	Perforations	50	19 (sutures)	31 (H-M pyloro- plasties with exci- sion)
	Stenosis compensated	29	—	79 (71 Finney, 7 H-M pyloroplasties 1 GEA)
	Stenosis subcompensated <i>n</i> = 79	50	—	
Total		402	259	143

Of the 164 complicated duodenal ulcers (35 haemorrhages + 50 perforations + 79 stenoses = 40.8% of the whole material) 132 patients (80.5% were males. The majority of them were of working age (average age: 46.2 years). The patients had had a history of chronic ulcer with relapses in spring and autumn, and a part of them (18%) of haemorrhages healing and stopping on conservative treatment. The history of ulcer was longer than 5 years in 92 patients (56). Medical and sanatorium care for several times (3 to 15 occasions) proved to be ineffective in 68 patients (41.5%). Of them 21 (12.8%) had previously been sutured due to perforation. Associated diseases increasing the surgical risk were found in 26 patients (15.8%).

Surgical Indications

1. In haemorrhage, ineffective conservative therapy and restarting of bleeding were regarded as surgical indications. In our practice the acceptable time of conservative treatment is 24 to 28 hours. If during this period repeat endoscopy, clinical and laboratory tests are suggestive of a continuous bleeding, surgery is indicated. Operation is also favoured if the arrested bleeding restarted. At an advanced age, operation is earlier indicated, since bleeding from sclerotic vessels is less liable to weaken.

2. In perforation, diffuse peritonitis as well as the age over 60 were considered to be counterindications. According to our experiences, the time elapsing from perforation to operation is not closely correlated with the ex-

tension of peritonitis. In view of the favourable results, recently, the patient's biological condition has been considered to be more important than his age and operations are performed even over the age of 60 if the patient is in a good general condition.

3. In stenosis, the operations were indicated because of compensated and subcompensated (Stages I and II) stenoses. In more progressive stenoses (Stages III and IV) truncal vagotomy combined with antrectomy (hemigastrectomy) is the solution of choice.

Surgical technique: All operations were performed by using the so-called extensive technique elaborated by Kuzin et al. [15]. After laparotomy, the diagnosis was checked for accuracy, and the obligatory revision of the intra-abdominal organs was made. What had to be done next was determined by the type of complication. In haemorrhage, the mucosa of the stomach and the duodenum were examined through a gastroduodenotomic opening. The bleeding ulcers of the anterior wall were excised and the ones in the posterior wall ligated, then Heinecke-Mikulicz pyloroplasty was performed. In perforation the opening could be closed in two ways: In 31 cases, a laurel-leaf excision of the ulcers was made and the defect was closed by the Heinecke-Mikulicz pyloroplasty. This method is used in cases when, around the opening of the perforation an extensive scarring or inflammatory infiltration appear, and the possibility of stenosis may arise. In 19 patients the opening due to perforation was simply sutured. In haemorrhage and perforation, vagotomy was always made after the local management of the complication. In perforation, the operated region was drained. In ulcerous stenosis, drainage ensuring the emptying of the stomach was performed after vagotomy. The need for drainage was determined on the basis of preoperative radiological and endoscopic findings, but it was finally decided in view of the operative situation. The patency or stenosis of the pyloroduodenal canal was examined by palpation and by using the thick (diameter: 15 mm) Boas probe: if in the ulcerous region the lumen was impassable for the Boas probe, the fact of stenosis was regarded to be proved. In doubtful cases, the size of the lumen was directly controlled through a small antromic opening. As drainage operations, Finney's pyloroplasty was made in the majority of cases (90%). According to our experiences, this type of drainage ensures the best emptying of the stomach and it can be performed even in extensive scarring without the risk of re-stenosing.

Intraoperative pH recording: Intraoperative recording of pH was first made in Hungary at our Department. It helps control the completeness of vagotomy and the necessary corrections can promptly be made. Initially, the pH recorder made by the Swiss Treier Co. was used, but due to difficulties in acquiring electrodes as well as to using the equipment exclusively with the reference electrode, it has been found unfit for use in our practice. A new measuring instrument with fitting glass electrodes was then made

by experts of the Hungarian Radelkis Co. This measuring instrument adheres to the international safety regulations, and the acid relations of the mucosa can, immediately, be read off the scale of the instrument without a latency time. The glass electrode of the equipment is of the combined type and, when used, no reference electrodes are required. Therefore, the examination is simpler with a limited source of error. The electrode is not vulnerable and it can be easily passed through the thick Boas probe with its semi-hard wire. The electrode can be sterilized in ethylene dioxide and is highly durable. On intraoperative measuring of pH for stimulating maximum gastric secretion, Penta-gastrin injection is administered subcutaneously (0.006 mg/kg). The drug is injected 20 minutes prior to measuring pH to make the time of pH recording coincide with the peak of stimulation. Vagotomy is considered to be complete if in the acid-producing regions of the stomach (corpus-fundus), no pH value under 5 is recorded. In the opposite case, vagus fibres having not been sectioned, remained, the exploration and transection of which are, by all means indicated (in our material in 7%).

Operative mortality, complications: The mortality rate of the 164 operations performed due to complications was altogether 0.6% (1 case), which does not, practically, differ from the 0.8% mortality rate (2 cases) of the 238 PSVs performed in complication-free ulcers. One death in the complicated group occurred after an operation performed in bleeding: the patient had to be re-operated in the first 24 hours due to intraabdominal haemorrhage, then fatal cardiorespiratory failure developed. Restarting bleeding due to ulcer did not occur. In the group of perforations and stenoses no death occurred. Of 164 patients only 30 showed some complications associated with the operation (Table III). These complications occurred during the operation and in the

TABLE III

Intraoperative and early postoperative complications of PSV in haemorrhage, perforation and stenosis

Complications		Haemorrhage <i>n</i> = 35		Perforation <i>n</i> = 50		Stenosis <i>n</i> = 79		Total <i>n</i> = 164	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Intra-operative	Splenic injury	1	2.9	0	0	2	2.5	3	1.8
	Gastric perforation	0	0	0	0	0	0	0	0
	Oesophageal perforation	1	2.9	0	0	0	0	1	1.6
Post-operative	Intraabdominal haemorrhage	1*	2.9	0	0	0	0	1*	0.6
	Circulatory disorder in the lesser curvature	2	5.7	0	0	4	5	6	3.7
	Dysphagia	2	5.7	5	10	9	11.4	16	9.8
	Bronchopneumonia	2	5.7	3	6	7	8.9	12	7.3
	Wound supuration	1	2.9	2	4	2	2.5	5	3.3

* death

early postoperative period. Some special complications associated with PSV have to be pointed out as, e.g. the splenic injury requiring splenectomy amounting to, generally 1% of vagotomies, intraoperative perforation of the lesser curvature of the stomach or the oesophagus, and dysphagia. The (1.8%) splenic injuries of our own material exceeding the average in the literature occurred in the initial period when we had not have sufficiently technical experience in PSV. A special complication of the lesser curvature is the ischaemic necrosis. This can be a superficial event restricted only to the mucosa, but can invade more deeply the muscular layer, too, and can cause a necrosis penetrating through the gastric wall causing perforation. Of the six such complications in our material (3.7%) one appeared as a gastric fistula responding by healing to conservative treatment. In the other 5 cases, only a routinely performed postoperative endoscopic examination revealed the subclinical and spontaneously healing superficial mucosal necrosis. One case of gastric and one case of oesophageal perforation was detected intraoperatively, the injuries were sutured. Both patients recovered after a complication-free postoperative period. Dysphagia (9.8%) is a transitional phenomenon due to perioesophageal dissection and denervation. It healed spontaneously in each case during 2 to 4 weeks.

The intra- and postoperative complications of PSVs performed in haemorrhage, perforation and stenosis as well as the mortality do hardly differ in the elective operations: in 238 selected operations 41 complications occurred in a total of 32 patients (13.4%).

Clinical results of patients operated on for complications of duodenal ulcer (1 to 4 years). The tasks of operations made in complicated duodenal ulcers are twofold: prevention of complications and definitive curing of the duodenal

TABLE IV
Long-term results after PSV

Visick	Haemorrhage operated 35 controlled 30 (85.7%)			Perforation operated 50 controlled 41 (82%)		
	1-2 yrs	3-4 yrs	total	1-2 yrs	3-4 yrs	total
I	7	16	27 (90%)	17	18	41 (100%)
II	2	2		4	2	
III	—	1	1	—	—	—
IV	2 (recurr.)	—	2 (recurr.)	—	—	—

ulcer. For evaluating the long-term results of the operation, Visick's classification is the most widely used.

To follow up the PSV results, the patients were summoned back for control. On the basis of clinical examinations (endoscopy, stomach X-rays) the operated patients were grounded according to Visick's method (Table IV). Following PSVs performed for complications of duodenal ulcer, outstanding and good results were observed in 92.3% of the controlled patients, while satisfactory and bad results, respectively, were found in 2.3 and 5.4%, respectively of the controlled patients. These results hardly differ from the results of those obtained in the treatment of complication-free duodenal ulcers, where 94.1% of the controlled patients were included in Visick's groups I and II. The best results were achieved in treating perforations. All operated patients belong to groups I and II according to Visick's classification. In haemorrhage, and stenosis, outstanding and good results, respectively were observed in 90 and 88.1%, respectively, of the controlled patients. Of the 7 recurrences (2 in haemorrhage and 5 among those operated for stenosis), 4 were due to incomplete vagotomy and 3 due to defective pyloroplasty.

Summarizing our 5-year experiences based on the 164 complicated duodenal ulcer operations, it can be stated that PSV is an effective operation incurring small risk, yielding good functional results, and being characterized by low mortality rates (0.6%) and infrequent recurrences (5.4%).

Conclusions. Based on the analysis of the 5-year material of the Department including 164 cases (35 haemorrhages, 50 perforations and 79 stenoses), it has been proved that the extensive PSV is a suitable method, yielding better results as compared to traditional ones, in treating the complications of duodenal ulcer.

(1 to 4 years) in uncomplicated cases

Stenosis operated 79 controlled 59 (74.7%)			Total operated 164 controlled 130 (79.3%)		
1—2 yrs	3—4 yrs	total	1—2 yrs	3—4 yrs	total
18	27	52 (88.1%)	32	61	120 (92.3%)
2	5		8	9	
2	—	2	2	1	3 (2.3%)
5 (recurr.)	—	5 (recurr.)	7 (recurr.)	—	7 (recurr.) (5.4%)

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Proximale selektive Vagotomie bei der Versorgung der Komplikationen des Duodenalgeschwürs

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Anhand der Analyse des 5jährigen, 164 Fälle (35 Blutungen, 50 Perforationen und 79 Stenosen) umfassenden Materials des Lehrstuhls wird darauf hingewiesen, daß sich die ausgebreitete selektive Vagotomie — in gewissen Fällen — zur Behandlung der Komplikationen des Duodenalgeschwürs eignet und sich sogar als ein vorteilhafterer Eingriff als die herkömmlichen Operationen erweist. Die Operationsmortalität betrug 0,6% und die Häufigkeit der Rezidive 5,4%. Bei 92,3% der kontrollierten Patienten ließen sich ausgezeichnete oder gute Ergebnisse registrieren.

Проксимальная селективная ваготомия при лечении осложнений (кровотечение, перфорация, стеноз) язвы 12-перстной кишки

М. ИХАС, Й. БАТОРФИ и А. БАЛИНТ

На основании анализа 5-летнего материала Кафедры хирургии Будапештского медицинского университета, включающего в себя 164 случая (35 кровотечений, 50 перфораций, 79 стенозов), авторы приходят к выводу, что — в некоторых случаях — расширенная проксимальная селективная ваготомия пригодна и является более хорошим вмешательством, чем традиционные операции, для лечения осложнений дуоденальной язвы. Операционная смертность составляет 0,6%, частота рецидивов 3,4%. У 92,3% проконтролированных больных наблюдали отличные или хорошие результаты.

Experiences on the Local Adriamycin Treatment of Bladder Tumours

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Following repeated resections, local cytostatics have recently been increasingly applied for preventing the recurrence of superficial bladder tumours. Fifty-five patients at stages Tis, Ta, T1 were treated intravesically by adriamycin for 16 to 24 months. After the treatment period, the total number of tumour recurrences decreased by more than half. In 18 cases there were no tumour recurrences. The administered cytostatics did not produce any systemic side-effects.

Chemocystitis and haematuria were the most frequently associated side-effects. Based on favourable experiences, local adriamycin treatment is looked upon as an effective prevention of recurrences.

A basic condition for effectively treating bladder tumours is the early detection of the tumours, possibly in the preinvasive stage, their radical removal and the greatest possible decrease of the number of recurrences.

For making the adequate choice of treatment, for comparing the different treatment groups and for accurately following up the course of the tumour, beside identifying the cell-type of the tumour, its 'staging', i.e. its extension, and its 'grading', i.e. the degree of its malignancy, should be accurately defined. In Europe, for describing bladder tumours, the TNM classification [22] and the definition of the degree of malignancy according to WHO are mostly used.

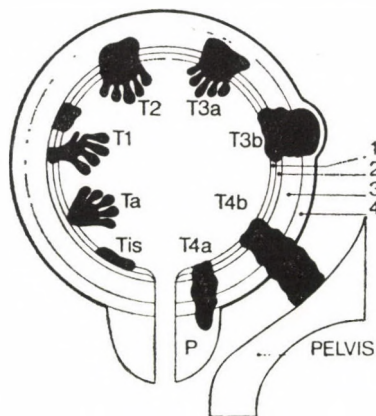


FIG. 1. TNM classification of bladder tumours

The depth of infiltration is indicated according to the TNM classification issued by UICC the last time in 1978 (Fig. 1). Superficial tumours cover Tis, Ta and T1 changes. Artificial separation of deep and superficial bladder tumours was originally made as a result of differing prognostic perspectives. The various tumours can be of different degree of malignancy. The exophytic tumours with a degree of malignancy of 0 are called papillomas and are usually designated by TaG0. The degree of malignancy of the cells, the measure of their undifferentiated character are designated by GI, GII and GIII where GIII stands for the most malignant change.

The currently generally accepted initial treatment of superficial bladder tumours is transurethral resection [2, 14]. Even following an early detection and a resection considered to be complete, a recurrence ratio of 50 to 70% can be reckoned with [8, 9, 20, 25]. For preventing recurrence, for prolonging the tumour-free period as long as possible, several procedures were tried by the authors. Such were specific and non-specific immunotherapy [15, 21], radiotherapy [1], hydrostatic pressure on the bladder wall [4], the use of hyperthermia, administration of vitamins stimulating mucosal regeneration [3], combined parenteral administration of cytostatics [23] and the application of intervesical cytostatics [8, 13, 21].

The latter is the recently most widely used procedure aimed at preventing recurrences. Table I summarizes the recently most often used chemotherapeutic drugs.

The requirements to be fulfilled by the cytostatics used by us for intravesical treatment are as follows [11]: The drug should be effective, it should easily penetrate the urothelium, it should only be absorbed, to a small extent,

TABLE I

*Drugs used for intravesical chemotherapy**1. Alkylating drugs*

Thiotepa, Mechlorethamine, Tremimon,
Cyclophosphamide, Mannitolmyleran,
Epodyl, Peptichemio

2. Antibiotics

Adriamycin, Mytomycin C, Daunorubicin,
Actinomycin D, Bleomycin

3. Antimetabolites

Methotrexate, 5-Fluorouracil

4. Antimitotics

Podophyllin, SPI (Mitopodozid),
VM-26 (Teniposid)

5. Others

Cis-Platinum (DDP)

through the bladder wall. It should have hardly any, or no, local side-effects, it should not produce a systemic toxic effect, it should be suitable for out-patient treatment, it should not be carcinogenic and the costs of treatment should be acceptable.

The possibility of an effective treatment by the cytostatic adriamycin was pointed out one decade ago by Pavona—Macaluso [17]. It has become extensively used in the recent years.

Currently, there is still no uniformly accepted way of use and dosage of the local adriamycin treatment of superficial bladder tumours. Those favouring early instillation, attempt to achieve destruction of the tumour cells released after resection and prevention of their implantation. Chemoprophylaxis follows directly after operation, but at least within 24 hours. Those applying prolonged local cytostatic treatment, consider the appearance of bladder tumour to be a multifocal urothelial disease and expect the regular topical treatment to help preventing the carcinogenic effect transmitted by the urine. Here, treatment starts one to 3 weeks after resection at monthly intervals lasting for at least one year. According to Swedish authors [5], for avoiding the risk of appearance of atypical cells, treatment should be stopped not earlier than 3 years. The amount of cytostatic administered at a time changes between 30 to 80 mg. Eksborg et al. [7] believe that treatment is much more effective and the results can be better compared if the patients do not receive the same amount of drug, but in view of their bladder capacities, identical concentrations are attempted at. The cytostatic is, generally retained in the bladder for one hour.

The local administration of adriamycin has therapeutic and prophylactic indications. A therapeutic effect can be hoped for in case of Tis [5, 13]. It is prophylactic if used following the resection of superficial bladder tumours [5, 16, 17, 19].

Material and Method

Adriamycin, doxorubicin hydrochloride or, by its trade name Adria-blastina, is a widely used antitumour antibiotic produced by *Streptomyces peuceii* var. *caesi* (Fig. 2). It is composed of two main parts: of the red non-water-soluble alkaline aglycone (adriamycinone) and of the water-soluble amino glucose (daunosamine). This latter molecular part ensures the cytostatic effect. Its point of attack is the double helix of the DNA. The aminoglucose closely interacts with the phosphate group, which, as a result of the splitting of the base relations, results in the disorganization of the double helix of the DNA.

Local adriamycin has been used at our clinic for two years for preventing recurrences (Table II). Apart from 5 Tis cases, patients were selected who, beside the primary alterations prior to resection, had had tumour recurrence

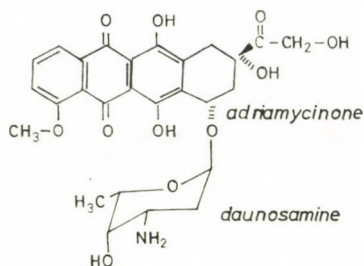


FIG. 2. Structural formula of adriamycin

at least twice. They were treated as out-patients. In the first year, they received monthly treatments, while subsequently at every three months. In case of recurrence, transurethral resection was performed. The first treatment was initially applied three weeks, while later already one week, following resection: 40 mg adriamycin solved in 50 ml physiological saline solution was injected via a narrow catheter into the bladder. The patients were requested to retain the administered drug in the bladder for at least an hour, then to urinate. Follow-up was made, based on the patients' complaints, by urinalysis at every three months or, when needed, even more frequently by cystoscopy and, in some cases collecting samples by aimed biopsies. The time of observation and that of follow-up, respectively, ranged between 16 to 24 months. It was studied whether the number of tumour recurrences decreased to cytostatic treatment.

Results

Our results were expressed by ratios referring to the duration of the disease in months (Table III). The period elapsing from the onset of the tumour up to the starting of adriamycin treatment can be regarded as control of the local treatment. The number of tumour recurrences were retrospectively col-

TABLE II
Patients with bladder tumour

Stage	Degree of malignancy	No. of patients
Ta	GO 9 (papilloma)	9
Tis	GIII (carcinoma <i>in situ</i>)	5
Ta	11 GI 9 GII 2 GIII	22
T1	6 GI 9 GII 4 GIII	19
Total		55

TABLE III

Changes in the ratios of tumour recurrences due to adriamycin treatment

Stage Degree of malignancy No. of patients	No. of recurrences		Follow-up time (months)		Ratio of recurrences Duration of disease in 100 months	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Ta GO (9)	31	6	279	192	11.1	3.1
Ta GI-GIII (22)	60	25	435	429	13.7	5.7
T1 GI-GIII (19)	53	24	419	372	12.6	6.4
Total 50 patients	144	55	1133	993	12.7	5.5

lected and added up (at least 2 for each patient) as well as the number of months (differing by persons) from the onset of the tumour up to the beginning of adriamycin treatment. For comparison, the number of recurrences appearing during the months having elapsed from the starting of treatment were also added up and extrapolated for 100 months. Comparison of the number of recurrences before and after treatment allows various conclusions to be drawn. During the follow-up period of 16 to 24 months, no tumour recurrence was found in case of Tis, as neither was it found in 13 additional cases. The Table shows that the number of tumour recurrences decreased in each case in total by more than 50%. The increase of the depth of infiltration was found in 3 cases, in one case cystectomy was performed.

Using local cytostatics, no systemic side-effects were observed. In a total of 637 installations, chemocystitis occurred in 87 cases (13.6%). It appeared in 29 cases associated with such strong urgency to micturate that the patient could only retain the cytostatic in his bladder for less than an hour. These symptoms did not regularly reappear in the same patient so the treatment did not have to be interrupted in any of the cases.

Discussion

During treatment, adriamycin administered directly on the bladder mucosa exerts its effect by destructing the tumour cells remaining in contact with the urothelium and by producing a direct cytostatic effect on the intra-endothelially located microscopic tumour. After administration of the cytostatic, a very rapid adherence to the nuclei of the tumour cells can be demonstrated by the fluorescence microscope. The degree of its penetration involves only some cell layers and does not reach the muscular layer of the vesical wall in a therapeutic concentration [12]. A minimal amount can be traced in the regional lymph nodes. Only a fraction of the adriamycin injected

into the bladder enters the blood vessels. The lack of absorption of adriamycin by the circulation can be ascribed not only to their rapid adherence to the nuclei but to its large molecular weight of about 60,000, too. The effectiveness and penetrating ability can be increased by adding the surfactant detergent 'Tween 80' [6].

Chemocystitis and haematuria are the most frequent side-effects. Their risk is increased if the patient has been previously irradiated or he is having a bacterial infection. Data of animal experiments [18] and human observations have proved that vesicoureteral reflux cannot contraindicate intracavitary treatment.

As regards the result of treatment, we believe, despite the not negligible side-effects, that local adriamycin treatment is an effective means of preventing recurrences of papillomas and superficial bladder tumours. In case of Tis, it can be an alternative to early cystectomy, and, when used after resection of superficial tumours, it can promote the prolongation of the recurrence-free period and remission of the tumorous process.

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Erfahrungen mit der lokalen Adriamycinbehandlung von Blasentumoren

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Zur Vorbeugung des nach wiederholter Resektion auftretenden Rezidivs der oberflächlichen Blasentumoren kommen immer häufiger lokale Zytostatika zur Anwendung. In der Abteilung wurden 55 Patienten in den Stadien Tis, T_a und T₁ 16–24 Monate lang intravesikal mit Adriamycin behandelt. Nach der Behandlungsperiode hat sich die Gesamtrezidivzahl der Tumoren auf mehr als die Hälfte verringert. In 18 Fällen war kein Tumorrezidiv zu beobachten. Im Laufe der zytostatischen Therapie meldeten sich keine systemischen Nebenwirkungen, Chemozystitis und Hämaturie meldeten sich jedoch häufig. Die vorteilhaften Erfahrungen sprechen dafür, daß sich die lokale Adriamycinbehandlung zur Rezidivprophylaxe gut bewährt hat.

Опыт лечения опухолей мочевого пузыря локальным применением адриамицина

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Для предупреждения рецидивов поверхностных опухолей мочевого пузыря после повторной резекции, в последнее время стали все чаще применять локальные цитостатики. Авторы применяли интравезикальную адриамициновую терапию у 55 больных, находящихся в Tis, T_a и T₁ стадиях болезни. Лечение продолжалось от 16 до 24 мес. Общее число рецидивов опухолей после периода терапии уменьшилось больше, чем наполовину. В 18 случаях рецидива опухоли не наблюдали. Во время применения цитостатического средства системных побочных явлений не отмечали. Среди побочных явлений наиболее частыми были хемосистит и гематурия. На основании благоприятных результатов терапии, авторы видят в локальном лечении адриамицином эффективную возможность профилактики рецидивов.

Effect of Growth Zone Injury on Growth in the Tibia of Rabbits

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Damaging the ossification centre of the proximal epiphysis of the tibia, the articular disc and the metaphysis of rabbits, the effect of injury on growth and the capacity for tissue regeneration during growth were studied radiologically and histologically. The injury penetrating into the metaphysis, directly damaging the articular disc gave rise to a more serious growth disturbance at the proximal end of the tibia than did the injury localized to the epiphyseal ossification centre. Tissue regeneration resulted in a richly vascularized granulation tissue in the injured region, with subsequent spongy bone formation. The hyaline cartilage did not regenerate.

In everyday medical practice, lesions of the growing tubular bones are not rare phenomena. Clinical observations [1, 2, 3, 5, 6, 9, 10, 13, 16, 17, 19, 23] and experimental studies [4, 7, 8, 11, 12, 14, 18, 20, 21, 22, 24] show that lesion of the growth zone greatly influences the further fate of the bone by affecting its growth.

Our aim was to study the effect of inflicting different degrees of injuries on the proximal end of the tibia of immature rabbits on bone growth, and to get an insight into the regenerative processes in the injured region.

Material and Method

The experiments were made in 30, four-week-old chinchilla rabbits weighing 660 to 710 g.

Group I. Under Nembutal anaesthesia, the right knee joints of 15 rabbits were explored from a medial parapatellar incision and, using a 4 mm dental drill, the epiphyseal ossification centre was bored into, from the medial condyle of the tibia down to a depth short to the articular disc.

Group II. Surgical intervention was made in 15 rabbits by boring through the epiphyseal ossification centre, through the articular disc underneath it, and penetrating into the metaphysis of the tibia.

In both groups, 5 animals each, were sacrificed on the second, 6th and

14th weeks postoperatively. Both tibiae were processed, the left was considered the control.

Radiological examination: Sagittal and lateral view pictures were taken of the tibial pairs by using industrial film—with an X-ray tube of a focus of 0.3×0.3 , with a focus-film distance of 80 cm and with exposure values of 40–45 kW and 1 s. The comparative radiographs helped in revealing the morphological and structural changes in the insured region.

Histological examination: The proximal ends of the tibiae were sawed into halves along a line connecting the medial and lateral intercondylar tubercles in a frontal plane perpendicular to the articular surface. The bone ends at the border of the metaphysis and diaphysis were removed in the horizontal plane. After fixation in a 4% formaldehyde solution, decalcination in EDTA and embedding in paraffin, 7 μ m frontal sections, stained by haematoxylin—eosin, were prepared from the bone ends.

Results

Group I

Second postoperative week: The X-ray revealed a bone deficiency covered by a shadow of soft density in the injured medial region of the ossification centre of the epiphysis (Fig. 1).

Histology disclosed several fragmented necrotic bone trabeculae in the epiphyseal ossification centre in an organized haematoma in the injured region



FIG. 1. Comparative sagittal X-ray picture of the tibial pair two weeks after the injury



FIG. 2. Necrotic bone trabeculae and fragments of the articular cartilage in an organized haematoma, H & E, $\times 25$

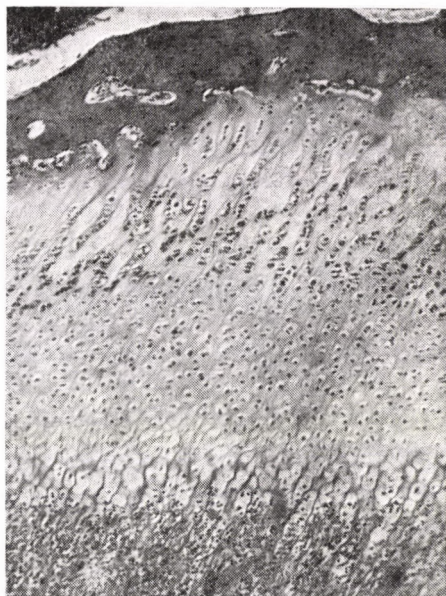


FIG. 3. Irregular articular disc, H & E, $\times 40$



FIG. 4. Layer of osteoblasts in a richly vascularized granulation tissue on the surface of necrotic bone trabeculae, H & E, $\times 40$



FIG. 5. Disorganized articular disc, H & E, $\times 40$

as well as fragments of the articular cartilage (Fig. 2). Underneath the lesion, the columns of chondrocytes were of irregular course, the zone of the resting and proliferative cells was widened with fissures among the chondrocyte columns (Fig. 3). The metaphysis showed no abnormalities.

Sixth postoperative week: X-ray: In the injured region the epiphyseal ossification centre was lower than on the side of the control. *Histology:* revealed, at the site of the lesion, a richly vascularized granulation tissue in the epiphyseal ossification centre filling also the intracellular spaces around the injury. On the surface of some of the necrotic bone trabeculae, a layer of osteoblasts, and newly-formed bone tissue could be noted (Fig. 4). The articular disc showed a severe disorganization (Fig. 5), without any abnormalities in the metaphysis.

Eleventh postoperative week: X-ray disclosed a bony reconstruction of the deficiency but with the medial part of the epiphyseal ossification centre being lower than on the side of the control (Fig. 6). *Histological study* revealed mature spongy bone in the epiphyseal ossification centre which was covered by a fibrous connective tissue from the side of the articular surface. In some regions of the ossification centre, cyst formation could be observed. Also the spaces



FIG. 6. Comparative sagittal X-ray picture of the tibiae 14 weeks after the epiphyseal injury



FIG. 7. Cyst filled with fibrous connective tissue in spongy bone tissue, H & E, $\times 40$



FIG. 8. Articular disc showing signs of an almost terminal stage of growth, H & E, $\times 40$

were filled with fibrous connective tissue (Fig. 7). The articular disc showed signs of an almost terminal stage of growth on both sides with no essential difference between the injured and the control sides. There was no pathological change in the metaphysis (Fig. 8).

Group II

Second postoperative week: The *X-ray* showed a bone defect covered with a shadow of soft density in the operated region both in the epiphysis and the metaphysis (Fig. 9).

Histologically, several fragmented necrotic bone trabeculae and articular discs as well as the fragments of articular cartilages were found to be present in an organized haematoma at the site of the lesion.

Sixth postoperative week: The *X-ray* showed an extensive crater-like deficiency deeply extending into the metaphysis displacing the medial condyle of the tibia at the site of the lesion.

Histology revealed a richly vascularized granulation tissue at the site of the lesion. There was a layer of osteoblasts and newly-formed bone tissue suggestive of tissue regeneration on the surface of the individual necrotic bone trabeculae (Fig. 10).

Eleventh postoperative week: The *X-ray* showed a lack of the medial condyle of the tibia with the proximal end of the tibia being severely deformed (Fig. 11).



FIG. 9. Comparative sagittal X-ray picture of the tibiae, two weeks after the epiphyseo-metaphyseal lesion

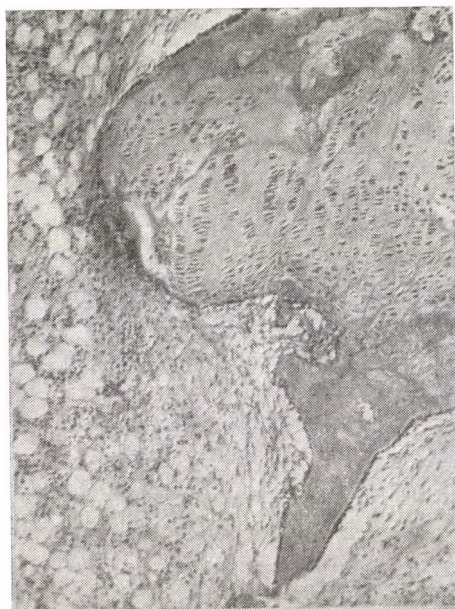


FIG. 10. Deficiency of the articular disc filled with a richly vascularized granulation tissue, H & E, $\times 40$



FIG. 11. Comparative sagittal X-ray picture of the tibiae, 14 weeks after the epiphyseo-metaphyseal lesion



FIG. 12. Deficiency of the articular disc filled with a spongy bone tissue, H & E, $\times 40$

Histologically, at the site of the lesion, mature spongy bone tissue was seen in both the epiphysis as well as the metaphysis with cyst formation in several regions near the articular surface. The deficiency of the articular disc was also filled with spongy bone (Fig. 12).

Discussion

The investigations revealed that lesions of the growth zone may considerably influence the growth of tubular bones. The injury restricted to the epiphyseal ossification centre retarded growth only to a small extent. When the articular disc was not directly injured, the irregularities and disorganization in the zone of the resting and proliferative cells could be due to an insufficient blood-supply of the epiphysis [15]. In a lesion penetrating into the metaphysis, as a result of the direct damage to all layers of the articular disc, a serious disturbance of the endochondral ossification had developed which also led to a considerable deformity of the injured bone end.

Tissue regeneration was shown by the appearance of a richly vascularized granulation tissue, then spongy bone formation. This, however, did not bring about a total tissue restitution. The hyaline cartilage did not regenerate. The degenerative changes, i.e. a histological picture simulating subchondral ossification occurring late after the injury, may be indicative of a possible relationship between the epiphyseal lesion and the development of arthrosis, the articular lesion being assessed as a prearthrotic condition.

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Über die Wirkung der Verletzung der Wachstumzone auf den Knochenwachstum auf der Tibia von Kaninchen

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Nach Schädigung des Knochenkerne der proximalen Epiphyse, der Wachstum-Knorpelscheibe und der Metaphyse der Tibia von im Wachstum befindlichen Kaninchen wurden mit Hilfe von Röntgen- und histologischen Untersuchungen die den Wachstum beeinflussende Wirkung sowie die Möglichkeiten der Geweberegeneration im Laufe des Wachstums analysiert. Durch die in die Metaphyse eindringende, die Wachstum-Knorpelscheibe direkt schädigende Verletzung wurden am proximalen Ende der Tibia wesentlich schwerere Wachstumstörungen verursacht als durch die sich auf den Knochenkern der Epiphyse lokalisierende Verletzung. Die Geweberegeneration meldete sich auf dem Gebiet der Verletzung in Form eines gefäßreichen Granulationsgewebes und einer spongiösen Knochenbildung, der Hyalinknorpel regenerierte sich nicht.

Влияние повреждения зоны роста на рост большой берцовой кости у кроликов

Л. КЕРИ и Ди. ЛЕНАРТ

Авторы, повреждая костное ядро проксимального эпифиза, росткового хрящевого диска и метафиза большеберцовой кости у молодых, растущих кроликов, с помощью рентгенологических и гистологических исследований получали информацию о влиянии травмы на процесс роста и о возможности регенерации в период роста. Проникающая в метафиз травма, непосредственно повреждающая ростковый хрящевой диск, вызывала гораздо более тяжелые нарушения роста в проксимальном конце большеберцовой кости, чем травма, локализованная в костном ядре эпифиза. Траневая регенерация проявлялась в образовании на месте повреждения богатой сосудами грануляционной ткани, затем спонгиозной кости; гиалиновый хрящ не регенерировал.

Two Cases of Traumatic Denudation of the Penile and Scrotal Skin

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Two cases of denudation injuries of the penis and the scrotum are reviewed. In the first case a total skin erosion of the penis and scrotum has happened. In the second injury, the major part of the skin was lost. The reconstructive operations are shown in a series of photographs. Replacement of the total skin deficiency was performed by placing a split-thickness graft on the penis, while reconstruction of the scrotum was carried out by using a thigh pedicle flap. In the second case partial loss of the skin could be replaced by mobilizing the free skin edges.

One of the most frequent forms of penile and scrotal injuries is the denudation of the skin, mostly as a result of accident. In the overwhelming majority of cases, some rotating shaft (tractor, agricultural machine, lathe) pulls off the elastic mobile skin of the penis and scrotum together with the garments covering the external genital organs. There can be varying degree of injury: A skin defect may arise involving only the penis or the scrotum. However, more frequently, complete denudation of the external genital organs with tearing off the skin of the mons pubis, the perineal region and the thighs may occur.

Surgical management of the skin injuries of the external genital organs is always individual. The possibilities are determined by the degree of denudation. In the case of an isolated penile denudation, utilization of the scrotal skin seems to be the most feasible solution. Should it be only a scrotal injury, even with a considerable degree of skin defect reconstruction can be successfully made due to its easy mobilizability, elasticity and reduced predisposition to scarring. If during injury the prepuce remains intact, its internal layer can also be used for replacing of the skin deficiency the external ring of the prepuce has been recommended by Kirschner [6]. In the case of an extensive, fresh injury, transplantation of split-thickness graft obtained by the dermatome is performed by most of the authors [1, 3, 4, 12, 13]. If for some reason free grafting is not possible, the skin for covering the penis can be obtained by forming and mobilizing, a tunnel graft from the inguinal region, or from underneath the abdominal skin.

In the case of total loss of the scrotum, the testicles remain uncovered. In such cases, they are transitionally placed into the soft parts of the perineum

or underneath the femoral skin, a new scrotum will be created only secondarily. Millard [9] reports on a case of complete scrotal reconstruction by using the modified, almost classical, method of Robinson—Stephensen and Padgett. In the first step, the testicles are placed underneath the skin of the thighs, and the penile skin is replaced by a half-thickness graft. The author calls attention to the importance of delaying grafting steps. He points out also the possibility of covering the testicles by using a half-thickness graft, although he seems to be reluctant to recommend the procedure for its technical difficulties and uncertain results. McDougal [8] reports on three cases of scrotal reconstruction. The testicles were first placed underneath the femoral skin, then six weeks later a pedicle graft was used for constructing an artificial scrotum. Beside good cosmetic results, he also reported on undisturbed scrotal function. A multiphase scrotal reconstruction, using a graft from the thigh has similarly been reported by Taguchi [13]. A more than two-year follow-up of his two patients has shown them to be completely free of complaints. From their marriages contracted following their injury, one and three children were born, respectively.

In Hungary, several reports have been published on skin injuries of the scrotum and penis [2, 4, 5, 10, 15]. Takáts [14] and Lukács [7] replaced skin deficiencies of the penis and scrotum by a pedicle graft in a single operation. Kett and Lukács [5] reported on a complete skin deficiency of the penis with a partial one of the scrotum, in a patient aged 26. After an unsuccessful primary management, a series of reconstructive operations performed in several sessions followed using a tubed pedicle graft, as a result of which the patient became complaint-free with undisturbed sexual life.

Case Reports

Case 1. N. J., a 29-year-old male was admitted as an emergency case to our department on 6th December, 1982. Two hours prior to his admission, the rotating shaft of a tractor had ripped off his trousers and along with them also the entire skin of the scrotum and the penis. The testicles were completely uncovered by skin, the penis was denuded in its full length, only the internal layer of the prepuce remained intact (Fig. 1A). The patient was admitted in a good general condition with intact circulation. Operation was performed under endotracheal intubation under the protection of tetanus antitoxin, gentamycin and ampicillin.

With an indwelling catheter, having been inserted and the tissue fragments incised, the lacerated wound edges were refashioned then the testicles were placed temporarily in bags prepared underneath the femoral skin. Subsequently two split-thickness grafts were taken by the dermatome from the lateral surface of the right thigh. After covering the penis, the skin grafts were

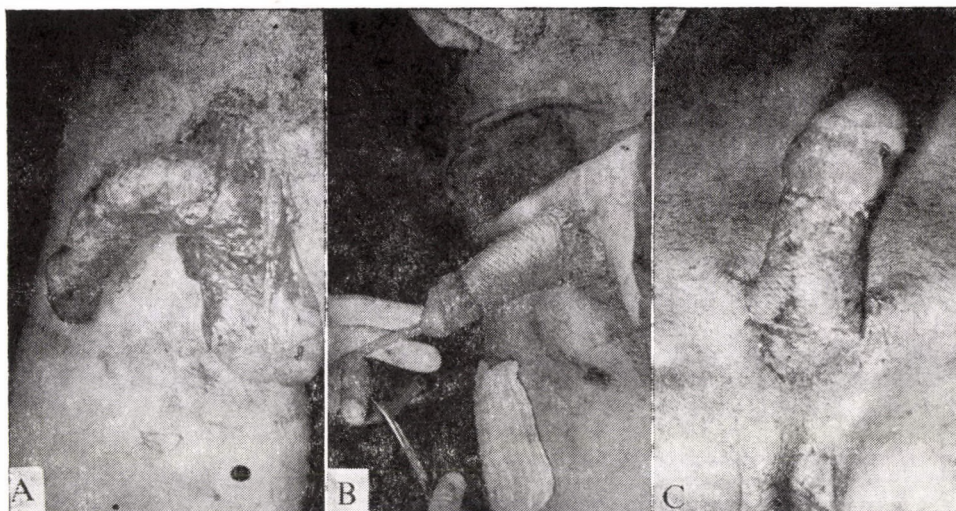


FIG. 1. A: Denuded penis and testicles. B: Covering of the penis with a split-thickness, free graft. C: Reaction-free healing of the wound

stitched by Dexon sutures (Fig. 1B). The wound was covered by a gauze pad soaked with peruvian balsam. The patient was discharged with a reaction-free wound on the 12th postoperative day (Fig. 1C). He was summoned back for a reconstructive operation of the scrotum to be performed in two months' time. He did not appear at the appointed date. Six months later he presented at a control examination in a complaint-free condition. The possibility of scrotal reconstruction was raised which he refused. After another month he appeared spontaneously and requested us to perform the reconstructive operation. The spermatic examination disclosed normozoospermia.

Millard's modified femoral grafting was the operation of choice. Grafts of an adequate size, the shape of pingpong bats, were marked out and cut which were then twice delayed. The ultimate operation was made on 17th July, 1983. While forming the femoral grafts, a thin, newly-formed connective tissue envelope was noted around the testicles (Fig. 2A). These together with the femoral grafts were lifted from the femoral fascia and, being turned toward each other, the new scrotum was constructed (Figs 2B, C).

Considering the extremely loose neighbouring skin at the donor site of the thigh, after adequate mobilization, closure of the skin was made immediately without using a split-thickness graft (Fig. 2D). Healing of the wound was uneventful. No circulatory disturbance or any other complications appeared. After healing of the wound the patient presented for a check-up only after some months. Then a loose, relatively thin scrotum, well-demarcated from the thigh and the penis, was found, with the left testicle situated lower (Fig. 3).

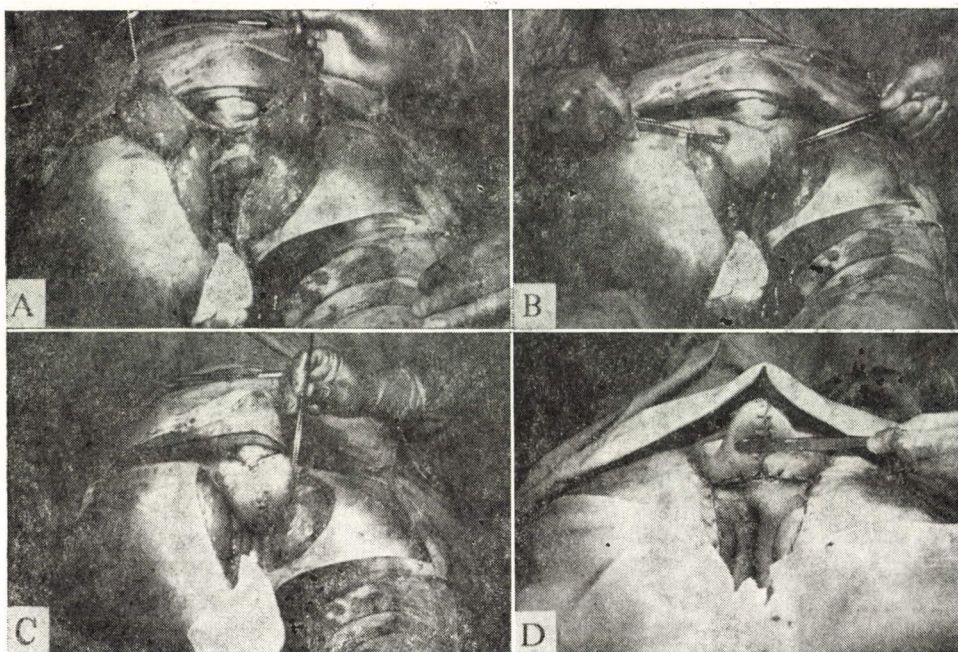


FIG. 2. A: The testicles are surrounded by a connective tissue envelope. B and C: The new scrotum develops by turning the femoral flaps toward each other. D: Primary closure of the donor site of the thigh



FIG. 3. Artificial scrotum constructed from the femoral skin after healing

The patient reported about no disorder in his sexual life. The repeated spermatic examination showed normozoospermia.

Case 2. F. T. S., a 34-year-old male patient, was transferred to our clinic from the department of surgery of the county hospital. One-and-a-half hours prior to his admission, the rotating shaft of an agricultural machine had ripped off his trousers causing denudation of the penile and scrotal skin. One-third of the radicular skin of the penis was missing. The left testicle became uncovered, the right one was only partly covered by the lacerated skin edge. A 4 cm wide and 8 cm long, markedly destructed, necrotic flap was hanging from the perineal region of the scrotum (Fig. 4A). In summary, one-third of the penile skin and half of that of the scrotum were missing. The reconstructive operation was performed under spinal anaesthesia after insertion of an indwelling catheter and administration of tetanus antitoxin, gentamycin and ampicillin (4 ml 0.5 Marcaine intrathecally). The median necrotic skin flap was resected, then the wound edges refashioned. By mobilizing the scrotal half having remained intact on the right side, the covering of the left testicle and replacement of the skin of the penile root could be performed successfully without tension. For postoperative drainage three drains were placed and the wound was closed with knotted sutures (Fig. 4B). On the 11th day, the patient was dismissed with his wound healed. At the control examination (Fig. 4C) in two months' time, he reported on neither erection nor other sexual problems.

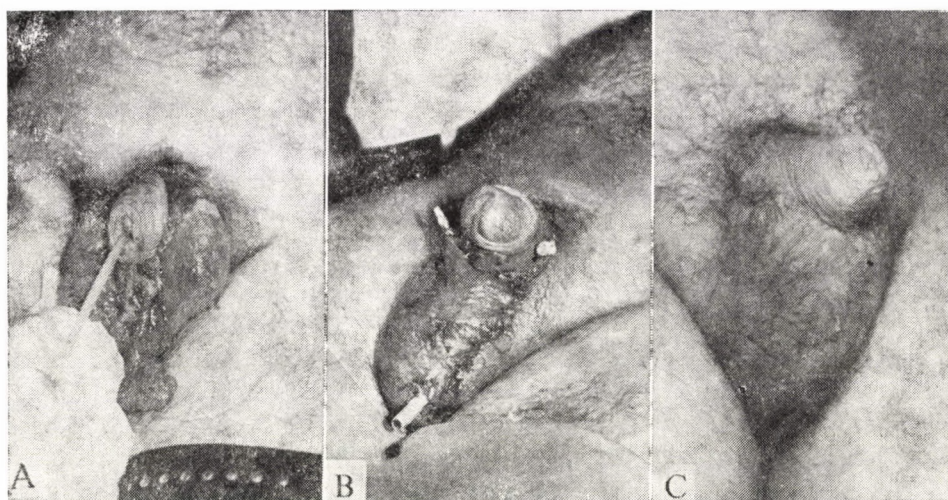


FIG. 4. A: Skin is missing from one-third of the penis and two-thirds of the scrotum. B: By mobilizing the skin, the considerable skin deficiency can be replaced. C: State of recovery two months postoperatively

Discussion

As a result of the increasing industrialization and motorization, injuries of the external genital organs occur more frequently. Denudation of the skin of the penis and the scrotum may present a ghastly sight. In our Case 1, the total skin defect was replaced by transplantation of a split-thickness graft and the placing of the testicles underneath the femoral skin. Free grafting of the split-thickness flap proved to be a successful procedure, it stuck rapidly without necroses and adapted well to the elasticity of the penis. Subsequently, no scarring developed and it did not shrink either. Construction of scrotal skin from the femoral graft is an accepted method. With careful planning and delaying the graft, practically normal conditions can be reconstructed. Although in our case, due to a lack of cooperation on the part of the patient, plastic operation was performed later than ideal, its effectiveness was also confirmed by the normal spermatic picture. Finally, the patient himself requested the operation which he must have done for obvious psychological reasons. In our opinion, artificial reconstruction of the scrotum is justified both from psychological as well as cosmetic points of view, even in cases when the denudation injury is associated with loss of the testicle. In a further step, testicle prostheses can be implanted.

In Case 2, despite the partial, but considerable skin defect, a reconstructive operation was performed adequate from both morphological and functional points of view. Observation of the up-to-date surgical principles and the use of the latest chemotherapeutics and antibiotics are indispensable in achieving the required results.

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Über die traumatische Denudation der Penis- und Skrotumhaut im Zusammenhang mit 2 Fällen

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Dargestellt werden zwei Fälle mit einer Denudationsverletzung von Penis und Skrotum. Im ersten Fall handelte es sich um den totalen Hautdefekt des Penis und des Skrotums, während im zweiten Fall ein großer Teil der äußeren Haut fehlte. Die Rekonstruktionseingriffe werden mit Hilfe von Photos veranschaulicht. Der Ersatz des totalen Hautmangels erfolgte mit der Transplantation eines halbdicken Hautlappens auf den Penis, während zur Wiederherstellung des Skrotums ein gestielter Schenkelslappen diente. Beim zweiten Patienten konnte der partielle Verlust der äußeren Haut durch Mobilisierung der freien Hautränder ersetzt werden.

О травматической денудации пениса и мошонки в связи с двумя наблюдениями

Л. ШОМОДИ, З. ТЕРЕФ, Л. ПОЙАК и А. ЙИЛЛИНГ

Авторы описывают два случая денудационной травмы пениса и мошонки. В первом случае наблюдалось полное отсутствие кожи пениса и мошонки, у второго больного отсутствовала большая часть внешнего покрова. Авторы фотоснимками иллюстрируют описание реконструктивных операций. Замещение полного кожного дефекта произошло трансплантацией полутолстой кожи на пенис, восстановление кожи мошонки произвели с помощью бедренного кожного лоскута на ножке. У другого больного частичную потерю внешнего покрова удалось заместить мобилизацией свободных кожных краев.

Surgical Management of Pulmonary Arteriovenous Fistulas

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In the past decade seven patients have been operated for pulmonary arteriovenous fistula at the 3rd Department of Surgery of the Semmelweis University Medical School, Budapest. Three of the patients were adults, the others being children and adolescents. Fistules were localized in the left lower lobe in four cases, and in the right upper lobe in three cases. Two of the patients displayed bilateral fistules. The type of the operation was lobectomy in six cases and enucleation in one case. The symptoms, the diagnostic and surgical methods and the results obtained are discussed.

Pulmonary arteriovenous fistulas (PAF) are pathological communications between the pulmonary arteries and pulmonary veins, resulting in right-to-left shunts. They may be single, multiple or bilateral and may differ in size. PAFs of a diameter of 4 cm have also been reported.

Churton [9] was the first to describe PAF when reviewing the autopsy finding of a 12-year-old boy, in 1897. Wilkens [61] published his case in 1917. His patient presented with epistaxis, clubbed fingers, cyanosis and dyspnoea. X-rays revealed densities in both lungs. On auscultation murmurs were heard in both armpits. The patient died of massive haemothorax. Autopsy disclosed three PAFs. The rupture of one of the fistulas produced the fatal haemothorax.

Reading [39] was the first to describe the triad of symptoms associated with PAF, i.e. cyanosis, polycythaemia and clubbing of fingers. Smith and Horton [44] were the first to establish the diagnosis of PAF in humans. Hepburn and Dauphice [17] performed first the resection of the lung due to PAF.

In the Hungarian literature, the diagnosis and treatment of PAF have excessively been dealt with [10, 15, 21, 22, 23, 24, 25, 29, 37, 51, 52, 53, 56, 57, 59].

According to Prager [35], up to 1983, 450 cases had been presented. In the recent 20 years seven patients have been operated for PAF.

Case Reports

Case 1. Screening of V. F., a 16-year-old, complaint-free girl revealed a density in the right upper lobe. First she received antituberculous treatment which, however, did not change the size of the density. On palpation, a thrill could be felt over the region corresponding to the 2nd segment of the right upper lobe. Tomographies demonstrated two vascular densities displaced toward the round density in the axillary subsegment at the right upper lobe. X-rays also showed a pulsating round density. Pneumoangiography confirmed the diagnosis of PAF. On operation, lobectomy was performed for PAF present in the axillary subsegment of the right upper lobe. The postoperative period was uneventful and she was discharged being cured.

Case 2. Screening revealed a round density in the left lower lobe of Sz. J., a 14-year-old boy, which on X-ray examination was strongly pulsating (Fig. 1). In the area corresponding to the change a marked thrill could be heard over the left lung. Pneumoangiography confirmed a PAF of a nut's size (Fig. 2). Operation revealed a nut-sized subpleural pulmonary aneurysm in the basal medial segment which was enucleated from its environment with a minimal loss of parenchyma and was resected. The patient was discharged cured after an uneventful postoperative period.

Case 3. L. K., a 6-year-old girl, was admitted for progressive dyspnoea and cyanosis. Her complaints raised the suspicion of a valvular defect. Pneumoangiography disclosed several large PAFs in the lower lobe of the left lung. Some smaller fistulas were also present in the upper lobe and also in the right



FIG. 1. Chest X-rays of a Sz. J., a 14-year-old boy: round density in the left lung field



FIG. 2. Pneumoangiogram of Sz. J. A—V shunt in the left lower lobe

lung. Since the large fistulas were contained by one lobe, lobectomy was decided upon. Following lobectomy, the child's cyanosis disappeared.

Case 4. K. I., a 7-year-old girl was examined for cyanosis and dyspnoea having persisted since her infancy. The complaints raised the suspicion of valvular defect. Pneumoangiography demonstrated a large PAF in the basal segments of the left lower lobe. One minor PAF each was also found in the lingula as well as in the right lung. Perfusion scintigraphy of the lungs revealed an essentially lower activity in the left lower lobe. An activity was shown in the projection of the spleen, too. Following left lower lobectomy, cyanosis disappeared.

Case 5. P. G., a 45-year-old woman, was admitted to the department of cardiology suffering since 5 years from dyspnoea, and cyanosis. Pneumoangiography and aortography revealed multiple cardiopulmonary vascular malformations. The PAF localized to the left lower lobe was eliminated by lobectomy. Blood gas analysis for verifying the diagnosis was performed pre- and postoperatively.

Data of the blood-gas analysis

Preoperatively

PO₂ = 45 mm Hg
O₂ST = 79%
O₂CT = 16.6 U%

Postoperatively

PO₂ = 73 mm Hg
O₂ST = 94.8%
O₂CT = 19.9 U%

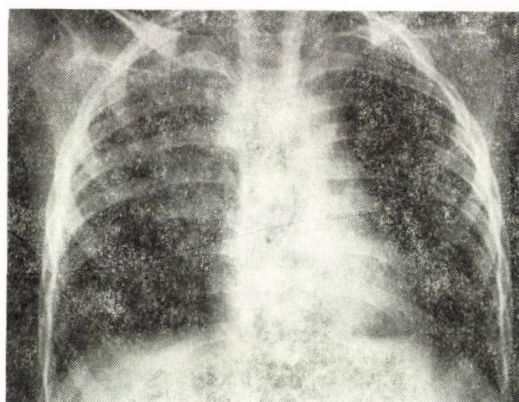


FIG. 3. Chest X-rays of S.G. (8-year-old boy). Fascicular densities in the right upper lung

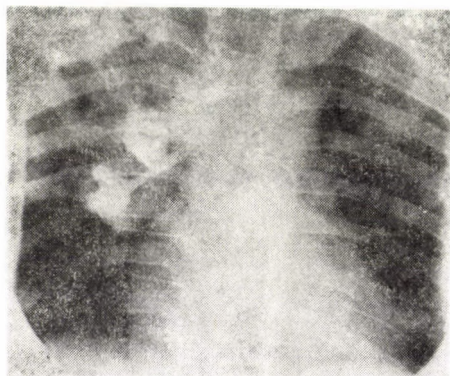


Fig. 4. Pneumoangiogram of S. G.: arterial phase. A—V shunts in the right upper lobe

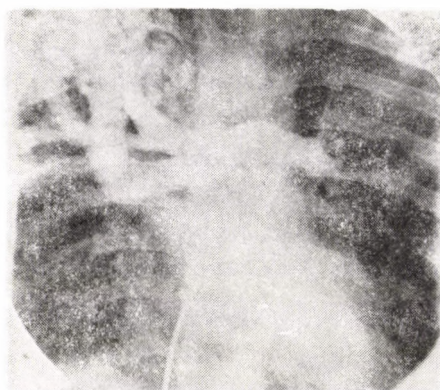


FIG. 5. Pneumoangiogram of S. G.: venous phase, early filling of right superior pulmonar vein

Following the operation, the patient's cyanosis ceased with a significant decrease of dyspnoea. Three months postoperatively aortic operation was performed. After half a year she reported herself, in a letter, to be complaint free.

Case 6. S. G., a 8-year-old boy was referred to the department of bronchology for fatigue, dyspnoea and cyanosis. His chest films demonstrated a thick pulmonary pattern appearing to be vascular densities in the region corresponding to the right upper lobe (Fig. 3). Based on the clinical symptoms, the bronchologist suspected PAF. Pneumoangiography was performed which confirmed his diagnosis (Figs 4 and 5).

Right upper lobectomy revealed several dilated thin-walled vessels subpleurally and in the region corresponding to the lobar hilum. Intraoperative blood-gas analysis was made prior to and following lobectomy.

Data of the blood-gas analysis

Before lobectomy		After lobectomy	
Temp.:	37.0 °C	Temp.:	37 °C
pH	7.322	pH	7.395
PCO ₂	38.4 mm Hg	PCO ₂	35.4 mm Hg
BBe	— 6.1 mmol/l	BBe	— 3.2 mmol/l
BE	— 6.9 mmol/l	BE	— 3.0 mmol/l
BB	41.0 mmol/l	BB	44.9 mmol/l
HCO ₂	14.3 mmol/l	HCO ₂	21.0 mmol/l
TCO ₂	20.5 mmol/l	TCO ₂	22.1 mmol/l
PO ₂	45.7 mm Hg	PO ₂	54.9 mm Hg
O ₂ ST	78.5%	O ₂ ST	90.4%
O ₂ CT	16.5U%	O ₂ CT	19.0U%

The significant elevation of PO₂ and O₂ST was striking after lobectomy. Since the operation only two months have elapsed. The child has been well, his cyanosis and dyspnoea disappeared. He has gained 3.5 kg.

Case 7. N. I., a 2.5 year-old boy, having born from a twin pregnancy, was admitted for gradually increasing cyanosis and dyspnoea having persisted since his infancy. Cardiological examination ruled out the possibility of valvular defect. Chest X-rays (Fig 6) revealed an inhomogeneous infiltrate in the area corresponding to the right upper lobe. Lung scintigraphy performed by ¹³¹I—MMA indicated complete lack of activity in the right subapical and subclavicular regions, while a higher than normal activity below the diaphragm suggesting shunt of the lesser circulation. Surgery disclosed multiple PAF's in the right upper lobe for which lobectomy was performed. Figure

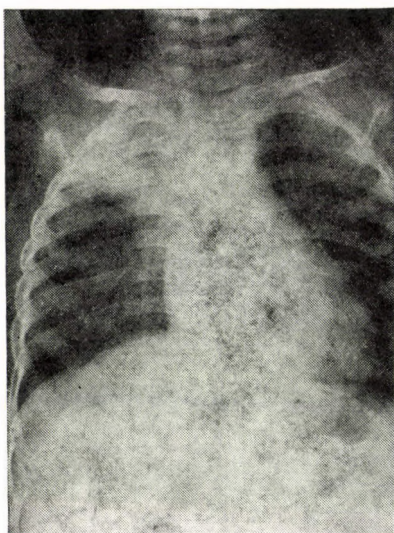


FIG. 6. Chest X-rays of N. I. (2-year-old boy). Density in the right upper lung

7 shows the removed specimen. Histological examination (Fig. 8) confirmed the presence of PAF.

Postoperatively, the child's cyanosis stopped and he was discharged being cured.



FIG. 7. Specimens removed from N. I.'s right upper lobe



FIG. 8. Histological picture of the right upper lung of N. I. shows vascular transections occupying two-thirds of the lobe

Discussion

Pulmonary arteriovenous fistulas can be congenital or acquired. Their majority are congenital and are associated with haemorrhagic teleangiectasia. Hodgson and Keye [19] found 91 members of a family to be affected by Rendu-Osler-Weber disease, 15% of them had PAFs. Secondary or acquired PAFs develop after trauma, schistosoma, liver cirrhosis, metastatic carcinoma and actinomycosis.

Several theories were set forth concerning the origin of congenital PAF. According to Anabtawi *et al.* [2], it is derived from the incomplete degeneration of the septum separating the arterial and venous plexuses in the second month of the intrauterine disease. According to others [25, 65], it is due to the dilatation of the terminal loop.

An arterial communication can open towards the chest and the surrounding segment [1, 40, 49].

Pregnancy may result in progression of the process and the symptoms [20].

PAF developing after trauma was described by Symbas *et al.* [50], Loebl *et al.* [27], Arom and Lyons [3] and Ekstrom *et al.* [12].

The male : female ratio is estimated at 26:18 [33] and 22:41 [11]. In our own material the male : female ratio was found to be 4:3 (Table I). There was only one adult woman, the others being children or adolescents.

PAFs can be cavernous or capillarized. In the present material three were capillarized and three cavernous. The fistulas are multiple in 33–50% of the

TABLE I
Data of patients operated for PAVF

No.	Sex	Age (years)	Symptoms	Localization	Type of operation
1	female	16	thrill	right upper lobe	lobectomy of right upper lobe
2	male	14	thrill	left lower lobe	enucleation of left lobe
3	female	6	cyanosis, dyspnoea	left lower lobe, diffuse	lobectomy of left lower lobe
4	female	7	cyanosis, dyspnoea	left lower lobe, diffuse	lobectomy of left lower lobe
5	female	45	cyanosis, dyspnoea	left lower lobe	lobectomy of left lower lobe
6	male	8	cyanosis, dyspnoea	right upper lobe	lobectomy of right upper lobe
7	male	2.5	cyanosis	right upper lobe	lobectomy of right upper lobe

cases. According to the published data [7, 33], the process is bilateral in 8 to 20% of the cases. In five cases they were localized to one lobe, in two cases they involved more lobes. In case of these two multiple capillary PAFs both lungs were involved. Surgical treatment was nevertheless attempted because the majority of shunts were present within one lobe. The results of operations have come up to our expectations, i.e. cyanosis disappeared and the patients became complaint-free.

The shunts considerably varied in diameter, ranging from the size of a capillary to one of 4 cm. Should the diameter of the shunt exceed 2 cm, symptoms of right-to-left shunt often appear.

The dilated PAFs are not infrequently supplied by several pulmonary arterial branches. They occasionally receive branches from the systemic circulation via the bronchial artery or the intercostal artery or directly from the aorta. Enucleation is possible primarily in cases where there is a single afferent and efferent artery, as e.g. in Case 2. Otherwise surgical treatment implies lobectomy as in the other six cases.

PAFs consist of vessels lined with endothelium, their wall narrowing as a result of the small intraluminal pressure. In the PAF thrombotic aggregates or bacterial endarteritis may develop which give rise to cerebral or peripheral abscesses [18]. Pulmonary arteriovenous fistulas are located, in most of the cases, subpleurally [7]. In contrast to systemic arteriovenous fistulas, they are mostly accompanied by normal haemodynamics and cardiac index [11, 14, 31], by normal intracardiac pressure, blood pressure, pulse rate and ECG. In addition, PAF associated with pulmonary hypertension was reported by several authors [26, 38, 41].

The most important consequence of PAF is right-to-left shunt which may amount to 79% of the cardiac output [13]. If the volume of the shunt

reaches 20%, arterial desaturation arises with cyanosis, clubbing of fingers and polycythaemia. Five out of seven patients presented these symptoms.

On physical examination, auscultation mostly reveals a murmur over the lungs. Pulmonary arteriovenous fistular murmur was heard over the lungs in one case. In this instance, also a thrill, could be felt over the chest.

The size and nutritive arteries of PAF should be localized, prior to any surgical intervention, by angiography or its position be determined to be simple or multiple, uni- or bilateral [18, 46].

Concerning its differential diagnostics, tuberculosis, tumour, histoplasma, coccidioidomycosis, pulmonary metastasis, hamartoma, cyst, adenoma, infarction, intraparenchymal haematoma, etc. may be considered. By pneumoangiography an exact diagnosis can be established. However, even a chest X-ray may reveal the change and the pulsation of the afferent vessels. This is regarded as a valuable diagnostic sign and PAF can be distinguished from the above changes even before pneumoangiography. Chest X-rays may only raise a faint suspicion of this rare alteration and first of all other more frequent diseases are thought of. The forms of PAF associated with cyanosis should, first of all, be distinguished from valvular defect. Three of our seven cases were referred to us with the suspicion of valvular defect. Since the majority of patients are affected by polycythaemia, it should also be differentiated from polycythaemia vera. In the latter case, the symptom of clubbed fingers is absent, arterial oxygen saturation is normal, there is a high leucocyte count and splenomegaly can be palpated.

Curing (operation, embolization) of PAF is necessitated not rarely, beside serious complaints (dyspnoea, weakness, vertigo, tinnitus, etc.), by threatening complications. Cerebral thrombosis and cerebral abscess, as the most severe neurological complications, appear in 5% of patients with PAF [30, 34]. According to Thompson et al. [55], recurring cerebral abscesses can be due to PAF. The incidence of cerebral abscess and meningitis can be as high as in congenital valvular defects. These complications manifest most often in the third or fourth decade of life. In our cases these complications were not observed, but as a matter of fact, only one patient was over 40, the others were children.

Cerebral symptoms, i.e. dizziness, headache, convulsions and hemiplegia appeared in 30% of the patients.

Another large group of complications was constituted by haemorrhages. Since PAF is often associated with Rendu-Weber-Osler disease, haemoptysis may develop in 10% of patients. Haemothorax may arise from subpleural thin-walled PAFs [43, 44, 45].

Schumacker and Waldhausen [42] estimated the frequency of complications at 20 to 30%.

A valuable examination method in diagnosing PAF is perfusion lung

scintigraphy. By injecting intravenously ^{99}Tc -labelled albumin of a granule-size of 10 to 15 μmol or ^{131}T -MMA the tracer is trapped in the pulmonary capillary branch and does not enter the systemic circulation. Under normal condition, an even activity be found over both lungs. In PAF, however the albumin particles or MAA, by evading the capillary filter, may enter the circulation. In these cases, there is an activity over the liver and the spleen, too, and in the region corresponding to the PAF so-called 'cold areas' develop [47, 60].

After an adequate examination and localization of PAF, treatment can be instituted which mostly is surgical. Small, peripheral subpleural changes can be removed by wedge-resection [6, 36]. The larger, circumscribed subpleural changes can be enucleated with a minor loss of parenchyma (2 cases). The larger, more deeply lying changes or those involving one lobe or segment are removed by lobectomy or segment resection [59, 67].

It is the most difficult to find the operation of choice in case of multiple PAFs. In some cases, the supplying arteries of the PAF were dissected and the changes excised even in bilateral processes [6, 8].

The balloon embolization for the treatment of PAFs was first described in 1980 by Terry et al. [54] and by Hatfield and Fried [16]. This method has serious advantages over conventional treatment as the patients need not be exposed to the strains and risks of operation. Nevertheless, this is not a harmless intervention either, with the rise in the number of embolizations, and reports have been published on the complications (pulmonary infarction) and recurrences(4).

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Chirurgische Behandlung pulmonaler arteriovenöser Fisteln

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Im Laufe der letzten 20 Jahre wurden an der III. Chirurgischen Klinik der Medizinischen Universität Semmelweis wegen einer pulmonalen arteriovenösen Fistel 7 Patienten operiert. Mit der Ausnahme eines Erwachsenen waren sämtliche Patienten Kinder oder heranwachsende Jugendliche. Die Verteilung der Lokalisation zeigte folgendes: 4 Fälle im linken unteren Lappen und 3 im rechten oberen Lappen. In zwei Fällen lag eine bilaterale Veränderung vor. Operationstyp: In 6 Fällen Lobektomie, in 1 Fall Enukektion. Anschließend finden die Symptome, die Diagnostik, das chirurgische Verfahren und die Ergebnisse eine Besprechung.

Оперативное лечение пульмональных артериовенозных свищей

Т. ТОТХ, И. СЁЧ, Р. БАТИ, Л. БЕНДИГ и Д. СИНАИ

За последние 20 лет авторы прооперировали 7 больных по поводу пульмонального артериовенозного свища в Клинике хирургии № 3 Будапештского медицинского университета им. Семмелвейса. Лишь один больной был взрослого возраста, остальные были дети или подростки. В 4 случаях патология локализовалась в левой нижней доле, в трех случаях — в правой верхней доле. Двое больных имели двусторонние изменения. Типы операций были следующими: в 6 случаях лобэктомия, в одном случае энуклеация. Авторы обслуживают симптомы, диагностику, оперативные методы и результаты.

Surgical Treatment of Bell's Palsy

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In 17 patients with Bell's palsy not treated or not responding to conservative therapy, vertical and horizontal decompressions were performed between days 7 and 10, relying primarily on the findings of neuromyography. Four patients (23.5%) recovered fully. Further 35 patients were operated after the regeneration period for absence of reinnervation signs between the 3rd to 6th months. An unusually marked and rapid improvement was noted in a 20-year-old female patient. In a 49-year-old male patient a neurinoma was found on the tympanic section of the facial nerve. Residual symptoms were significantly milder after early and late decompressions compared to spontaneous recovery of paralysis associated with total degeneration. There was no difference between the two operated groups.

Idiopathic peripheral facial paralysis is one of the most frequent diseases of the facial nerve. Seventy-three per cent of Adour's [1] patients including a total of 1221 peripheral facial paralysis cases, 52% of Székely's [30] patients and 78% of the peripheral facial paralysis cases observed at the Department of Otorhinolaryngology of the Szeged University Medical School in the period between 1978 and 1984, were Bell's palsies.

The pathomechanism involves oedematous swelling of the facial nerve which is supposed to be a consequence of ischaemia due to vasospasm or some immunological event [11, 20, 21, 25, 26, 27]. Increased pressure in the closed bony duct further impedes blood supply, a vicious circle occurs, causing ischaemic impairment of various degree by compression of the nerve. In severe cases considerable part of the nerve fibres is destroyed, Waller's degeneration involving the portion from the site of the lesion to the end-plate. As a result of a both qualitatively and quantitatively incomplete regeneration, so-called secondary defects (synkinesis, contractures, spasms, syndrome of crocodile tears, complete or partial paralysis) may remain, distorting the patient's face and causing severe communication disorders.

Severe degeneration can theoretically be prevented in two ways, i.e. by drugs or by surgical decompression. Steroids are extensively used in the conservative treatment of Bell's palsy, based on their antiinflammatory and immunosuppressive potency, although their effectivity is subject to contro-

versy. Several authors failed to show any differences between the course of treated and untreated paralyses [10, 18, 36]. Others have gained favourable experience [2, 7], moreover a symptomless recovery of over 90% has also been reported [24, 25, 26, 27]. Most authors emphasize—and we ourselves also have found—that therapy introduced only during the first few days may be effective [5, 23, 26]. It can be proved by electrophysiological and morphological methods that the acute stage of Bell's palsy lasts only for two weeks: degeneration of the nerve fibres is complete on the 10th to 11th days, while in severe cases the endoneural structures may disintegrate around the 12th day [6, 8, 38]. In paralyses processing despite conservative therapy, surgical treatment aimed at preventing a critical degeneration is worth to be undertaken only within this period, although surgical exploration may be considered even in paralyses not improving in the regenerative phase. It is therefore recommended to distinguish between 'early' and 'late' decompressions [22, 32, 34].

Patient Material and Method

The nerve is explored according to the method of Wullstein [37], Kovács and Z. Szabó [15]. After dissecting the mastoid antrum, we removed, similarly to Székely [30], only as much from the antral cells as to provide sufficient room for exposing the conducting structures and for the removal of the ductal wall. By exploring the attic, the body of the incus, the head of the malleus and the anterior cavity of the attic are exposed. Removing one part of the antral threshold i.e. the segment of the posterior wall of the tympanic cavity between the facial duct and the tympanic ring, distal to the short branch of the incus, the structures of the tympanic cavity become well visible. To support the short

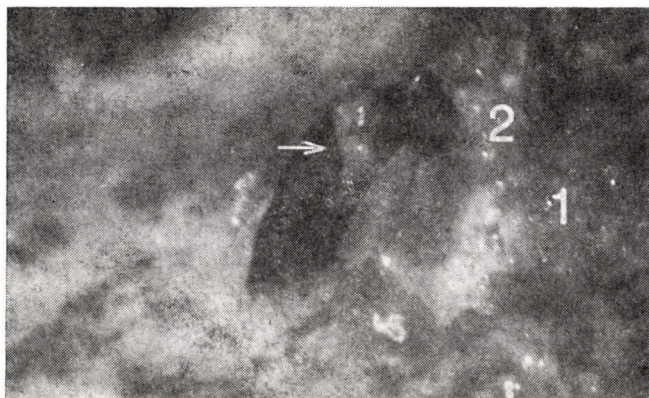


FIG. 1. State after removal of the antral threshold. 1 = lateral semicircular canal, 2 = the remaining portion of the antral threshold, the arrow indicates the tendon of the stapedial muscle and the incudostapedial joint

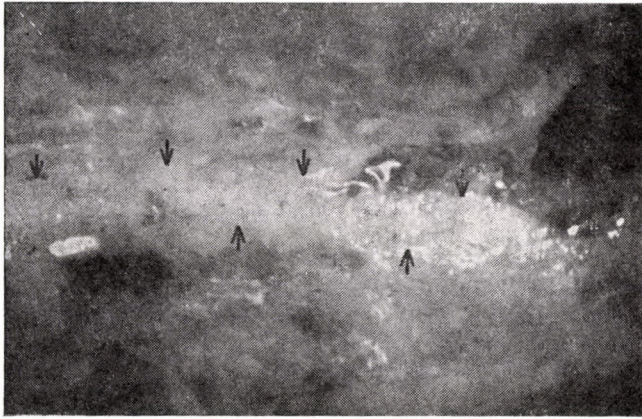


FIG. 2. Abrasion of the wall of the duct. The course of the nerve is marked by arrows

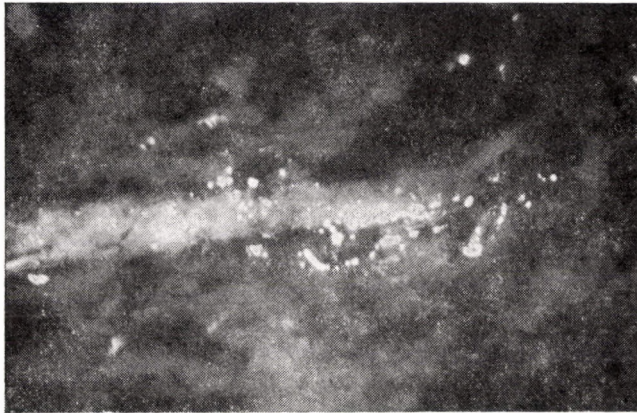


FIG. 3. The released nerve

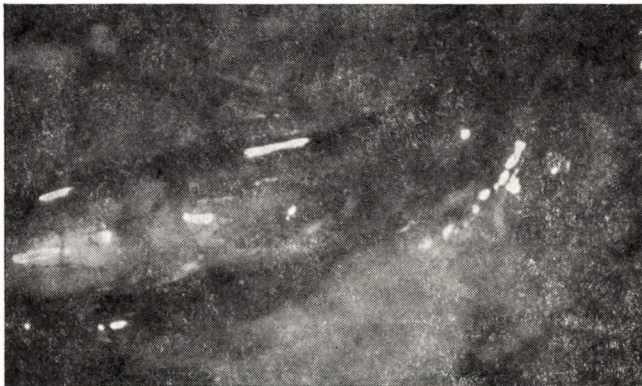


FIG. 4. The markedly swollen nerve bulging from the duct, after opening of its sheath

branch of the incus, a part of the antral threshold is maintained (Fig. 1). To spare the nerve as much as possible, the duct is still not opened at this stage but the wall of the bone is thinned by a diamond drill from the semicircular canal to the stylomastoid foramen; through this, the nerve appears as a whitish vascular bundle (Fig. 2). Then the duct is opened by a fine hook close to the anterior slope of the semicircular canal, then the nerve is released by microinstruments, first along the vertical then, when necessary, along the tympanal segment up to the geniculate ganglia of the facial canal (Fig. 3). Dissection of the epineurium is performed in accordance with the principles of Székely [30], depending on the degree of oedematous swelling (Fig. 4). Finally, the nerve is covered by a gel-foam containing steroid and after a loose tamponade of the surgical cavity the wound is closed.

In the acute stage of paralysis, between days 7 and 10, the vertical and horizontal segments of the nerve were explored in 17 patients, due to a progressive degeneration resisting conservative treatment. The neurilemma was dissected in all cases. Indication for surgery was based on the result of neuro-myography. Stimulating the nerve trunk percutaneously on both sides, the amplitude of the action potentials recorded over the contracting facial muscles allowed us to conclude for the degree of degeneration [8, 12, 13, 14]. From the results of the measurements repeated daily or every other day, the tendency



FIG. 5a. Bell's palsy with an onset four months prior to admission in a 20-year-old patient; b The same patient one week after decompression

of the process could be assessed. If in the acute stage critical degeneration was to be expected (in general, development of defects can be anticipated with a degeneration rate of over 80 to 85%) and the actually measured value had reached 80%, the operation was performed. Age over 50 years, diabetes, hypertension and recurring ipsilateral paralysis were factors considered to aggravate prognosis and to be indications for surgery.

A total of 35 patients with no or insufficient improvement of their paralyzes were operated after a regeneration period of 3 to 6 months. Depending on the pressure or absence of the acoustic reflex, vertical decompression was performed in 24 cases (the reflex could be elicited) and verticohorizontal decompression in 11 cases (the reflex could not be elicited). The neurilemma was opened because of oedematous swelling in 20 cases. Indication was decisively based on the clinical picture. In some cases electromyography was performed at the Department of Neuropsychiatry, Szeged University Medical School, Szeged, and the absence of reinnervation potential was considered to be in favour of performing an operation. In cases with protracted regeneration and some degree of residual paralysis, however, surgery was undertaken after some time even if there were electromyographic signs of reinnervation.

For the evaluation of the results, a control group of 23 patients was established in whom electrophysiological examination revealed total degeneration of the facial nerve but they had not been subjected to steroid or surgical therapy.

The state after recovery, the severity of the complications were characterized by a paralysis index and a residual symptom index calculated on the basis of a score system elaborated by Stennert et al. [28], a score of 10 indicating paralysis, and the most marked residual symptoms, respectively. For statistical evaluation Student's *t*-test was applied.

Results

After early decompression, four patients (23.5%) showed symptom-free recovery, 13 patients (76.5%) were found to have residual secondary defects. The average paralysis index was 1.7, the average residual symptom index was 2.5 (Table I).

All of the patients subjected to late decompression, recovered with residual symptoms. The average paralysis index was 1.8, the residual symptom index attaining 2.9 (Table I). Operation in a young female patient was followed by an unusually rapid and dramatic improvement (Fig. 5). A neurinoma was found in the tympanic cavity of the facial nerve of a 49-year-old male patient one year after onset of the paralysis. (In the present material, the postoperative state was not evaluated.)

TABLE I
Secondary defects after operations and spontaneous recovery

	Early decompression <i>n</i> = 13	Late decompression <i>n</i> = 35	non-operated <i>n</i> = 23
Average paralysis index	1.7	1.8	3.5
Average residual symptom index	2.5	2.9	3.6

In the untreated patients, without exception, secondary defects had persisted. The average paralysis index was 3.5, while the residual symptom index 3.6 (Table I).

Residual paralysis following early and late decompressions and the additional secondary defects were significantly milder than after spontaneous recovery. (The result of Student's *t*-test was as follows: *Residual paralysis*: early decompression vs. untreated group: $p < 0.01$. Late decompression vs. untreated group: $p < 0.001$. *Secondary defects*: early decompression vs. untreated group: $p < 0.001$. Late decompression vs. untreated group: $p < 0.05$.) Comparing the two operated groups, no significant difference was found concerning either the degree of persistent paralyses or that of the other residual defects ($p > 0.05$).

Discussion

In Bell's palsy, prognosis is of particular importance. This helps in deciding whether besides conservative treatment surgical intervention will be necessary to control oedema and the resulting compression to prevent total degeneration of the nerve. In case of an intratemporal lesion, however, there is no possibility to precisely assess the degree of impairment by proximal stimulation of the nerve, and only indirect procedures are available. Thus the proportion of degenerated fibres may be assessed by determining the muscle response to distal stimulation [26]. The descent of Waller's degeneration takes, however, some time, and consequently, even these indirect electrodiagnostic tests cannot be applied within the first days of the onset of paralysis. In the early stage, i.e. on the first four days, an attempt is made to estimate the degree of impairment of the motor fibres from the function of the highly sensitive sensory (sense of taste) and secretory (lacrimation and salivary secretion) fibres, as well as from the reflex involving the stapedial nerve [4, 26]. Although the functional tests may indicate, within certain limits, the degree of compression, the degree of impairment of the motor fibres cannot at all be judged [3].

Thus, in the first part of the acute stage, there is no available diagnostic method for predicting a reliable prognosis. Therefore, in contrast to several other authors, we consider decompression performed within the first days of the onset of paralysis, not to be diagnostically justified. An operation in the early stage can also be questioned since adequate conservative therapy may be of benefit [27].

In the second part of the acute stage, the tendency of the process can be assessed more reliably by electrophysiological tests, primarily by neuromyography [8, 12, 13, 14]. Four (23.5%) of our 17 patients operated on for a progressive degeneration despite appropriate medication between the 7th and 10th days, recovered without sequelae. Complete postoperative restitution is extremely rare as shown by Ganzer et al. [10] analysing data in the literature. Somewhat better results have been obtained when releasing the nerve from the inner auditory duct to the stylomastoid foramen [5, 9, 16, 17]. Total decompression, the opening of the endocranium in Bell's palsy may be regarded as unfounded interventions in view of the possible complications and the expected results.

Following completion of the biological recovery, late decompression was performed in 35 cases showing failure of reinnervation or inadequate improvement between the 3rd and 6th months. All patients had residual defects in the facial nerve function. That late operations may be justified is demonstrated by the fact that severe paralysis, as observed in one of our young female patients, may considerably and rapidly improve postoperatively [19], as well as by the recognition of other, eventually severe abnormalities concealed by the false diagnosis found a neurinoma in the tympanic cavity of the facial nerve of a 49-year-old male patient treated for one year with the diagnosis of Bell's palsy.

Complications ensuing after early and late decompression proved to be essentially milder than those following a spontaneous recovery. Our observations supported also by statistical studies are in agreement with Székely's experiences [30, 31]. The good results can probably be ascribed to the intra-funicular fibrosis ensuing, to a smaller extent, following surgery [29].

Transient conductive hearing defect was observed after operation, in 8 patients, while in four also a transient mixed, and in two patients a permanent perceptual hearing defect localized in the range of 4 kHz were observed.

Based on our results, it is recommended to consider Bell's palsy an urgent clinical picture, however, without the necessity of an urgent surgical intervention. In case of threatened total degeneration developing despite conservative treatment, decompression can be made first of all by relying on electrotests, primarily on neuromyography in the second half of the acute stage with the primary aim of making use of the modest chance of preventing complications, with the thought in mind that, should it fail, the remaining defects will by all

means, be much milder. In untreated cases and in those not responding to medication, but not operated in the acute stage, if there is no satisfactory improvement after the biological recovery, it is recommended to perform late decompression to create more favourable conditions for regeneration. In such cases, exceptionally, even a rapid and considerable improvement may follow. Late decompression can be regarded as an explorative intervention, too. Based on an eventually false finding, diagnosis can still be corrected in due time.

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Chirurgische Behandlung der Bell-Parese

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Bei 17, an Bell-Parese leidenden, medikamentös nicht behandelten oder auf die konservative Therapie nicht reagierenden Patienten wurde — in erster Linie aufgrund der Ergebnisse der Neuromyographie — zwischen dem 7. und 10. Tag vertikale—horizontale Dekompression vorgenommen. 4 Patienten heilten symptomfrei (23,5%). Nach Abklingen der Regenerationsphase wurden zwischen dem 3. und 6. Monat wegen des Fehlens von Regenerationszeichen 35 Patienten operiert. Bei einer 20jährigen Patientin ließ sich ungewöhnlich rasche, hochgradige Besserung verzeichnen, während im tympanalen Abschnitt des N. facialis eines 49jährigen Patienten ein Neurom vorzufinden war. Die sich nach den Früh- und Spätdekompressionen entwickelten Restsymptome waren signifikant milder als nach der Spontanheilung der mit totaler Degeneration einhergehenden Paresen: Zwischen den beiden operierten Gruppen trat kein Unterschied in Erscheinung.

Хирургическое лечение пареза белла

Й. ЁРИ и О. РИБАРИ

У 17 больных параличом Белла, состояние которых не улучшилось после консервативной терапии, на 7–10-й день произвели вертикально-горизонтальную декомпрессию, опираясь, в первую очередь, на результаты нейромиографии. 4 больных (23,5%) выздоровели, симптомы исчезли. После окончания регенерационного периода, между 3–6-м мес, прооперировали 35 больных, из-за отсутствия признаков реиннервации. Необычайно быстрое и сильно выраженное улучшение состояния авторы наблюдения у одной 20-летней больной, у одного мужчины 49 лет нашли невриному лицевого нерва в области барабанной полости. Остаточные симптомы, возникшие после ранних и поздних декомпрессий, были достоверно более слабыми, чем таковые, наблюдавшиеся после спонтанного излечения от паралича, сопровождавшегося тотальной дегенерацией: между двумя группами прооперированных больных разницы не отмечали.

Abdominal Hernioplastics Sewn by Horizontovertical Mattress Sutures

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An abdominal reconstruction made by overlapping is reported. Operation was performed by horizontoververtical mattress sutures. It did not significantly impair the vascularization and innervation of the tissues, representing, therefore, both anatomically and functionally favourable type of reconstructive operation of the abdominal wall.

At present, the surgical solution of umbilical hernia, rectus diastasis and abdominal postoperative hernia seem not to impose great difficulties on the surgeon. If, however, the roughly 20%, recurrence rate is considered, this may draw the attention to the need of improvements in this field [2].

To be able to most effectively accomplish our hernioplastics, it is necessary to survey the anatomical and kinetic properties of the abdomen. In devising the operation the direction of the individual muscles and fasciae, the vascular supply and the innervation and the tractive forces have to be considered. As a starting point, median hernias can be used, namely these are the most frequently encountered in our practice. The skills acquired here can easily be utilized in other abdominal regions.

In case of median hernias, the force acting on the median line is constituted by the traction exerted by the external and internal oblique and transverse abdominal muscles. Vectorially, these exert their effect lateral from the median line through the rectus sheaths. It would be obvious to avoid recurrences by suturing the rectus sheath with densely inserted transverse stitches. Unfortunately, this is not so. The importance of the median line should be studied in the case of rectus diastases. The stability of the abdomen is considered to be decisively based on the transverse muscles. The fascia fibres of the external and internal oblique abdominal muscles being incorporated into its fascia, form the general abdominal fascia which passes to be inserted into the linea alba. Linea alba is the target point of the transverse traction and the internal abdominal pressure. The equilibrium between the forces acting on it and tissue resistance serves as a basis for the stability of the abdomen. Upsetting of this balance gives rise to rectus diastasis, the linea alba widens into an

aponeurosis and the two straight abdominal muscles are becoming detached from each other by 4 to 10 cm. The surgical solution implies, after longitudinal slitting of the rectus sheaths, at a distance of half a centimetre from their medial margin, the separate suturing of fasciae forming the anterior and posterior rectus sheath. After suturing the posterior sheath, the myofibrils of the rectus muscles will already approximate each other becoming apposed only after suturing of the anterior fasciae. The traction acting from lateral is practically loaded on the anterior rectus sheath. In the majority of cases, the procedure still yields perfect results, since the belly of the rectus muscles has reached the median line most exposed to the internal abdominal pressure and it can exert an active counter-force against it. The actual surgical solution of the rectus diastases is namely the reconstruction of the abdominal wall by apposition of the rectus muscles [2, 3].

The best known hernioplastics of umbilical hernias are linked with the names of Lexer, Menge and Mayo. Lexer closed the defect of the aponeurosis, after managing the hernial sac by purse-string sutures which he then covered by suturing the rectus muscles. Menge sutured the peritoneum together with the posterior fascia longitudinally, then also the rectus muscles, and finally closed the anterior fascia transversely slit up to the midpoint of the abdominal rectus muscles. Mayo, after managing the peritoneum, sutured the aponeurosis, having been transversely slit up to the margins of the rectus muscles, by overlapping them, i.e. the rectus diastasis was not managed [3].

A solution most frequently used in managing median incisional hernias is the separate suturing of the anterior and posterior rectus sheaths. Recurrences may occur even with this solution, the majority of them being due to closure of the hernial orifice by large transfixing sutures. Such sutures may undoubtedly impair the blood supply of the muscles and the attached fasciae, and the extensive consecutive scarring produces a less valuable tissue being poorly resistant to traction facilitating the recurrence of the hernia [1].

Utilization of fascia lata and implantation of alloplastic materials are not dealt with here, because of their well-known inadequacies. Neither can the rotation of the fascia used in the management of solving umbilical hernias produce lasting results, since the fasciae transform after some time into common scar tissue [1].

In suturing the rectus muscles together with the fascia by placing horizontal mattress sutures, the vessels are practically running longitudinally in the muscles, compressed by the loop of the suture destroying thereby the musculature and producing an extensive scar formation.

The procedure, when the right rectus is pulled underneath the left one by transfixing mattress sutures, then the right edge of the left rectus is sutured over the left rectus also by mattress sutures, has become known as the overlapping technique of Bremen. At the moment of the operation the hernioplastics

seems to be solved, but by compressing the nerves innervating the muscles, denervation atrophy of them is resulted. In using horizontal or vertical mattress sutures, the results of the hernioplastics will be in jeopardy by destructing either the vessels or the nerves.

Overlapping can be solved by inserting horizontoververtical mattress sutures which do not markedly impair either the vessels or the nerves.

Description of Our Method

After managing the hernial sac, the anterior fascia of the rectus muscles is deprived of adipose tissue. The linea alba is slit longitudinally. On the left side, the anterior and posterior sheaths of the rectus medialis are also sutured at a distance of one centimetre from their edge. Then, proceeding from inside outwards, a bite of the 4 to 5 mm tissue of the right wound edge is taken, then the right rectus is sutured from inside outwards. Subsequently, the edge of the left rectus sheath following from the inside outwards. The needle is introduced downwards from outside inwards at one-and-a-half centimetre from the stitch, then by drawing it through the rectus sheath from inside outwards, taking a bite of the right edge from outside inwards, then of the left rectus sheath from inside outwards. Then the sutures are knotted by avoiding strong traction. The left rectus is pulled over the right one and the rectus muscles close the hernial orifice by overlapping (Figs 1 and 2).

Only two vertical portions of the suture remain visible, at the same time, only horizontal silk ligatures are seen at the abdominal surface. There is no loop formation either horizontally or vertically and the nerves and the vessels are not markedly impaired. The traction involving the vertical portion of the silk ligature is transposed also to the contralateral one through the horizontal pair



FIG. 1. Placing the sutures. The loop of the silk ligature marked by a broken line circle will fix the right abdominal edge to the lower surface of the left rectus sheath

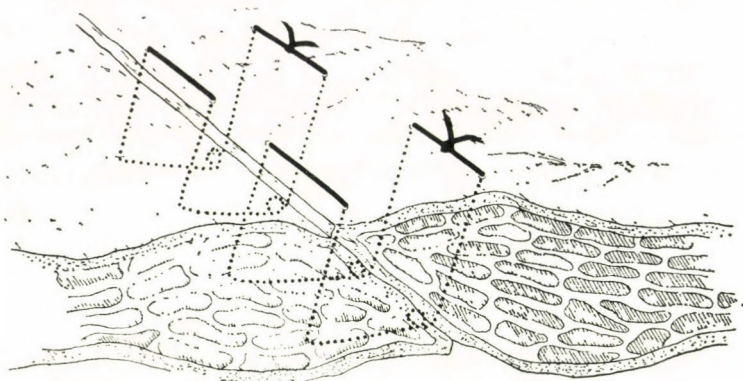


FIG. 2. After knotting of the sutures at a wide surface, the rectus sheaths are apposed in two lines, and the straight abdominal muscles are situated in the median line of the abdomen

of silk ligatures pressing the edge of the left rectus to the right rectus. If we knotted the suture more tightly, the horizontal pair of silk ligatures would tightly stretch and would push forward the rectus muscles, which were to badly protrude between the two vertical silk ligatures and, in an extreme case, even the nerves would be compressed. After knotting the sutures, stretching of the abdominal wall does not result in such consequences. We should be considerate in using our method, because the abdominal wall can be narrowed to an unexpected measure, causing the marked upward pushing of the diaphragm. The solution can be applied in the management of each kind of abdominal postoperative hernias.

This method has been used for six years. Though it may seem to be fairly complicated, it has yielded very good results. Hernioplastics were performed in 52 cases without any recurrences. In two cases laparotomies were made more than one year after hernioplastics. In both cases, an anterior abdominal wall covered by smooth peritoneum, and on slitting of the rectus sheaths, an intact muscle tissue were found.

The results accomplished have justified us to recommend our procedure for solving umbilical hernias, rectus diastases and postoperative abdominal hernias.

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Mit horizonto-vertikalen Matrazennähten durchgeführte Bauchwand-Hernioplastik

B. KEMENES

Beschrieben wird eine Überlappungs-Bauchwandrekonstruktion, die mit horizonto-vertikalen Matraznähten ausgeführt wird, die Gefäß- und Nervenversorgung der Gewebe nicht wesentlich schädigt und deshalb eine, sowohl anatomisch, als auch funktionell gute Rekonstruktion der Bauchwand bedeutet.

Пластика грыжи брюшной стенки с применением горизонтально- вертикальных матрацных швов

Б. КЕМЕНЕШ

Автор знакомит с техникой реконструкции брюшной стенки, при которой он применяет горизонтально-вертикальные матрацные швы. При этом способе сосуды и нервное снабжение тканей заметно не повреждаются, благодаря чему как анатомически, так и функционально наблюдается хорошая реконструкция брюшной стенки.

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Professor A. Babics 85 Years Old



In this special issue of *Acta Chirurgica*, the 85th birthday of Professor A. Babics, academician, the chief editor of *Acta Chirurgica* is celebrated by the publications of his students.

Professor Babics, with his 50 years' work in urology, has earned an outstanding reputation for Hungarian science not only in his home country but also abroad. He was Head of the Department of Urology of Semmelweis University Medical School, Budapest for almost 30 years. As an academician and a public figure he made a substantial impact on both social and scientific world.

He was a talented and inquisitive young clinician and researcher, who achieved outstanding and internationally acknowledged results within a relatively short time in nephrolithotomy and in the study of the renal lymph flow. This has made him not only the initiator of research in the field of kidney and lymph circulation, but also a leading personality of Hungarian experimental research. His pioneering works and experimental investigations have widely been recognized in international literature. His monograph summarizing his research and clinical studies written in collaboration with his students, has earned him, and this field of research in Hungary, fame and appreciation.

His scientific interest is characterized by an intense concern with almost all fields of urology. This is hallmarked by over 200 research reports, 7 monographs and two textbooks. His recently published book on intraoperative diagnostics is the summation of his clinical experience of several decades. His new, coauthored book entitled "The Importance of Lymphography in the Diagnosis and Treatment of Urogenital Diseases" has appeared at the Publishing House of the Hungarian Academy of Sciences this year.

Beside his arduous scientific work, and his role in education, Professor Babics could also find time for performing extensive and outstanding social work in several walks of life. After the second World War, he made an immense contribution to organizing public health care in Hungary. First, as a member of the National Health Council, then as that of the Scientific Public Health Committee, he had been Dean of the Semmelweis University Medical School, Budapest for several years.

In recognition of his scientific work, he was elected in 1949 Associate Member, and in 1950 Member, of the Hungarian Academy of Sciences. In the subsequent years he became secretary of the Department of Medical Sciences of the Hungarian Academy of Sciences. Professor Babics is the member of several medical and social organizations and of the editorial board of several Hungarian and foreign scientific journals. He is member of the German, Austrian, Italian and Romanian Urological Societies, honorary member of the USSR Academy of Sciences and member of the Soviet Surgical and of the Czechoslovak Purkinje Societies. He continues to support clinicians in his field with expert advice. He is also honorary life president of the Hungarian Urological Society.

He was M. P. from 1964 to 1970.

Several distinctions have been conferred upon him in appreciation of his scientific and social services by the Hungarian People's Republic.

His unceasing devotion to public health has been recognized in 1980, by his election as president of the Central Management of the Health Workers' Trade Union for a period of 5 years, while in 1985, as honorary president of the same organization.

Professor Babics has educated and taught several generations of Hungarian urologists and he felt it his duty to support them in their later careers. Of those, six have become university professors, seven consultant physicians and several of them, highly qualified research scientists.

Thanks to his work and endeavours, four urological chairs are operating in Hungary, a relatively significant number, in relation to the size of Hungarian population.

Professor Babics serves as an example not only as an outstanding scientist, clinician and a teacher but also as a humanist physician to the whole medical society. He tried to cure not only the physical illness, but he treated

the whole person as well, with affection and calm resolution so usual of him and it was in this spirit in which he educated his students, too. He encouraged his students to follow in his footsteps.

It is a great honour for us to pay tribute to this outstanding figure of Hungarian Medicine, the founder of Hungarian urology on his 85th birthday, on behalf of his former colleagues and students. On his birthday we wish him good health, happiness and great success in his future work.

S. Csata

Resection in Renal Tumour Patients

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(Received: December 22, 1986)

Nine cases (two of them bilateral) of renal resections for renal tumour are reviewed.

The survival results of patients with bilateral renal tumours are considered particularly favourable, one of them has survived for 72, the other for 37 months.

Of the patients with solitary renal tumour, one was lost 25 months post-operatively, after the development of a distant metastasis. The other patient has been free of recurrence and metastases after 31 months.

The above results have proved the outdatedness of the old concept, i.e. to remove the tumorous kidney. As supported by the authors' cases, their patients have had a high survival rate after resection for renal tumour. The clear-cell tumours are well demarcated by a fibrous capsule and they can easily be resected. The granular-cell renal tumours are localized more centrally, they often infiltrate the kidney. In cases cautiously considered, the resection of the tumorous kidney can be performed under the present technical conditions by strict 6 monthly postoperative urographic, ultrasound, and angiographic examinations.

In the case of kidney tumours until recently radical nephrectomies were performed. During operation after primary vascular ligation, the perirenal adipose tissue and the regional perihilar lymph nodes, were also removed. Currently, in a large number of cases, the resection of the renal tumour is decided upon, mainly if a solitary kidney, or the resection of a bilateral malignant tumour may leave behind a sufficient amount of functioning renal substance.

It has been an endeavour in urology for several decades to perform a conservative operation instead of nephrectomy in the case of renal tumours. The removal of the tumorous kidney can be made by ligation of the vessels supplying the tumour or in hypothermia. This can be achieved by local cooling or by perfusion of the kidney. The kidney can also be operated extracorporeally. At the termination of the resection the kidney is autotransplanted.

Almost 100 years have elapsed since the first kidney tumor resection [4, 11]. Topley [12] reported on 23 renal tumour resections which he had collected during 24 years. He found the 5-year survival rate of his patients to be 70%. The 20-year material of the Mayo Clinic contains a total of 306 patients having been operated for renal tumour. In 23 of these cases partial nephrectomies were performed [10]. Gittes [4] removed twice during 4 years the tumour

of a solitary kidney extracorporeally, then for the third time, he rendered the kidney free of recurrence by local hypothermia and hilar compression [17]. During the operation frozen sections, too, were prepared from the marginal portions of the resected specimens. Resection for renal tumour has been dealt with in several reports also in Hungary [1, 2, 4, 5, 6, 7, 9, 13, 14, 16]. Surveying the literature, Frang et al. [3] reviewed 12 of their cases with 51-month survival.

Patients

According to investigations based on a large material, 1.8 to 3.8% of renal tumours are bilateral, these can also be synchronous and asynchronous tumours. In our department, of the 125 operated renal tumour cases studied in the recent 10 years, 2 simultaneous renal tumours, and two cases occurring in solitary kidneys were found. The most important data of the patients operated are summarized in two tables.

Table I shows the sex, age, and leading clinical symptoms of the patients and the localization of their renal tumours. In Table II, the types of incision, the prevention of hypoxia (by hypothermia, hilar compression), the histological findings and the time having elapsed since the operation are presented. In the following the clinical histories of 2 out of the 9 cases will be described.

Case Reports

N. A., a 53-year-old male patient was admitted to the department of medicine, for hypertension. Urography revealed in both kidneys a space-reducing process. In the upper pole of the left kidney a mass, the size of a man's fist, could be seen which was pressing downwards the upper and middle groups of calyces (Fig. 1). In the upper pole of the right kidney a still larger mass was present which displaced downwards arcuately the upper and middle

TABLE I

No.	Patients'		Dominant	
	sex	age	clinical symptom	side
1	male	60	haematuria	in the right upper pole of L-shaped dystonic kidney
2	male	59	loss of weight	in left solitary kidney
3	male	53	hypertension	bilateral tumour
4	male	59	pain, haematuria	left kidney
5	male	49	haematuria	left kidney
6	female	63	hypertension	left kidney
7	female	20	fever	left kidney
8	male	54	haematuria	horseshoe kidney on the right side
9	male	66	haematuria	bilateral tumour

TABLI II

No.	Incision	Type of hypothermia	Duration of arterial compression (min)	Histology	Time elapsed since operation (months)
1	transperitoneal	ligation of blood vessels supplying the tumour	—	clear-cell renal cancer	84
2	thoracolumbar	intraarterial	34	clear-cell renal cancer	died 25 months postoperatively
3	thoracolumbar	external cooling	27	left side: clear-cell renal tumour right side: renal cancer of granular plasm	72
4	thoracolumbar	primary ligation of blood vessels supplying one of the kidneys	—	hypernephroid carcinoma	48
5	thoracolumbar	external cooling	30	clear-cell renal cancer	31
6	thoracolumbar	—	20	clear-cell renal cancer	19
7	thoracolumbar	—	—	clear-cell renal cancer	250
8	transperitoneal	primary ligation of blood vessels supplying the kidney	—	clear-cell renal cancer	220
9	thoracolumbar	ligation of blood vessels supplying the tumour		left side: clear-cell renal cancer right side: renal cancer of granular plasm	27

groups of calyces (Fig. 2). The arterial phase of the angiogram shows a hyper-vascularized tumour of malignant vascular pattern in the right kidney (Fig. 3). The artery supplying the left kidney divides early at the level of the hilus. In the upper pole of the left kidney a tumour of malignant vascular pattern can be visualized, the intact lower portion of the kidney is supplied by a separate artery. The left tumour was removed by the first operation. The



FIG. 1. In the urogram both calyx-systems are distally dislocated

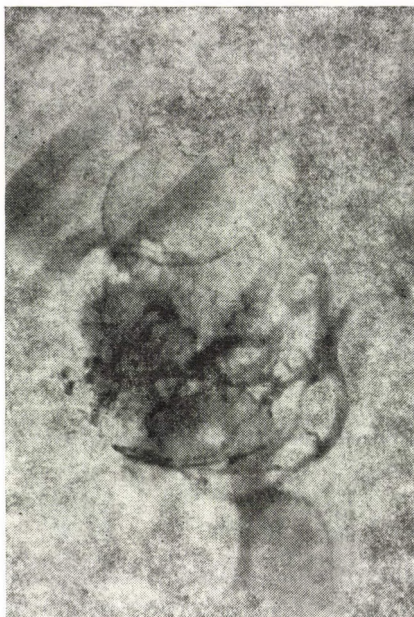


FIG. 2. Angiography reveals a malignant process in the upper two-thirds of the right kidney



FIG. 3. The malignant change in the upper pole of the left kidney is supplied by a separate artery

operation was made from a thoracolumbar incision. The hypothermia of the kidney was performed by external cooling. Hilar compression lasted for 27 minutes. In the postoperative phase azotaemia did not develop. The histological finding was clear-cell renal cancer. Three months later right nephrectomy was performed, because of the size of the tumour and the arterial supply (Fig. 4). Histology revealed a granular cell renal cancer. The patient received



FIG. 4. The control urography shows a free filling and passage of the calyces



FIG. 5. Calyces of the solitary kidney are dislocated cranially by the space-reducing process in its lower pole

Depo-Provera. Seventy-two months have elapsed since the operation, the patient has been free of recurrences.

T. I., a 49-year-old patient, was examined for macrohaematuria at the department of medicine. Urography disclosed agenesis of the right side, the left kidney raised the suspicion of a space-reducing process at its lower pole



FIG. 6. The malignant mass in the lower pole, is supplied by an artery supplying the kidney

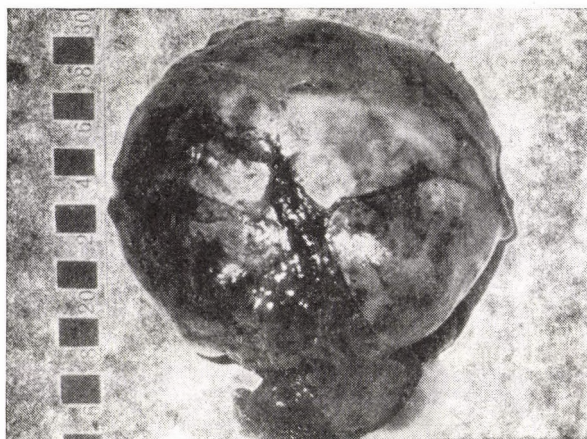


FIG. 7. The removed tumour was localized intracapsularly

(Fig. 5). The angiogram showed that the right kidney supplied by a single artery contained at its lower pole a tumour of a vascular pattern suggesting malignancy (Fig. 6). In view of a solitary kidney, partial resection of the left kidney was performed by external cooling. The capsule of the tumour extended to the renal pelvis. During enucleation, the renal pelvis opened. Figure 7 shows the picture of the resected tumour. Postoperatively, no azotaemia or urinary fistula developed. Histology disclosed a clear-cell tumour. After operation the patient received hormone therapy. The time elapsed since the operation has been 31 months, the patient has been recurrence free.

Discussion

In the case of the simultaneous development of bilateral tumours, the following therapeutic alternatives can be considered.

1. Cytostatics and irradiation therapy which can be resorted to only in the terminal stage in infaust cases.

2. Bilateral nephrectomy in advanced tumorous process when resection is technically impossible. It is to be noted that renal transplantation in such patients has so far been disapproved by both nephrologists and transplanting surgeons. In the majority of cases, however, partial renal resection is the treatment of choice.

In bilateral cases a primary tumour may be on one side, while its metastasis on the contralateral side.

Multiple tumours and the long interval between the two lesions was also indicative of metastasis. In many cases not even the histological finding is decisive. Simultaneous appearance, multiplicity and the absence of distant metastases may suggest the diagnosis of synchronously appearing tumours. Our cases were in accordance with Vermooten's theory that the clear-cell renal tumours are harboured in the cortex, their growth is expansive, they are surrounded by a connective tissue capsule which is infiltrated by the tumour only in its advanced stage. Clear-cell tumours spread via the haematogenic route. They are surrounded by a capsule and can thus be well resected. Renal tumours of a granular plasm are localized centrally, they grow by infiltration and are only surrounded by a thin capsule [8].

According to data in the literature, the majority of authors advocate resection and not enucleation [15, 17]. We regard enucleation as a better solution but if the tumour has penetrated the capsule, we too, recommend tumour resection in the intact part.

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Resektionseingriffe bei Nierentumorkranken

F. BALOGH und J. PÁNOVICS

In den 9 dargestellten Fällen handelte es sich um mit Nierenresektion operierte Nierentumoren (zwei waren bilaterale Prozesse).

Die Überlebensergebnisse der Patienten mit beidseitigem Nierentumor können als besonders gut betrachtet werden, der eine lebt 72, der andere 37 Monate seit der Operation.

Einer der Patienten mit solitärem Nierentumor starb 25 Monate nach dem Eingriff, wegen der Entwicklung einer Fernmetastase. Der andere Patient ist gegenwärtig, 31 Monate nach der Operation rezidiv- und metastasefrei.

Die angeführten Ergebnisse beweisen es, daß die frühere Stellungnahme — daß nämlich die tumoröse Niere entfernt werden muß — heute bereits überholt ist. Wie das auch die dargestellten Fälle zeigen, erfreuten sich die resezierten Nierentumorkranken einer langen Überlebenszeit. Die mit einer faserigen Kapsel gut umgrenzten hellzelligen Tumoren können leicht reseziert werden. Die Lokalisation der granulärzelligen Nierentumoren ist zentraler, sie infiltrieren ihre Umgebung häufig. Unter den gegenwärtigen technischen Verhältnissen kann die Resektion der tumorösen Niere in mit der nötigen Sorgfalt erwogenen Fällen durchgeführt werden, postoperativ erweist sich aber die 6 monatlich vorgenommene Kontrolle des Patienten mittels Urographie, Sonographie und Angiographie als unbedingt erforderlich.

Резекционные операции, произведенные больным с опухолью почек

Ф. БАЛОГ и И. ПАНОВИЧ

Авторы описывают 9 случаев опухолей почек, по поводу чего была произведена почечная резекция (в 2-х случаях двусторонняя).

Результаты переживания больных с двусторонней опухолью почек они считают особенно хорошими: один больной живет после операции 72 мес, второй больной 37 мес.

Среды больных с одиночным почечным tumor одного потеряли спустя 25 мес после операции, вследствие возникновения отдаленных метастазов. У второго больного, спустя 31 мес после операции, нет ни рецидива, ни метастазов.

Вышеописанные результаты показывают, что прежняя точка зрения, а именно — туморозная почка должна быть удалена, устарела. Как показывают приведенные в статье случаи, больные живут продолжительное время после операций резекции почечных опухолей. Светлоклеточные опухоли хорошо отграничены волокнистой капсулой, их легко резектировать. Зернистоклеточные опухоли почек располагаются более центрально, часто инфильтрируют. В тщательно продуманных случаях можно производить, в условиях сегодняшней техники, резекцию опухолевой почки, при этом должен осуществляться тщательный послеоперационный контроль больного с помощью урографического, ультразвукового и ангиографического исследований, производимых каждые 6 месяцев.

Injuries of Ureteral Lower Segment and the Bladder during Surgery

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The injuries of the lower ureteral segment and the bladder are relatively frequent during gynaecological and surgical interventions in the small pelvis.

The cases of 25 ureteral injuries observed in the period between 1976 and 1985 are now evaluated. The majority of them are complications arising due to gynaecological operations. Attention is drawn to the rise in the number of ureteral lesions connected with the progress of colic and vascular surgery. The aim of reconstructive surgical solutions is to reconstitute function and to attempt to find the organ-saving possibilities.

Bladder injuries occur most often during transurethral operations (TUR). The nature of artifactual injuries associated with TUR and the ways they are inflicted were analysed on the basis of a study of about 1000 cases.

Among the injuries due to urological operations, the lower segment of the ureter and the bladder are most at risk. The majority of the urological borderline operations is performed in the small pelvis. Therefore, the urological lesions mostly involve these organs as reviewed extensively by a number of authors in Hungary and abroad [2, 3, 5, 6].

In the present report, as the most frequently occurring complications in the lower ureteral segment and the bladder are presented based on a 10-year material (1976–1985), by only touching upon the symptoms, diagnostics, therapy as well as prevention.

The causes and incidence of the iatrogenic lesions of the lower ureteral segment in the material of our department are shown in Table I.

Studying 27 cases, Fry et al. [3] have found a similar distribution also during a period of 10 years. Gynaecological injuries are the most frequent causes. Among the surgical operations, it is observed as the complication of sigmoid colonic resections as and rectal extirpation. Recently, it has occurred during the application of vascular prostheses, proportionally to the rise in the number of vascular operations [8, 9].

Urologically, the various kinds of instrumental interventions such as the introduction of a ureteral catheter and lithotomy, may cause injuries.

The ureteral injuries during gynaecological operations are inflicted by inserting stitches through the ovarian or uterine arteries but may occur during peritonization, too. In the latter case a lesion produced by several stitches involving the ureter may occur.

TABLE I

Causes of iatrogenic injuries		No. of cases
Gynaecological	Abdominal hysterectomy	
	Ovariectomy	18
General surgical	Colonic resection	2
	Sigmoid resection	2
Urological	Ureteral catheterization	
	Dormia extraction	3
Total		25

TABLE II

Distribution of ureteral injuries

Type	No. of cases	Management	No. of cases
Suturing through	11	Ureterolysis	2
Transection by ligation	2	Deligation	8
Transection without ligation	2	End-to-end anastomosis	4
Penetration by suture	3	Ureterovesical anastomosis	3
Deflection	3	Ureterocutaneostomy	1
Combined	4	Replacement by bladder	3
		Nephrectomy	4

The types of ureteral injuries are demonstrated in Table II.

In assessing the symptoms according to the various types, also the circumstances should be considered. The most favourable case is when the injury is observed intraoperatively and on its slightest suspicion an urological examination is made.

After the operation early and late symptoms can be distinguished.

Early symptoms are lumbar pain, abdominal complaints, peritoneal irritation. Such symptoms can also be observed in the cases of partial injury, while in those penetrating the abdominal wall, the picture of urine infiltration developing within a short time, in the form of chills, fever, acute abdominal events and of urinary fistula.

In the injuries deflecting the ureter by completely suturing or inserting a stitch through its wall, the symptoms will appear only after some days or still later.

A passage disorder associated with periureteritis or oedema due to a tangential stitch would produce complaints possibly after a longer time and divert attention from the persisting ureteral lesion.

On suspicion of ureteral injury, i.v. urography and functional urography by a preamplifier are most valuable.

Ureteral stasis and pyelectasis can be detected by ultrasound, while information on the renal function is provided by the isotope renogram.

Although it is better not to expose to possible damage the injured area, there still may be an occasional need for ureteral catheterization for restoring passage.

Managing the ureteral injury, it is essential to (i) detect and solve the injury as early as possible and (ii) reconstitute physiological state by surgical reconstruction.

The various ways of management in the material of our department are shown in Table II.

Theoretically, it is the most important that (i) the injury be detected as early as possible and (ii) the recognized injury be managed immediately and the physiological state be reconstructed.

If the injury has been detected during operation, immediate reconstruction is possible. Solving ureteral injuries with some delay, in cases when complete reconstruction were not accomplished, there is a possibility for urine diversion, percutaneous nephrostomy and for a subsequent reconstruction of the injury.

Defect of the lower ureteral segment can generally be reconstructed by ureteral neoimplantation or by replacing it by the bladder wall.

Replacement by intestine of the mid-segment of the ureter or of a whole ureter can also be realized [7]. Besides, attempts have been also made to replace it by plastic grafts.

In our department ureteral lesions could mostly be solved by organ-saving operations, and nephrectomy was necessary only in a negligible number of cases.

In the past decade, there has been an increase in the number of transurethral interventions. The number of bladder injuries of urological origin has increased chiefly during transurethral operations of bladder tumours. In the period between 1976 and 1985, concerning the cause of intraoperative bladder injuries, gynaecological operation was in the background in 6 cases.

Bladder perforations were observed in 19 (2%) out of 929 transurethral operations performed in the same period.

Table III shows the distribution of transurethral interventions.

TABLE III

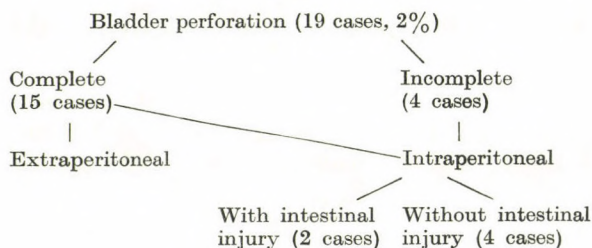
Type of operation	No. of cases
TUR	514 (55.33%)
TUC	299 (32.18%)
Lythotripsy	116 (12.49%)
Total No. of operations	929 (100%)

Eighty per cent (411 cases) of transurethral resections were due to bladder neoplasm, 20% (103 cases) to bladder neck obstruction (prostatic adenoma, malignant prostatic tumour, bladder neck contracture, sphincteral sclerosis).

The types of bladder injuries are presented in Table IV.

Bladder perforations occurred in 16 cases during transurethral resections made for bladder tumour. It can be stated that this type of operation involves

TABLE IV



the greatest risk, which has been supported by literary data, too [4, 6]. Perforation occurs most often in the posterior wall of the bladder (in 14 out of 19 cases) which can be ascribed to this being the thinnest part of the bladder. The risk of complication is also considerable in the case of operated bladder, chronic inflammation or of a small capacity.

Earlier, mainly during prostatic resection, the stimulation of the obturator nerve by producing a stray current induced a strong muscular contraction of the bladder, which in a thinner or overfilled bladder, resulted in perforation. Recently, this lesion can be avoided by high-frequency instruments.

According to our experiences, the age of the patient has a share in producing iatrogenic injuries. The average age of our cases was approximately 80 years.

Prevention is served by the functional and morphological urological examinations performed prior to gynaecological and surgical operations. Beside ultrasound and i.v. urography, isotope renography can be applied, the latter also for the follow-up of the postoperative course.

In the case of accidental bladder perforation, an immediate operation is required and the perforation opening is sutured by absorbable thread. The postoperative course is usually uneventful.

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Operativ bedingte Verletzungen des unteren Ureterdrittels und der Blase

E. BARANYAI

Im Laufe der im kleinen Becken durchgeführten gynäkologischen und chirurgischen Eingriffe kommen am häufigsten die Verletzungen des unteren Ureterdrittels und der Blase vor.

Die Daten der zwischen 1976 und 1985 beobachteten 25 Ureterverletzungen, die größtenteils als Komplikationen von gynäkologischen Operationen entstanden, werden unter die Lupe genommen. Es wird aber auch darauf hingewiesen, daß sich parallel mit der Entwicklung der Dickdarm- und Gefäßchirurgie auch die Zahl der Ureterverletzungen erhöht. Das Ziel der wiederherstellenden chirurgischen Lösungen ist ein in jeder Hinsicht befriedigendes funktionelles Ergebnis, gleichzeitig müssen aber auch die organ-konservierenden Möglichkeiten angestrebt werden.

Blasenverletzungen melden sich am häufigsten im Zusammenhang mit transurethralen Eingriffen. Anhand von nahezu 1000 Fällen werden Typen und die Verhältnisse der Entstehung der mit der TUR verbundenen iatrogenen Verletzungen analysiert.

Травмы оперативного происхождения нижнего участка мочеточника и мочевого пузыря

Э. БАРАНЯИ

Травмы нижнего участка мочеточника, мочевого пузыря в связи с оперативными вмешательствами являются самыми частыми при гинекологических и хирургических операциях, производимых в малом тазу.

Автор анализирует данные 25 травм мочеточников, отмеченных в период между 1976 и 1985 гг., которые в большинстве своем были осложнениями в связи с гинекологическими операциями. Он обращает внимание, однако, на увеличение числа мочеточниковых травм в связи с развитием сосудистой хирургии и хирургии толстого кишечника. Целью восстановительных хирургических решений является как можно более хороший функциональный результат, вместе в этом надо добиваться возможностей консервирования органов.

Чаще всего повреждения мочевого пузыря наступают в связи с трансуретральными вмешательствами. Автор анализирует характер и условия возникновения операционных повреждений, связанных с трансуретральными вмешательствами, на материале почти 1000 случаев.

The Effect of Cell Extracts of Urological Tumours on Adenovirus Mutants

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Various tumours of the urogenital system were studied whether their cells contain gene products characteristic of functioning adenovirus genes. Complementation studies were made by using tumour cell extracts and two temperature-sensitive adenovirus mutants at restrictive and permissive temperatures. The procedure was applied in *in vitro* HEp-2 cell culture. It was found that cell extracts of bladder tumour, renal tumour, malignant bladder papilloma and of penis cancer are capable of complementing adenovirus mutants at restrictive temperature, i.e. they induce the reproduction of virus mutants being otherwise incapable of replication. Thus, functioning adenovirus genes are present in the tumour cells. It seems that virus genes together with hormonal changes activate the cell proto-oncogenes giving rise to and maintaining tumours.

The aetiological role of several DNA viruses has already been contemplated in the tumorous diseases of the urogenital system [1, 13]. Since our investigations revealed antibodies to an early antigen of one of the human oncogenic adenoviruses in two-thirds of tumour patients, but no infective virus could be cultured, it was assumed that the tumour cells may contain partially functioning adenovirus genomes [1]. A new biological method, i.e. the *in vitro* complementation, has been applied for demonstrating adenovirus gene-products. The procedure essentially lies in applying such adenovirus mutants which are incapable of reproduction at restrictive temperature due to the damaged specific-structure polypeptides of the virion. Nothing else but virus genes integrated into and functioning in the tumour cells and specific proteins produced by genes are able to replace these proteins, i.e. to reproduce them [10]. If *in vivo* tumour cell extracts are capable of complementation, i.e. of replacing the missing proteins, it proves the presence of functioning active adenovirus genes in the cells which may have a role in tumor formation or in maintaining the tumour.

Material and Method

Distribution of patients according to diagnosis, age and sex is shown in Table I. The small pieces of tumour tissue removed on operation were smeared under sterile conditions followed by its suspension in a small amount of Hanks'

TABLE I
Complementation between tumour extracts and adenovirus mutants
(in percentage of patients)

Diagnosis	Sex	No. of patients	Age (yr)	Successful complementation with			
				both mutants	ts18 mutant only	ts19 mutant only	summarized
Renal adenocarcinoma	male	17	54.3+12.0	17.7	11.8	17.7	47.1
	female	7	57.2+14.2	42.9	14.3	25.6	85.7
	Total	24	55.2+12.7	25.0	12.5	25.6	58.3
Carcinoma of the urinary bladder	male	32	63.3+16.6	31.2	9.4	12.5	53.1
	female	12	67.5+ 5.1	50.0	25.0	0	75.0
	Total	44	64.5+13.4	36.4	13.6	9.1	59.1
Papilloma of the urinary bladder	male	9	60.6+10.7	0	33.3	33.3	66.7
Prostatic adenoma	male	36	67.7+14.2	0	5.6	13.9	19.5
Planocellular penile carcinoma	male	5	64.2+14.2	0	60.0	20.0	80.0
Seminoma	male	14	36.3+13.9	0	7.1	7.1	14.2
Non-tumorous urological disorders	male	11	47.9+13.2	0	18.2	9.1	27.3
	female	2	18.0	0	0	0	0
	Total	13	43.3+15.9	0	15.4	7.7	23.1

solution. Then it was centrifuged at 3000 *g* for half an hour, the supernatant was removed and its protein content measured according to Lowry [5].

Complementation was made on a continuously maintained HEp-2 cell culture. Fifty to 100 mg of tumour cell extract (protein and DNA) was placed on cells cultured in tubes according to the Ca-phosphate transfection technique [4]. Following incubation for two hours at 37 °C, the individual tubes were separately superinfected with the temperature-sensitive mutants of type 5 human adenovirus. Designation of the applied mutant viruses was ts18 and ts19, and of them, 1 TCD₁, i.e. only a minor amount was used for superinfection [7]. Then the cultures treated in two different ways were parallelly incubated at 39 °C (at restrictive) and at 32 °C (at permissive) temperatures. Successful complementation is the virus reproduction at 39 °C. The amount of reproducing viruses was titrated for calculation of the complementation index and the recombination frequency [6]. The produced infective viruses were examined by placing the tumour cell extracts on HEp-2 cells.

Results and Discussion

Successful complementation between the tumour cell extracts and virus mutants could already be judged in the majority of tumour patients within 24 hours, since it produced a light-microscopically well-detectable cytopathic effect on the HEp-2 cells kept at 39 °C. The "all or none" law applied to this phenomenon. In positive cases, the complementation index was high: 5×10^3 to 1×10^4 , while recombination was practically zero.

In the individual patient groups the ratio of tumour cell extracts capable of successful complementation was highly varying which can be judged also from Table I. It was primarily the tumour cell extracts of patients with renal and bladder tumour which were able to complement one or another virus mutant. It was striking that complementation was most successful in extracts derived from old women. Since there is a higher incidence rate of vesical tumour in men than in women, and in our material an inverse ratio was observed (see Table I), it can be supposed that in males a still smaller portion of adenovirus genomes is integrated, i.e. expressed, than in females. In the cases of atypical bladder papillomas or of penile cancer, the presence of adenovirus sequences in the tumour cell extracts could also be demonstrated. The cells of these tumours could have originated from the Wolff tube or they were ectodermal [2].

The prostate adenoma cells derived from the Müller tube as well as the seminoma cells of germinal origin contained adenovirus gene products only in a small number of cases, similar to the cells of patients, examined as controls, with ureteral bacterial inflammation or with calculi.

Concerning tumorigenesis, the positive cases in these groups can represent risk groups in the population.

It seemed to be characteristic, although in different proportions in the various groups, that functioning adenovirus genes were found in the tumour cells while in the same cases culturing of infective viruses had failed. This led to the conclusion that a part of the adenovirus genome was integrated into the renal, vesical and penile tumour cells only in the form of one or two larger segments. The functioning of these genes is particularly expressed in advanced age and, since adenovirus is hormone-sensitive, the genes can be activated by hormonal changes. The activated gene products can promote the expression of the protooncogenes of the cells and thus adenoviruses can play a role through this mechanism by triggering and maintaining malignant processes.

Although the characterization of adenovirus integrated into the tumour cells was not our primary aim, our earlier studies [1] as well as the successful intertype complementation with oncogen human adenovirus type 12, as also the early antibody titre to this type of virus present in the serum of patients, all indicated that the genome of this type of virus had integrated into the

tumour cells. As seen also in Fig. 1, the impairment of mutant on the gene map is near to coordinate 50. Genes participating in the malignant transformation are situated at the right and left end of the genes. Thus it can be assumed that integration of the two larger viral segments [3] was produced by the detection of the gene (between coordinates 53 and 63) coding the hexon antigen

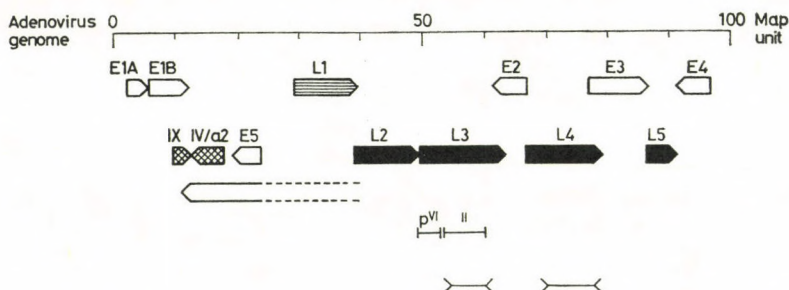


FIG. 1. Adenovirus genes with location of mutations and possible deletions. E = early genes with transforming role, L = late genes, L1-L3 = genes with role for in vivo tumorigenesis, pVI = location of mutations in the gene of polypeptide VI resulting temperature-sensitive character, II = hexone gene, >—< possible locations of deletion

of the adenovirus. The integrated genes can be activated as a result of hormonal changes [8], and their individual, possibly abnormal, gene products can activate the protooncogenes and/or the equality integrated retrovirus oncogenes [9] by overexpression or translocation [11]. This malignizing cascade mechanism may trigger and maintain tumorigenesis.

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Über die Wirkung des Zellextrakts urologischer Tumoren auf die Mutanten des Adenovirus

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In den verschiedenen Tumoren des Urogenitalsystems wurde die Frage untersucht, ob die Zellen eventuell für die funktionierende Adenovirusgene charakteristische Genprodukte enthalten. Mit den Extrakten der Tumorzellen und mit zwei wärmeempfindlichen Adenovirusmutanten wurden bei restriktiver und permissiver Temperatur Komplementationsuntersuchungen durchgeführt. Das Verfahren wurde in der *in vitro* HEP-2 Zellkultur angewandt. Es wurde festgestellt, daß die Extrakte der Blasenkrebs-, Nierenkrebszellen sowie der Zellen des maligne Entartung zeigenden Blasenkrebses und Peniskrebses bei restriktiver Temperatur imstande sind die Adenovirusmutanten zu ergänzen, d. h., daß sie die Vermehrung der ansonsten replikationsunfähigen Virusmutanten ermöglichen. In den Tumorzellen sind somit funktionierende Adenovirusgene vorhanden. Dem Anschein nach werden durch die Virusgene mitsamt den hormonalen Verschiebungen die Protoonkogene der Zellen aktiviert, die sich auf diese Weise an der Entwicklung und Aufrechterhaltung der Tumoren beteiligen können.

Влияние клеточных вытяжек из урологических опухолей на мутанты Аденовирусов

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Авторы исследовали, содержат ли клетки различных опухолей уrogenитальной системы характерные для действующих аденовирусных генов генные продукты. С вытяжками опухолевых клеток и с двумя термочувствительными мутантами аденовируса проводили исследование на комплементы при рестриктивной и пермиссивной температурах. Этот метод применяли в условиях *in vitro* на клеточной культуре HEP-2. Показали, что клеточные вытяжки из опухолей при раке мочевого пузыря и почки, при папилломе пузыря с признаками злокачественного перерождения и при раке полового члена способны к дополнению аденовирусных мутантов при рестриктивной температуре, то есть делают возможным размножение вирусных мутантов, которые в противном случае не способны к репликации. Таким образом, в опухолевых клетках присутствуют действующие гены аденовирусов. По-видимому, вирусные гены — вместе с гормональными отклонениями — активируют протоонкогены клетки, и таким образом могут принимать участие в возникновении и сохранении опухоли.

Surgical Treatment of Vesicoureteral Reflux

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Based on the critical analysis of their own material, the authors evaluate the different antireflux operations. The problems of surgical indication are dealt with. The principles applied in selecting the type of operation are reviewed and the experiences of the control examinations are reported.

Vesicoureteral reflux (VUR) having been known for about 100 years may lead without an adequate treatment, to the serious impairment (hydroureter, hydronephrosis) of the upper urinary tract. Bladder pressure increasing during micturition is shifted to the upper part of the transport system. This promotes the development of bacterial infection or the exacerbation of the already existing ureteral suppurative process [6, 10, 13]. It may be a maintaining factor of chronic pyelonephritis and may result in the destruction of the kidney. In producing reflux, not only the morphological factors of the ureterovesical junction but also the innervation of this region and the joint functions of smooth muscle elements and elastic fibres play a role. If undisturbed function is attempted to be restored by a certain type of operation, it is not sure whether it will always yield good results in seemingly identical cases. This is supported by the fact that reports on large patient materials give account of both favourable and unfavourable experiences in the same type of operation. Several surgical procedures have been developed for elimination of VUR [1, 3, 4, 5, 7, 14, 15]. Their principle is the creation of an adequately long intramural ureteral segment in the ureterovesical junction and the ensuring of ventil function. After an era giving preference to surgical treatment, the number of advocates of drug therapy has been increasing in the recent years. This does not, naturally, mean that with an adequate indication, the operation is not to be performed. In selecting the adequate therapy, some new diagnostic procedures are of help [4]. In the present study, our experiences on the surgical treatment of VUR are reported as a contribution to finding on optimal approach.

Material and Method

During a period of 10 years (1973–1982) 172 different types of operation were performed in the ureterovesical junction of 156 patients. The individual types of operation are shown in Table I. The age of the patients ranged between

TABLE I
Operations performed by us

Types of operations	No. of patients	No. of operations performed
Simple neoimplantation	57	68
Gregoir	27	27
Cohen–Cukier	29	42
Politano–Leadbetter	23	25
Glenn	1	1
Neoimplantation in the case of dilated ureter with fibrotic bladder wall	9	9
Total	156	172

2 and 67 years. Not all surgical interventions were antireflux operations. They are, however, still included in our material to be able to give a uniform opinion on our experiences (Table I).

Discussion and Experiences

For the adequate surgical indication of VUR, the accurate determination of the character of reflux is necessary. High- and low-pressure refluxes have been differentiated and the grade of VUR (ureteral and renal functions) was considered. As it has already been stated in an earlier report [4], it was found that in the case of high-pressure reflux of grades I to II, conservative treatment leads to recovery (permanent symptom-free state) and operation can be avoided in the majority of cases. In low-pressure reflux, with no stasis or dilatation of the collecting system, with the urine being infected slightly or not at all reckoning with maturation, no operation is performed but the patient is kept under strict control by permanent disinfection. Even if maturation does not occur in each case, a permanently subcompensated condition can be maintained. If during the observation period, the up to that time only ureteral reflux is spreading, dilatations of the caliceal ending occurs or the ureter becomes elongated circularly or longitudinally, these are indications for operation. The antireflux operation is performed in both children and adults in VUR of grade II to IV (low-pressure reflux, conspicuous ureteral dilatation, pyelectasia, deformity of the collecting system, destruction of the parenchyma). Secondary,

(or acquired) reflux occurs as a result of obstruction of the lower urinary tract, neurogenic causes, inflammation involving the trigonum or of injury of the orifice due to iatrogenic lesions. If after elimination of the inducing cause, the reflux does not improve, antireflux plastic operation is indicated. Substantial damage of the orifice will always make this necessary.

Criteria for Choosing between the Types of Operation

1. It should stop VUR but should not cause stasis.
2. When needed it should be performed on both sides in one session.
3. Ureteral obstruction should be eliminated simultaneously.
4. Expert skills of the team performing the operation.
5. Adequate facilities for postoperative care.

The Operations Performed by us

Simple neoinplantation: It is, in fact, not an antireflux operation. It was performed primarily in the first part of the study period for various damages of the juxtavesical portion of the ureter. If the function of the ureter has not been damaged, postoperative reflux does not occur. Of the 68 operations performed, 57 were successful, with clear urine and no reflux. In 7 cases pyuria and reflux were present but the patient was subsequently free of complaints. In 4 cases nephrectomy had to be made.

Lich-Gregoir operation: It is well adaptable in case of slightly dilated, not elongated ureters. In children it is successful in infection-free cases with the construction of an adequately long tunnel. The bladder should not be opened, the orifice has to remain in its original place. If this cannot be accomplished, another kind of antireflux technique can readily be performed. The ureter must be secured by splint. Inadequate results are most often due to the too tight insertion of sutures or the shortness of the tunnel created [1, 2, 8]. Twenty-three of the 27 operations were successful, the patients have been clinically free of symptoms. In 4 cases, antireflux plastics have been performed due to the maintained reflux.

Cohen-Cukier's operation: It is an intravesical transposition of the orifice with construction of a submucous tunnel. It was applied in moderately dilated ureters in some cases on both sides during one session [5, 9, 12]. In some patients the ureter was fixed by splint, but recovery was noted even without this. Its disadvantage is that, in the case of stasis or fever, the introduction of an ureteral catheter is practically impossible because of transposition of the orifice. Percutaneous pyelostomy can be considered instead. In our material

we have had fairly good experiences with this type of operation. Thirty-nine of the 42 operations have been successful. The patients are free of reflux, their urine is negative. In 3 cases, reflux did not cease completely, but by prolonged slight disinfection, the patient's urine became clear, there was no acute exacerbation. No introduction of ureteral catheter or pyelostomy was necessary in the postoperative period.

Politano-Leadbetter's operation: According to the classic description, it is an extra- and intravesical procedure [3, 11, 15]. With adequate skill the juxtavesical ureteral segment can be pulled through a small incision also from the side of the bladder and so exploration of the paravesical region can be avoided. It was primarily applied in the case of dilated, serpiginous ureters. Using an adequate technique, it can be performed on both sides in one session. A total of 25 operations were performed by using this procedure. Twenty-one cases were successful, in one case nephrectomy had to be made, in 3 cases, the reflux decreased, but did not cease completely.

Neointplantation in dilated ureter, with fibrotic bladder wall: In the case of a dilated ureter associated with bladder wall fibrosis, the variations of anti-reflux plastics surveyed above are not successful, because the rigid bladder wall produces postoperative stenosis in the lower ureteral segment. In these cases ureteroneocystostomy may yield the best results by constructing an intravesical tunnel from the lower segment of the ureter [14]. This type of operation was made in 9 cases. None of these patients has been completely free of symptoms and complaints but in 7 cases, the reflux stopped and in two, it decreased. Pyuria of a lesser or larger degree has remained in all of them but no acute exacerbation has been noted.

Mező-Boari's plastics: In our experiences gained from a large material [4], this in itself is not of an antireflux effect. When Boari's plastics can be considered, bladder fibrosis is always present. This is the cause that, after a technically well accomplished operation, the inflamed muscles of the created flap are scarred producing destruction at the site of the operation and a further increase in the consequential ureteral dilatation and the destruction of the parenchyma.

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Über die chirurgische Behandlung des vesikoureteralen Refluxes

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Anhand der kritischen Analyse des eigenen Krankenguts werden die verschiedenen Antirefluxoperationen ausgewertet. Eine Besprechung finden die Fragen der Operationsindikation, die bei der Auswahl des Operationstypes zu berücksichtigenden Prinzipien sowie die Erfahrungen der Kontrolluntersuchungen.

О хирургическом лечении пузырно мочеточникового рефлюкса

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На основании анализа собственного материала, авторы оценивают различные рефлюкс-тормозящие операции. Занимаются вопросом показания к операции. Знакомят с принципами выбора типа операции. Сообщают о собственном опыте проведения контрольных исследований.

Complex Treatment and Care of Prostatic Carcinoma Patients

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The authors' 5-year experience in the management and care of prostatic carcinoma are summarized. Their method differs essentially from earlier practice. They have found a new diagnostic and therapeutic method by introducing the TECO irradiation therapy, extensively using bone scintigraphy, by introducing cytostatics, extensively applying the prostate-specific acid phosphatase and by performing rectal biopsy of the prostate. They describe their own observations on the diagnostics and therapy of prostatic carcinoma. They stress that none of the therapies is the method of choice, the use of the various kinds of treatment are defined by strict indications. They state that care of prostatic cancer patients is highly important because only observation of the course of the disease may ensure the evaluation of treatment results and the indication of the adequate therapeutic method.

Management of prostatic cancer has undergone a fundamental change in the recent 10 years. Since 1942, hormone treatment has become increasingly applied in the management of the cancer of the prostate. Total prostatectomy has only been gradually gaining ground because the operation involves serious complications. The disease awareness of patients of an initial T stage is low, they present only with insignificant complaints. They accept only reluctantly operation which may result in prolonged wound healing, urethral stricture, urinary incontinence and impotence. Currently, several ways of treatment are available. The various ways of treatment extensively used in the management of prostatic carcinoma do not compete with each other, since each way of treatment has a strict indication [9]. It is not recommended to apply hormone therapy in treating prostatic cancer of stage $T_1N_0M_0$, as also to indicate irradiation or total prostatectomy in generalized prostatic carcinoma. In treating moderately malignant tumours, the results of irradiation therapy are favourable, while in the case of prostatic cancers of a higher malignancy, total prostatectomy is advisable to perform [7]. Consequently, treatment of prostatic cancer can only be a complex one.

In this report, our change in approach is presented in our own material, the special indications are described and the importance of care is emphasized.

Diagnosis

Diagnosis can be ensured in 90–95% of the cases by the simultaneous use of prostatic palpation and prostatic biopsy findings [1]. Perineal, rectal and transurethral prostatic biopsies are performed. The choice or indication of the biopsy are not incidental either. Rectal biopsy is made in prostatic cancer of initial stage, in the case of small nodules. These cannot be precisely

TABLE I
Histological grading according to Dhom

Grade I.	Mature adenocarcinoma with large acini
Grade II	Mature adenocarcinoma with small acini
Grade III	The glandular structure is destroyed, cribriform carcinoma and solid carcinoma are seen
Grade IV	Anaplastic histological picture

reached via the perineal route. Rectal biopsy is also recommended if despite the palpation finding the process is not verified histologically by perineal biopsy. In the case of larger tumours, perineal prostatic biopsy is performed. It has been pointed out in a comparative study of a total of 180 cases that the early diagnosis of prostatic cancer can only be established by rectal prostatic biopsy. Comparing our results with those of perineal biopsy, rectal biopsy has been more favourable [5]. TUR biopsy was applied in tumours penetrating into the urethra and in those of central localization [12]. Each of the methods involves a certain number of complications. Concerning the complications, none of the methods can be preferred to the other. A total of 240 patients with prostatic carcinoma have been under our care. In 232 of them single or repeated prostatic biopsies verified the process. In 8 cases, prostatic carcinoma was proved histologically only some years after the first records of these patients at our department and only the clinical pattern and the palpation finding as well as the appearance of metastases have drawn our attention to prostatic cancer. Considering that the various histological types of prostatic carcinoma are different as to prognosis and therapy, histological classification was made according to Dhom [2]. This is shown in Table I. The value of aspiration biopsy is beyond doubt. In our opinion, diagnosis should by all means be histological. A possible way of follow-up is aspiration biopsy. Consequently, prostatic biopsy offering a histological possibility cannot be missing from our arsenal.

Acid phosphatase is a marker enzyme. The detectability of metastases by the traditional method moves between 20 to 70%. Here, all organic phosphatase fractions are defined. The phosphatases of the various organs are not separated. With the advance of immunological methods and by special antigen preparation, prostatic phosphatase determination has become possible. In

our material the immunological assessment of specific prostatic phosphatase heralded clinical deterioration or the appearance of metastases in 80% of the cases [6]. This was indicated, however, by the colorimetric method only in 40% of the cases. High acid phosphatase values enable also the follow-up of therapy. Decrease in the phosphatase value implies a positive therapeutic answer. Our cases prove that decrease of the phosphatase value is clinically associated with stagnation and regression.

Radiology

Bone scintigraphy is the safest method of verifying the presence of bone metastases. By contrast with radiograms, it reveals sooner the presence of bone metastases and yields a more precise picture of them. If we attempted to perform examinations as in the case of bone scintigraphy, i.e. an assessment of the state of bones at 3- to 6-month-intervals, we would have needed a large amount of x-ray films and would have subjected our patients to a great dose of irradiation. It cannot be ignored that scintigraphy would save expenses in our institutions. Figures 2 and 3 show generalized lytic and sclerotic metastases. Bone scintigraphy is a method equally adaptable to establish a diagnosis



FIG. 1. Lytic metastases of the pelvic bones

and to monitor the disease. Figure 1 shows a positive scintigram. The patients are checked 3 to 6 monthly. With the appearance of bone metastases, the therapy having so far been directed on the prostate is modified, and generalized treatment, orchiectomy is applied or cytostatics are administered. Based on our experience, bone scintigraphy is also a marker, it provides valuable information on the actual stage of the prostatic carcinoma.

The clinical staging of prostatic carcinoma is useful, it provides a good basis for comparing therapeutic results. In Table II, the Nagel-Whitmore TNM classifications are compared. The VACURG staging considers also acid



FIG. 2. Sclerotic metastases of the pelvic bones

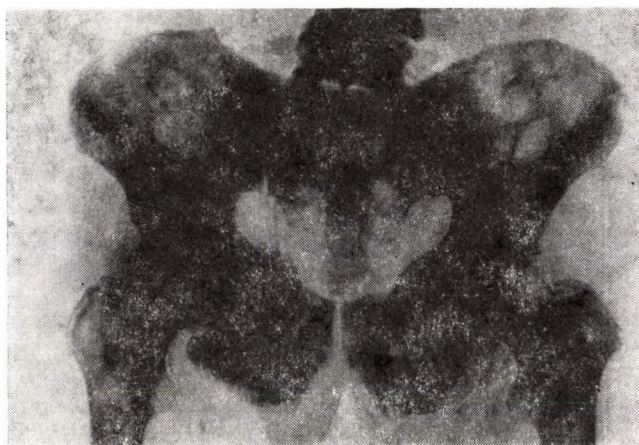


FIG. 3. An unambiguously positive bone scintigraphic finding documenting multiple bone metastases (500 MBq ^{99m}Tc -Phosphon is used)

TABLE II
Comparison of the Nagel-Whitmore TNM classification

O	A.	Histological carcinoma: T ₀
	A ₁	Grades I-II
	A ₂	Grades II-III
A	B.	Carcinoma localized to the prostate:
	T ₁ :	One nodule intracapsularly
	T ₂ :	Several nodules intracapsularly
	T ₃ :	Mobile prostatic tumour infiltrating the capsule
C	C.	Extracapsular involvement without metastasis:
	T ₄ M ₀ :	fixed prostatic tumour
D	D.	Carcinoma with metastasis:
	D ₁ :	Regional metastasis N ₁₋₃ M ₁
	D ₂ :	Distant metastases N ₄ M ₂

phosphatase. Each classification has its own shortcomings. There is practically no perfect staging but they are to the purpose and they serve clinical orientation.

Therapy

Radical prostatectomy and the high-energy (TECO) irradiation are listed under the curative therapies of prostatic carcinoma [11]. They are indicated only in carcinoma localized to the prostate. They are applied only if metastases are absent. Total prostatectomy imposes a large strain on the patient, its complications are significant. Impotence, incontinence, urine leakage, posterior urethral stricture may occur. Total prostatectomy is not performed by us due to the large number of complications. The prerequisites of high-energy irradiation are a tumour localized to the prostate, negative urine, absence of residue and an uninvolved colon and rectum. In our material, a total of 34 TECO irradiations have been performed since June 1983 at the Department of Radiology of the Pécs University Medical School. The patients tolerated the cystitis and proctitis arising due to irradiation well, these stopped within 3 to 4 weeks. Twenty-nine of the 34 patients are alive. Control biopsies were made one or one-and-a-half years following irradiation. Fifteen patients consented to the biopsy. In two of them carcinomatous tissue could be revealed after irradiation. Clinically, 20 patients were evaluated. In 10 of them the prostate could not be palpated, it was replaced by a scar. In 6 patients the prostate had become diminished. In 4 no change was noted. In these 4 patients, the irradiation therapy had to be interrupted, they did not receive a full dose. Interruption was necessary in all cases because of total urinary retention.

The discovery of hormone therapy is linked with the name of Huggins [4]. He was awarded the Nobel Prize in 1966 for proving that the decrease of testosterone level is connected with tumour regression. The listing of the effects

TABLE III
Classification of the effects of hormone therapy

Estrogen and stilbene group	Dienoestrol, Syntestrin, TACE
Gestagens	Hormofort, Norcolut
Antiandrogens	Flutamide (Fugerel), Cytoproteronacetate (Androcur)
Antiprolactins	Bromokriptine, Pravidel, Parlodel
LH-RH analogues	Superfact, Buserelin, Carcinil, Leuporelin
Adrenalectomy	Prednisolone therapy
Hypophysectomy	Bromokriptin, Parlodel, LH-RH LH-RH analogues

of hormone treatment is contained in Table III. Estrogen therapy has several targets [3]. It blocks the gonadotropic activity of the pituitary gland causing a decrease in testosterone level. Its direct blocking effect is exerted on the testicles. It binds the sexual hormones, increases the amount of globulin thereby decreasing the free testosterone level. It blocks the activity of prostatic cell reductase, and so dihydrotestosterone level of the prostatic tissue can be defined and its level may predict regression or progression. On this basis, in generalized cancer of the prostate, orchiectomy should be completed by the administration of antiandrogens to balance the extratesticular testosterone effect. Also cytoproteronacetate and flutamide, can be employed.

According to the VACURG investigations, estrogen therapy cannot be applied in cardiovascular diseases, because it increases inclination to thrombosis and worsens the vascular disease. Instead of them, administration of gestagens and antiandrogens is recommended [10]. The effect of low-dose estrogens was studied in 102 patients. The decrease of testosterone level was found not to be satisfactory. A low-dose estrogen treatment can only be a complementary one. It is applied in combination with orchiectomy or TECO irradiation. Administration of antiprolactins is indicated in the case of hyperprolactinaemia. Antiprolactin treatment by administration of 3 times 2.5 mg Parlodel per day was applied in 14 patients. Prolactin level decreased in each case. Gynaecomastia did not disappear in a single case and mastectomy had to be performed. Unfortunately, only about two-thirds of the patients tolerate Parlodel, due to vomiting, orthostatic hypotension and vertigo. The LH-RH analogues block gonadotropin formation in the pituitary gland and they saturate the LH receptors in the Leydig cells of the testicles. The drawback of the treatment is that it induces overproduction of testosterone during the first three weeks which should by all means be prevented by antiandrogens. A further disadvantage is that administration of the medicine is fairly cumbersome. Three doses of sniffing powder per day or daily one subcutaneous injection

lead to more inconvenience than a single orchiectomy. With both forms of treatment, impotence has to be reckoned with. Its benefit is that, in case of hormone resistance, the cure can be suspended. In our material we resorted to it only sporadically. Several of our patients refused to consent to the cure of daily injections. The treatment cannot be continued without hormone determination, because this is the sole proof of the patient's regularly receiving the drug.

Administration of cytostatics is advisable in prostatic carcinoma only if metastases are present or if the prostatic tumour is hormone-resistant. Hormone-resistance is considered when, in spite of the hormone level after castration, the prostatic cancer shows progression. Of the cytostatics Estracyt and Cyclophosphamide are employed. A so-called secondary cytostatic therapy is applied and it is given only in the generalized disease. The Cyclophosphamide is administered in a dose of 800 mg/m² body surface. The patients receive the drug in infusions given every 3rd or 4th week. Extracyt is given in a maintenance dose of 3 times 1 and 3 times 2 tablets per day following a pulse-therapy of 10–12 days. Cyclophosphamide treatment was applied in our material in 31 patients during a period of 5 years. In 20% of them an objective partial remission was observed if the metastases documented by scintigraphy decreased and clinical improvement was noted. In 50% of the cases, the clinical picture was unchanged, in 40% of the cases the pains diminished significantly, while in 20% only moderately. The main advantage of cytostatic therapy in the treatment of generalized prostatic carcinoma is its analgetic effect.

The total retention of prostatic cancer patients is cured by transurethral resection and cryocaustics. In 165 patients a total of 290 TUR and 40 cryocaustic operations were performed. In 8 cases, transurethral resection was made for preparing the patients with total retention, dysuria and pyuria to irradiation therapy. The patients' pyuria disappeared, they voided without residue and thus the conditions of irradiation therapy were fulfilled.

Treatment of prostatic cancer patients can be made only with continuous care. Progression or regression of the patients can be judged only in the care. The patients are summoned back for examination every three months. The necessary physical examination, the acid phosphatase and hormone level

TABLE IV
Scheme of care

3 weekly	6 weekly
blood count	bone scintigraphy
BUN, serum creatinine	possibly a bone x-ray
PAP and total phosphatase	i.v. urography
physical state	chest x-ray
category T	

determinations and the required routine laboratory tests are performed also at that time. Possible modifications of therapy or the necessity of hospitalization are indicated also on this occasion. Our method of care is demonstrated in Table IV.

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Komplexbehandlung und Betreuung der an Prostatakarzinom leidenden Patienten

D. FRANG und J. HÜBLER

Zusammengefaßt werden die 5jährigen Erfahrungen mit der Behandlung und Betreuung der an Prostatakarzinom leidenden Patienten. Die Methode unterscheidet sich in bedeutendem Maße von der früheren Praxis. Mit der Einführung der Telekobalt-Strahlenbehandlung, der Knochenszintigraphie, der Zytostatika, der Verbreitung der prostataspezifischen Säurephosphatase und der Anwendung der rektalen Prostatabiopsie, gelang die Entwicklung neuer diagnostischer und therapeutischer Methoden. Die diesbezüglichen eigenen Beobachtungen werden ausführlich beschrieben. Es wird betont, daß im Heilprozeß des Prostatakarzinoms keine Therapie eine absolute Priorität besitzt, den Einsatz der einzelnen Behandlungsverfahren bestimmen strenge Indikationen. Die Betreuung der Prostatakarzinomkranken ist von ausschlaggebender Wichtigkeit, weil ja die Auswertung der Behandlungsergebnisse und die Indizierung des entsprechenden therapeutischen Verfahrens nur durch kontinuierliche Beobachtung der Patienten möglich ist.

Комплексное лечение и патронирование больных с саркомой простаты

Д. ФРАНГ и Я. ХЮБЛЕР

Авторы обобщают свой пятилетний опыт лечения и патронирования больных с карциномой простаты. Их метод существенно отличается от бывших ранее. Они получили новый диагностический и терапевтический метод благодаря введению лучевой терапии ТЕСО, освоению костной сцинтиграфии, внедрению цитостатических препаратов, распространению определения специфической кислой фосфатазы простаты, применению ректальной биопсии простаты. Они описывают собственные наблюдения относительно диагностики и терапии карциномы простаты. Подчеркивают, что, в лечении карциномы простаты, не одна из терапий не имеет абсолютного права на существование, применение различных терапевтических методик определяется строгим и показаниями. Авторы показывают, что патронирование больных с карциномой простаты является очень важным моментом, поскольку только наблюдение за процессом болезни обеспечивает возможность оценки терапевтических результатов и показаний к применению соответствующего способа лечения.

The Significance of Early Diagnosis in the Management of Testicular Tumour Patients

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Surveying the therapeutic results of 16 testicular tumour patients treated in the recent 5 years, the authors stress, beside the generally accepted and use complex treatment, the importance of recognizing the disease in its early stage.

According to overall statistics, testicular tumours amount to 1 to 2% of the total of malignant tumours [3, 5]. Their importance is accentuated, beside their manifestation in juvenile age, by their extremely rapid progression [1]. In the recent years, the most spectacular results could be achieved in managing the tumorous disease in case of testicular tumours [6]. Currently, one of the essential procedures is retroperitoneal lymphadenectomy having previously been considered as a heroic intervention. Considerable progress has also been achieved in the field of chemotherapy [2, 4, 8].

In our department a total of 16 testicular tumour patients have been treated in the recent 5 years, with an age range of 17 to 48 years. The distribution of patients according to histological diagnosis is shown in Table I. Our seminoma patients were all over 30, while all the non-radiosensitive tumour patients under 30 years of age. The number of non-seminoma patients was 9. In our patients, beside the usual laboratory and radiological examinations (chest x-ray, urography), tumour marker examinations as well as bipedal lymphography and abdominal ultrasound examination were performed.

TABLE I

Diagnosis	No. of cases
Seminoma	6
Seminoma with anaplastic parts	1
Embryonal carcinoma + seminoma	1
Embryonal carcinoma	1
Teratocarcinoma	3
Teratoma	1
Total	16

On admission, 3.1% of the patients treated at our department were found to have extensive retroperitoneal lymph node and pulmonary metastases.

A 26-year-old patients with embryonal carcinoma had noted a hard nodule in his left testicle several years ago. The suspicion of testicular tumour had, however, been raised only on detection of the palpable retroperitoneal lymph node and of the pulmonary metastasis revealed by chest x-ray. Another 37-year-old seminoma patient was treated at the department of rheumatology for lumbar pains, then for his periodical fevers, at the department of medicine. The urogram revealed compression of the left ureter. The urological examination which was made 9 months after the appearance of the first symptoms uncovered the origins of the patient's complaints.

The third patient had noted the painless nodule in his left testicle two years prior to admission. He had not consulted a physician until he was forced to do so by the appearance of the cauda equina syndrome due to metastasis.

All three patients died soon. Complex treatment failed also in the other two patients. One of them consulted a physician almost one year after manifestation of the first symptoms, who diagnosed the process to be epididymitis

TABLE II

Patient No.	Age, yrs	Observation time	Histology	Markers	Metastasis	Survival time, yrs	Present state
1	22	4 weeks	teratocarcinoma	menotest: negative	retro-peritoneal	5	complaint-free
2	21	5 weeks	teratocarcinoma	menotest: negative AFP: 52.0 2.9	none	4	complaint-free
3	23	4 months	embryonal carcinoma	menotest: negative AFP: 550 5000	retro-peritoneal pulmonary	1.5	died
4	30	16 months	embryonal carcinoma with seminoma parts	menotest: positive AFP: over 5000, CEA: 76	retro-peritoneal pulmonary	2	died
5	17	2 weeks	teratoma	monotest: negative AFP: 11.5 below 5	none	2	complaint-free
6	30	6 weeks	embryonal carcinoma	menotest: negative AFP: below 5	none	2	complaint-free
7	37	2 months	embryonal carcinoma	menotest: negative AFT: below 5	none	2	complaint-free

and referred him to our department only with a delay of an additional half-year treatment.

The other patient was admitted to the department only 4 months after the appearance of the first symptoms because of his preparation to university examinations. In these latter two patients lung metastases were observed, beside the still operable retroperitoneal lymph node metastases. Retroperitoneal lymphadenectomy was made in 7 out of 9 non-seminoma patients. In two of them only high castration could be performed, and RLA could not be considered as a result of their inoperability. Data of the patients having undergone RLA are shown in Table II.

Complications did not appear in either of the patients. The retroperitoneum was drained in each case up to the second or third postoperative day. Leakage of lymph was observed in none of the cases. Chemotherapy of the patients was applied in the National Oncological Institute. Five of the 7 patients are currently alive and free of complaints, of them also the patients having been operated 5 years earlier, in whom during RLA a 5 by 4 by 3 cm tumorous lymph node had been removed. The two patients, who had been found to have pulmonary metastases already on starting treatment, died within one-and-a-half and two years, respectively.

The survival time of patients with malignant testicular tumour has essentially changed due to complex treatment [7].

The number of patients treated at our department was not too high as compared to the number found by other authors. Nevertheless, it provides, further data to the favourable experiences on complex treatment.

It is still a problem that the disease is recognized only in its advanced stage, partly due to an inadequate circumspection on the part of the physician and partly due to the patient's behaviour. Almost one-third of our patients had been sent to us with extensive metastases. The high ratio of our patients recognized only late calls attention to the deficiencies in patient care and health education. The up-to-date diagnostic procedures and therapeutic interventions have induced fundamental changes but they cannot replace careful history-taking and the physical examination of patients.

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Über die Bedeutung der Frühdiagnose bei der Behandlung der Patienten mit Hodentumor

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Im Laufe der Überblickung der therapeutischen Ergebnisse der im Laufe der vergangenen 5 Jahre behandelten 16, an einem Hodentumor leidenden Patienten werden die Wichtigkeit der Frühdiagnose der Krankheit sowie der Anwendung der heutzutage bereits allgemein akzeptierten Komplextherapie betont.

Значение раннего диагноза в лечении больных с опухолью яичка

Ф. ФЮРШТ и Ф. ПАЦЕЛТ

Делая обзор терапевтических результатов, достигнутых при лечении 16 больных с опухолью семенников в последние 5 лет, авторы подчеркивают важность распознавания болезни в ранней стадии, а также, в настоящее время уже повсеместно признанного и применяемого, комплексного лечения.

Primary Retroperitoneal Tumours, in the Material of our Department

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After giving a brief survey of the literature, the authors discuss the symptomatology, diagnostics and management of retroperitoneal tumours.

Four of their own cases treated between 1979 and 1985 summarized in tables are presented. All of them were operated and three of them received irradiation therapy. The fate of the first patient is unknown. The second patient survived for 24 months following the first operation, with additional three operations and irradiation on two occasions for recurrence of tumour. The third patient survived for 5 months. In the fourth, it could be revealed by ultrasound and angiography that the retroperitoneal tumour was independent of the kidney. Thus, the intact left kidney was preserved during operation. The patient died three months post-operatively at the department of pulmonology. The histological finding of the tumours of all patients was a malignant tumour of mesenchymal origin, a type of sarcoma.

Based on their experiences, the authors stress the importance of the early recognition and removal of the tumour, since the patients have a poor chance of surviving these extremely malignant sarcomas in spite of the surgical and irradiation therapies.

The term retroperitoneal tumour involves tumours of various origins based on their common anatomical localization, symptomatology, diagnostics as well as on their common surgical solution. Tumours originating from the vascular and lymphatic system, from the nerve fibres and ganglia and also from the mesenchymal adipose and connective tissue belong here. It should be differentiated from the tumours of the urogenital organs and the pancreas and from tumour metastases harboured by the retroperitoneum.

They occur very rarely, i.e. they represent only 0.03–0.3 thousandth of human tumours [10, 13, 14]. Based on an autopsy finding, it was first described by Benevieni [cit. 7]. According to some data [7], 60–90% of them are malignant, but, due to the high tendency of recurrence and malignization of the tumour described histologically to be benign, it can be considered potentially malignant. Their classification is rather divergent. The embryogenetic classification seems to be the best [12] in outlining of which only malignant tumours of mesenchymal origin will be dealt with in detail, as all four of our cases belong to this group.

Classification (Pliess 1973)

1. Mesenchymal
 - liposarcoma
 - leiomyosarcoma
 - myosarcoma
 - fibrosarcoma
 - mesenchymoma
2. Epithelial
3. Neurogenic
4. Teratoid

Five per cent of overall retroperitoneal tumours is of mesenchymal origin [12]. They are followed in order of their incidence, by those of neurogenic, epithelial and finally, by those of teratogenic origin. Retroperitoneal tumours are encountered by the surgeon, gynaecologist, urologist and in diagnosing them by the radiologist. The urologist is concerned with these tumours because the urinary duct is involved. From the Hungarian literature, the reports of the surgeons Gönci et al. [7], Pákozdy [11], of the radiologists Kónya and Vadon [9], among the urologists of Bors et al. [1], Jármay et al. [8] as well as Brenner and Molnár [3] are mentioned.

The clinical symptoms are not characteristic, they are connected with the localization and size of the tumour. On an average, 3 to 6 months may elapse between the appearance of the first symptoms and the establishing of the diagnosis [5]. In the overwhelming majority of cases, the abdominal diameter increases with a palpable mass or vague abdominal or lumbar pain. With the growth of the tumour, gastrointestinal complaints, due to the lifting up of the diaphragm, dyspnoea may ensue.

One-third of the patients presents with urological complaints (renal colic, bladder complaints, lumbar pains, varicocele). The general symptoms associated with tumour also appear, i.e. weakness, anaemia, loss of weight. Occasionally there also may be some gain in weight because of a bulky tumour. The so-called hormone-active tumours may produce characteristic symptoms, as e.g. fibrosarcoma may cause hypoglycaemia by producing insulin-like materials [2].

Diagnostics

No specific examination is available for detecting the tumours of the peritoneum. During physical examination a large abdominal mass may be palpable which cannot be removed from the posterior wall and does not follow the respiratory movements. Of the laboratory tests, beside data characteristic of the tumour, the vanilin amygdalic acid and catecholamine (phaeochromo-

cytoma) concentrations of the urine and in the serum the testicular tumour markers (in the case of extragonadal testicular tumour) can be specific [2].

Occasionally the plain radiograph may show the contours of the tumour, dislocation of the kidney, disappearance of the psoas contour and calcifications in the projection of the tumour. Intravenous urography, retrograde pyelography may reveal the involvement and dislocation of the urinary tract as well as the passage disorders. Angiography may be useful in examining the vascularization of the tumour and of the dislocation of the large vessels, while cavography in detecting dislocation and obstruction. The occasional lymphogenic origin, lymph node metastasis or obstruction of lymph flow can be disclosed by lymphography. The abdominal ultrasound and CT are used for clarifying the localization and extension of the tumour and its relation to other organs.

Treatment

Surgical treatment means the radical removal of the tumour. On establishing the diagnosis, only 32 to 36% of retroperitoneal tumours are operable [11]. Operative mortality is very high, i.e. 15 to 25% [13]. The inadequacy of

TABLE I

More important data of the four patients with retroperitoneal tumour treated at the Department of Urology of the Ujpest Hospital

Case No.	Name	Sex	Age	From the first symptom to diagnosis, months	Date of operations	Survival time	Histology
1	V. J.	male	55	13	23, 5, 79	unknown	polymorpho-cell sarcoma
2	P. R.	female	56	2	9, 11, 82 18, 11, 82 8, 6, 83 24, 1, 84	24 months	myxoid liposarcoma
3	B. T.	male	39	1	12, 8, 84	5 months	lipo-myxosarcoma
4	L. Gy.	female	64	12	4, 12, 84	3 months	pleomorphic liposarcoma

the surgical treatment in itself is shown by the fact that, following radical operation, the average survival is three months [13] and the three-year survival rate is 13% [4]. Radiotherapy can be used for the palliative treatment of inoperable tumours or in the hope of their becoming operable. Beside this, postoperative irradiation can also be considered. Particularly the undifferentiated tumours of mesenchymal origin are radiosensitive [13]. Combined

systemic cytostatic treatment can be attempted, however with a questionable result.

At the Department of Urology of the Újpest Hospital since 1979 four patients have been treated for primary retroperitoneal tumour. All tumours were found histologically to be of mesenchymal origin, they were various types of liposarcoma. Some characteristic data of the four patients are summarized in Table I.

All four patients were operated, three of them were subjected to radiotherapy, too. Patient 2 in Table I, who had been operated four times because of tumour recurrences during a period of two years, was irradiated twice. This patient survived for 24 months after the first operation, the other two died 3 and 5 months following the first operation after removal of the retroperitoneal tumour due to tumour metastasis. Of the cases in Table I, only the documentation of the fourth patient is presented.

Case Report

L. Gy., a 64-year-old female patient was admitted to the department of medicine for abdominal pains in the left flank and loss of weight having started 12 months. She was transferred to us because of suspicion of renal tumour.



FIG. 1. The urogram shows good excretion and free flow in the left kidney, the cavital system of the left kidney is dislocated medially



FIG. 2. The retrograde pyelogram shows the cavital system of the left kidney dislocated medially and cranially and discloses that the ureter is localized in the projection of the spine



FIG. 3. The abdominal aortography and the selective left renal arteriography reveal a hypovascular tumour of retroperitoneal origin filling the left abdominal region, which dislocates the aorta to the right and ventrally and the left kidney medially and cranically. There is no tumorous involvement in the kidney

Six months prior to her admission the protrusion on her left lumbar region had been observed but it was ascribed to the deformity of the spine. Physical examination revealed the left abdominal region to be above the level of the chest, the costolumbar region was filled with a hard mass which protruded forward in to the pelvis. Of her laboratory tests, the sedimentation rate of 50 mm/h should be mentioned. The retroperitoneal tumour as well as its unattachment to the kidney could be preoperatively demonstrated by the examinations performed, i.e. urography (Fig. 1), retrograde pyelography (Fig. 2), abdominal aortography and selective left renal arteriography (Fig. 3). During operation a hard tumour of 25 cm in diameter, consisting of several pieces and attached to bones and muscles was removed from a lumboinguinal incision. The intact left kidney was preserved. The result of the histological examination was pleomorphous liposarcoma. Her postoperative period was prolonged. The patient was transferred to the department of pulmonology due to her asthma, where she died three months postoperatively.

Our experiences and data of the literature show that the management of retroperitoneal tumours is far from being solved. The improvement of the results can be expected of the earliest possible recognition of the disease for which further development of diagnostic possibilities can be of help. At present, the combined application of an early radical operation and irradiation offer the best results.

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Primäre retroperitoneale Tumoren im Krankengut der Abteilung

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Nach kurzem Überblick des Schrifttums finden Symptomatologie, Diagnostik und Therapie der retroperitonealen Tumoren eine Besprechung.

Die Daten der vier, zwischen 1979 und 1985 behandelten Fälle sind in Tabellen dargestellt. Alle vier Patienten wurden operiert, drei von ihnen erhielten auch eine Strahlenbehandlung. Das Schicksal des ersten Patienten ist unbekannt, der zweite lebte nach dem Eingriff noch 24 Monate lang, in der Zwischenzeit kam es bei ihm wegen eines Tumorzidivs noch dreimal zu einer Operation und zweimal zur Strahlenbehandlung. Im vierten Fall konnte es mittels Ultraschall und Angiographie nachgewiesen werden, daß der retroperitoneale Tumor von der Niere unabhängig ist, so daß im Laufe der Operation die intakte linke Niere beibehalten wurde. Der Patient starb drei Monate nach dem Eingriff an der Lungenabteilung. Die histologischen Befunde sprachen in sämtlichen Fällen für einen malignen Tumor mesenchymalen Ursprungs, für irgendeinen Sarkomtyp.

Aufgrund der Erfahrungen wird die Wichtigkeit der Frühdiagnose und der Frühentfernung des Tumors betont, zumal diese äußerst bösartigen Sarkome den Patienten, trotz chirurgischer- und Strahlenbehandlung nur geringe Überlebenschancen bieten.

Первичные ретроперитонеальные опухоли в материале нашего отделения

Ш. КОТТАС и Э. БРОУШИЛ

После краткого литературного обзора, авторы обсуждают симптоматику, диагностику и терапию ретроперитонеальных опухолей.

На таблицах они демонстрируют собственные наблюдения четырех больных, которых лечили между 1979 и 1985 гг. Всем четырем больным была произведена операция, трое из них получили также лучевую терапию. Судьба первого больного не известна. Второй больной жил 24 месяца после первой операции, за этот период он перенес из-за рецидивов еще три операции и дважды лучевую терапию. Третий больной после операции жил пять месяцев. С помощью ультразвука и ангиографии удалось показать, что у четвертого больного ретроперитонеальная опухоль не связана с почками, поэтому при операции удалось сохранить интактную левую почку. Спустя три месяца после операции больной умер в легочном отделении. Гистологический анализ показал, что у всех больных была злокачественная опухоль мезентериального происхождения, какой-либо вид саркомы.

На основании собственного опыта, авторы подчеркивают важность раннего распознавания и удаления опухоли, поскольку эти чрезвычайно злокачественные саркомы дают мало шансов на выживание, несмотря на хирургическое и лучевое лечение.

Retroperitoneal Tumour of Rare Histology and Manifestation

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The operated and cured case of fibrous histiocytoma, a retroperitoneal tumour of rare histological structure, unusual localization and size is reported.

Fibrous histiocytoma of a relatively rare histological structure and of connective tissue origin was first described by Oberling in the retroperitoneum presenting signs of inflammatory xanthogranuloma and a varied histological picture. With the same histology, malignant and benign course alike is possible.

This tumour has for a long time been detected in the skin or connected with the synovial ligaments. It has become evident only recently that it may originate also in deeply situated soft parts.

Case Report

P. M., a 59-year-old female patient, was admitted to our department for the first time November 22, 1980. Prior to this, she had been referred to the department of surgery of the Semmelweis Hospital, where, on suspicion of gallbladder perforation supported by a mass palpable under the right costal arch and a febrile state, laparotomy had been performed. No pathological change had been found in the organs of the abdominal cavity, however, a mass 14 cm in diameter, was palpated on the right side of the retroperitoneum.

In her physical status the about 10 by 10 cm, hardly sensitive mass, palpable under the right costal arch is to be pointed out.

Laboratory findings: Urine: neg. Wass., negative, WBC: 9,200, Hg: 13.3 g%, blood sugar: 5.7 mmol/l, BUN: 4.9 mmol/l, serum creatinine: 79, serum bilirubin 17, thymol: 14, blood pressure: 160/100, sedimentation rate: 112 mm/h.

Urography: Stone cannot be visualized, the left kidney is slightly enlarged as a whole, the left ureter and the cavital system are duplicated, on the left kidney is displaced downwards, with about a density of the soft parts, the size of 14 cm in diameter.

Angiography and selective arteriography of the right side. The density on the urography can be a cyst originating either in the liver or the retroperitoneum. The right kidney is dislocated by the described mass caudally and medially.

The patient was prepared for operation. She, however, left on her own responsibility referring to personal causes. For the second time she was admit-

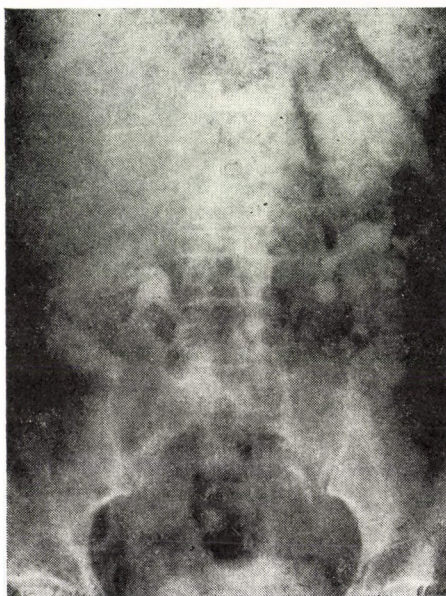


FIG. 1. A mass of about 10 by 10 mm over the right kidney



FIG. 2. Operative state

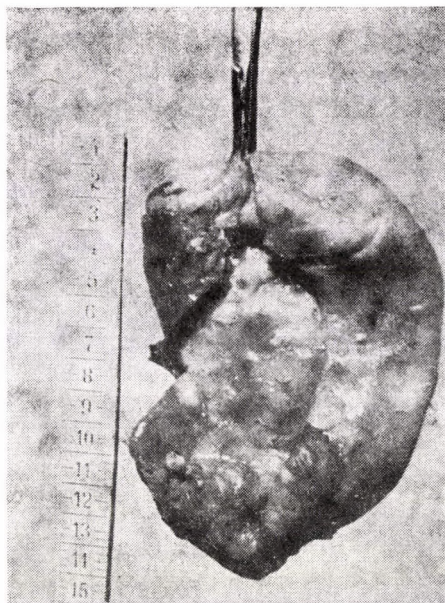


FIG. 3. The removed tumour

ted on 28th April, 1981. There was an improvement in her general condition, she gained some weight. In comparison to her earlier state, only the sedimentation rate of 65 mm/h is to be mentioned. For judging the extension and site of the also at that time palpable mass, diagnostic pneumoperitoneum was made that revealed the mass not to be attached to the kidney and to be sharply demarcated from its surroundings. On 18th May, 1984, the kidney and the retroperitoneum were explored from an oblique lumbar incision by resection of the 12th rib.

Above the kidney, a smooth-surfaced, elastic, cystous mass of a diameter of about 10 by 10 cm was visible being unattached to the kidney, and displacing it downwards with the adrenal gland closely adhering to it. For this reason, about half of the adrenal gland was also resected. The cystous mass was dissected on all sides. It had no major supplying vessel running to it. The mobile kidney was fixed to the psoas muscle.

On the first postoperative day, the electrocardiogram of the patient complaining about retrosternal pains, showed septal myocardial infarction, therefore, the patient was transferred to the intensive care unit. Then, due to a subsequently appearing febrile state, which was an associated symptom of pneumonia, she was transferred to the 2nd Department of Medicine from where she was discharged cured. The recent control examination has revealed her to be symptom- and complaint-free.

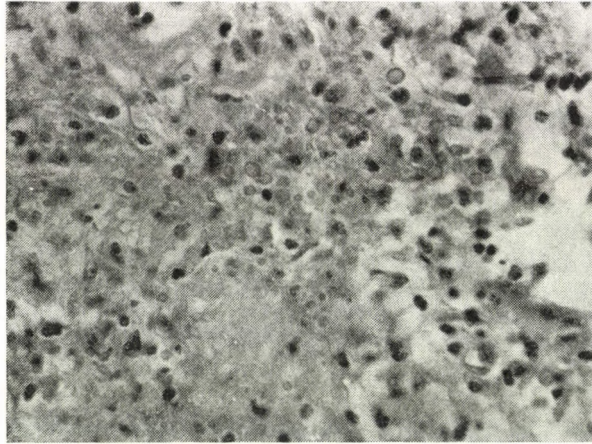


FIG. 4. Calcification in the tumour

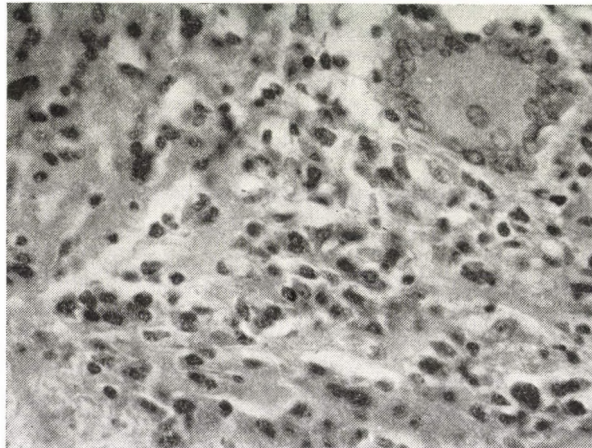


FIG. 5. Giant cell in the tumour

In our case, it is about a fibrous histiocytoma occurring in the retroperitoneal region of which mention has already been made in the latest handbooks. Histologically, the tumour represents a morphologically strange transition between a reactive granulomatous change and a tumour. Its structure is composed of histiocytes of a vacuolated cytoplasm presumably containing cholesterol, that is how the tumour gets its name from, as also fibroblasts, partly haemosiderin and partly giant cell containing a fatty substance.

Calcification may also occur in the kidney. It generally shows infiltrative growth and has a tendency to recur.

With the present histological type, the future behaviour of the tumour can be both malignant and benign. An extremely malignant, atypical form

of the tumour displaying necroses and cell multiplication is also known. This, in all cases, has a clinical course of unambiguously bad prognosis.

In the present case, despite the infiltrative character underlying the usual histological pattern, the rarely occurring tumour shows a relatively benign course.

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Retroperitonealer Tumor mit seltenem zytologischem Aufbau und seltener Erscheinungsform

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Im dargestellten Fall handelt es sich um ein operiertes, geheiltes Histiocytom; der retroperitoneale Tumor war von seltenem histologischem Aufbau, ungewöhnlicher Lokalisation und ungewöhnlicher Größe.

Ретроперитонеальная опухоль с редкой гистологической картиной и формой проявления

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Авторы описывают случай ретроперитонеальной опухоли — фиброзной гистиоцитомы, которая имела редкую гистологическую структуру, располагалась на необычном месте и была необыкновенного размера. Больной был прооперирован и выздоровел.

Percutaneous Technique in the Diagnostics and Therapy of Renal Diseases

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Based on the literature and of their own experience, authors deal with the possibility of the percutaneous approach of renal diseases. Of the diagnostic and therapeutic interventions, they report their experience regarding percutaneous nephrolithotomic investigative methods employed in the differential diagnosis of renal masses. During a period of one-and-a-half years, percutaneous nephrostomy was performed in 130 cases, of them in 64 for removing stones. In 48 cases of renal tumours revealed to be cystous structures by ultrasonography, puncture controlled by ultrasound was made. Based on the cytological and chemical analyses of the samples obtained by puncture, exploration was made in 6 cases for suspicion of malignancy. The requirements of the application of the percutaneous technique is discussed.

In the diagnostics of the so-called internal renal diseases, renal needle biopsy has been a pioneering procedure of the percutaneous technique. Although it has already happened in the practice of urological surgeons that they were forced to perform puncture of a distended renal calyceal system or of a purulent sacciform kidney, the percutaneous approach of urological renal diseases has become a routine procedure only in the past decade. More than 20 years had to elapse after the first trocar nephrostomy of Goodwin and Casey [6] in 1966 that the regions be outlined where with either diagnostic or therapeutic purpose, the construction of a renal fistula is advisable [2, 5, 8, 12, 18]. In addition to a safe fistula, it seemed reasonable to develop an endoscopic instrument which enables good orientation and manipulation within the renal cavity. Conditions have been established for considering the percutaneous technique as a therapeutic alternative to open surgery of the renal cavital system [4, 11, 16, 19].

Application, Own Experience

Artificial renal fistula was constructed primarily as an emergency intervention [2, 8]. In cases of acute urinary obstruction, due either to a septic state or to anuria, ensuring of the urine flow is a life-saving procedure. The first percutaneous diversion of the urine flow was made when introduction of

the traditional ureteral catheter was impossible due to technical difficulties, and open surgery was not enabled by the patient's condition.

Percutaneous diversion of the urine flow can be made also in subacute or chronic cases, (i) as a provisional solution, in the case of ureteral injuries inflicted by gynaecological or surgical operations, or (ii) transrenal drainage can offer a final solution, in the case of inoperable tumours of the pelvis or bladder.

Possibilities offered by percutaneous nephrostomy (PCN) are being more extensively exploited for diagnostic purposes [20].

1. In the case of radiolucent obstructive ureteral stones, percutaneous filling with a contrast agent may show the site and degree of occlusion and can, at the same time, yield information on the morphology of the cavital system overneath the calculus.

2. Direct visualization of the renal cavital system offers a possibility of establishing an accurate diagnosis and in certain cases a final solution (nephrolithotomy, biopsy or resection).

3. According to i.v. urography or isotope renography, PCN may serve a double purpose in the cases of the so-called silent kidneys. (i) It may provide information partly on the morphology of the cavital system and on the presence and extent of obstruction, and (ii) partly, maintaining it for 2 to 3 weeks, the type of operation to be performed (organ conservation or nephrectomy) can be defined safely by renal function tests.

4. It can be a valuable aid in clarifying dilatations of the cavital system and functional disorders (occlusion, atony, impaired parenchyma) after ureterovesical (UV) or pyeloureteral (PU) plastic operations.

5. Pressure measurement of the cavital system through a percutaneous fistula is recommended for excluding or confirming the obstructive origin of dilatations of the renal cavital system.

In certain renal diseases, interventions equal to open surgery can be performed through PCN.

1. The possibility of the percutaneous or endoscopic removal of renal stones has, in the recent years, revolutionarized urological surgery [1, 15]. After widening of the fistular opening, minor calculi can be removed through the nephroscope. The larger ones can be crushed by ultrasound probe, percussion wave generator or by endoscopic probe.

2. Percutaneous suction and sclerotization of renal cysts may represent an alternative to open decompression operations. Arresting by coagulation or resection of the excretory function of the cyst wall is a well-known procedure as is the endoscopic marsupialization in the case of parapelvic cysts.

3. Endoscopic elimination (the so-called pyelolysis or endoplasty, dilatation) of the strictures of the pyeloureteral (PU) junction has been gaining ground.

4. Some authors prefer resection through PCN to the open operations in certain types of tumours of the renal cavital system.

The diagnostic and therapeutic conditions of applying the percutaneous technique have been gradually evolving in the recent three years at the Department of Urology of the Postgraduate Medical School. Initially, we

TABLE I
Indications of PCN

Indications	No. of cases
1. As primary intervention after the ureteral injuries due to gynaecological operations	14
2. As provisional or final solution in case of gynaecological or other tumours of the small pelvis	20
3. For clarifying morphologically the so-called silent kidneys or for functional assessment	12
4. Measuring of pressure through dilatations of the cavital system of obscure origin	5
5. In the case of tumour of the prostate, if it infiltrates the orifice	4
6. For the morphological clarification of the cavital system of patients with uric acid calculi	3
7. For percutaneous stone removal	68
8. For clarification of flow obstacle and functional disorders occurring after UV and PU junctional plastic operations	4
Total	130

TABLE II
Main characteristics of 64 percutaneous stone removals

Calculi localization	No.	Mode of removal		No. of interventions		Results	
		direct mechanical stone extraction	Ultrasonic lithotripsy	single	multiple	calculus-free	residual stone
Caliceal stone	10	7	3	10		9	1
Renal pelvic stone	24	15	9	18	6	24	
Caliceal and renal pelvic stone	22	13	9*	16	6	20	2
Calculus in the upper ureteral segment	5	5	0	5		5	
Staghorn calculus	3		3**	0	3	2	1
Total	64						

* Use of a flexible nephroscope was necessary; ** Use of ureteroscope was needed

TABLE III
Complications of 64 percutaneous stone removals

Inflammation	Bleeding		Perforation of the cavit system	
	transfusion	exploration	observation	exploration
5	5	0	4	2

TABLE IV
Results of punctures of renal masses proved to be cystose structures by ultrasonography

Ultrasono- graphy	Cytology		Chemical examination of the sample obtained by puncture (triglyceride, cholesterol)	
	negative	positive	normal	pathological
Cyst 36	35	1	34	2
Uncertain 12	9	3	9	3

have become experienced in the field of performing diagnostic punctures guided by a TV image amplifier and of antegrade urographies. After the appearance of percutaneous sets and the routine application of ultrasonography with transducer, we switched to constructing PCNs adaptable to therapeutic interventions.

Percutaneous lithotomies completed by the regular use of ureteroscope have been systematically made from November 1985. Diagnostic puncture of renal cysts, in some cases, combined with sclerotization has been made also for one year.

Classification according to indications of the 130 percutaneous nephrostomies performed at our department is shown in Table I.

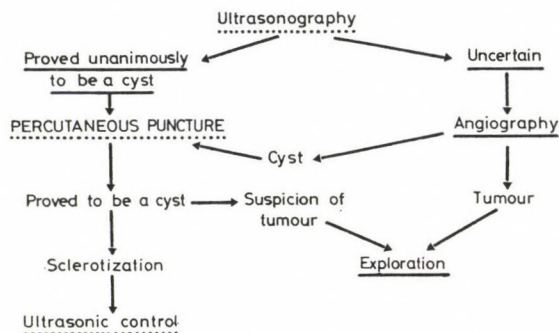


FIG. 1. Examination algorithm of cystous renal structure

The more important characteristics of percutaneous stone removal is shown in Table II, while the complications are summarized in Table III.

Another large group of therapeutic interventions is constituted by renal punctures and their sclerotization. In the recent two years, ultrasound diagnostics and aimed punctures have had a decisive role in the differential diagnostics of renal space-reducing processes [3, 7, 9, 22]. The algorithm of investigations applied at our department of renal masses revealed by ultrasonography to be cysts is shown in Fig. 1. Table IV summarizes the results of the examinations of the samples obtained by puncture of 48 cystose renal masses.

Discussion

The technical progress made in the past decade has opened up new vistas in medical practice. In addition to attempts in noninvasive diagnostic and therapeutic interventions, the endoscopic treatment of the diseases has become a real alternative to open operations. Endoscopic solutions have come to the foreground in urological practice, primarily in the diseases of the lower urinary tract (stone, tumour, stricture).

After the routine use of PCN and the introduction of ureterorenoscopes, some urologists have arrived at the conclusion that in certain renal diseases (stone, tumour, stricture of the pyeloureteral junction) PC technique can completely oust open operations from the surgeons repertoire.

For a urological surgeon of a functional approach, the observation, according to which all these interventions can be fully performed on the kidney by using the percutaneous technique, is not acceptable considering the limitless variational possibilities faced in everyday practice, the renal cavital system questions already in itself, the practical realization of theoretical possibilities (e.g. the percutaneous removal of stones filling out the caliceal endings of orthograde localization, resections of tumour harboured in a narrow intrarenal portion of the renal pelvis).

Reports in the literature unanimously reveal that endoscopic solution of PU junctional strictures maintaining dilatations of the cavital system can be successful only in certain cases [13].

In cases, where stone formation is due to local, intrarenal causes, even if the stone can be removed percutaneously, the intervention cannot at all be considered to be curative. According to the literature, in such types of calculi, the number of residual and recurring calculi is significantly higher after the application of the percutaneous technique than following open operations [17]. About 70–80% of stones of the renal cavital system are considered suitable for percutaneous solution. Unsuccessful termination due to unexpected causes (i.e. bleeding, technical error, etc.) is also deduced from this ratio. Beyond the

strictly professional aspects, neither the personal nor the technical conditions of the procedure can be ignored.

The percutaneous technique is gaining ground because it can be employed with benefit in the so-called patients at risk. The complications during anaesthesia can be prevented and, depending on the patient's condition, it can be interrupted at any time and repeated within a short period. It cannot be disregarded either that the patient becomes fit to work already several weeks earlier after the intervention. All these statements are true only if proper technical facilities are available. One of these basic requirements is a high-resolution ultrasonograph with transducer [10], by which the cavital system can be punctured, according to the planned intervention, at the optimal site. The contents of the renal cyst can be estimated and so the partial emptying necessary for sclerotization can be solved without difficulty. The number, size and localization of calculi can be assessed precisely. An adequately movable operating table and a TV image amplifier equally increase safety, while the theoretical advantages promote realization.

It is not advisable to start removing a renal calculus percutaneously without having a flexible nephroscope and equipment needed for ureteroscopy. It occurred three times in our own material that, performing lithotripsy by ultrasound, some stone fragments passed from the renal pelvis into the caliceal endings. Their removal without a flexible instrument is possible only by repeated puncturing or after a longer manipulation. In two cases, some minor stone pieces entered the lower or mid-segment of the ureter after pulling of the ureteral catheter used at lithotripsy. Their removal without ureteroscope could have been solved only with open operation, for the avoiding of which percutaneous intervention was made. Removal from the cavital system of calculi which could not be crushed by the available ultrasonic probe imposed some difficulties. In lack of an electrohydraulic generator [14] or of a probe, the removal of the stone without open surgery essentially prolonged the time of the intervention. In two cases, the stone in the branch of the calyx approached from the direction of the hydrocalyx could not have been removed without a cold knife introducer through the endoscope. All these examples illustrate that the nephroscope completed with one or two stone-grasping forceps and possibly with an ultrasound probe does not mean that even the seemingly most simple stone of the cavital system can be removed safely in each case without an open operation. Open surgery can naturally occur even with the most skilled surgeon with perfect technical facilities, working on the basis of an adequate indication.

It is not advisable therefore to start a percutaneous intervention under such circumstances that in the case of complications it may end up as an open operation. Consequently, the practice having been adopted in several places, that the intervention is commenced by roentgenologists at the x-ray unit and

the patients are transferred for the termination into the urological operating theatre, cannot be approved of at all.

In summary, it can be said that the percutaneous approach of renal diseases has revolutionarized renal surgery. Owing to the exaggerated, ill-considered expansion of the fields of indication concerning some disease, it is not advantageous in each case for the patient. Attempts should by all means be made that, where personal conditions are given, the advantages of the percutaneous operation based on adequate indications be implementable by raising the technical equipment and the conditions of the operating theatre to an adequate level.

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Perkutane Technik in der Diagnostik und Therapie der Nierenkrankheiten

P. MAGASI und A. KARSZA

Die Arbeit befaßt sich anhand der Literatur und der eigenen Praxis mit den Möglichkeiten der perkutanen Annäherung der Nierenkrankheiten. Unter den diagnostischen und therapeutischen Eingriffen wird über die Erfahrungen mit der perkutanen Stein Entfernung und der Differentialdiagnose der Nierengebilde berichtet. Im Verlauf von anderthalb Jahren wurde in 130 Fällen perkutane Nephrostomie durchgeführt, in 64 dieser Fälle zwecks Stein Entfernung. In 48 der Fälle, in denen die US-Untersuchung ein zystöses Gebilde nachwies wurde US-Leitungspunktion vorgenommen. Anhand des zytologischen und chemischen Befundes des Punktats kam es wegen eines Malignitätsverdachts zur Freilegung. Schließlich wird das Bedingungssystem der Anwendung der perkutanen Technik ausführlich besprochen.

Перкутанная техника в диагностике и терапии почечных заболеваний

П. МАГАШИ и А. КАРСА

Основываясь на данных литературы и собственной практике, авторы в своем сообщении занимаются возможностями перкутанного доступа при болезнях почек. Из диагностических и терапевтических вмешательств они сообщают о собственном опыте, приобретенном при применении исследовательского метода в дифференциальной диагностике почечных териме и при перкутанном удалении почечных камней. В течение полуторогодового периода в 130 случаях они произвели перкутанную нефростомию, среди них в 64 случаях с целью удаления камней. Среди почечных териме в 48 случаях, диагностированных с помощью ультразвука как цистозные образования, была произведена пункция под управлением ультразвука. На основании цитологического и химического анализов в 6 случаях, из-за подозрения на злокачественность образования, пришлось сделать вскрытие. В обсуждении авторы анализируют систему условий применения перкутанной техники.

Uroandrology I. Andrological Importance of Epididymal Functions and Diseases

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The evaluation, from the andrological point of view, of epididymal functions is made with an emphasis on the necessity of incorporating new knowledge into practical andrology. The andrological importance of the most common epididymal diseases and the more important modes of their correction are reviewed.

Execution of demographic policy in Hungary has set up growing demands for andrological therapy. It has become obvious that andrological therapy, currently not always efficient, can make a step forward only when it utilizes effectively the new results completing the classic andrological knowledge of biochemistry, immunology, genetics and other branches of interdisciplinary science. There has been a growing demand for accelerating the practical application of this new body of knowledge. One of the main trends of the more target-oriented andrological research has inclined towards a less studied organ, the epididymis.

Functions and Andrological Importance of the Epididymis

The currently known functions of the epididymis are summarized in Table I.

Reservoir Function

The storage of sperms is a function of the epididymis known for a long time. The epididymis possessing an about 4 cm long tubular system is an

TABLE I
Functions of the epididymis

Reservoir
Maturative
Secretory
Transport

extremely adequate "garage" for the sperms conveyed from the testis which undergo different qualitative changes up to their leaving through the deferent duct.

Maturation Function

Sperms in the epididymis undergo significant maturation processes. It is here that the spermatozoa acquire their final "sharpened" form after the reduction of chromosomes. As a result of their maturation, the epididymal sperms become more valuable, and as compared to the sperms of the testicle, their fertility increases fivefolds [6]. According to the literature, the sperms being stored and maturing in the different portions of the epididymis, differ in fertility. The fertility of sperms originating in the tail of the epididymis is significantly higher than of those from the head or the body of the epididymis [2].

Secretory Function

This is one of the most frequently studied fields of andrology. Biochemical processes occurring in the epididymis change both the composition of the spermatic plasma as well as the internal environment (active membrane function) of the sperm. The secretory product of the epididymis is rich in protein, glycogen, lactic acid, carnitine and glycerol phosphorylcholine. These substances serve partly as energy sources for the protozoon or they promote in other ways the movement of the sperm (by carnitine, a lipid metabolic catalyst). The specific glycoprotein "coat" of the sperm being conveyed through the epididymis is important in the initial linkage to the pellucid zone of the oocyte [8]. The maturation of the protozoa in the epididymis has been proved to be directed and controlled by an androgenic effect. There is a great number of still not fully estimable data on the andrological role of cyclic AMP, potassium incorporation or that of "forward motility protein" also of epididymal implications. Concerning the andrological significance of the secretory activity of the epididymis, it may suffice to refer to the excellent and detailed analytical work of Glander [4].

Transporting Function

The common role of the epididymal and ductal junction in conveying the spermatozoa has already been raised by Molnár et al. [7]. This region rich in muscular tissue is likely to play a central role in producing the deferent duct peristaltics during ejaculation and in forwarding the ejaculate. It deserves particular consideration in correcting diseases involving this region (unsuccessful deferent duct replacement by deferent prosthesis).

The above observations on the functions of the epididymis may well seem to be of theoretical nature which, however, they are not. Several of them can be effectively used in everyday therapeutics and diagnostics of andrological practice. It will suffice to refer to the artificial epididymal reservoir constructed with the knowledge of reservoir function, or to the insemination principles formulated during the analysis of the maturative function. However, its diagnostic activity based on its secretory function cannot be ignored either (significance of spermatocytic plasm markers) [5, 15].

Diseases of the Epididymis and their Andrological Significance

Following is a survey of the andrological implications of epididymal diseases. Table II shows the more common diseases of the epididymis.

Developmental Disorders

Developmental anomalies of the epididymis and the junction between the epididymis and the deferent duct are frequent. Their andrological importance is attached to the atresia of the deferent duct as a result of herniations

TABLE II
Diseases of the epididymis

Congenital	Defects
	Cysts
	Obstructions
	Herniations
	Tumours
Acquired	Inflammations
	Tuberculosis
	Gonorrhoea
	Obstructions
	Scarring
	Injuries

due to the absence of the development of organ parts. Congenital direct atresias are less frequent. The obstruction of the deferent duct may lead to obliteration azoospermia which can be diagnosed by the adequate classic andrological investigative methods (deferentography, measuring of pH), or, more recently, by demonstrating from the ejaculate the absence of biochemical markers characterizing the epididymis (carnitine, GPC) [13]. The solution is furnished by vasoepididymoanastomosis reconstructing the passage which was first performed in Hungary by Babics in 1942 and which has currently become a routine procedure of microsurgery [9, 10].

Epididymal Cysts

The epididymal cysts with water-clear contents or occasionally containing a milk-like fluid play an andrological role only by producing, due to their size, compression of the epididymal substance. Their solution is made today from a direct, minor scrotal skin incision also by microsurgical methods. In 1978 Molnár et al. [6] found changes characteristic of these sperms (neck and middle piece deformities, decreased motility, change in enzyme activity) during the biochemical and electron microscopic studies of the contents of spermatoceles [6].

Epididymal Tumours

Tumours of the epididymis are rare and, according to the literature, 70% of them are benign. Their andrological importance is conveyed by the fact that on detection of an epididymal mass, in most cases epididymectomy is still performed. This is the result of the not always simple differentiation of the separate mass of the epididymis attached to the scrotum, although in the recent years, several malignant tumours originating from the testis and penetrating the epididymis (T₃ stage of testicular tumour) have been observed. Of the benign epididymal tumours, the so-called adenomatoid tumour is the most prevalent, which has been observed also by us [12]. Surveying the distribution and therapeutic possibilities of the male genitals, among them, the tumours of the epididymis, have recently been summarized in the Hungarian literature by Frang [3].

Inflammatory Diseases

Inflammations developing in the epididymis may cause, beside the atresia and scarring of the deferent duct, appearing as late complications, also a transitory mucousness of the ejaculum, which decreases the motility of spermatozoa (inflammatory mucus) by increasing the viscosity of the spermatic plasma. This pathological picture results not infrequently in haemospermia, particularly in its chronic form [11]. Scarring or atresia of the deferent duct causing loss of fertility, if adequate treatment of trivial inflammations including also an aimed antibiotic therapy is performed, develops at present only rarely. At the same time, efficacious curing of chronic epididymitis requires great patience and expertise from the physician. The importance of the bacterial culture of the ejaculum inevitable for establishing diagnosis and adjusting an effective treatment, and the increasing number of iatrogenic noxae (unnecessary catheterization, instrumental examinations) should be pointed out. Solution of the scars developed and of compressions was made by Schoysmann by epididymolysis [14].

Gonorrhoeal Epididymitis

While in the material of Molnár (1975), bilateral gonorrhoeal epididymitis was found to be the most prevalent among passage disorders of the deferent duct, as a result of adequate antibiotic treatment, only sporadic cases occur.

Specific Epididymitis

Although of the urological organs, epididymis is the preferred organ of postprimary tuberculosis, scarring due to specific inflammation in everyday andrological practice is virtually not observed. This is also due to the fact that on suspicion of specific epididymitis, a tuberculotic pretreatment is followed by the removal of the epididymis. Thus, concerning fertility the product of the testis of the respective side is of no significance.

Injuries

Isolated injuries of the epididymis are rare. In case of penetrating injuries, epididymectomy, and if the injury is associated with prolapse of the testicular parenchyma, castration are to be performed. Logically, in this case the chance of fertility is subject to the state of the contralateral testicle.

Discussion

The prerequisite of up-to-date andrological therapy is that, beside incorporating a growing body of knowledge, earlier knowledge, too, should be evaluated and re-evaluated. The latest knowledge on epididymal functions has made the emergence of new therapeutic activities possible, while the development of diagnostics has led to a more accurate exploration of the changes and to the application of more effective treatment.

New surgical procedures (i.e. artificial spermatocele, various microsurgical VEA types) emerging, as a result of examinations of the functions and diseases of the epididymis, and conservative treatments currently represent additional possibilities in the otherwise poor andrological therapy.

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Uroandrologie I. Andrologische Bedeutung der Funktionen und Erkrankungen des Nebenhodens

GY. PAPP

Im Zusammenhang mit der Auswertung der Nebenhodenfunktionen aus der Sicht der Andrologie wird auf die Notwendigkeit der Einfügung dieser neuen Kenntnisse in die praktische Andrologie hingewiesen. Hiernach werden die andrologische Bedeutung und die Korrektionsmöglichkeiten der häufigsten Nebenhodenkrankheiten überblickt.

Уроандрология I. Андрологическое значение функций и заболеваний придатка яичника

ДЬ. ПАПП

Автор производит оценку функций придатка яичка с андрологической точки зрения; указывая на необходимость включения в практическую андрологию новых знаний. Затем он рассматривает андрологическое значение наиболее известных болезней яичка и главные способы их коррекции.

Removal of Renal Tumours from Thoracoabdominal Incision

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It is stressed that the 5-year survival in the T₃ stage renal tumour patients is decisively influenced by the radical removal of the tumorous kidney. It is, however, often difficult to secure radicality. According to the authors' experience, radicality can be ensured by extrapleural throacoabdominal incision also in the case of large renal tumours. This way of exploration combines the advantages of both the abdominal and high lumbar incisions. It facilitates postoperative care by making thoracic drainage unnecessary.

From January 1, 1979 to January 1, 1987, a total of 93 renal tumour patients were operated. The staging of the patients is shown in Table I, while the types of surgical incision in Table II. In this report, problems arising during removal of the tumorous kidney are summarized. The various modes of surgical

TABLE I

Stage distribution of tumorous nephrectomies performed between 1979 and 1986

Stage	No. of cases
T ₁ N ₀ M _{0-x}	2 (both can be accidental findings)
T ₂ N ₀ M _{0-x}	13
T ₂ N _x M _{0-x}	11
T ₂ N ₂ M _{0-x}	3
T ₂ N _x M ₁	2
T ₃ N ₀ M _{0-x}	24
T ₃ N _x M _{0-x}	13
T ₃ N ₂ M _{0-x}	10
T ₃ N ₂ M ₁	4
T ₃ N ₄ M ₁	1
T ₄ N _x M _{0-x}	2
T ₄ N ₂ M _{0-x}	1
T ₄ N _x M ₁	4
T ₄ N ₂ M ₁	1
T ₄ N ₄ M ₁	2
Total	93

Note: The staging of lymph nodes was made on the basis of histological findings. In case of N_x, no lymph node was removed. In cases of M_{0-x}, due to inadequate diagnostic possibilities, distant metastases could not be excluded, the examinations, however, did not disclose any distant metastases.

TABLE II

Surgical incisions in case of radical nephrectomy (between 1979 and 1986)

Incision	No. of cases
Thoracoabdominal (intrapleural)	4
Transperitoneal	19
Thoracoabdominal (extrapleural)	28
Extended lumbotomy (with rib resection)	30
Nagamatsu's	5
Simple lumbotomy	7
Total	93

exploration based on experience obtained in the past decade at our department are indicated.

It is indisputable that the survival of patients with renal tumour in stages T_{2-3} , N_{0-1} , M_0 is decisively affected by the ablative, radical removal of the renal tumour and by dissection of the regional lymph nodes [1, 2, 3, 4, 5, 6, 7, 8, 10, 11]. The essential difference between the 5-year survival results of the radical tumour removal and the so-called simple nephrectomy was pointed out by Skinner et al. in 1971. In accordance with their data, we, too, observed this change. The 30% 5-year survival rate in 1960 has changed into 55% after the extensive use of radical operations.

In the case of radical nephrectomy, for prevention of the intraoperative closure of tumour cells, first the renal artery, then the renal vein are ligated. The renal tumour is removed "en block" together with the perirenal fatty capsule, with the adrenal gland, the ureter, the testicular or ovarian vein.

The radical nephrectomies were made through transperitoneal, intra- or extrapleural thoracoabdominal, lumbar incisions completed by costal resection. The mode of surgical incision was selected in each case according to the size, stage or local extension of the tumour, the age and other changes of the patient [12].

Under the age of 65, radical nephrectomy and lymphadenectomy are made, in the majority of cases, from a transabdominal or extrapleural thoracoabdominal incision. In patients over 65, abdominal exploration is only sporadically indicated. According to our experience, lumbotomy completed by rib resection (or in case of larger tumour, Nagamatsu's incision) impose less strain on the patients. Otherwise, in the presence of certain risk factors, in patients under 65 years of age, these latter two incisions are suggested for radical operation depending on the size of the tumour.

The staging of the patients reveals that the renal tumours to be removed belonged to stage T_3 , N_{0-2} , M_{0-x} . Primary hilar management from a transperitoneal incision could be made in each case in a way reported earlier with a tumour either on the right or the left side. Nephrectomy posed some problem

also if the tumorous kidney was located high up, or if the tumour was harboured by the upper pole and/or if the tumour largely infiltrated the retroperitoneum. In such cases it is almost impossible to mobilize and remove a renal tumour through a transperitoneal incision, since it is difficult to explore the suprahilar region. Nephrectomy can be performed in these cases from right intra-, or extrapleural thoracoabdominal incision.

In Hungary, the extrapleural throacoabdominal incision has not been extensively practised, therefore, based on our favourable experiences, the more important technical details and benefits of the operation are reviewed.

The patient is placed obliquely at an angle of 45° in the lateral position. The incision is made at the height of the XIth rib, following the course running transversely through the upper portion of the abdomen up to the pararectal line, then it is carried toward the mons pubis (Fig. 1). After resection of the XIth rib, the pleura together with the diaphragm becomes visible, removal of the XIIth rib is necessary only in some cases [9].

After transection of the abdominal muscles, the abdominal cavity is opened. The small intestines should not be lifted in front of the abdominal wall in each case, because the patient is lying on the operating table at an angle of 45° in the lateral position and so, in the majority of cases, the small intestines are displaced to the contralateral side from the region of the operation.

Management of the hilus is made as in transabdominal incision (Figs 2, 3).

Following management of the hilus, the kidney is removed extraperitoneally and so it is easier to isolate the tumorous kidney since the fascia of Gerota can be separated stepwise from the peritoneum (Fig. 4). Bleeding from the wide collateral vessels can be prevented or can be easier arrested since dissection of the kidney is made under visual control. By performing a large incision the traction or compression of the tumorous kidney can be avoided.

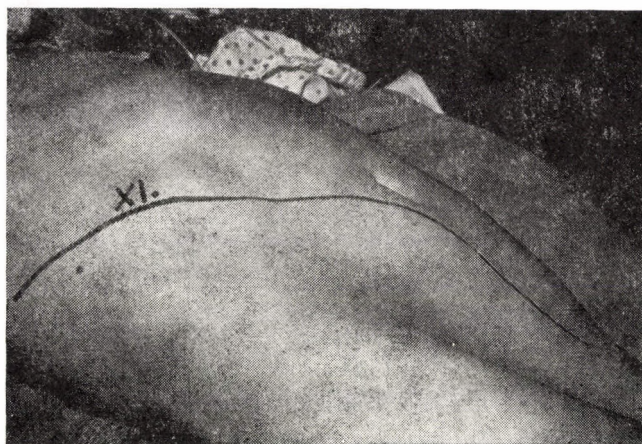


FIG. 1. Extrapleural thoracoabdominal incision

This type of incision facilitates the removal of suprahilar lymph node metastases, or of other lymph nodes (Figs 5, 6).

Radical removal of the tumour is rendered problematic by a tumour thrombus harboured in the renal vein or the vena cava. Prior to the removal



FIG. 2. Isolation of the right renal artery (R.R.A.) between the vena cava and the aorta, below the left renal vein (L.R.V.)

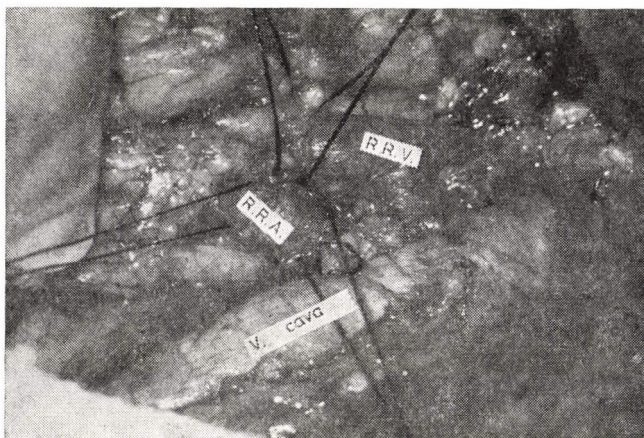


FIG. 3. After lifting of the right renal vein (R.R.V.), the right renal artery (R.R.A.) can be isolated beside the vena cava



FIG. 4. Radically removed kidney



FIG. 5. Metastasis below the vena cava



FIG. 6. State after removal of the metastasis

of a right renal tumour of stage T₃, it is advisable to perform cavography in each case. The vena cava is isolated depending on the size and localization of the thrombus. The incision made on the vena cava is closed by placing continuous sutures. The thrombus present in the vena cava can be removed through a modified thoracoabdominal extrapleural incision. Suprahilar isolation of the vena cava renders manipulation safe.

Finally, it should be stressed that the modified extrapleural thoracoabdominal incision combines the advantages of both abdominal and of the high lumbar incision. On the one hand, primary vascular supply can be managed from a transabdominal incision, while on the other, also a large renal tumour can easily be removed from an extrapleural thoracotomy incision without the opening of the thoracic cavity. Also regional lymphadenectomy can be performed and, if necessary, the tumour thrombus can also be removed from the vena cava.

Extrapleural manipulation can prevent the development of occasional pleural inflammatory processes and may facilitate the postoperative care of patients since no thoracic drainage is necessary.

During the 20 extrapleural thoracoabdominal explorations performed in the recent years no surgical complications have been observed. Due to its benefits, it is becoming more widely used.

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Nierentumorentfernung aus extrapleuraler thorakoabdominaler Freilegung

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Das 5 Jahresüberleben der sich im Stadium T₃ befindlichen Nierentumorkranken wird durch die Radikalentfernung der tumorösen Niere in bedeutendem Maße beeinflusst. Die Gewährleistung der Radikalität erweist sich indessen manchmal als schwierig. Die Erfahrungen sprechen dafür, daß mit extrapleuraler thorakoabdominaler Freilegung die Radikalität auch im Falle großer Nierentumoren gesichert werden kann. Diese Eindringung vereinigt nämlich die Vorteile der abdominalen und der hohen lumbalen Inzision, außerdem wird auf diese Weise auch die Nachbehandlung erleichtert, indem sich die thorakale Absaugung erübrigt.

Удаление опухоли почки из экстраплеврального торакоабдоминального доступа

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Авторы подчеркивают, что, на пятилетнее выживание больных с опухолью почки, решающее влияние оказывает радикальное удаление в T₃ стадии пораженной опухолью почки. Обеспечение радикальности однако иногда трудноразрешимо. Опыт авторов показывает, что, при экстраплевральном торакоабдоминальном доступе, можно обеспечить радикальное удаление и больших почечных опухолей, так как этот доступ объединяет достоинства абдоминального и высокого люмбального разрезов. Кроме того, он облегчает также послеоперационный уход, так как делает излишним дренаж грудной клетки.

Procedures Increasing the Effectivity of Percutaneous Nephrolithotomy

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The advantages of percutaneous nephrolithotomy are reviewed and the difficulties are pointed out. During more than 100 successful nephrolithotomies it was found that stones or their fragments often drift away during manipulation into lateral or upper calices which cannot be visualized by a rigid nephroscope. Thus, removal of calculi was possible only by an auxiliary manipulation and so it took more time. To prevent this, an occlusive catheter was introduced, simultaneously with the ureteral catheter, into the renal cavital system and by blocking the balloon, the orifice of the calices was closed. In the case of multiple stones, two calices were simultaneously punctured and the two nephroscopes introduced were alternately applied during ultrasonic crushing of the stone, depending on which of the two instruments was closer. The modifications introduced by the author have significantly reduced the time of the operation and increased the effectivity of the procedure.

In the recent years, a unique change has been experienced with the appearance of new nephrolithotomic procedures in the history of urology. The technique of the percutaneous removal of renal calculi has been widely spreading in the western part of Europe. This can be traced back to the years of 1983 and 1984 [1, 2, 3, 4, 5, 9]. With not too much delay, the first steps have also been taken in Hungary [6, 7, 8]. Development has been continuous ever since. At the same time, the extracorporeal lithotripter equipments appearing at the beginning of the 80s have become more extensively used, and in places where enough of them were available, this resulted in a significant decrease in the number of percutaneous stone removals. Currently, not only the huge coral calculi but those lodged in any ureteral segment can be crushed successfully without risk [10]. Still, for us, who do not possess the very expensive extracorporeal lithotriptors, percutaneous stone removal should be the stone removal of choice in the suitable cases in centres provided with adequate expertise and equipment.

The rapid spread of percutaneous stone removal is adequately explained by its not insignificant advantages which are as follows.

1. Penetration into the kidney incurs only a slight tissue damage.
2. In skilled hands, the operation lasts for a short time and puts the patient to little inconvenience. The postoperative nursing period is brief, the patient can return to work within a short time.

3. In recurrent operations, the difficulties of dissecting out the kidney can be avoided.
4. It can be performed under local anaesthesia.
5. It can be repeated several times and interrupted at any time.
6. In the case of emergency, it can be continued by exploration of the kidney, the operation is rendered difficult by the advanced percutaneous intervention.

In addition to its advantages, percutaneous stone removal poses some problems. These should by all means be reckoned with. The operating surgeon should master the endoscopic technique and be at the same time well-versed in handling x-ray and ultrasonograph and in evaluating the pictures.

The intervention is composed of an infinite number of unknown events. The errors produced will add to the number of complications and mean, at the same time, the failure of removing the stone, i.e. its removal should be postponed by a second intervention.

Until competent skills are acquired, the intervention may often take quite a long time (this may affect the patient as well as the work of the operating team). In Hungary, where the very expensive endourological operating theatres are available from the start only in a limited number of places, difficulties arising from activities with the not quite adequate technical equipments should also be overcome. The time required for stone removal depends, beside the expertise of the operating surgeon and his team, on (i) the patient's organism, (ii) the anatomy of the kidney, and (iii) the characteristics of the stone to be removed.

Of our over 100 successful percutaneous nephrolithotomies only two will be dealt with in brief in the present report without discussing the separate details of the procedure. Also the author's modification, which increases the efficacy of the intervention, is going to be reviewed.

Under conditions which can be considered normal, with the average technical difficulties, one of the most frequent problems was that the calculus or its fragment was drifting during the manipulation, from its original position to a caliceal ending which could not be visualized by a rigid nephroscope.

Under such circumstances, the stone could be removed only by applying auxiliary procedures which took much more time and often made, repeated intervention necessary.

The stone that had drifted into an upper or lateral caliceal ending was either washed out by a vigorous lavage through an angiographic catheter or was attempted to be extracted by a Dormia basket.

Our modification comprised the prevention of the drifting away of the stone. For this purpose a single-balloon ureteral catheter of varying thickness [3, 4, 5 Ch] with a thin guiding wire and an occlusive catheter, were introduced

possibly high (i.e. 35 cm) into the renal cavital system, via the ureter, simultaneously with the previous introduction of the ureteral catheter. Subsequently, balloon blocking was pulled back under x-ray control to the required place, while this was made under fluoroscopic control at the orifice of the upper



FIG. 1. Stone of the renal pelvis with the balloon of an occlusive catheter over it

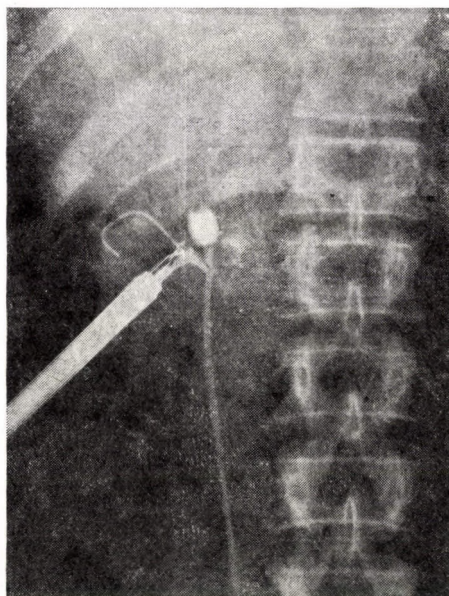


FIG. 2. Balloon of an occlusive catheter filled with contrast agent with a stone of the renal pelvis and guiding wires underneath it

lateral branch of the calix (Figs 1, 2). The advantages of the procedure are shown in the summarizing Table I. Difficulties with migration of calculi are often encountered during removal of multiple stones, particularly if there were larger stones requiring crushing among them. The stones were crushed by a Storz ultrasonic lithotripter. The stone entered the not visualizable lateral



FIG. 3. Multiple caliceal calculi, renal pelvic and ureteral stones. Plain x-ray



FIG. 4. Pyelogram, multiple caliceal, renal pelvic and ureteral stones

TABLE I
Necessary interventions in 10 patients with dislocated stones

No. of patients* without an occlusive catheter	No. of interventions	
	by patients	total
4	2	8
3	3	9
2 repeated punctures	3	6
1	4	4
10		27

* Average duration of interventions: 50 min; Average amount of irrigation fluid used: 6-8 l/intervention

In 6 patients with an occlusive catheter, nephrolithotomy was without problem. Average duration of interventions: 30 min; Average amount of irrigation fluid used: 3-4 l/intervention

caliceal ending, partly under the effect of the perfusing fluid and partly due to the touching of by the lithotripter probe the surface of the stone, making further crushing impossible.

In preventing this, the simultaneous puncture and dilatation of the two separate calyces and introduction of a nephroscope were performed manipulating alternately through them, depending on which tract the stone to be crushed was being lodged in (Figs 3, 4, 5).

Using the two procedures surveyed, the effect of percutaneous interventions could be enhanced by reducing the time of percutaneous stone removals as well as by decreasing the number of repetitions.



FIG. 5. Guiding wires introduced through two different caliceal endings

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Über die, den Erfolg der perkutanen Nierensteinentfernung steigernden Verfahren

E. ROSDY

Die Vorteile und Schwierigkeiten der perkutanen Nierensteinentfernung werden überblickt. Die im Laufe der erfolgreichen Entfernung von mehr als 100 Nierensteinen ermittelten Erfahrungen sprechen dafür, daß im Laufe der Manipulation Steine oder Steinfragmente häufig in seitliche oder obere Kelche verschwenkt werden, die mit dem steifen Nephroskop nicht mehr überblickt werden können. Demzufolge war die Entfernung der Steine nur mit einer, mehr Zeit in Anspruch nehmenden Hilfsmanipulation möglich. Um diesem Ereignis vorzubeugen wurde mitsamt dem Ureterenkatheter auch ein Okklusionskatheter in das Hohlsystem der Niere eingeführt und die Öffnung der Kelche durch Blockierung des Ballons verschlossen. Im Falle von multiplen Steinen wurden zwei Kelche simultan punktiert und die eingeführten beiden Nephroskope im Laufe der Ultraschall-Steinzertrümmerung abwechselnd angewandt, davon abhängig, welchem Gerät der Stein näher lag. Durch diese Modifikationen konnten die Operationsdauer wesentlich verkürzt und die Wirksamkeit des Verfahrens gesteigert werden.

О методах, повышающих эффективность перкутанного удаления почечных камней

Э. РОШДИ

Автор рассматривает преимущества перкутанного удаления почечных камней, указывает на трудности этого метода. В ходе более, чем 100 удачных удалений почечных камней, выяснилось, что, во время манипуляции, камни или их фрагменты часто уносятся в такие верхние или боковые почечные чашки, которые не просматриваются негибким нефроскопом. Поэтому удалять камни было возможно только с помощью вспомогательных действий, что требовало большего времени. Для предотвращения этого, одновременно с мочеоточниковым катетером вводили закрывающий катетер в полостную систему почки, и блокированием баллона закрывали чашечные отверстия. При множественных камнях производили пункцию двух чашечек и применяли два введенных нефроскопа, меняя их в ходе ультразвукового размоложения камней, в зависимости от того, к какому из инструментов был камень ближе расположен. Введенные автором модификации значительно сократили время операции и увеличили эффективность этого способа.

The Echographic Examination of Urological Homogeneous Masses Based on 15 Years of Experience

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Based on his 15 years' experience, the author described the ultrasound diagnostics of urological homogeneous masses. He stresses that, of the diagnostic examinations, always the less inconvenient intervention imposing the least strain on the patients should be selected.

The reliability of ultrasonic diagnosis is verified by the authors' own results.

The introduction of ultrasonic diagnostics has facilitated the establishment of an accurate diagnosis for the practising urologist. It has reduced the time of examination and essentially decreased the number of examinations involving the risk of iatrogenic injury [1, 2, 6].

In 1973, Leopold [8] reported on the ultrasonic diagnosis of retroperitoneal space-reducing processes. Goldberg et al. [7] examined 150, and Davidts et al. [4] 146 urological patients.

In Hungary, reports on ultrasonic diagnosis were published at the end of the 60s and at the beginning of the 70s.

In 1970 Falus et al. [5] published a summarizing study on the ultrasonic diagnosis of urological diseases.

Method

Each ultrasonic diagnostic equipment fulfills a threefold task, such as

1. it transforms electric to sound energy
2. it perceives the emitted echoes
3. and, finally, it transforms them to electric signals which can be visualized on the oscilloscope.

The parenchymatous and hollow organs, such as the kidneys, the para-aortic lymph nodes, the urethra, the prostate as well as the intrascrotal processes can be well visualized on the oscilloscope (Table I).

TABLE I
The use of ultrasonography

<i>Kidney</i>	cyst tumour polycysts hydronephrosis agenesia pyonephrosis subcapsular haemat. calculus tuberculous cavern
<i>Retroperitoneum</i>	paranephric abscess lymph node tumour recurrence
<i>Bladder</i>	papilloma diverticulum stone urinary retention
<i>Prostate</i>	adenoma neoplasm abscess
<i>Scrotum</i>	hydrocele testicular tumour testicular torsion hernia

In the recent 15 years, the diagnostics of urological diseases has been completed by ultrasound diagnosis. In the present report only the ultrasonic diagnosis of acoustically homogeneous masses is dealt with [9, 10, 11].

I. Kidney

1. The echo pattern appears in circular, oval or elliptic forms [12]. It shows an expressed reflectivity given by the capsule. Since being filled with fluid, no echo spikes are seen within the cyst wall (Fig. 1).

2. In the case of hydronephrosis, the echo-free region is not regular (Fig. 2).

3. In showing a tuberculous cavern, the capsule does not give a reflection of smooth contours. Depending on the contents of the cavern, solitary echo spikes are seen within the mass (Fig. 3).

4. The diagnosis of vascular tumours can be established in most cases intraoperatively, since they cannot be safely differentiated either by angiography or by ultrasonic diagnosis (Fig. 4).

5. Polycystic diseases can be revealed only in middle age due partly to the symptoms and partly to the roentgeneological changes. By using ultrasonography, it is possible to form a diagnosis prior to the development of the deformities of the cavital system (Fig. 5).

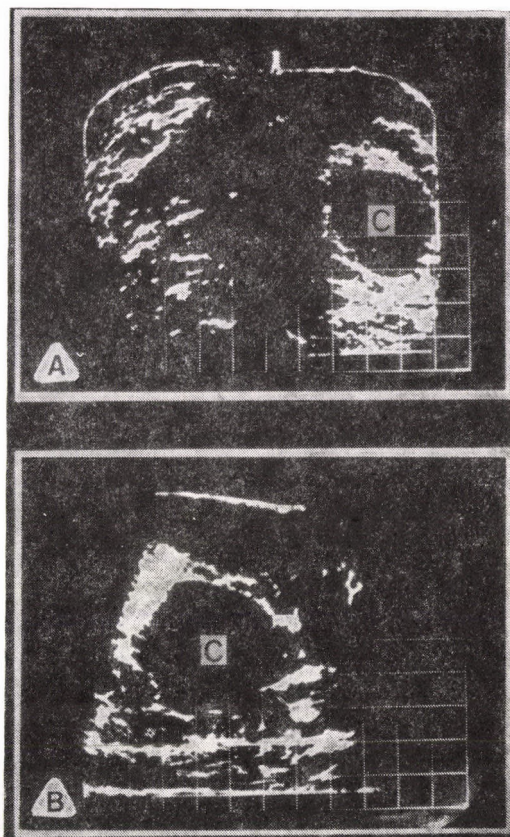


FIG. 1. Transverse (A) and longitudinal (B) scans of a right renal cyst (C)

II. Determination of the urine retained in the *bladder* was attempted also by B scan and gray-scale diagnostic equipments. According to experiences, the accuracy of the method by the two equipments is almost identical (Fig. 6).

III. In diagnosing *intrascrotal* processes the characteristic reflectivity of hydrocele can be observed (Fig. 7).

Results and Discussion

Most ultrasonic diagnostic studies were made for differentiation of renal tumours and cysts.

Beside the ultrasound diagnosis of 1,18 renal cysts, angiography was performed in 22.9%, retrograde pyelography in 4.2% and pneumoretroperitoneum in 6.8% of the cases (Fig. 8).

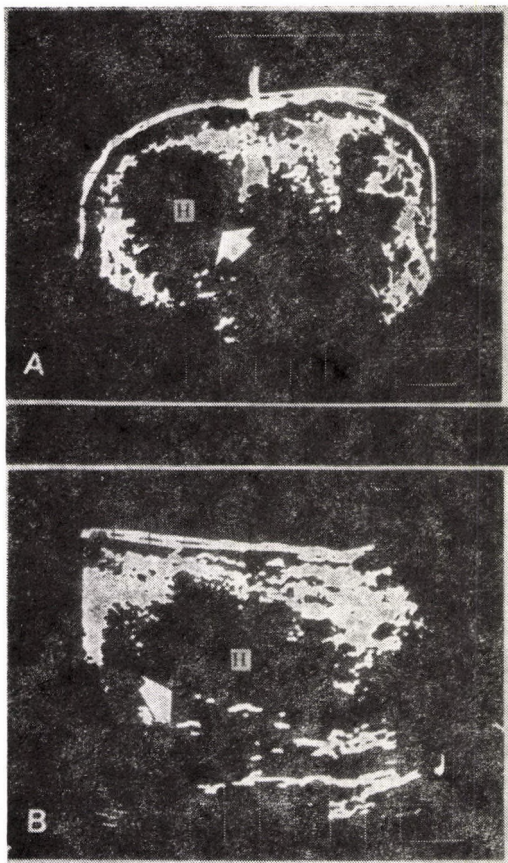


FIG. 2. Transverse (A) and longitudinal (B) scans of hydronephrosis on the left side

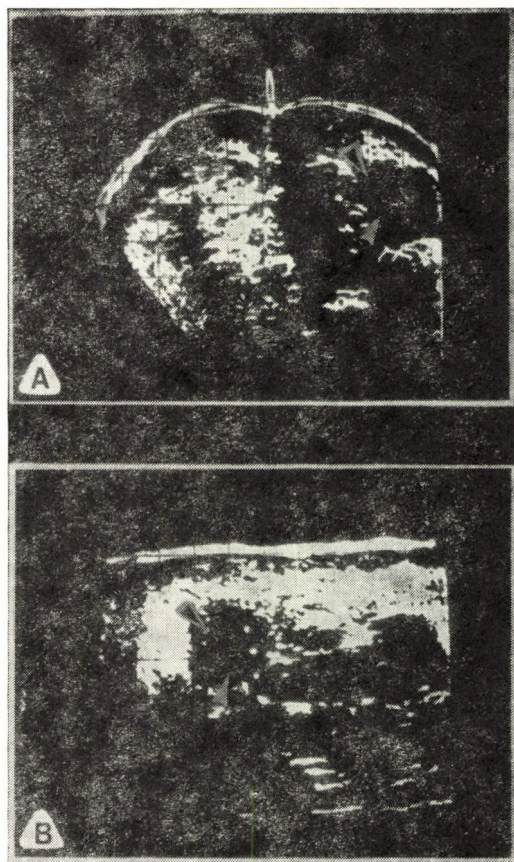


FIG. 3. Endoscan of an occluded cavern in the right upper pole

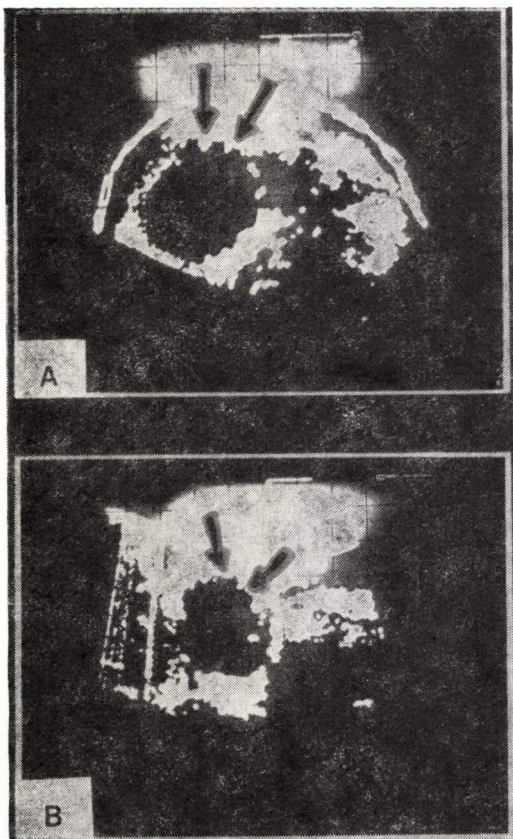


FIG. 4. Detection of an avascular tumour in the left upper pole

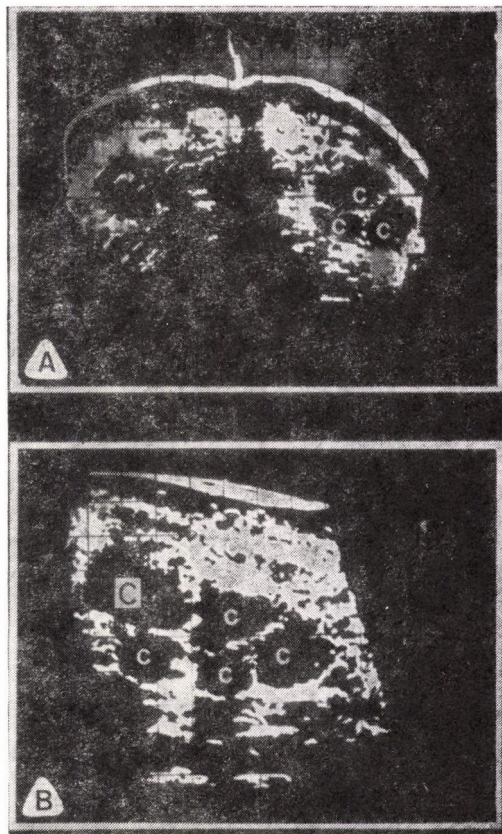


FIG. 5. Transverse (A) and longitudinal (B) scans of polycysts. C: cyst

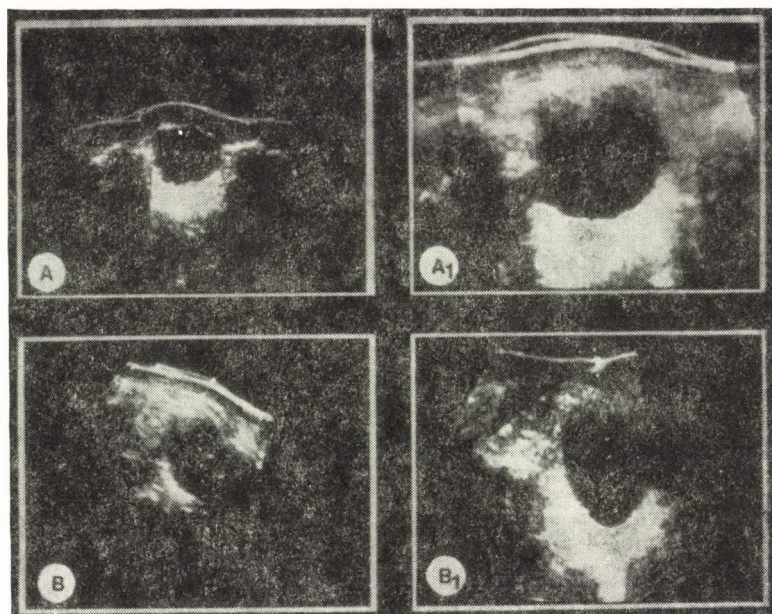


FIG. 6. Measurement by ultrasound diagnosis of urinary retention without catheter.
A₁ and B₁: prior to voiding, A and B: after voiding (retention)

The exploratory diagnosis corresponded to the ultrasonographic finding in 88.9% of the cases.

The ultrasonic diagnosis of the other homogeneous masses yielded similar results.

Based on experience obtained in the past 15 years, ultrasonic diagnosis can be used as

1. An independent method for (i) detection of renal cyst and hydro-nephrosis; (ii) that of perirenal processes; (iii) determination of urine retention in the bladder and (iv) differentiation of testicular tumours and hydrocele.

2. As a complementary examination procedure for detection of (i) renal calculi, (ii) tuberculous caverns, (iii) bladder tumours and (iv) testicular torsion and epididymitis.

It is essential to define the sequence of the available methods. Examinations involving a risk of iatrogenic lesions are performed only in cases of emergency.

At our clinic, the sequence of application of the examination method is as follows:

- urography
- sonography

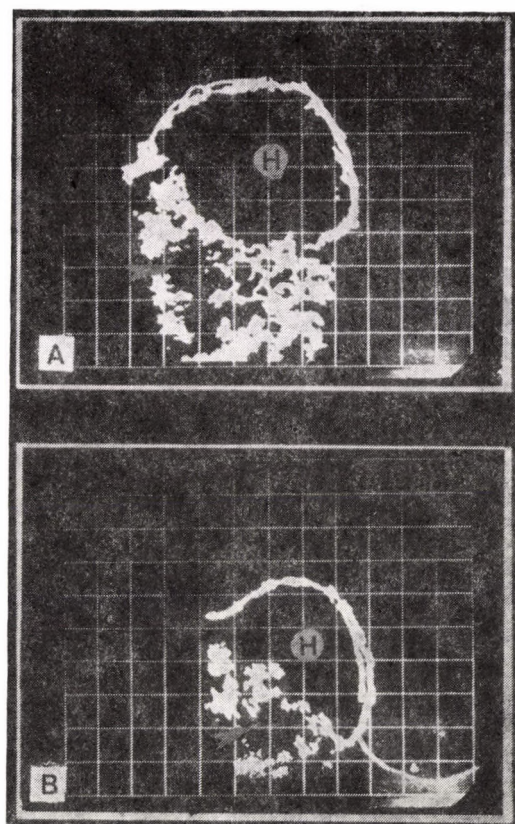
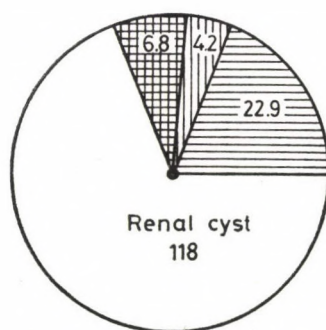


FIG. 7. Hydrocele-sac in transverse (A) and longitudinal (B) scans. H: hydrocele






 Angiography27.... 22.9%
 Retrogr. pyelogr.....5..... 4.2%
 Pneumoretroperit....8..... 6.8%

FIG. 8

- angiography
- instrumental intervention
- other methods.

For assessing the ultrasonic diagnosis, great practice, the knowledge of the patient's history and the parameters of the diagnostic equipment are required. The establishment of ultrasonic diagnostic centres and the procurement of up-to-date equipments as well as a good collaboration guarantee the reduction in the time of examination and in expenses.

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Echountersuchung der homogenen urologischen Resistenzen anhand von 15jährigen Erfahrungen

V. SZABÓ

Anhand 15jähriger Erfahrungen findet die Echodiagnostik (USD) der homogenen urologischen Resistenzen eine ausführliche Besprechung. Unter den diagnostischen Verfahren empfiehlt es sich stets die am wenigsten unangenehme, den Patienten am geringsten belastende Methode anzuwenden.

Die zuverlässliche Aussagekraft der USD beweisen die ermittelten Ergebnisse.

15-летний опыт использования «ЭХО»-исследования в диагностике урологических гомогенных резистенций

В. САБО

Автор описывает ультразвуковую диагностику урологических гомогенных резистенций, на основании 15-летнего опыта ее применения. Подчеркивает, что, среди исследовательских методик, необходимых для постановки диагноза, всегда целесообразно применять наименее неприятное вмешательство, которое для больного представляет наименьшую нагрузку.

Надежность ультразвуковой диагностики автор доказывает результатами собственной работы.

Pre- and Postoperative Examinations in Intestinal Tumours of the Pelvis

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Pre- and postoperative urological and lower urinary tract urodynamic studies were made in patients operated for intestinal tumours of the pelvis. It was established that urological complications often arise and they often escape detection during the examination or under the conventional surgical care. An examination and a control scheme is recommended for the early detection of the possible complications and for starting an adequate treatment in due time.

Earlier retrospective studies have shown that after radical operations of intestinal tumours transitional or permanent voiding or urinary *continence disorders* occurred in 30–50% of the cases [1–5].

From answers of questionnaires it has been deduced that a much smaller number of patients is referred to urological examination after detection of their underlying surgical disease and its treatment than would be necessary in view of the frequency and degree of severity of the complaints.

Consequently, prospective and consecutive urological and lower urinary tract urodynamic studies were conducted in patients who were treated at the First Department of Surgery for intestinal tumours of the pelvis in the second quarter of 1983 (i.e. 7 males). Our aim was to decide which screening examinations are indicated pre- and postoperatively, and on suspicion of a urological complication what would be the scheme of continuing the investigations.

Three male patients are presented who were referred to us for a voiding disorder after abdominoperineal rectal extirpation having been performed in another institution.

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Method

The urological and urodynamic studies were made on an outpatient basis at the Department of Urology, in general, 1 to 3 days prior to the planned operation. The postoperative examinations were usually conducted 2 and 6 weeks postoperatively, unless they had been necessitated by an early urological complication or complaint.

The examination was made as follows.

1. *History-taking.* Attenuated emphasis was focussed upon the possible complaints which may indicate the already existing urological complications of the tumour and which may manifest postoperatively (voiding and continence disorders, tumorous infiltration of the bladder wall, ureteral occlusion, etc.). Recording of the "initial state"—even if it is negative—affords some help in more accurately defining the origin of postoperative complaints.

2. *Physical examination.* In males, rectal examination of the prostate deserves particular attention. It is known, however, that the rectally palpable size of the prostate should not by all means be proportional to the severity of the dysuric complaints. With the manifestation of these, however, a fundamental element of the urological examination is the rectal examination. After an abdominoperineal operation, however, there is already no possibility for this most simple procedure, while other methods for assessment of the size of the prostate are not always available (ultrasonography) or are considered invasive (urethroscopy). In females, however, the degree of dislocation of the anterior vaginal wall and of cystocele is examined which may give rise to voiding and continence disorders regardless of the tumour or its removal.

3. *Uroflowmetry.* The flow velocity of the urine stream is measured by the uroflow-cystometer of Metripod (Hódmezővásárhely) in men in the standing, while in women, in the sitting position. The equipment is adaptable for recording the momentary flow velocity (ml/s) and from this, the maximal and mean flow velocities as well as the amount of urine voided can be measured and calculated. The latter was over 200 ml in all cases.

4. *Residual urine.* In case of a decreased flow velocity, the residue is assessed. This can also be measured by an approximate accuracy by using a contrast study, isotope or ultrasound method. The examination is performed by catheterization, even in case of a negative urine finding, since a catheter is anyway introduced during the operation.

5. *Cystomanometry.* In the patients whose uroflow velocity has decreased or they void more frequently but insignificant amounts, cystomanometry is performed. An amount of 60–80 ml/min sterile fluid is introduced into the bladder through one channel of the double-lumen Porges catheter at medium velocity, while through the other, intravesical pressure is continuously recorded

by the uroflow-cystometer. According to the shape of the cystomanometric curve, the first, then an expressed impulse to urinate and, according to the appearance of the so-called uninhibited or emptying contraction, hyperactive, normoactive or hypoactive detrusor activities can be differentiated.

6. *Pressure profile examination of the urethra.* It is performed by a double-lumen 8 Ch Porges catheter by using the Brown and Wickham technique. Through one lumen which serves for measuring the intraurethral pressure, fluid is perfused at a speed of 7.5 ml/min and the catheter is moved in the urethra at a speed of 1.1 mm/s by starting from the bladder. Through the other lumen, the intravesical pressure is measured. The smooth pulling of the catheter and the perfusion are secured by a Profilometer (Biomed) developed by us.

7. *Miction and retrograde urethrography cystography and polycystography.* It is indicated in infravesical obstruction or on suspicion of a tumorous infiltration of the bladder.

8. *Isotope renography.* On suspicion of partial or complete ureteral occlusion, which can be caused by the tumour itself or by surgical complication, renography is of great importance.

9. *Endoscopic examination.* If the above examinations are suggestive of an infravesical obstruction of undefined origin or a detrusor activity deviating from normal, urethrocystoscopy is to be performed. Information can be obtained by a simultaneous chromocystoscopy on the function of the kidneys and on passage disorders if previously no isotope renography or i.v. urography have been performed.

Results

Our overall results are shown in Table I. In the 8 to 10 patients no preoperative examinations were conducted because their rectal operation had been made at other surgical departments. They had had no history of urological complaints.

In Patient 1, decreased urine-flow and a 60 ml residue were found which were due to bladder neck adenoma. Besides, also a hyperactive detrusor and decreased bladder capacity were demonstrated (Fig. 1), which raised the possibility of the tumorous infiltration of the bladder. Cystoscopy and cystography confirmed this finding.

In Patients 2 and 3, due to inflammatory urethral stricture (on examination penetrable through a 8 Ch catheter) and bladder neck adenoma, respectively, the uroflow velocity decreased but with a satisfactory detrusor activity, the patients had residue-free urine postoperatively. It has to be mentioned that Patients 1 to 3 had already been dysuric for several months, but neither of them had consulted a doctor with their urological complaints.

TABLE I

Patients (n = 10)		1	2	3	4	5	6	7	8	9	10
Preoperative examination	Urological diagnosis	HP, IVU	SU	HP	s.m.	s.m.	s.m.	s.m.	s.m.	s.m.	s.m.
	Uroflow, ml/s	15	10	10	22	20	25	20	—	—	—
	Residue, ml	60	Ø	Ø	Ø	Ø	Ø	Ø	—	—	—
	Cystometry	Hyper	N	N	N	N	N	N	—	—	—
Operation		Exp.	APE	APE	APE	APE	APE	APE IOUL	APE	APE	APE
Postoperative examination	2nd week										
	Uroflow, ml/s	5	10	10	12	10	8	—	—	—	—
	Uroflow, ml/s	7	10	15	20	13	12	8	4	10	5
	6th week										
	Residue, ml	300	280	Ø	Ø	Ø	Ø	500	500	100	Ø
	Cystometry	Hyper	Hypo	N	N	N	Hypo	N	Hypo	Hypo	Hypo
Stress in continence		—	—	—	—	—	+	+	—	—	+
Treatment	Detrusor stimulation	—	—	—	—	—	+	—	+	+	+
	Sphincter stimulation	—	—	—	—	—	+	—	—	—	—
	Urethral dilatation	—	+	—	—	—	—	+	—	—	—
	Internal urethrotomy TURP	—	—	—	—	—	—	+	—	+	+
	Indwelling catheter	+	+	—	—	—	—	—	+	+	—

Abbreviations: Hyper = hyperactive detrusor; N = normoactive detrusor; Hypo = hypoactive detrusor; Exp = exploration; APE = abdominoperineal extirpation; IOUL = intraoperative urethral lesion; TURP = transurethral prostatic resection; HP = prostatic hyperplasia; s.m. = sine morbo; SU = urethral stricture; IVU = infiltration of the urinary bladder

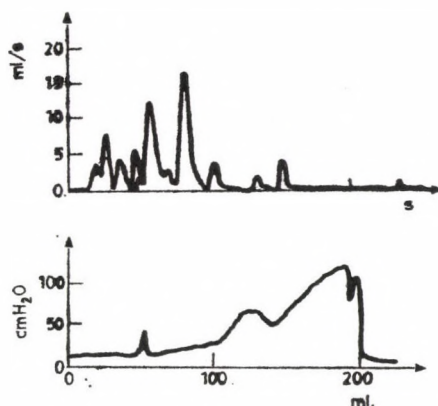


FIG. 1. Preoperative uroflowmetry of Patient 1 (upper curve). Emptied urine: 140 ml, residue: 60 ml, obstructive flow curve. Mean flow is low, under 5 ml/s. Preoperative cystomanometry of Patient 1 (lower curve). Irritable bladder. Due to increased detrusor activity at a filling of 200 ml an uninhabitable contraction occurs and voiding starts

The preoperative examination of Patients 4 to 7 did not reveal any change, their flow velocity and detrusor function proved to be normal.

According to the examination performed two weeks after the operation (it was not made in Patient 7), the uroflow values of Patients 4 to 6 earlier having had no change were reduced and it did not reach the initial value even after the sixth week, but their bladder was free of residue (Fig. 2).

In Patient 1, due to a massive tumour, no extirpation could be performed. In the period after exploration, the flow was invariably weak, the residue increased and an indwelling catheter was maintained.

In Patient 2, uroflow values remained invariably low and the arising detrusor hypoactivity (the result of parasympathetic denervation) further aggravated micturition, and residue also developed. Therefore, and also because the urethra very soon narrowed, the patient was discharged with an indwelling catheter.

In one case (Patient 3), uroflow somewhat improved, but it still remained of obstructive nature.

In Patient 6, the postoperative uroflow velocity decreased which had been produced by the hypoactivity of the detrusor (due to parasympathetic denervation). At the same time, with a filling of the bladder of over 150–200 ml some drops of urine emptied through the urethra on coughing or sneezing, and on movements accompanied by a rapid increase in intraabdominal pressure. This corresponded to stage II of stress incontinence and suggested the weakening of sphincter function due to sympathetic denervation. Both complaints proved to be temporary only and they stopped by the third post-operative week by medication.

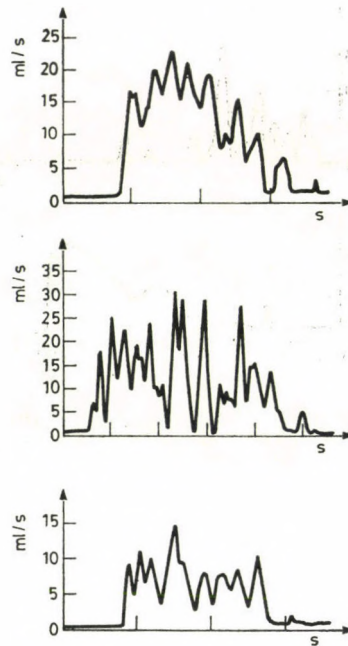


FIG. 2. Pre- (upper curve) and postoperative (middle and lower curves) uroflowmetries of Patient 5. In the preoperative examination a normal curve was visible, while postoperative controls showed an obstructive micturition of a low flow rate with periodically interrupted emptying

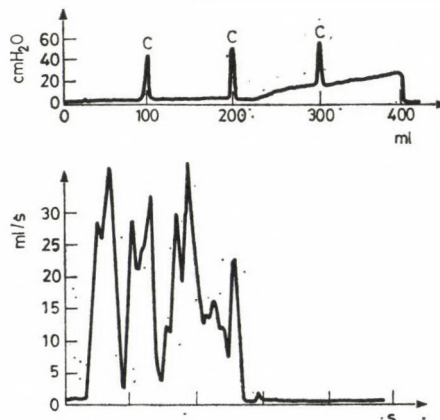


FIG. 3. Postoperative examination of Patient 7 immediately after removal of the catheter. Cystomanometry (upper curve) shows a slightly elevated detrusor activity (c = making the patient cough), the flow (lower curve) is not even, however, the average and maximal values are normal

In Patient 7, intraoperative urethral injury occurred which was managed during the operation. Removal of the indwelling catheter was attempted first 4 weeks postoperatively, but after one-and-a-half days, the patient again needed catheterization for complete anuria and he was transferred to the Department of Urology.

Cystomanometry revealed a slightly elevated detrusor activity and immediately after removal of the catheter, the patient emptied his bladder at an average flow rate of 15–18 ml/s, without residue (Fig. 3). Accordingly, he remained without a catheter. After some day, due to increasing dysuric complaints, miction cystourethrography was performed. In Fig. 4, the stricture having developed at the site of the injury which was again dilated, that time to 22 Ch, is marked by an arrow. After several days of observation, the patient was discharged since his voiding was satisfactory. However, one-and-a-half months later, he again presented with dysuric complaints. His uroflow decreased to 4 ml/s with a significant amount of residue which had been caused by a narrowing of the urethra in place of the injury to 5 Ch. Internal urethrotomy was made 8 weeks after which uroflow normalized. One year later, the control proved a good uroflow.

Patients 8 to 10 were admitted to the Department of Urology with indwelling catheter for postoperatively developing micturition disorder. In



FIG. 4. Miction cystourethrograph of Patient 7. The stricture occurring at the site of the injury is marked by an arrow

all three patients the weakening of detrusor function was resulted by the parasympathetic denervation as a result of their operation. This was the most severe in Patient 8, in whom, the infravesical obstructive function could be excluded on the basis of a normal urethral pressure profile (Fig. 5), and therefore maintenance of an indwelling catheter remained the only solution at that time.

The complementary examinations in Patients 9 and 10, revealed the fairly weak urine flow and significant residue in the urine to be possibly due to the already preoperatively existing, but at that time still not overt infravesical organic obstructive factor, to a bladder neck adenoma. All these considered, the patient was subjected to transurethral prostatic resection (TUR), after which the residual urine of Patient 9 still remained 100 ml (Fig. 6) and so the catheter was maintained. Patient 10, even despite the weak urine flow, emptied his bladder without residue and with a continuous detrusor stimulation by drugs, he could be freed of the catheter

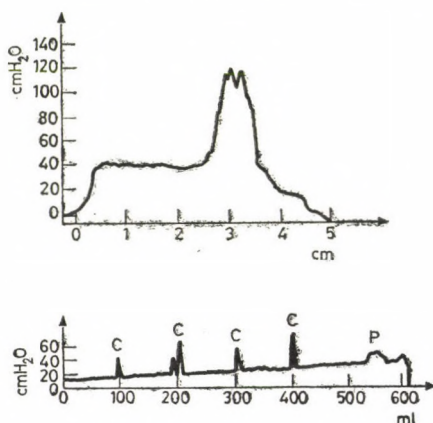


FIG. 5. Urethral pressure profile (upper curve) of Patient 8 following a rectal operation. The shape of the curve and its parameters are normal, they do not indicate an organic intravesical obstruction (e.g. bladder neck rigidity of bladder neck adenoma). The postoperative cystomanometry of Patient 8 (lower curve) suggest a hypoactive detrusor. The intravesical pressure on achieving a filling of 600 ml has also remained low (c = making the patient cough, p = passive increased pressure of non-detrusor origin due to abdominal pressure)

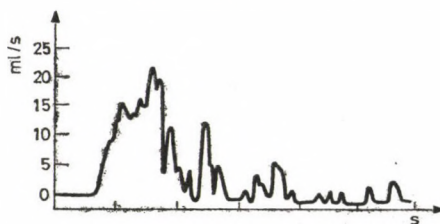


FIG. 6. Uroflowmetry of Patient 9 after TUR. Voiding occurs periodically and is, therefore, prolonged in time. The emptied amount is 400 ml, the residue is 100 ml

The control examination of Patient 4 on the 6th postoperative week did not disclose any urological complaints and he reported at the Department of Urology only 5 months after the operation. In the meantime his intolerable pelvioperineal pains had become permanent which were not even reduced by the phenol injected between L₅-S₁ intrathecally. The examinations gave evidence of a slowed urine flow and a residue of 150–200 ml. The patient was pyuric and complained about dull bilateral perineal renal pain. After his admission, the laboratory tests revealed a limited renal function. I. v. urography showed partial ureteral occlusion on the right, and a complete one on the left side in the region of the pelvis. Due to rapidly progressing local recurrence and the deterioration of the general state, right renal percutaneous pyelostomy was performed for urine diversion. In the urinary bladder a purulent cystitis developed and therefore it had to be periodically irrigated with antibiotics.

Discussion

In our prospective and consecutive studies, beside the conventional urological procedures, also urodynamic methods were applied. Our results have confirmed the opinion that intestinal tumours localized in the small pelvis and their operations result in urological complications in a quite large number of cases. Nevertheless, previous retrospective investigations, in which patients having undergone an operation and asked by questionnaires, had indicated that these complications were not always detected or treated. They fall into the background behind the underlying surgical disease, i.e. the surgeon controlling the patients postoperatively does not, in each case recognize the urological complications in the early phase of their manifestation. Therefore, the presented pre- and postoperative examination and control scheme is recommended, because it may help detecting the complications of the lower and upper urinary tract in due time. It is also helpful in deciding whether we are facing a temporary functional disorder requiring conservative treatment or an organic change calling for operation.

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Prä- und postoperative urologische Untersuchungen bei intestinalen Tumoren des kleinen Beckens

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Bei wegen intestinaler Tumoren des kleinen Beckens operierten Patienten wurden prä- und postoperativ urologische und urodynamische Untersuchungen der unteren Harnwege vorgenommen. Die nicht selten vorkommenden urologischen Komplikationen werden im Laufe der Durchuntersuchung bzw. der traditionellen chirurgischen Betreuung nicht immer entdeckt. Zur Früherkennung der eventuellen Komplikationen und dementsprechenden rechtzeitigen Einsatz der geeigneten Therapie wird ein sich gut bewährtes Durchuntersuchungs- und Kontrollschema empfohlen.

Пре постоперативные урологические исследования в случае интестинальных опухолей в малом тазу

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и А. ХОЗНЕК

Больной, перенесшим операцию по поводу интестинальной опухоли в малом тазу, сделали пре- и постоперативные урологические и уродинамические (нижних мочевыводящих путей) исследования. Авторы показывают, что урологические осложнения возникают часто, и что обследование и традиционное хирургическое обслуживание не во всех случаях приводят к их выявлению. Они предлагают схему обследования и контроля для раннего распознавания возможных осложнений, чтобы лечение их можно было бы начать вовремя.

States Causing Infertility in Adulthood in Children with Undescended Testis

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A total of 1386 operations for undescended testis was made in 1250 boys. In 774 of them an apparently intact testis and epididymis were found. In 612, such epididymal developmental abnormalities were detected which exclude or do not make possible the passage of sperms from these organs to the deferent duct. It is believed to be plausible that the large number of cases with infertility is due, also in individuals with a unilateral cryptorchidism, to the abnormal fusion of the epididymis in both testes.

A high incidence of infertility is known in the adulthood of children with undescended testis. This state is extensively discussed not only by the literature but also by the daily press [1, 2, 3, 5, 6, 8, 9, 11]. It is generally believed that maturation of the testis is primarily influenced by its malposition in a region of unfavourable temperature, and therefore the earliest possible fixation of such testicle in the scrotum is considered very important by many authors. Accordingly, this operation is recommended already in infancy. Others prefer to wait until the beginning of the differentiation of the epithelium of the testicular tubule and find it sufficient to apply surgical fixation of the testis in the scrotum up to the age of 3 to 7 years [6, 9]. Regardless of when the operation has been made, the spermatogram performed in adult age of such individuals does not yield a favourable picture which is characterized by oligospermic or aspermic state. Not even an early operation seems to improve this condition, or it does, but only to a small extent [2, 5]. In patients whose testis has descended into the scrotum only after administration of gonadotropic hormone, the results concerning fertility are more favourable. These are, in general, mobile testicles of a good turgor and it is also sure that among them hypermobile testis also occurs.

There are several acceptable theories on why and how the testis descends to the scrotum in intrauterine life. The descent of the testicle into the scrotum depends not only on developmental and hormonal factors, but it can be suspected that in this, the epididymis also plays a very important role [4, 7, 8]. The parenchyma of the testicle and the epididymis develop from two different embryonal primordia and fusion of these two organs occurs in that stage of intrauterine life when the testis is still in the region of the small pelvis.

TABLE I
Observations on 1386 operations for undescended testis

Condition of the testis and epididymis	No.	%	Ratio of intact and pathologic, %
Intact testis, epididymis and deferent duct	774	55.9	55.9
Small, dysplastic, flaccid testis, epididymis without any developmental disorder	220	15.9	
Small, dysplastic, flaccid testis with a distant epididymis	312	22.5	44.1
Testis of an adequate size, but with a far removed epididymis	49	3.5	
Testicular agenesis and aplasia	31	2.2	
Total	1386	100.0	100.0

Thus, there can be a disorder in the fusion of the testis and the epididymis and this may influence fertility. Infertility in individuals with undescended testis can be due to a developmental anomaly which is to be traced back to the testis, the epididymis or to the abnormal fusion of these two organs [4, 7, 8]. Bearing these in mind, the morphological state of these organs was observed in children operated for undescended testis and the following was noted (Table I).

At the Department of Urology of the Heim Pál Paediatric Hospital, a total of 1386 operations were performed in 1250 boys between the age of 20 months and 16 years with undescended testis in the period between October 1, 1973 and November 15, 1986. On exploration it was observed whether there was any change inhibiting or making impossible the maturation or the migration of sperms from the testis through the epididymis or the deferent duct.

In 774 (55.9%) of the 1386 operated patients, the testis, the epididymis and the deferent duct were found to be normal and there was no visible morphological alteration preventing the development of a normal spermatogram in adulthood. In 220 patients (15.9%) small, dysplastic, flaccid testicle was found without any epididymal abnormality. In 312 patients (22.5%) a small, dysplastic, flaccid testis was found with a distant, apparently not fused, epididymis. The testicle was of adequate size but the epididymis was quite far removed from the testis in 49 patients (3.5%), while in 31 (2.2%) there was testicular agenesis or aplasia. Biopsies were not performed, since in this case often the whole testis could have been damaged, on the other hand, it is believed that androgenic hormone level examination, the result of the study of the somatic state, but still more, that of the ejaculate obtained in adults is more revealing and therefore more valuable concerning the functional disorder of the testicle than the histological study of the gonads of the immature child. The state observed on operation was accurately described to be available later for the

andrologist making the fertility examination. Accurate records on the testicle and mainly on the epididymis in patients having undergone orchiopexy are unfortunately only rarely to be found in surgical journals and therefore it is difficult or even impossible to submit precise andrological opinion for such patients.

Discussion

In children with undescended testis, the testicle was often found to be small and flaccid, the epididymis to be rudimentary and fusion of the testis and the epididymis could not occur due to abnormal development. This could cause than impaired of sperm development or no passage through the inadequate tubules of the epididymis to the deferent duct. Our observations indicate that adult infertility is due not only to the fact that the testis has not descended to the scrotum in due time, but as it was found in 44.1% of our patients, there are developmental disorders which affect fertility also in themselves. This high ratio can also account for the fact why there are so many infertile individuals following successful orchiopexy [8]. There are individuals with unilateral cryptorchidism, their other testicle having descended into the scrotum and they are, nevertheless, infertile. This can be primarily ascribed to their epididymal abnormality or to the failure of fusion of the testis and epididymis. Our observation may be of help in the andrological examination performed in adults for revealing the causes of infertility. We believe that the principle of the earliest possible operation in boys, as the main criterion ensuring fertility, is not infallible in view of our observation, but in children whose testicle is of an adequate size and their epididymitis is intact. In spite of this, the surgical fixation of undescended testis into the scrotum is recommended in early childhood. We think that the operation will only accidentally promote fertility but it should still be performed because if there were a possibility for the maturation of the sperm to be unheeded, it should then be ensured. Testicular atrophy was not noted in any of the operated children, but it should be pointed out that the further fate of an existent Leydig cell substance by fixing the testis at all costs in the scrotum in the hope of possibly attaining fertility, should not be risked. The operation should particularly not be forced if, on exploration, it is evident that the state of the testis or the epididymis or the connection between the two organs would be excluded, due to a developmental disorder, that sperm could later enter the ejaculate.

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Die bei den Kindern mit Kryptorchismus beobachtbaren Zustände, die Ursachen einer Infertilität im Erwachsenenalter sein können

J. TÓTH, M. MERKSZ und P. SZÖNYI

Bei 1250 Knaben wurden wegen Kryptorchismus 1386 Operationen durchgeführt. In 774 dieser Fälle waren intakte Hoden und Nebenhoden vorzufinden, während in 612 Fällen Hoden- und Nebenhoden-Entwicklungsanomalien aufwiesen, die es ausschlossen bzw. nicht verwahrscheinlichten, daß aus diesen Organen oder durch diese Organe Spermien in den D. deferens gelangen. Die Großzahl der Infertilitäten wird auch bei den Personen mit homolateralem Kryptorchismus vermutlich durch die in beiden Hoden vorhandene Fusionsstörung der Hoden und Nebenhoden verursacht.

Об отмечаемых у детей с не опустившимися яичками таких состояниях, которые могут вызвать бесплодие во взрослом возрасте

Й. ТОТ, М. МЕРКС и П. СЕНИ

1250 мальчикам сделали 1386 операций из-за не опустившихся яичек. Среди них у 774 яички и их придатки казались интактными, у 612 обнаружили такие нарушения развития яичек и их придатков, которые исключают или не делают вероятным попадание из этих органов или через эти органы сперматозоидов в семявыносящий проток. Авторы считают возможным, что большое число случаев бесплодия также у лиц с одним задержавшимся яичком вызывается фузией яичка и придатка яичка в обоих семенниках.

Application of Aluminium Ammonium-Sulphate Solution in Treating Massive Haemorrhage of Bladder Origin

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The effect of the 1% aluminium ammonium-sulphate solution has been studied. As revealed by animal experiments and clinical examination, the new method can effectively be used without side-effects in the symptomatic treatment of the massive vesical haemorrhages of different origin.

The arresting of excessive bladder haemorrhages is a frequent and difficult task. Haematuria is mostly caused by tumours, cystitis of various aetiologies and by mechanical noxae. The extensively used preparations promoting systemic coagulation are indicated only in blood clotting disorders. The intraoperative haemostatic procedures impose strain on the patient and have, in general only temporary effect. Treatment of the bladder with formalin is toxic, producing tissue necrosis. It may damage the ureteral orifices and the sphincter muscles of the urinary bladder. It requires general anaesthesia. Since several side-effects have been described, it can be applied only with caution, primarily in tumour patients as a last resort.

In 1982 Ostroff and Chenault were the first to report, in the *Journal of Urology*, on haemostatic bladder treatment by using the sterile solution of 1% aluminium ammonium-sulphate. This compound was used effectively in patients with bladder tumour in 6 cases. No complication or systemic absorption was observed. In 1985 Gock et al. reported on its use in 9 cases, of them 8 had transitional bladder carcinoma. One case was bleeding due to radio-cystitis following the irradiation of collum carcinoma. The biopsy taken from the intact bladder mucosa after treatment did not show any urothelial damage. Studying three cases, no vesicoureteral reflux was seen. The method was evaluated to be effective by both reports.

Material and Method

Aluminium ammonium-sulphate is pharmacologically an astringent. Its effect is based on the reversible denaturation of proteins, the so-called salting-out. The essence of the effect is the linkage with the free radical of the protein molecule and dehydration. As a result of the slow penetration, it is confined to the cell surface and the intercellular substance. The permeability of the cell membrane is becoming reduced but the cell does not lose its viability. Due to the astringent effect, the surface contracts and blanches.

At our department, the coagulative effect of aluminium ammonium-sulphate has been dealt with since 1983. As a first step, its effect on the intact bladder mucosa in animal experiments was studied. For this purpose, male rats were applied in 5 groups, the groups containing six experimental animals (Table I). Following bladder treatment with "aluminium" of the anaesthetized animals, cystectomy was performed under anaesthesia at intervals defined in the experimental plan. Histology was made on sections stained with haematoxylin-eosin. The urothelial epithelium was shown to remain intact everywhere (Fig. 1). The change was characterized by a submucosal oedematous loosening and perivascular inflammatory infiltration. By the increase between the times elapsing between the treatment performed and cystectomy, the extent of the changes became limited. In Group 3, already as early as after two weeks' "aluminium" treatment, a completely intact urothelium was detected. Our investigations have disclosed that bladder treatment with aluminium ammonium-sulphate did not induce any change which would prevent clinical application.

Clinical application was started only after the animal experiments. The method consists in the elimination of bladder tamponade followed by washing

TABLE I
*Results of experiments in male rats, mode of bladder treatment,
time of cystectomy and histological results*

Intervention	Time	Histological change
Filling of the bladder with aluminium ammonium-sulphate solution	1 hour	The epithelium is intact, oedematously loosened bladder wall, congestion, perivascular inflammatory infiltration
	96 hours	Regular urothelium with oedematous loosening beneath it, minimal perivascular change
	2 weeks	Regular urothelium, almost completely free of reactions
Filling of the bladder with isotonic NaCl solution	2 weeks	Regular urothelium with no detectable oedema
No intervention		Regular urothelium

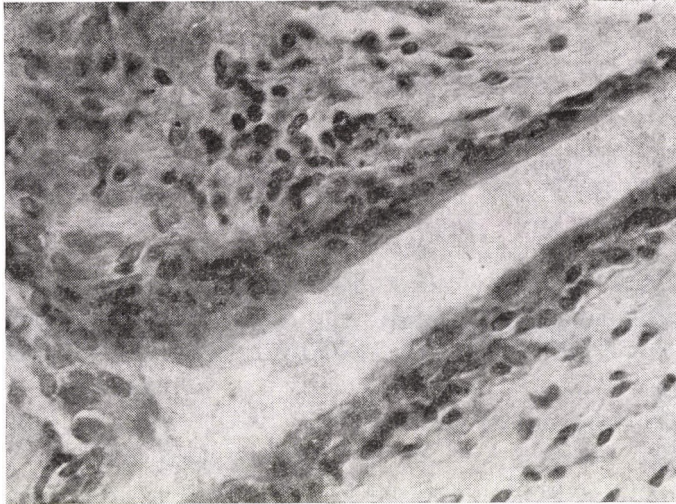


FIG. 1. The histological picture shows the urothelium to be intact in the rat bladder after the 'aluminium' treatment

out of possibly the whole coagulum from the bladder. Then continuous closed-system lavage of the bladder is made by using a three-barrel balloon catheter. In each case, in general, 3 l sterile 1% aluminium ammonium-sulphate solution is perfused through the bladder during 2 to 4 hours.

Results

This method of coagulation has so far been applied in 43 patients (Table II) with bladder haematurias of different aetiologies. After the first half hour of bladder lavage, the amount of blood in the urine decreased. By the end of the treatment, the urine was cleared and bleeding stopped. In 9 cases, for arresting bleeding, the treatment had to be repeated. In 5 patients, the intervention failed. After all, bladder treatment with aluminium ammonium-sulphate solution was applied successfully in a total of 38 patients.

TABLE II
Cause of haematuria and treatment results

Cause of bladder haemorrhage	Effective	No effect	Total
Neoplasm of the urinary bladder	28	3	31
Cystitis due to irradiation	1	2	3
Prostatic hyperplasia ex vacuo bleeding	2	—	2
Bleeding after transvesical prostatectomy	7	—	7
Total	38	5	43

Discussion

"Aluminium" treatment of the bladder was first employed only in patients with bladder tumour. Later it was also used in the case of other bleedings originating from the bladder. After the initial experience, the indication was extended to the management of each massive vesical bleeding. During bladder lavage with "aluminium", the patients did not complain of any pain. Complication associated with the procedure was not observed. According to our earlier experience, bladder treatment with "aluminium" can be considered to be an almost ideal symptomatic haemostatic procedure. It is effective, inexpensive, it can be used rapidly, does not require anaesthetization and is not associated with any currently known by-effects. Complications indicating its absorption into the circulation were not noted. Finally, it should be stressed that, as a symptomatic treatment, its effect can only be transitional. It can, however, be established that this preparation has enriched our therapeutic arsenal.

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Über die Anwendung der Aluminium-Ammonium-Sulfat-Lösung in der Behandlung von massiven Blasenblutungen

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Untersucht wurde die Wirkung der 1%igen Aluminium-Ammonium-Sulfat-Lösung. Laut der tierexperimentellen und klinischen Untersuchungen kann die neue Methode in der symptomatologischen Behandlung der massiven Blutungen der Harnblase unterschiedlichen Ursprungs — ohne daß sich Nebenwirkungen melden würden — eine erfolgreiche Anwendung finden.

Применение раствора сернокислого алюминия и аммония для лечения массивных кровотечений из мочевого пузыря

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Авторы исследовали действие 1% раствора сернокислого алюминия и аммония. Как показали результаты экспериментов на животных и клинических исследований, новый метод эффективен, не дает побочных эффектов при симптоматическом лечении массивных кровотечений из мочевого пузыря различной этиологии.

Experiences on the Surgical Management of Testicular Torsion

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The authors performed operations in 9 patients at the Department of Urology of the István Hospital during the past 5 years. In 7 cases, detorsion and saving of the testicle was successful in possession of an early diagnosis. Two patients had to be castrated. In view of their results, authors draw attention to the necessity of establishing a rapid diagnosis and to the importance of an early surgical intervention.

Testicular torsion is just touched upon by the textbooks, although its importance is more accentuated since it occurs mostly in young men, and without treatment it may lead to the loss of the organ [1, 2, 3, 4, 12]. Recent reports in Hungary have also given account of the lamentable fact that, out of every ten torsions, one is associated with the destruction of the testicle. Following the obstruction of the pampiniform plexus, functionless atrophic testicles remain even in case of detorsion [3, 4, 6, 9, 15].

In the literature, numerous reports analyse the late complications enlarging primarily on spermatogenesis and its impairment [3, 4, 5, 7, 8, 9]. Incidence is highest in the age of 14 to 18 and that is why establishment of a rapid diagnosis and accurate specialized care are necessary. The practitioner, the doctor on night duty cannot be satisfied with diagnosing "acute orchitis" or "acute epididymitis".

Testicular torsion exhibits characteristic symptoms [1, 2, 5, 13, 14].

1. It usually occurs in the age of 14 to 18, in the history of the patient with sudden movement, jump or riding on the biocycle or a cause inducing the stimulus of the cremaster muscle (cold bath, tight jeans, etc.).

2. An abrupt pain in the given half of the scrotum or in the hypogastrium, swelling of the scrotum without a red or reddish discolouration. On movement or application of cold compress (!), pain increases.

3. Fever and leukocytosis do not appear during the first hours.

4. The hypogastric pain is accompanied by intense peritoneal signs (vomiting, nausea, pallor, a decrease in blood pressure!).

5. Anatomical predisposing factors are a retained testicle, a loose gubernaculum, an extremely mobile testicle, a long mesorchium and a high origin of the tunica vaginalis [1, 2, 5, 10, 15].

Based on these symptoms, it is not difficult to form a diagnosis when one considers torsion of the testicle as well as the patient's age (14–18 years). It should be differentiated, however, from orchiepididymitis, traumatic haematoma, inguinal hernia and hydrocele. It frequently occurs between 14 and 18 years of age but is of low incidence in the younger or older age groups [1, 2, 3, 5, 10, 13, 14].

In the recent 5 years (between January 1982 and September 1986) 9 patients were operated at our department for torsion of the testicle. Their age ranged between 15 and 65, with a mean age of 29.2 years.

Table I demonstrates these cases.

TABLE I
Distribution of patients with testicular torsion according to operation

Age (yrs)	Time of observation	Involved side	Operation
16	17 days	right	Castration of the right side
15	1 day	left	Orchiopexy of the left side
21	1 day	right	Orchiopexy of the right side
65	1 day	right	Castration of the right side
15	2 hours	right	Bilateral orchiopexy
23	2 hours	left	Bilateral orchiopexy
15	1 hour	right	Bilateral orchiopexy
34	1 hours	right	Bilateral orchiopexy
54	1 day	left	Bilateral orchiopexy

Results and Discussion

In possession of our patients' data, it is obvious that the fate of the patient or of the testicle depends on the time factor. Based on literary evidence [3–5, 6, 7] and our own experience, it can be stated that about 5 to 6 hours is the critical time, which is the borderline between a saving and an organ-removing operation. Castration was made in two cases due to pressing of the time. On immediate transfer of the patient to the department, manual detorsion should be attempted [11, 13, 14]. The patient cannot be discharged either in such cases, because, due to his anatomical predisposition, the torsion can recur at any time [3, 5, 10, 14].

Surgical solution is bilateral orchiopexy.

Late testicular atrophy, fertility disorders are in direct proportion to the duration of the torsion [3–7, 11, 13, 14]. Earlier there had been a controversy about the necessity of a contralateral prophylactic fixation, since even a minor intervention may produce adhesions and, although the operation concerning the torsion may be preventive, it still can in itself destroy testicular function.

The question has been conclusively settled. Krakup [8] published the fertility data of 74 patients in 1978. These patients underwent a bilateral operation between 1961 and 1974. According to late follow-up results, he stated that contralateral preventive fixation did not lead either to testicular atrophy or to any fertility disorder.

The follow-up of our own material has also confirmed the above statement. No pathological change was found in spermatogenesis in any of the cases.

Supported by our data, we believe that orchiopexy must immediately be performed on both sides.

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Erfahrungen mit der chirurgischen Behandlung der Hodentorsion

A. VEREBÉLYI und S. CSATA

Im Laufe der vergangenen 5 Jahre wurden an der Urologischen Abteilung des István Krankenhaus-Ambulatoriums 9 Patienten operiert. In 7 Fällen konnte im Besitz der Frühdiagnose die Detorsion durchgeführt und der Hoden gerettet werden. In 2 Fällen erwies sich die Durchführung der Kastration als erforderlich. Aufgrund der Erfahrungen werden die Bedeutung der raschen Frühdiagnose und der Frühoperation betont.

Опыт, полученный при хирургическом лечении перекрута яичка

А. ВЕРЕБЕИ и Ш. ЧАТА

За последние пять лет авторы девяти больным произвели операцию в связи с перекрутом яичка, в Урологическом отделении больницы им. Иштвана (Будапешт). В 7 случаях, когда был поставлен ранний диагноз, операция удалась и яичко удалось сохранить. Двум больным пришлось произвести кастрацию. На основании полученных результатов, авторы обращают внимание на быструю постановку диагноза и значение раннего оперативного вмешательства.

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Experiences with Kryptocur[®] in the Treatment of Cryptorchism

A. VÉGH

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(Received: July 11, 1985)

Kryptocur[®] (Gonadorelin, Hoechst) was applied in the form of intranasal spray three times daily in 16 boys. A total of 18 retained testes were treated. Kryptocur[®] causes release of LH and FSH. The hormonal pulse-therapy elevates testosterone level which, in turn, leads to descension of the testis. Side-effects are less significant than with HCG.

Among the children the youngest was 2.5 and the oldest 9 years old. In seven cases, the testis descended into the scrotum, in three cases migrant testes were resulted, in six cases, there was no result at all. The most favourable effect was achieved in the youngest age-group (2.5 to 5 year-olds) with retained testes lodged at the root of the penis.

Introduction

The agent of Kryptocur[®] Gonadorelin, is a decapeptide (containing 10 amino acids). It is a releasing hormone for FSH (prolan A) and LH (prolan B). This hormonal impulse may lead to the elevation of testosterone level, then to descent of the retained testis. Because of the existing feedback mechanism, the daily dose is 1.2 mg, independent of body weight. Treatment lasts for four weeks usually with positive results already in the fourth week. The application in the form of intranasal spray was based on the works of Bartsch and Frick [1] and Dahlén et al. [4]. Cryptorchism may arise due to (i) endocrine causes (e.g. an inadequate maternal gonadotropin effect), (ii) to anatomical causes (e.g. narrow inguinal canal, short deferent duct, congenital inguinal hernia, deficient development of gubernaculum testis and (iii) to the primary disorder of the testicular tissues.

In malpositions—except for the ectopic testicle which requires surgical reposition—attempts have to be made at instituting conservative therapy possible up to the age of 5 to 6 but by all means prior to the appearance of secondary sex characters. Conservative therapy is also justified if treatment has yielded only partial results. The andrological results of patients having received postoperative hormone treatment are more favourable [2]. The late results of the purely surgical repair are andrologically not fully sufficient [6, 7].

Material and Method

Treatment was administered by one box of *Kryptocur®* (containing 2 doses of 20 mg gonadorelin sufficient for about 100 insufflations). It was intranasally sprayed three times daily postprandially, but, as a matter of course, not in catarrhal children.

Sixteen boys were treated for 18 retained testicles. Ten of them were between 2.5 to 5 and six between 5 to 9 years of age. The children were controlled after the 2nd, 4th, 8th and 12th weeks. Table I shows the distribution of cryptorchism according to age and position.

TABLE I
Distribution of cryptorchism according to age and position

Position		Age	
		2.5-5	5-9
Abdominally retained testicles	?	3	2
Inguinal retention	?	4	3
Prescrotal retention	?	4	3

TABLE II
Results of treatment of cryptorchism

Position	Testicles lodged in the scrotum	Migrant testicles	No movement
Abdominal retention	—	—	1
Inguinal retention	1	3	—
Prescrotal retention	6	—	—

There were 5 abdominally retained testicles (27.7%), 7 inguinal (38.8%) and 6 prescrotal (33.3%) ones.

Table II presents the results of treatment of cryptorchism. The descension of the testicles was found to occur between the 4th and 8th weeks. In two patients in whom the testicles had failed to descend (abdominal retention), treatment was repeated after the 12th week, without success.

In the case of abdominal retention of the testicles, treatment was unsuccessful. Complete descension was observed in one case of the inguinally retained testicles (5.5%) and in six cases of prescrotal retentions (3.35%). That means a total of seven testicles having descended into the scrotum (38.8%) which approaches the results of Weissbach and Struth [11].

Discussion

Drug treatment of cryptorchism is recommended from the age of one year because spermatogenesis may become impaired.

The number of spermatogonia in the dystopic testicles is significantly smaller than in normally descended ones [5]. In the recent ten years, in addition to the agents used so far [HCG, Clostilbegyt (clomiphene citrate)], the structure and the effect of the releasing hormone gonadorelin, have been elucidated immunohistologically and radioimmunologically [6, 7]. The effect of gonadorelin is highly specific promoting LH and FSH formation and release

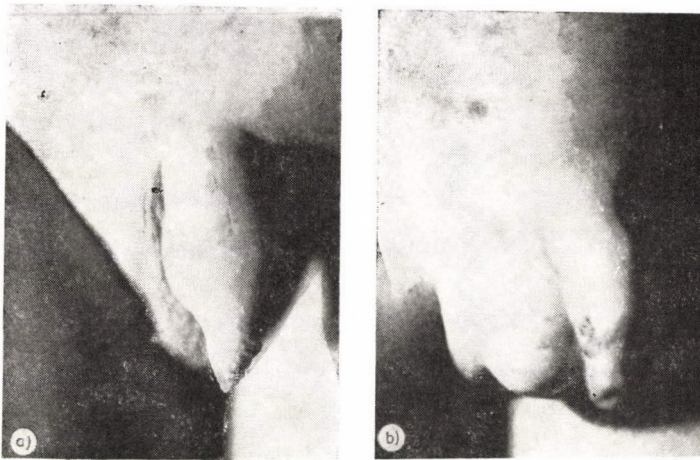


FIG. 1. Inguinally retained testicles (a) before and (b) after treatment

resulting in testosterone production and release in the testicles which is a necessary prerequisite of their descent.

The various forms of cryptorchism have been treated by gonadorelin [1, 4] since 1974 and the obtained results have led to the development of the nasal spray *Kryptocur®* (Hoechst).

As compared to HCG, Synder and Greaney [10] found descension of testicles to average 40% in patients treated by HCG (15–66%). Clostilbegyt treatment [2] yielded a 23 to 50% results. In our own material a complete descension of the testicles occurred in 38.8% following *Kryptocur®* treatment primarily in testicles located prescrotally.

Considering that 44% of the retained testicles are lodged prescrotally and 20% in the inguinal canal [3], the use of this preparation, despite the small number of cases can be regarded as effective. Since in 3 cases migrant testicles and in two more mobile ones, were resulted, it may also facilitate

the surgical repair. In one case moderate hyperplasia of the penis and wrinkling of the scrotum as well as mild rhinitis appeared as by effects.

With regard to the target of action of this hormone, it may open new vistas in the effective treatment of cyptorchism.

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Erfahrungen mit Kryptocur bei der Behandlung des Kryptorchismus

A. VÉGH

Kryptocur® (Gonadorelin, Hoechst A. G.) fand bei der Behandlung von 18 retinierten Hoden von 16 Knaben eine Anwendung und zwar täglich dreimal in Form eines nasal Sprays. Durch Kryptocur® (Gonadorelin) wird das Freiwerden von LH und FSH verursacht. Durch den, durch den Hormonstoß erhöhten Testosteronspiegel wird der Descensus herbeigeführt. Die Nebenwirkungen sind weniger ausgeprägt als bei HCG.

Das jüngste Kind war 2,5 Jahre alt, das Älteste 9 jährig. Der Erfolg der Behandlung konnte am frühesten nach 4 Wochen bemerkt werden. In 7 Fällen deszendierte der Hoden in das Skrotum, in 3 Fällen führte die Behandlung zu einem mobilen Hoden, in 2 Fällen wurde der Hoden mobiler, während in 6 Fällen die Behandlung erfolglos blieb. Die besten Ergebnisse waren in der jüngsten Altersgruppe (2,5-5 Jahre) und bei den bei der Peniswurzel lokalisierten retinierten Hoden zu erreichen.

Наш опыт применения криптокура в терапии ретинированного яичка

А. ВЕГ

При лечении 18 ретинированных яичек, у 16 мальчиков, мы применяли препарат *Kryptocur® (Gonadorelin)* (Hoechst A. G.) в форме назального аэрозоля, три раза в день. Криптокур® вызывает высвобождение ЛГ и ФСГ. Гормональный удар повышает уровень тестостерона, что приводит к опусканию яичка. Побочные эффекты были слабее, чем при HCG.

Самому младшему пациенту было два с половиной года, самому старшему — 9 лет. Эффективность терапии в лучшем случае наблюдалась нами через 4 недели. В 7 случаях яичко опустилось в мошонку, в трех случаях результатом стало маятниковое яичко, в двух случаях яичко стало подвижнее, в 6 случаях лечение не дало результатов. Самые лучшие результаты были достигнуты в самой младшей возрастной группе (2,5–5,0 лет) и в тех случаях, когда ретинированное яичко располагалось у корня полового члена.

Childhood Rhabdomyosarcoma in Otorhinolaryngology

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(Received: January 24, 1986)

Two cases of childhood rhabdomyosarcoma with otorhinolaryngological localization are reported and the literature of this rare malignancy is reviewed. The prognostic importance of localization, early diagnosis and combined surgical, irradiation and cytostatic treatment are emphasized.

Rhabdomyosarcoma (RMS) is a malignancy of mesenchymal origin [6] representing 5–15% of the malignant soft-tissue tumours. Its occurrence is most frequent in childhood. RMS accounts for 4–8% of all malignant tumours under the age of 15 years [12]. Two frequency peaks are observed in young age: in the periods between 3 to 5 and 15 to 19 years. The sexual incidence is predominantly male, with a ratio of 1.23 : 1. Relationships have been found between the frequency of the disease and the low socioeconomic status and/or the smoking habits of the parents. Certain families exhibit a higher incidence of this tumour and of malignancies such as pulmonary, adrenocortical and breast cancer [14]. The embryonic mesenchyma is regarded as the origin of the tumour since the undifferentiated primitive mesenchyma is capable of rhabdomyoblastic metamorphosis. It may also develop from the normal striated musculature. In the latter case, however, the source is the rhabdomyoblast remnants rather than the fully-differentiated cells of the muscle [7].

The diagnosis is verified by light- and electron microscopy. The Z-shaped bands of the myosin and actin fibres are the most pathognomonic ultrastructural formations for the morphologist [6].

A histological classification of RMS has been established by Horn and Enterline [10].

1. The embryonic type. Most frequent under 15 years. Characteristic localizations are the head and neck and the genitourinary tract. It may also occur in the extremities.

2. The botryoid type is a variant of the embryonic RMS; it is typically localized in the cavities of the organism (e.g. nasal cavity and paranasal sinuses, nasopharynx, middle ear, urinary bladder, biliary tract and vagina).

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3. The alveolar type, with an incidence peak between 10 and 25 years. Mostly the musculature of the extremities is involved, and early metastases to the lungs and lymph nodes are detected.

4. The pleomorphic RMS of the extremities is most common in adults.

The main localization of the RMS are (i) the head and neck, (ii) the genitourinary tract and (iii) the extremities. Laryngeal RMSs, however, have only rarely been reported [2, 4, 9, 18].

From a differential diagnostic viewpoint, the clinical resemblance of the orbital RMS to the orbital complications of ethmoiditis and frontal sinusitis must be considered. Likewise, the macroscopic picture of the nasal sarcoma may be very similar to that of a polyp of the nasal cavity, as may be that of the nasopharyngeal RMS to that of adenoid vegetation or an angiofibroma. The tumour of the middle ear may imitate the clinical manifestations of chronic mastoiditis, it may protrude as a polyp through a tympanic perforation into the external acoustic meatus, and it may also be accompanied by facial palsy and later by palsies of further cerebral nerves as a consequence of its intracranial invasion [1, 16, 23].

The clinical staging follows the proposals of the Intergroup Rhabdomyosarcoma Study (IRS), established in the USA in 1972 [11]:

Group I: Localized tumour, with no evidence of microscopic residual disease following surgery.

Group II: Localized tumour, with microscopic residual disease following surgery.

Group III: Incomplete resection or biopsy with gross residual tumour.

Group IV: Distant metastases (lung, liver, bones, bone marrow, brain, distant muscle and lymph nodes).

In the past twenty years, views on the treatment of RMS have been revised. A combined therapy including surgery, radiation and multidrug cytostatic therapy offers currently the best chance of survival for the patients [3, 5, 8, 15, 17, 20, 21, 24].

The following therapeutic strategy was suggested by the IRS [12]:

Group I: Surgical intervention is followed by multidrug chemotherapy for two years (vincristine, dactinomycin, cyclophosphamide).

Group II: Combined therapy including surgery, multidrug chemotherapy and irradiation. Wide-field irradiation to the primary site of the tumour in doses of 50–60 Gy (with no more than 40 Gy to those under 3 years of age). Prophylactic craniospinal irradiation in doses of 20–30 Gy may be applied in cases involving parameningeal primary sites.

Group III: No curative surgery can be applied. A combination of chemotherapy and irradiation is the only possible therapy.

Group IV: Chemotherapy and irradiation with excessive doses are employed, both to the primary tumour and to its distant metastases.

The clinical histories of two RMS patients allow us to summarize our diagnostic and therapeutic experience.

Case Histories

Case 1. B. Cs., boy. One great-grandfather had died of laryngeal cancer. The child underwent bilateral mastoidectomy at the age of 7 months. Mastoiditis recurred on the left side in 1983, when he was 8 years old. Histological examination after repeated mastoidectomy demonstrated RMS. He was admitted to our Oto-Rhino-Laryngology Department for further observation. The left external acoustic meatus was obliterated by neoplastic tissue. During radical mastoidectomy, the upper and posterior walls of the bony external acoustic meatus, the anterior two-thirds of the horizontal semicircular canal and a 1 cm portion of the facial canal were found to be destroyed. The mastoid cavity and the tympanum up to the orifice of the auditory tube were filled with polypous tumour tissue resembling a bunch of grapes. The malleus and incus were necrotized. The disease exerted a retrolabyrinthine extension. The tumour was removed surgically under the microscope without any visible residue. Histologically, the botryoid subtype of embryonic RMS was demonstrated (Fig. 1). Two weeks after surgery, multidrug chemotherapy was commenced at the Department of Paediatrics. The therapeutic regime during the

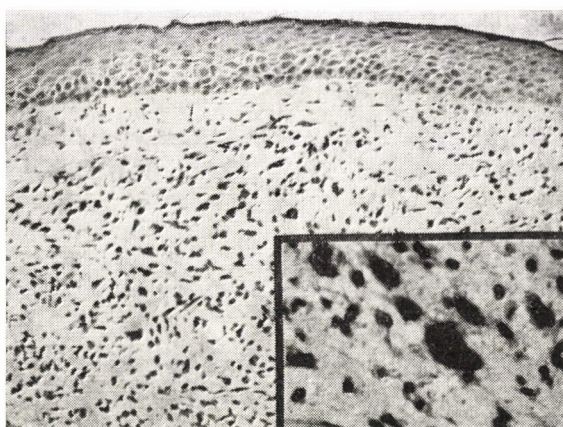


FIG. 1. Subepithelial detail of embryonal botryoid rhabdomyosarcoma. Polynuclear tumour cells in the myxoid matrix, with a slight amount of ramifying cytoplasm. Inset: mitotic cells (HE $\times 140$, $\times 350$)

TABLE I
Cytostatic treatment schedule for B. Cs.

Week	1	2	3	4	5	6
Vincristine 1.5 mg i.v.	↓	↓	↓	↓	↓	↓
Cyclophosphamide 600 mg i.v. inf.	↓	↓	↓	↓	↓	↓
Adriamycin 40 mg i.v. inf.	↓	—	↓	—	↓	↓
Actinomycin 0.4 mg i.v.	—	↓	—	↓	—	↓

first 6-week period is shown in Table I. The cytostatic treatment was subsequently followed every other week by a repetition of the sequence of drugs used in the first cycle.

No local recurrences were observed. The tumour spread intracranially and destroyed the petrous part of the temporal bone. After one month, palsy of the abducent nerve, after six months peripheral facial palsy and anaesthesia of the statoacoustic nerve had become manifest. In order to influence the progression, chemotherapy was then supplemented with telecobalt irradiation in a dose of 30 Gy to the area of the petrous bone. Thereafter, the therapy was suspended due to the lack of co-operation by the parents, and the patient was discharged seven months postoperatively. In the tenth month, the child was readmitted to the Paediatric Department in a comatose state. The cheek and the retroauricular area were swollen on the left side, with tumour recurrence in the external acoustic meatus. After two weeks of observation, the boy died. Autopsy revealed tumour masses in the left maxillary bone, the parotid, the mandible, the temporal and sphenoid bones, the bony and soft tissue portions of the cranial base and the cerebellum and brain stem.

Case 2. Á. K., boy. Since birth, numerous "café au lait" type hyperpigmented spots have been visible on the skin. The child was first examined in 1982, at the age of 3 years. On the left side, a round tumour about 2 cm in diameter extended downwards from the free edge of the soft palate and the rear surface of the uvula. The histological examination of the removed tissue indicated a juvenile angiofibroma (Fig. 2). The tumour repeatedly recurred during the next 18 months and spread to the right tonsil, too. A gradual malignant transformation could be followed microscopically after repeated surgery. In October 1984, a recurrent tumour and a metastasis, the size of a pigeon egg in the middle of the right sternocleidomastoid muscle were, excised, and surgery was completed with radical cervical block-dissection on the right side. The histological diagnosis of the tumour residue (Fig. 3) and the cervical metastasis (Fig. 4) was in both cases RMS of embryonal type. Two

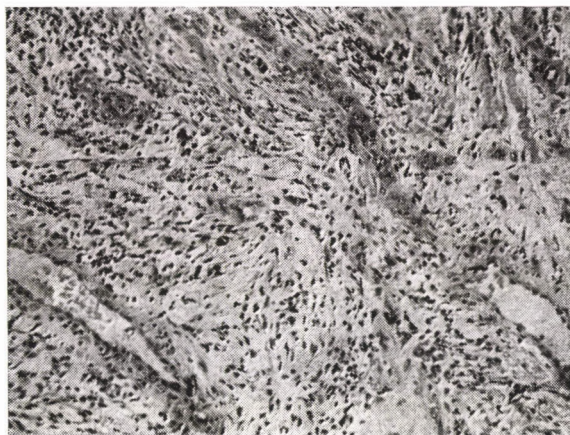


FIG. 2. Juvenile angiofibroma (HE $\times 140$)

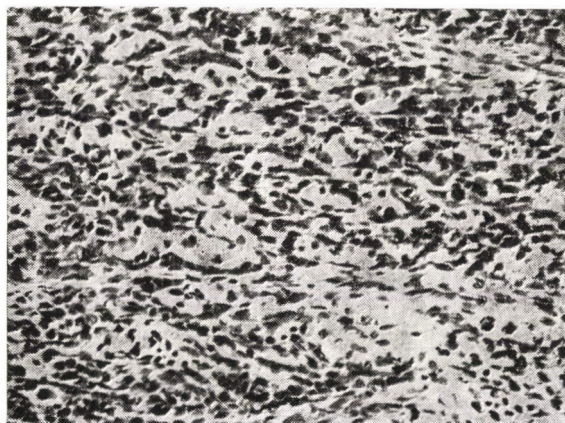


FIG. 3. Embryonal rhabdomyosarcoma. Cells in various stages of differentiation (HE $\times 220$)

weeks after surgery, long-term multidrug chemotherapy similar to that in the previous case was introduced and is currently continuing. Nine months following the last surgical intervention, the child is still tumour-free.

Discussion

Whereas 90% of RMS patients died within 5 years before 1960, acceptance of the therapeutic system proposed by IRS led to more differentiated treatment and to encouraging survival statistics. The two-year survival rate is 90% in group I, 70–75% in group II, 60–65% in group III, and 30% in group IV [12]. The five-year survival rate for patients with tumours not invading the intracranial space has been estimated at 50–68% after early

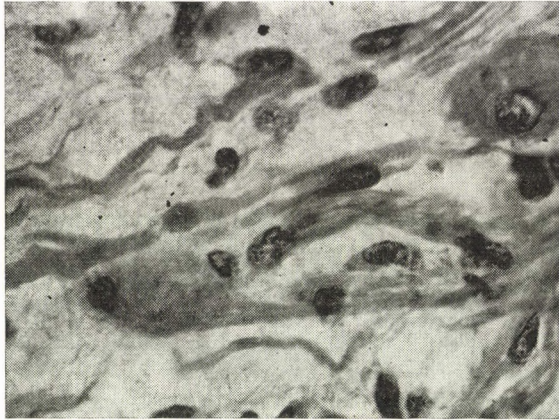


FIG. 4. Embryonal rhabdomyosarcoma. Striation in tape-shaped and racket-shaped rhabdomyoblasts (HE $\times 880$)

diagnosis [16, 17]. The poor expectation in the event of parameningeal RMSs is due to their intracranial penetration [13]. In these unfortunate cases, intrathecal chemotherapy and craniospinal irradiation are also permissible. Despite all these efforts, however, the survival does not exceed eight months.

The prognostic importance of proper staging and localization is demonstrated by our case histories. The disease of B. Cs. could be classified in group II, as a microscopic residue must have remained after surgery. The outlook was worsened by the intracranial invasion of the tumour. Thus, in spite of an appropriate therapeutic regime, the patient died ten months after diagnosis, which was in accordance with international experience [13].

The tumour of Á. K. was removed radically in stage I. The extracranial location here made the prognosis more favourable. The latter case may deserve attention with regard to the gradual development of the malignancy. The alteration of the histological picture to one of malignancy has been observed by other authors, too [22]. This phenomenon may serve as an evidence for the possibility of a step-by-step genesis of RMS, as an alternative to abrupt mutation.

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Rhabdomyosarkom im Kindesalter in der Oto-Rhino-Laryngologie

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Nach Überblickung der Literatur des seltenen malignen Krankheitsbildes werden 2 Fälle mit im Kindesalter aufgetretenen Rhabdomyosarkomen mit oto-rhino-laryngologischer Lokalisation dargestellt. Anschließend finden die prognostische Wichtigkeit der Lokalisation, der Frühdiagnose und der kombinierten chirurgischen, Strahlen- und zytostatischen Behandlung eine Besprechung.

Рабдомиосаркома детского возраста в оториноларингологии

Е. САБАДОШ, О. РИБАРИ, Й. ЭРИ, М. ИЙЕШ и К. БОХУШ

В настоящей статье сообщается о двух случаях рабдомиосаркомы детского возраста с оториноларингологической локализацией, а также дается обзор литературы этой редкой злокачественной патологии. Подчеркивается прогностическое значение локализации, раннего диагноза и комбинированного хирургического, лучевого и цитостатического лечения.

Diagnosis and Therapy of Varicocele. Fertility Aspects

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Calling attention to the andrological importance of subclinical varicocele, the authors' own operative material is analysed from the point of view of fertility. Problems of surgical indications, with particular regard to the azoospermic and normozoospermic groups, are discussed. Based on their own results, they express their views on the choice of surgical intervention.

The association between varicocele and the pathozoospermic state has long been known. Details of this subject are extensively discussed by international as well as Hungarian literature [8, 11, 21, 22, 23, 24]. Several factors play a role in the pathogenesis of varicocele. Currently the earlier hypotheses considering only anatomical causes (i.e. the morphological situation due to the impeded flow of the left testicular vein into the renal vein) have been revised and, beside the valve insufficiency of the testicular vein, the presence of renogonadal bypass and the degree of compression of the left renal vein (i.e. the steepness of the renocaval pressure gradient) seem to be responsible for the pathological state. Haemodynamic investigations have proved that the degree of varicocele does, however, depend on the backflow in the testicular vein [11].

The exact mechanism of damage is still not fully understood. Undoubtedly, the effect of local temperature and the deterioration due to the reduced oxygenation of the germinal epithelium, may also play a role. Recently, however, a third factor has also been supposed, i.e. the fertility-decreasing effect of anti-sperm antibodies due to the change of the blood-testicle barrier. This body of knowledge is, for the moment being, of theoretical value and still cannot be utilized for therapeutic purposes.

The best way of eliminating the pathogenic state, is the surgical solution, although other attempts are also being made [16, 17, 18]. The andrological value of an effective operation is appreciated by several reports [5, 10, 12, 14, 15, 19, 20, 22].

At the same time, the quantitatively successful operations, often, not offering a complete solution in themselves (i.e. without a substitutional therapy), do not improve the spermiatic picture for some unknown reason. This fact calls for the revision of the surgical indication. Earlier only cases

of large, visible and well-developed varicocele causing a dragging lumbar pain, were operated. Then, it became obvious that varicocele of minor degree may also produce an andrological change. The up-to-date examination methods for detecting subclinical varicocele were devised accordingly. (This applies to non-visible, hardly palpable varicocele, appearing sometimes only when being provoked, which can, however, be the cause of pathozoospermia.) These investigations attempted to reveal the local flow conditions (venous drainage), the temperature relations of the scrotum (various thermographic studies) and the hydrodynamic and pressure parameters of venous flow. Of them, selective phlebography, the various types of thermographies (contact scrotal thermographies, 'Bayrostrip', plate thermographies, infrared thermographies) scintigraphy, bidirectional Doppler sonography and the up-to-date flow-pressure studies are of practical importance [1, 2, 4, 6, 7, 9, 11].

To decide the field of indication, it is indispensable to know what to expect of the operation with the given andrological status. Earlier varicectomy has been thought to be useless in azoospermic patients. However, the reports by Czaplicki et al. [4] and by Mehan [13] called attention to the fact that varicoelectomy may improve even the fertility status of such patients [4, 13]. Our own results are summarized in Table I.

It has to be noted that, of 20 patients, not only 12 showed improvement (which, in some cases, meant the appearance of some sperms, i.e. it did not essentially influence fertility), but in 7 patients of these 12 (58%) an increase in the number of sperms of 10 million per ml, or over it, was observed.

It was also questionable whether varicoelectomy should be performed in normozoospermic patients, since, here, in the given time of observation, there was a seemingly undisturbed fertility. Our relevant results are summarized in Table II. It is important to note that a deterioration of the spermatogenic picture even in normozoospermic patients will occur, in more than half of the cases, within half a year and in over 80%, within one year.

The importance of the fertility aspect of the operation has already been pointed out in several cases [15, 16]. At the same time, it is not indifferent as to the results, at what level the varicoelectomy is performed. Based on our summarizing Tables, we are not too much for the method of scrotal or 'very high' (that is much higher than the inguinal region) venous ligation (Tables III and VI).

TABLE I
Andrological results after inguinal venous resection

No. of patients	Improved %	Recurrence % (1 year)
184	69	4

TABLE II
Andrological results after 'high' vein resections

	'Extraneous' material	Improved %	Recurrence % (1 year)	Own material	Improved %
No. of patients	92	58	10.4 9.6	110	62
	Improved: 10 million/ml, 15% motility				

TABLE III
Effectiveness of varicoelectomy in azoospermic patients

No. of patients	Improved	%
20	12	60
	10 million/ml-7 (58%)	

TABLE IV
Normozoospermia and varicocele

No. of patients	Control I (6 months)	Control II (1 year)	Pregnancy
	deteriorated	deteriorated	
40	57%	83%	3

As shown by Table III ('extraneous material', i.e. operations performed in another institution andrologically controlled by us; own material, i.e. operations performed by us), there is no essential difference in the result of the groups as to the high venous ligation was performed in another institution or by us. Using this method, a result of about 60% with 10% recurrences can be produced in both groups (Table IV). Results after venous resection in the upper (but not higher) portion of the inguinal region are much favourable. This can be ascribed, among others, to the fact that the operating surgeon may visualize the entire funicle (and the branchings of the pampiniform vein), and can decrease to the minimum the hazard of testicular atrophy as well as the possibility of recurrence—considering the probability factors—by resecting a given amount of the venous plexus.

Conclusions

1. Detection of subclinical varicocele is a basic condition of andrological therapy.
2. The presence of any degree of varicocele can be an indication for surgery from the andrological point of view.
3. Positive results can be expected even in azoospermic patients.
4. In normozoospermic patients the damaging effect of varicocele will be manifested in the spermiatic picture after six months, i.e. in childless, normozoospermic patients the surgical solution is by all means indicated.
5. Andrologically, the greatest improvement is to be expected of the venous resection performed in the inguinal region.

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Diagnose und Therapie der Varikozele. Fertilitätsaspekte

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Nach Betonung der andrologischen Bedeutung der "subklinischen Varikozele" wird das eigene großzahlige Operationsmaterial, unter Berücksichtigung der Fertilität analysiert, und die Frage der Operationsindikation besprochen. Im Spiegel der Ergebnisse wird auch betreffs der Auswahl der chirurgischen Freiliegung Stellung eingenommen.

Диагноз и терапия Varicole. Аспекты фертильности

ДЬ. ПАПП и М. АБДУЛЛА

Авторы обращают внимание на андрологическую значимость «субклинического varicocele» и производят анализ собственного большого хирургического материала — с точки зрения фертильности. Они занимаются также вопросами показания к операции (уделяя особое внимание группам больных с азооспермией и нормоспермией). На основании полученных результатов они занимают позицию также в вопросе выбора оперативного вмешательства.

The Possibilities of Real-Time Sonography in the Diagnostics of Peripheral Pulsating Resistances. Our Experiences of Some Cases

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Real-time sonography was performed in 5 patients in 7 cases for peripheral pulsating resistances. The change developed in the inguinal fold in one case after arteriography and in 3 patients following a vascular operation. In an additional case, a pulsating mass located in the neck proved to be the kinking of the subclavian artery. After a brief literary review of the ultrasound-diagnostics of the vessels, the authors have found sonography a suitable means for judging the relationship between the vessel or graft and the pseudoaneurysm, the size of the communication and eventual thrombus formation.

Advance in sonography has enabled, first by the use of the compound and later by real-time technique, the full visualization of vessels, the assessment of their internal movement, their identification according to their origin, the termination and course and the echomorphological analysis of the pathological changes [1, 7, 9, 14, 24, 26]. The majority of the studies deals with the pathogenic state of abdominal vessels [2, 6, 8, 10, 11, 13, 15, 16, 22, 23, 27, 29]. In the recent years, analysis of peripheral vessels has become possible with the appearance of equipments of a higher resolution [5, 12, 17, 19, 20, 21, 28] and only a limited number of reports have been concerned with the study of peripheral pulsating resistances [3, 4, 5]. The most ideal procedure is B-scan sonography combined with the Doppler technique integrated into one equipment, although this kind of instrument is only available at a fairly limited number of places and so, as an intermediary method, the parallel use of the two examination procedures can be recommended.

At our Clinic, peripheral pulsating resistances were observed in the recent three years in 5 patients for 7 times and also echography was performed as an initial examination for judging the connection between the palpable change and the vessels. In the present study, our first experiences are reported with a special emphasis on the relatively small number of the relevant literary data.

Method

Our examinations were carried out by using a Siemens Imager 2300 real-time equipment with 2.5 and 3.5 MHz linear focussed transducers, by applying Aguasonic transmission gel. The pathological region was compared

in each case with the corresponding region of the contralateral side. Beside the typical transversal and longitudinal sections, the transducer was also used for obtaining oblique scans respecting also the course of vessels and the shape of the palpable change. Documentation was made by a Polaroid camera. The result of sonography was confirmed, in all but one case, by arteriography and operation, respectively. In a single patient referred to above, an invasive intervention was not indicated on the basis of the unanimous echographic finding because of his being free of complaints.

Case-Reports

Case 1. A 29-year-old female patient had been subjected to a coronary bypass operation performed for myocardial infarction one year previously. A control coronarography had been made by the Seldinger technique three

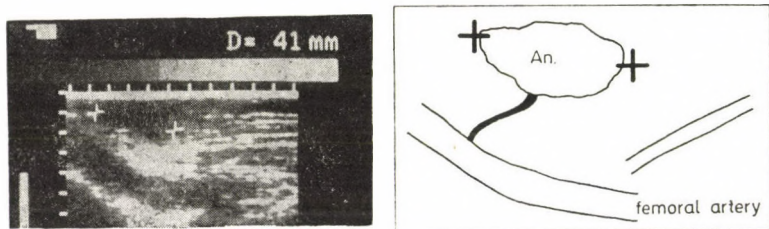
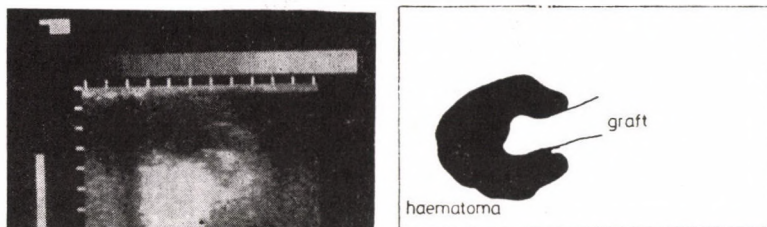


FIG. 1. Effusion in front of the femoral artery (An) communicating via a thread-like passage with the artery

days earlier. In the femoral region suffusion and a pulsating haematoma appeared. During ultrasonography a 4 by 2 by 2 cm effusion could be demonstrated before the common femoral artery, relatively far from the vessel communicating with the artery only via a thread-like passage (Fig. 1). The surgical finding also confirmed this and the lesion could be managed by one U-stitch.

Case 2. The 55-year-old male patient underwent an aortobifemoral bypass operation eight years earlier. A pulsating resistance had developed in the right inguinal fold about two weeks prior to his present admission. Ultrasonography revealed around the right branch of the graft, an about 45 cm long and 3.5 cm wide pulsating cavity with an effusion where the graft was floating freely with an opening of about 9 mm. In the anterior lateral portion of the pulsating haematoma an echo-poor mural region corresponding to the thrombus could be visualized (Fig. 2). During operation a decoloured thrombus, about half of the graft, the size of a woman's fist, got detached in the pseudoaneurysm. Following resection of the wall of the aneurysm, the vessel prosthesis was sutured in place by circular stitches.



Transversal

FIG. 2. The graft opening widely into the haematoma is well visualized in the transverse section of the right inguinal fold

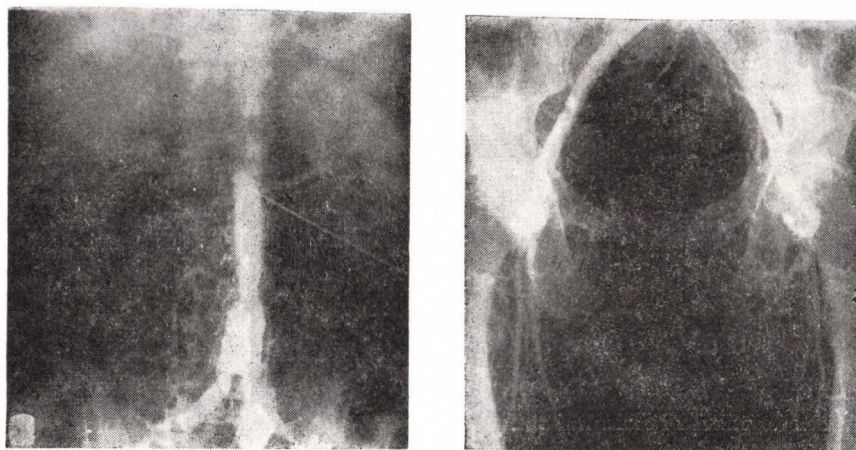


FIG. 3. Lumbar aortography performed 4 years after an aortobifemoral bypass cranially shows a small stenosis, while distally, a small aneurysm on both sides of a vascular anastomosis

Case 3. In the 57-year-old man a right inguinal pulsating aneurysm and a left inflammatory cyst independent of the vessel was found first three years subsequent to performing an aortobifemoral bypass. Two years after reconstruction, a second operation became necessary due to the appearance of a left, then half a year later, of an additional right pulsating resistance. Bacteriological examinations yielded negative results in all cases. Due to the recurring changes, several sonographies were made. Lumbar aortography (Fig. 3) revealed a small stenosis at a proximal anastomosis, while an aneurysm of 2.5 cm at the distal branch of both sides of the graft. Ultrasound documented on the left a 3 by 4 by 5 cm echo-poor, equally pulsating, region with interruption of the contours in the dorsal vessels and an inhomogeneity in the posterior portion of the haematoma (Fig. 4). On recurrence on the right side (Fig. 5), echography disclosed a 5 by 4 by 4.5 cm echo-free region with a

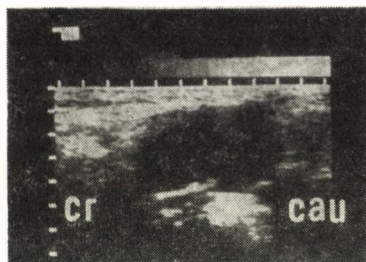


FIG. 4. Sonography of the patient mentioned in Fig. 3 made one year later demonstrates well the pseudoaneurysm in front of the vessels in the left inguinal fold (cr = cranial, cau = caudal directions)

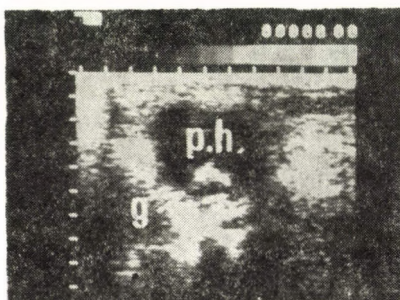


FIG. 5. Development, half a year later, of a recurring pulsating haematoma in the right inguinal fold of the patient shown in Figs 3 and 4. In the longitudinal sections, the effusion (p.h. = pulsating haematoma) and the dorsally situated graft (g) are well discernible

well-discernible, intensively echo-dense mass in its dorsal portion corresponding to the graft.

Case 4. In the 48-year-old male patient a femoropopliteal venous bypass was made 27 days earlier for a superficial femoral occlusion. The patient was discharged after healing of his wound by first intention and was summoned back for solving a similar stenosis on the other side. He was readmitted for a suddenly appearing painful left inguinal swelling and a fever of 39 degrees centigrade taken at home. The acute sonography revealed an echo-poor mass with a thick halo of 102 by 52 by 55 mm with a 35 by 43 mm portion containing an effusion centrally. Dorsally, an artery, the diameter of 6 mm was pulsating, distally with an interrupted central portion (Fig. 6).

Case 5. The 59-year-old female patient had been noting a pulsating resistance in the right supraclavicular fossa for some years. Recently, she had been dyspnoeic and was therefore admitted to the Department of Medicine. She was sent to our cardiovascular out-patient department for consultation with the suspicion of an aneurysm supposed to be localized to the neck. The echography revealed on the right side of the neck, a 14–15 mm vigorously pulsating artery, the shape of a U turned upside down, continuing into an S curve

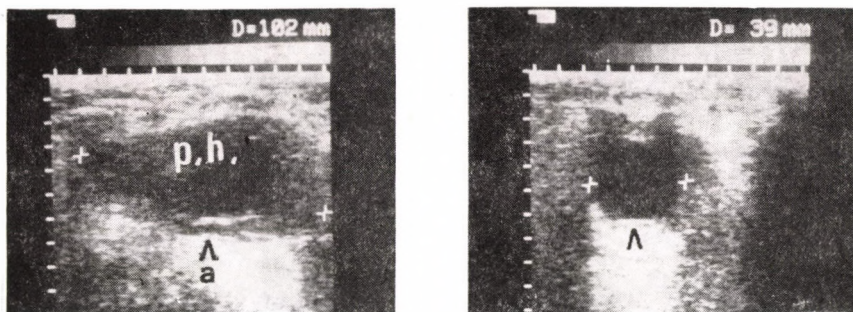


FIG. 6. Longitudinal (on the left) and transverse (on the right) sonograms of a left inguinal pulsating haematoma (p.h.) arising some weeks after a femoropopliteal bypass. The central echo-free region is well visible as well as the dorsally located artery (a)

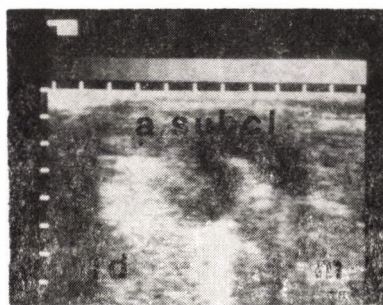


FIG. 7. Transversal section scan of the right supraclavicular regions clearly shows a kinking of the subclavian artery (l.d. = right side, m = medial)

(Fig. 7), which, according to its course, was diagnosed to be a kinking associated with a moderate aneurysm of the subclavian artery. This was so much in agreement with the clinical symptoms and the chest X-ray, that, considering the patient's otherwise angiologically negative state, no invasive diagnostic intervention, or operation was indicated, and her observation was continued.

Discussion

The examination of the abdominal vessels forms an integral part of sonography. Currently, a large number of reports are being published on the normal anatomy and the echographic assessment of the pathologic states of these vessels [2, 6, 7, 8, 9, 10, 11, 14, 15, 16, 22, 25, 26, 29]. The studies incorporate, in addition to the aimed demonstration of the great vessels (the inferior vena cava, aorta), also the clarification of the pathogenic state of the smaller vessels (renal artery, superior mesenteric artery and vein, coeliac artery, etc.).

To achieve all these results, the extensive use of high-resolution real-time equipments has been necessary, particularly in studying the peripheral vessels. In the latter field, extracranial carotid sonography has the amplest literature which is due to the fact that in 25 % of the patients with asymptomatic and untreated carotid stenosis within 5 years transitory cerebral ischaemia or other cerebral lesions may develop which makes the elaboration of a reliable non-invasive screening procedure desirable. Kuhn et al. [12] have found the sensibility of sonography in assessing the carotid changes, depending on their degree of severity, to be between 44 and 100 %, while Tölly et al. [21] defined this number to be 85 %, based on a larger number of cases. In agreement with the previously mentioned authors, Widder and Kornhuber [28] and Terwey and Gahbauer [20] point out that most diagnostic errors are those in differentiating subtotal stenosis from the total occlusion. Based on 15,000 (!) Doppler and echographic studies, Widder and Kornhuber [28] emphasize that the concurrent use of both procedures (Duplex scan) would be ideal for this purpose.

By using 5 and 8 MHz transducers, the thrombosis of the jugular vein could be demonstrated [19]. Sonography has become accessible for use in revealing the complications of artificial and arteriovenous shunts (stenosis, thrombosis, aneurysm, pseudoaneurysm, infection) applied for haemodialysis [17].

As compared with the literature on the echography of abdominal vessels and the carotid, a fairly smaller number of reports deal with the ultrasonography of the vascular changes of the extremities, including the pulsating haematomas and resistances, of the inguinal fold. Femoral aneurysms are rare, they can be genuine, of an arteriosclerotic origin, pseudoaneurysms due to trauma or to postoperative complications, and fairly infrequently, mycotic which is mainly to be found in narcotics [4]. The femoral pseudoaneurysms appear most characteristically in end-to-side anastomoses, in about 1–2 % of them [18]. Postoperative aneurysms can be caused by the too large diameter of the graft, by the difference in compliance between the graft and the natural artery, a tense vascular suturing or inadequate suturing techniques, but also by the progression of the underlying process and a degenerative vascular change in the anastomosis [5]. Gitschlag et al. [3] examined 29 patients having a painful and palpable resistance of the femoral triangle. One of them had bilateral aneurysms following an aortofemoral bypass and in two narcotics mycotic aneurysms occurred. Gooding and Effney [4] regard sonography to be suitable not only for judging the size, configuration of the aneurysm and of the eventual associated thrombus, haematoma or abscess, but also for studying the patency of the graft and the artery.

The above observations have encouraged us, although we only have transducers of 2.5 and 3.5 MHz, to study the possibilities and limitations of

ultrasound examination in pulsating peripheral haematomas. In our own material pulsating haematoma or pseudoaneurysm, resp., occurred in one patient after arteriography and in three following a vascular operation. In all these cases the diagnosis established by ultrasonography could be controlled by the operation. In one case with kinking of the subclavian artery, invasive examinations were not introduced on the basis of the complaint-free state of the patient and a typical echogram. Based on our experiences of some cases, ultrasound is suitable for defining the size, exact localization of the change, for visualizing the relationship between the vessel and the vascular graft, resp., and the pulsating resistance, and to draw conclusions as to the size of the communication and to detect an eventual thrombus. It should be emphasized that in the reviewed cases, in our opinion, an operation was necessary independent of the ultrasonic finding, nevertheless, fairly important information can be gained by sonography which is useful for the operative plan, i.e. changes equally pulsating or those independent of the vessels can be distinguished.

A further importance of sonography is that the proximal anastomosis (graft-aorta) can be judged and an eventual complication, too, may be detected. Our patient with a cervical pulsating change was not subjected to invasive procedures imposing a strain on him, in possession of the echographic finding.

The present report has not been concerned with the diagnostics and literature of the abdominal aortal aneurysms and of pulsating resistances, these experiences have been treated in a separate study [30].

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Möglichkeiten der Real-time Sonographie in der Diagnostik der peripheren pulsierenden Resistenzen. Erfahrungen im Zusammenhang mit einigen Fällen

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Bei 5 Patienten wurden wegen einer peripheren pulsierenden Resistenz in 7 Fällen Real-time-Sonographie vorgenommen. Die Veränderung entwickelte sich in der Leistenbeuge in einem Fall nach der Arteriographie und in 3 Fällen nach einer Gefäßoperation.

In einem weiteren Fall erwies sich das auf dem Hals lokalisierte pulsierende Gebilde als A. subclavia-Kinking. Nach kurzem Überblick der Literatur der Echodiagnostik der Gefäße, wird die Meinung geäußert, daß sich die Sonographie zur Beurteilung des Verhältnisse zwischen Gefäß bzw. Graft und der Pseudoaneurysmen, der Größe der Kommunikation sowie der eventuellen Entwicklung eines Thrombus bestens eignet.

Возможности Real-Time сонографии в диагностике периферического пульсирующего сопротивления. Наш опыт в связи с несколькими случаями

Я. РЕГЁИ-МЕРЕИ, М. ШЕБЕШТЬЕН и К. КОВАЧ

В 7 случаях у 5 больных авторы сделали *real-time* сонографию из-за периферического пульсирующего сопротивления. Изменения в паховом сгибе появились в одном случае после артериографии, у трех больных после операции на сосудах. Еще в одном случае пульсирующее териме, расположенное на шее, оказалось *a. subclavia kinking*. После краткого обзора литературы о сосудистой ультразвуковой диагностике, авторы считают сонографию пригодной для оценки отношения друг к другу сосуда или графта и псевдоаневризмы, для определения размера их коммуникации и возможности возникновения тромба.

Plasma Catecholamine Levels in the Postoperative Period in Complication-free and “paralytic” Ileus Patients*

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Plasma catecholamine concentrations were compared in a group of postoperative “paralytic” ileus patients and in another group of patients, who had undergone medium-size abdominal operations followed by uneventful recovery. The plasma epinephrine level was significantly in the former group, whereas no such difference was observed in the norepinephrine concentration. The data appear to confirm that the epinephrine released from the adrenal medulla appreciably contributes to the development of “paralytic” ileus. The therapeutically effective major tranquillizer and alpha-receptor blocking drug, trifluperidol, was found to reduce both epinephrine and norepinephrine levels in “paralytic” ileus patients. The decrease of the plasma epinephrine level was the higher, the greater its initial concentration. These findings seem to support the decisive role of increased catecholamine release in the development of postoperative motor inhibition (“postoperative” ileus) and also explain the success of sympatholytic treatment in such cases, i.e. the return of normal peristalsis.

A number of experimental and clinical studies suggest the involvement of the sympathetic nervous system in the development of postoperative “paralytic” ileus [24, 28]. This fact was first recognized through the favourable effect of spinal anaesthesia [17]. The use of sympatholytic drugs to influence “paralytic” ileus was first proposed by Petri in 1964 [23]. This suggestion was based on the observation that, even in patients undergoing severe abdominal surgery, the preoperative use of a drug combination containing chlorpromazine led to an earlier return of the peristaltic sounds than usual. Catchpole et al. [2, 20] reported the combined application of α - and β -adrenergic receptor blockers to counteract the sympathetic activation inducing “paralytic” ileus. In addition to chlorpromazine, Petri and Pórszász [26, 27, 28] subsequently investigated the effects of trifluperidol, a major tranquillizer with α -blocking action; they found that both drugs competitively antagonize the sympathetic inhibition of the peristaltic reflex. Trifluperidol alone proved effective in restoring peristalsis in nearly all cases, whereas chlorpromazine did so in only 82%. Kinnaert et al. [11] described similar results with chlorpromazine.

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Grund [7] used similarly successfully sympatholytic drugs (trifluoperidol dihydroergotamine or chlorpromazine) to treat "paralytic" ileus patients. Although all these data strongly suggested that sympathetic hyperactivity induced "paralytic" ileus, unequivocal evidence was lacking.

The concentration of the plasma catecholamines can be regarded as an index of sympathetic activity [12, 19]. Thus, we have measured in earlier studies the plasma catecholamine levels in patients suffering from "paralytic" ileus [25, 29]; the norepinephrine and epinephrine levels were found to be 7 and 8 times higher, respectively, than those found in healthy individuals. To our knowledge, no plasma catecholamine data had previously been reported in "paralytic" ileus as a direct proof of enhanced sympathetic activity in clinical cases of "paralytic" ileus. Not much later, Dubois et al. [4] described increased plasma catecholamine levels in ileus induced experimentally in rats; the same has been found in dog experiments [30].

In our clinical studies we found [25, 29] that trifluoperidol lowered only the plasma epinephrine concentration, but contrary to our expectation, did not affect the plasma level of norepinephrine, the sympathetic neurotransmitter. It should be noted that in these studies catecholamine determination was performed with the relatively non-specific trihydroxyindole method of Vendsalu [31]; more recently introduced techniques have increased the specificity and sensitivity of catecholamine measurement in plasma [9].

For these reasons, we have repeated our earlier study on the effect of trifluoperidol treatment in "paralytic" ileus patients, but now employing the more specific and sensitive radioenzymatic method. We have also examined if there is a correlation between the high plasma catecholamine levels characteristic of the "paralytic" state and the extent of the catecholamine response to trifluoperidol treatment.

Subsequently, we have followed the changes in the plasma catecholamine levels during the first five postoperative days in patients who had undergone medium-size abdominal surgery, i.e. a group of patients in whom postoperative "paralytic" ileus had not developed. This study aimed at seeing whether there is a difference in sympathetic activation (measured as increased catecholamine release) when manifest ileus prevails and when operated patients are free of postoperative ileus or any other complications.

Material and Methods

The catecholamine (epinephrine and norepinephrine) levels were measured in 20 operated "paralytic" ileus patients (aged 36–76 years) who had not received sympatholytic drugs before the assay. Patients were regarded as having "paralytic" ileus if there was no passage of flatus and/or stool for

72 hours, and bowel sounds were not apparent on auscultation. The abdomen was distended and there was considerable gastric retention.

Eleven of these patients (aged 48–73 years) were treated with triflupеридол (Trisedyl, Chemical Works of Gedeon Richter Ltd., Budapest). After an initial, blood sample was taken, triflupеридол was injected i.m. in a dose of 0.03 mg/kg, and further blood samples were taken 20, 60 and 120 minutes after the injection, for the determination of plasma catecholamines. The various operative procedures performed in the "paralytic" ileus group treated or not treated with triflupеридол are presented in Table I.

TABLE I
Surgical operations performed on paralytic ileus patients

Type of surgery	No. of cases	
	Non-triflupеридол treated	Triflupеридол treated
Billroth I gastric resection	1	1
Billroth II gastric resection	1	—
Cholecystectomy	1	1
Cholecysto-duodenostomy	1	1
Lysis of adhesions	2	2
Resection of the transverse colon	2	2
Splenectomy	1	—
Transrenal drainage	2	2
Sigmoideojejunostomy	1	1
Suture of gastric perforation	3	1
AP resection of the rectum	2	—
Appendectomy	1	—
Pancreatectomy	1	—
Laminectomy Thor. 9–10	1	—
Total number	20	11

For control, the effects of triflupеридол were followed in an analogous manner in a group of 12 healthy individuals (patients awaiting minor surgical procedures, who voluntarily consented to take part in the study).

The changes in the catecholamine levels during the postoperative period were also followed in 14 patients (aged 25–63 years) who had undergone similar abdominal operations but made an uneventful recovery and no signs of postoperative ileus, their bowel movements returned spontaneously to normal on the 2nd or the 3rd postoperative day, except in 2 patients; in whom this occurred on the 4th and 5th day, respectively. The distribution of these cases is shown in Table II. Control blood samples were taken during the afternoon of the day prior to the operation, before the routine premedication. Further samples were taken from all patients 2–4 hours after surgery and then early morning of the 1st, 2nd, 3rd and 5th postoperative day.

TABLE II
Operations performed in the medium-size abdominal surgery group

Type of surgery	No. of cases
Cholecystectomy	9
Billroth I gastric resection	1
Proximal selective vagotomy	2
Gastrostomy	1
Splenectomy	1
Total number	14

The radioenzymatic method of DaPrada and Zürcher [3] was employed to measure the plasma concentration of catecholamines. On each occasion 2–3 ml blood was taken from the cubital vein, the blood was collected in heparin containing centrifuge tubes, cooled in an ice-water bath. After centrifugation, the plasma was stored at -20°C until the determination within 20 days. The normal control values of plasma catecholamine levels were determined in 15 healthy blood donors who had rested for 30 minutes in the supine position prior to the blood collection.

The method of Wilcoxon et al. [34] was used for statistical analysis. A stochastic probability [6] of less than 0.05 was regarded as significant. The semiinterquartile range is given to estimate the scatter [5].

Results

Plasma Catecholamine Levels of Postoperative "Paralytic" Ileus Patients before Sympatholytic Treatment

These data supported our earlier reported observations: it was found that the concentrations of both catecholamines were significantly higher in the "paralytic" state as compared to the values for the healthy individuals (blood donors) we examined. The means of the data for 20 postoperative ileus patients showed the norepinephrine and epinephrine concentrations to be 6.4 and 10.4 times higher, respectively, than the normal control values (Table III). (The corresponding factors found with the older method were 7 times and 8 times, respectively.)

The catecholamine responses to trifluoperidol treatment are illustrated in Fig. 1. The high plasma norepinephrine level of the "paralytic" ileus patients was significantly lower 20 minutes after treatment with trifluoperidol. After 60 minutes, the decrease was much less prominent and, because of the considerable scatter of values, the change proved not to be significant. Nor was

TABLE III

Comparison of plasma catecholamine levels in patients underwent medium-size abdominal surgery and in "paralytic" ileus cases

	"Paralytic" ileus patients (n = 20)	Maximum levels after abdominal surgery (n = 14)	Normal control values (n = 15)
Norepinephrine (nmol/l)			
mean	8.34*	8.50*	1.31
median	7.46	8.06	1.26
Semiinterquartile range	1.83	3.29	0.25
Percentage changes compared to normal control values	636.6	648.8	—
Epinephrine (nmol/l)			
mean	7.15*	3.65*	0.69
median	6.54	3.46	0.67
Semiinterquartile range	1.98	0.96	0.19
Percentage changes compared to normal control values	1036.2	528.9	—
p^+	↑ $p < 0.01$ ↑		—

p^+ : stochastic probability of the occurrence of the difference between the two groups

*: $p < 0.01$ against normal control values

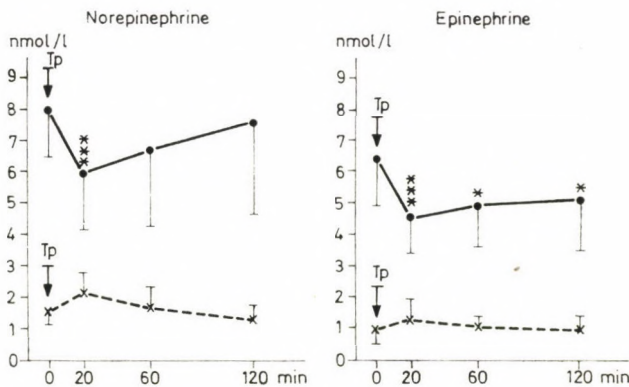


FIG. 1. Effect of trifluoperidol treatment on the plasma catecholamine levels in post-operative "paralytic" ileus patients and in healthy subjects. ●—●: the group of "paralytic" ileus patients ($n = 11$); x—x: the control group ($n = 12$). Tp: trifluoperidol 0.03 mg/kg i.m. * * *: $P < 0.01$; *: $P < 0.05$ against pretreatment values

a significant change found after 120 minutes. By contrast, a lasting decrease in the plasma epinephrine concentration occurred after the administration of trifluperidol: at each time of determination, the epinephrine levels were significantly lower than the pretreatment values of the ileus patients. Figure 1 also shows the catecholamine responses in the "healthy" control group waiting for minor surgery. Trifluperidol did not influence the plasma catecholamine concentrations in these healthy subjects: the slight rise of the epinephrine and norepinephrine level after 20 minutes proved to be only transient and was not significant.

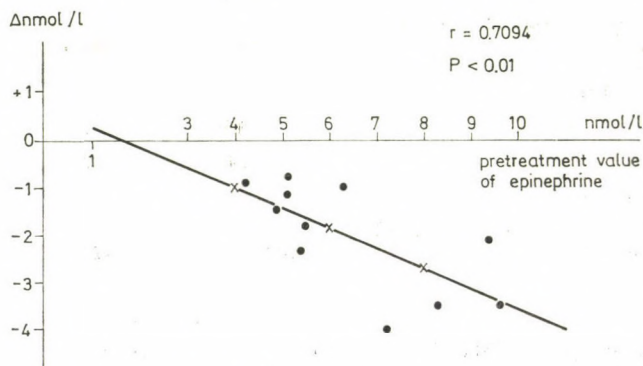


FIG. 2. Relationship between initial plasma epinephrine levels in "paralytic" ileus and its response to trifluperidol treatment. Ordinate: difference in plasma epinephrine levels before and 20 minutes after trifluperidol administration

To examine the possibility of a correlation between the magnitude of plasma catecholamine concentrations and the catecholamine response to trifluperidol, we calculated the correlation coefficients at those times when the catecholamine levels in the plasma were reduced significantly by the drug. There was a significant correlation between the pretreatment value and the decrease of the plasma epinephrine level 20 minutes after trifluperidol administration; this means that the plasma epinephrine concentration fell the greater extent, the higher the initial plasma epinephrine levels was in the ileus patient. The regression plot is given in Fig. 2; the correlation coefficient, $r = 0.7094$, $p < 0.01$.

Effect of a Complication-free Abdominal Operation

In this group, too, the surgical trauma significantly elevated the level of both epinephrine and norepinephrine in the plasma; during the postoperative period the levels became progressively lower (Fig. 3). However, the changes

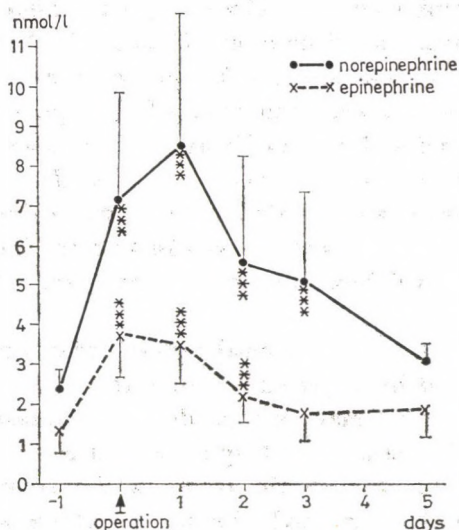


FIG. 3. Effect of medium size abdominal surgery on the plasma catecholamine levels (n = 14). ***: $p < 0.01$ against preoperative values

in the two amines differed: the increase of norepinephrine concentration was higher and more lasting than that of epinephrine. The highest norepinephrine level was measured on the 1st postoperative day. The values were progressively lower on the 2nd and 3rd postoperative days, but these values were still significantly higher than the preoperative ones. On the 5th day, the measured levels approached the normal values. The plasma epinephrine level, on the other hand, was highest on the day of surgery, then it fell gradually, and on the 3rd postoperative day it no longer differed significantly from the initial value.

Discussion

Through enhancement of the activity of the sympathetic nervous system, all forms of surgical stress increase the plasma catecholamine levels to various extents [8, 16]. Since "paralytic" ileus most frequently occurs in abdominal and retroperitoneal operations (though it may also occur in numerous other cases) [2], it appeared reasonable to compare the catecholamine response to uncomplicated abdominal surgery and the plasma levels in cases of manifest "paralytic" ileus. In this way, we excluded factors that might lead to adrenergic activation (e.g. hypotension, hypovolaemia, hypoxia, distorted acid-base equilibrium, etc.).

As to the increase of the norepinephrine level in this group, the surgical intervention evoked the largest response on the 1st postoperative day; at this

time, the plasma norepinephrine level was almost as high as in the individuals belonging to the "paralytic" ileus group (Table III). In these cases, the epinephrine concentration, was also the highest on the 1st postoperative day, but it was significantly lower than that of the "paralytic" ileus patients. The levels are compared with those of healthy individuals in Table III. At the time of the maximum response in this group of moderate surgical stress, the plasma epinephrine level was 5.3 times the normal value; the corresponding increase in the "paralytic" ileus group was 10.4 times. The analogous increases in the norepinephrine level, however, were 6.5 times and 6.4 times, respectively, i.e. the same.

It is a well-known fact in surgical practice that virtually all abdominal operations are followed by a period of some motor inhibition involving the gastrointestinal tract. This may be regarded as a "quasi-physiological" phenomenon [2, 14]. It is characterized by a delayed evacuation of the stomach and by the sluggish function of the colon, while the motility of the small intestine remains relatively normal; this is in contrast with the pathological "paralytic" condition, in which the intestinal tract is almost entirely inactive and incapable of furthering its contents. In the "physiological" postoperative ileus, the motor disturbances are transient in nature, and the gastrointestinal tract spontaneously recovers within 1-3 days [10, 21].

In both cases, it may be assumed that an already known mechanism is involved, i.e. the hyperactivity of the sympathetic nervous system leads to motor inhibition. The fact that enhanced sympathetic activity can also play a considerable part in the "physiological" ileus, is evidenced by the appreciable rise in the catecholamine levels on the first three postoperative days in patients with complication-free abdominal surgery. After the consistent initial rise of catecholamine levels as compared to the preoperative values, the subsequent normalization of the plasma catecholamine concentration coincided with the spontaneous restoration of intestinal motility; all 14 patients spontaneously produced stools on the 2nd-5th days. In accordance with the data of other authors [8, 16], therefore, our plasma catecholamine results relating to the postoperative period demonstrate that the surgical trauma stimulates both the secretion by the adrenal medulla and the release of norepinephrine from the sympathetic terminals. The increase in concentration of the catecholamines in connection with complication-free abdominal operations can be considered a proof that sympathetic activation plays a role also in the induction of the reversible gastrointestinal motor disturbances commonly encountered postoperatively.

Trifluoperidol is an α -receptor blocker with an associated central tranquillizing effect. Earlier we demonstrated that trifluoperidol alone is effective in the treatment of postoperative "paralytic" ileus [26, 28, 29]. In contrast with our own earlier data, with the use of a more sensitive assay, also the

plasma norepinephrine concentration was shown to decrease significantly 20 minutes after injection of trifluoperidol in the "paralytic" ileus patients; in accordance with our previous data, the epinephrine level was significantly lowered at all examination times. Thus, trifluoperidol obviously decreases the sympathetic activity in postoperative ileus patients.

Both the earlier [25, 29] and the present evaluation of the catecholamine responses to trifluoperidol treatment in postoperative "paralytic" ileus patients revealed that the catecholamine concentration fell the more, the higher the pretreatment level had been. Previously, however, the insensitivity of the method and the lack of a sufficient number of data meant that we were unable to establish a definite correlation. Our present data revealed that, 20 minutes after trifluoperidol administration, the plasma epinephrine concentration was generally lowered the more extensively, the higher the initial epinephrine level of the ileus patient ($r = 0.7094$, $p < 0.01$). However, as far as the extent of the norepinephrine decrease was concerned, we did not find a correlation with the pathologically high values in the ileus cases.

These data may be striking, for norepinephrine is the transmitter of the sympathetic nervous system, and the direct cause of the "paralytic" ileus is the blockade of the peristaltic reflex, which can predominantly be attributed to the norepinephrine released at the sympathetic nerve terminals of the intestinal wall, and, thus, inhibiting the liberation of acetylcholine [22, 32]. However, by blocking the peristaltic reflex, the epinephrine inhibits the intestinal motility in the same way as norepinephrine does [13, 18]. Our data indicate that not only norepinephrine, but also epinephrine plays an essential role in the induction of postoperative "paralytic" ileus. This can be concluded from the high plasma epinephrine levels found in the ileus patients, which were substantially higher than the average levels following complication-free surgery.

The role of epinephrine seems to be confirmed by recent studies: epinephrine may be incorporated into the noradrenergic neurons, from which it is subsequently released as a co-transmitter in response to a stimulus, and it facilitates the noradrenergic transmission through presynaptic beta-receptor activation [1, 15].

In an interpretation of the effects of trifluoperidol, attention must be paid to its central action, which may influence the epinephrine production by the adrenal medulla [33]. It appears that the epinephrine response in sympathetic mobilization, is not uniform: in certain individuals it may be smaller or greater than the average. To a certain extent, this observation provides an answer to the question of why "paralytic" ileus develops in some patients under certain conditions, but not in others.

In conclusion, it appears confirmed that the postoperative "paralytic" ileus is a consequence of generalized activation of the sympathetic nervous

system. Another point to be borne in mind is the individual variations of the regular catecholamine response to surgery, and possibly the individual sensitivity to catecholamines of the patients.

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Plasma-Katecholaminspiegel in der postoperativen Phase bei komplifikationsfreien Patienten und bei Patienten mit „paralytischem“ Ileus

K. TÁRNOKY, J. SZENOHRADSKY und G. PETRI

Die die sympathische Aktivität der postoperativen Ileuskranken anzeichnenden Plasmakatecholamin-Konzentrationen wurden mit den in der ungestörten postoperativen Periode der eine mittelschwere Bauchoperation überstandenen Patienten gemessenen Werten geglichen. Bei paralytischem Ileus lag der Plasmaadrenalin Spiegel der an paralytischem Ileus leidenden Patienten wesentlich höher als die durch mittelmässig schwere Bauchoperationen ausgelösten Adrenalin-Konzentrationen, während betreffs der Noradrenalin-Konzentrationen kein solche Unterschiede zu erkennen waren. Laut dieser Daten trägt die Adrenalin-Überproduktion des Nebennierenmarks aller Wahrscheinlichkeit nach zur Entwicklung des paralytischen Ileus in bedeutendem Masse bei.

In Hinblick auf das sich therapeutisch gut bewährten maior Tranquillantien Trifluoperidol, welches gleichzeitig auch ein Alpha-Rezeptorblocker ist, dass es die sympathische Aktivität der Patienten mit paralytischem Ileus sowohl was Adrenalin, als auch was Noradrenalin anbelangt, herabsetzte. Die Abnahme der Plasmaadrenalin-Konzentration war desto ausgeprägter, je höher die pathologische Ausgangskonzentration beim Patienten lag. Die Daten scheinen dafür zu sprechen, dass in der Entwicklung der postoperativen motorischen Hemmung das gesteigerte Freiwerden von Katecholamin eine entscheidende Rolle spielt, womit der Erfolg der angewandten sympatholytischen Behandlung erklärt werden kann.

Уровни катехоламинов в плазме в послеоперационном периоде у больных с неосложненным и „паралитическим“ илеусом

К. ТАРНОКИ, Я. СЕНОХРАДСКИ и Г. ПЕТРИ

Мы сравнивали значения концентрации плазменных катехоламинов, указывающие на симпатическую активность, у больных с послеоперативным паралитическим илеусом со значениями, определенными в неосложненный послеоперационный период у больных, пере-

несших тяжелую брюшную операцию. Показали, что у больных, страдающих паралитическим илеусом, уровень адреналина в плазме достоверно выше, чем уровни адреналина, вызванные брюшной операцией средней тяжести, тогда как между концентрациями норадреналина такой разницы не наблюдали. Согласно этим данным, повышенная продукция адреналина мозговым слоем надпочечников наверняка значительно способствует развитию паралитического илеуса.

Относительно трифлупериода, большого транквилизатора и вместе с тем блокатора альфа-рецепторов, испытанного в терапии, установили, что этот препарат снижал симпатическую активность у больных с паралитическим илеусом, как в отношении адреналина, так и норадреналина. Степень снижения уровня адреналина плазмы была тем больше, чем выше была его исходная патологическая концентрация у леченного больного. Полученные данные, по-видимому, подтверждают, что в возникновении постоперативного двигательного торможения решающую роль играет повышенное выделение катехоламинов, и это объясняет успешность применяемых в таких случаях симпатолитической терапии.

Experimental Study of Autologous Free Omental Grafts

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The fate of intraabdominal free omental grafts was studied in 15 dogs and it was found that a connection between the hollow organ and the transplanted omentum was established only when the former had been injured. The larger, pigeon-egg-sized free fatty omental grafts became necrotic already from the fourth day onwards being replaced by an abscess-like structure, while in thin membrane-like grafts tissue necrosis due to the creeping in of connective tissue was less marked. In both cases, an intact, omentum is creeping over the graft from the adjacent region, i.e. the ultimate covering is actually provided by the pedicle graft.

The greater omentum originating from the greater curvature of the stomach hangs down in a long, loose fold like an apron in front of the transverse colon and the small intestines. This wide membrane with a considerable store of fat contains actually four peritoneal layers with the branches of the right and left gastroepiploic arteries and the collateral veins in between them. This, in some places very fatty structure acts as an absorbent and protection against the spread of infection in the abdominal cavity, because after perforations and traumas it adheres to the injured site securing, as it were, a natural closure. This is observed following perforation of the stomach, duodenum or the intestines, but it plays also a role in restricting the various intraabdominal inflammatory processes. The importance of this has long been recognized by surgeons and, accordingly, the omentum is used in two different ways in abdominal surgery, i.e. in the form of free or pedicle grafts. It is also employed for making suture lines safer, when the sutures cut into inflamed, oedematous tissue, rendering the results dubious. Pedicle grafts have the advantage of preserving their viability with intact circulation. They, however, involve the drawback that, as a tightly stretched bridge, they may sometimes produce mechanical ileus or other strangulation phenomena which call for additional operations. The free omental graft, having no pedicle, cannot cause such compression. The question may, however, arise how long it may remain viable, i.e. how long it may fulfil its task at a given place. Attempts were made at clarifying this question experimentally to destroy the eventual illusions of surgeons. According to Littmann [9] (I. Bugyi, Sen.: Practical Surgery, Medicina, Budapest 1960, p. 652), if a rigid perforated

ulcer cannot be adequately closed with sutures, the opening has to be closed by omentum acting as a plug, i.e. the omentum has to be fixed to the previously inserted sutures. The surgical management of ulcers has been discussed by several authors who have never failed to emphasize the role of the omentum [1, 6, 7, 8, 10, 11, 12, 13, 14]. The fate of such 'patches' has, however, not been touched upon, since the authors were satisfied with enumerating the successful or unsuccessful operation. On the other hand, the treatment of perforated ulcers has currently been treated in several reports, stressing the importance of the question.

In our own experiment, we attempted to clarify the fate of free omental grafts. Considering that it is an autologous graft, no immunological phenomenon should be expected, rejection does not appear to be a problem and most authors feel free to use them. The matter of suture materials is not controversial either, since a perforated ulcer can be stitched by sutures, however, other questions also may arise in this context. Knotted sutures, where being placed, render the tissue anaemic [5], and just therefore not too many of them should be applied at a time. In contrast, as observed in our earlier experiments, tissue adhesives do not have the same effect and they can be used with benefit in certain cases [3, 4]. Accordingly, free omental grafts were fixed at the site of the gastroduodenal injury only by using a limited number of stitches (1 or 2 knotted sutures) and applying Histoacryl-N-blau in a point-like manner (at 4 or 5 points). The sutures at the same time also secured the closure of the artificial preparation.

Experimental Method

Experiments were carried out in 15 mongrel dogs by using two methods. The stomach and the duodenum were injured in 10 cases, while in 5 dogs the organs were left uninjured prior to the local fixation of the omental grafts. According to a further version, in 6 cases thick, fatty omentum pieces, the size of a pigeon's egg, were used, folding the omentum in several layers, and in 9 cases thin, membrane-like omental grafts were attached to the required place.

The animals were sacrificed after 4, 7, 14, 18, and 28 days and 6 and 8 weeks, and material was collected for histological study. After having fixed the tissue in formalin, it was embedded in paraffin and 6 to 8 μ sections were prepared and stained by haematoxylin and eosin and Goldner's staining.

Results

In the omentum grafted on the injured stomach or duodenum granulation tissue will grow and, in this region, the fat cells will fuse and will be absorbed after some time. In case of a thin omentum, this process can be

observed in its entire thickness, while the piece of omental pedicle graft creeping to its surface will stick to it.

A free omental graft placed on the surface of the stomach or duodenum with intact serosa will not stick, as neither will the granulation tissue creep to the graft. In such cases, leukocytic infiltration and tissue necrosis can be noted in the omentum, its surface being covered by the omentum of intact vascularization. The grafted omentum will necrose completely, subsequently being replaced by connective tissue.

In case of grafting a thick piece of omentum, several zones can be distinguished:

a. Granulation tissue grows into the narrow layer contacting the injured gastric wall.

b. In the central portion of the piece of omentum an infiltrated necrosed adipose tissue showing a concentric pattern is seen.

c. The degenerating adipose tissue is surrounded by a necrosed tissular zone infiltrated by leukocytes, from which a pyogenic membrane may be formed demarcating it from its environment.

d. The intact omentum creeping there will grow over and cover the degenerating thick omental graft.

The wall surrounding the necrosed tissue containing necrosed adipose tissue infiltrated by leukocytes will become thicker and, as a result of vigorous collagenous fibre formation, the volume or the abscess-like structure will decrease gradually, to be finally replaced by a connective tissue composed of collagenous fibres. The site of the grafted omentum is marked by a hard, palpable scarring over the surface of the stomach or duodenum to which the part of omentum creeping there will be attached, covering it.

In our experiments, the free omental grafts were transformed into omental pedicle by the surrounding omentum creeping over and covering the necrotic free grafts. The thick grafts had completely been destroyed due to tissue necrosis, while the thin membrane-like layers were fixed through the connective tissue elements creeping there from the injured surface, but their surface was also covered by omentum.

The process is demonstrated in Figs 1 to 9.

Conclusions

The free omental grafts can be applied only as thin layers and not as bulky tissue samples at the site of the injury, since a thick and fatty graft will undergo necrosis on the fourth day and this necrosed tissue will be retained there for a long time. To the place of the tissue necrosis, an intact omentum with adequate blood supply will adhere, i.e. the free omental graft transforms

into a pedicle graft. In case of thin, non-fatty grafts this does, not necessarily occur although often the same sequence of events will occur. Therefore, an omental pedicle graft with intact circulation is to be preferred where it is necessary, taking care that no strangulation ileus or other compression phenomena result.



FIG. 1. Histological picture of a bulky piece of omentum grafted on the injured surface of the stomach four days postoperatively. In the part of the omental graft adjacent to the gastric wall granulation tissue has grown and fusion of the lipocytes has started. In the central portion of the omentum, necrosis of the lipocytes is notable, surrounded by a zone infiltrated by leukocytes and this will compose the wall of the abscess being formed. The intact omentum creeping there sticks to the free surface of the grafted piece of omentum. *a*, gastric wall; *b*, granulation tissue; *c*, zone infiltrated by leukocytes; *d*, necrosed adipose tissue; *e*, pyogenic membrane being formed; *f*, adhesion of the intact omentum (haematoxylin-eosin staining, $\times 8$)

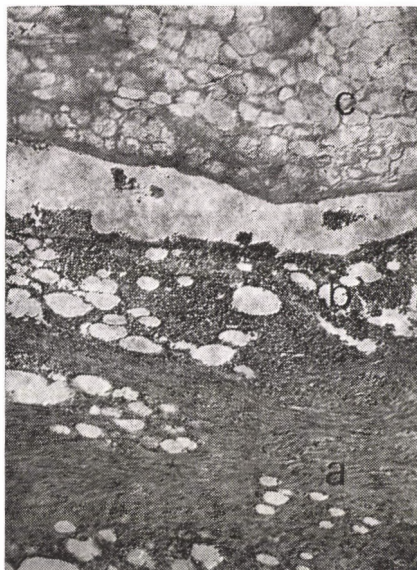


FIG. 2. The part of the grafted omentum adjacent to the gastric wall is surrounded, four days postoperatively, by an inflammatory zone infiltrated by leukocytes and the adipose tissue within the omentum is necrotized (Goldner's staining, $\times 20$)

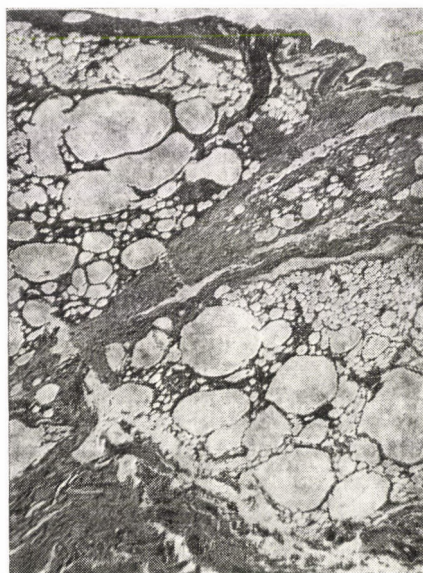


FIG. 3. In the omental layer grafted over the injured gastric wall granulation tissue has grown after one week, which covers the piece of omentum like a network. Degeneration and fusion of lipocytes are noted. Here, too, an intact omentum adheres to the surface (Goldner's staining, $\times 20$)



FIG. 4. In the omentum grafted on to the intact gastric surface, granulation tissue fails to grow even after one week. The graft becomes detached from the gastric wall. Within the omentum leukocytic infiltration and necrosis of the lipocytes is seen (Goldner's staining, $\times 20$)

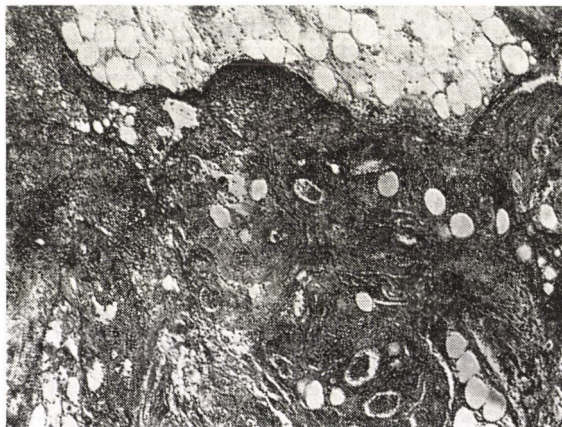


FIG. 5. The thin piece of omentum grafted on to the injured surface of the stomach will be interwoven with granulation tissue after one week, with leukocytic infiltration and necrosis of the adipose tissue (haematoxylin-eosin staining, $\times 20$)

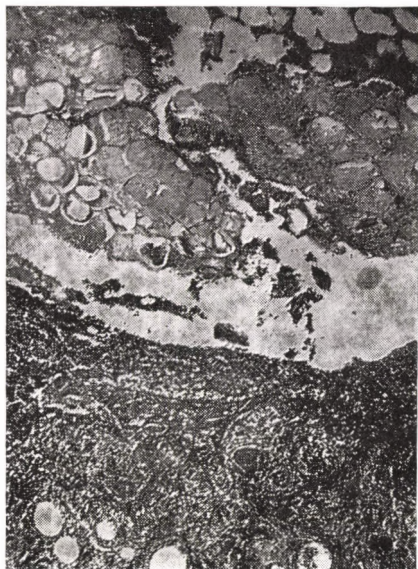


FIG. 6. After two weeks an abscess with a thick infiltrated wall, containing disintegrating tissue is seen to replace the thick patch of omentum grafted on the injured gastric surface, with necrosed adipose tissue and leukocytes in the central portion of (Goldner's staining, $\times 20$)



FIG. 7. After two-and-a-half weeks, a structure composed of necrosed adipose tissue of a concentric pattern is observed in the thick omental portion grafted on the injured gastric wall, which then forms an abscess and is surrounded in the marginal region by a demarcation zone infiltrated by leukocytes. This is from which wall of the abscess is subsequently formed (Goldner's staining, $\times 8$)

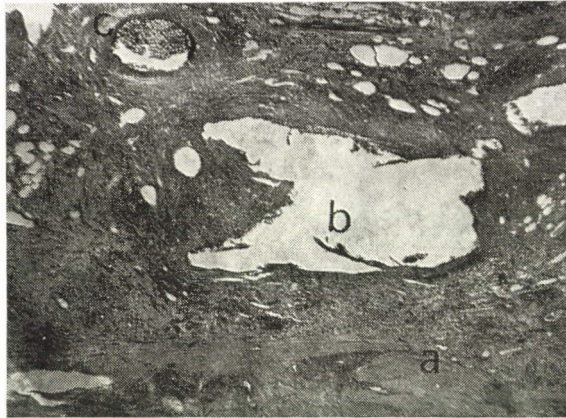


FIG. 8. On the fourth week, the abscess having formed in thick omental portion becomes contracted its cavity is narrowing, owing to the necrosed adipose tissue being absorbed. Replacing the omentum grafted on the gastric wall, a tissue composed of collagenous fibres is formed. The stitch fixing the omentum is also visible. *a*, gastric wall; *b*, residue of the abscess; *c*, suture (Goldner's staining, $\times 8$)



FIG. 9. By the sixth week, the thick omentum grafted on the gastric wall is replaced by a compact granulation tissue composed mainly of collagenous fibres. Only sporadic microabscesses have been left over of the bulky abscess among the collagenous fibre bundles (haematoxylin-eosin staining, $\times 20$)

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Experimentelle Untersuchung der autologen freien Omentum-Transplantate

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Die bei 15 Hunden betreffs des Schicksals der Transplantate des freien Omentums in der Bauchhöhle durchgeführten Untersuchungen ergaben, dass zwischen dem Hohlorgan und dem transplantierten Omentum nur dann ein organischer Kontakt zustandkommt wenn das Hohlorgan lädiert war. Die grösseren, taubeneigrossen, fetten, freien Omentum-Transplantate nekrotisieren schon vom 4. Tag an, an ihrer Stelle entwickelt sich ein abszessartiges Gebilde, während bei den membranartigen dünnen Transplantaten die Gewebenekrose, wegen des Bindegewebeeinkriechens geringer ist. In beiden Fällen kriechen aus der Umgebung intakte Omentumabschnitte auf das Transplantat, weshalb die definitive Deckung nur durch ein gestieltes Transplantat gewährleistet werden kann.

Экспериментальное изучение аутологичных свободных сальниковых трансплантатов

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В экспериментах на 15 собаках авторы изучали судьбу свободных сальниковых трансплантатов в брюшной полости и обнаружили, что органическая связь между полостным органом и пересаженным сальником возникает только в том случае, если упомянутый орган был поврежден. Большие, размером с голубиное яйцо, жирные свободные сальниковые трансплантаты уже с 4-го дня некротизируются, на их месте возникает абсцессоподобное образование, в то же время отмирание тканей меньше в случае пленкоподобных тонких трансплантатов, вследствие „вползания” в них соединительной ткани. В обоих случаях из окружающей территории интактный сальник наползает на трансплантат, таким образом окончательное покрытие по сути обеспечивает стебельчатый трансплантат.

Prevention of Endotoxin-induced Leukocytic Infiltration of Lung with Radio-detoxified Endotoxin (TOLERIN) Pretreatment

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Five mg of bacterial endotoxin (LPS) can provoke a serious leukocytic pulmonary infiltration in rats. The same dose of radiation-detoxified LPS (RD-LPS; 150 kGy ⁶⁰Co-gamma irradiated) can produce only slight pulmonary infiltration. However, 100 µg RD-LPS — as pretreatment — can prevent the LPS-induced leukocytic infiltration of the lung.

Introduction

Pulmonary insufficiency has been recognized as a serious hazard of surgery and other forms of trauma. Acute pulmonary lesions due to sepsis and endotoxaemia are significant causes of illness and death. Unfortunately, these lesions are frequent among surgical patients [1, 2, 3, 4, 5, 6, 7]. According to several reports, intravenous administration of bacterial endotoxin (LPS) in experimental animals produces hemorrhage into the alveolar wall and alveoli, with fibrin deposition and clumps of polymorphonuclear leukocytes, the most frequent forms of alveolar capillaries. These pathohistological changes simulate the 'shock lung' syndrome [8, 9, 10, 11].

On the other hand, it is well-known that small doses of LPS can protect experimental animals from endotoxin shock as well as increase nonspecific resistance (NSR) [12, 13]. Unfortunately, this beneficial influence is associated with some toxicity (e.g. pyrogenic, hypotensive, abortifacient, etc.) [14, 15]. To decrease the mortality rate of LPS while preserving its beneficial properties has become the aim of a number of investigators. Currently various techniques (physical, chemical, physicochemical, immunochemical, etc.) have been applied to achieve detoxification, with variable results [15, 16]. In our laboratory ionizing radiation has been employed for the detoxification of LPS [12, 13, 14, 15, 17]. Irradiation alters the chemical structure of LPS; the toxic properties of the parent LPS are also diminished [18]. However, the endotoxin tolerance-inducing immunoadjuvant, shock-preventing, NSR-enhancing capacity was preserved in the modified LPS. The radiodetoxified

LPS (RD-LPS) pretreatment protected the majority of animals against various shock-provoking challenges [19, 20, 21, 22, 24]. In the present investigation we examined the leukocytic infiltration of lung induced by LPS and its prevention by RD-LPS pretreatment.

Materials and Methods

Animals

Thirty six adult (180–200 g BW), female RLEF₁/Lati rats (Laboratory Animals Institute, Gödöllő, Hungary) were used. The animals were housed in type II plastic cages (6 rats/cage) and were supplied with LATI-chow and water ad libitum. The rats were divided into six groups and treated as indicated in Table I. Five hours after LPS, RD-LPS administration 'LPS challenge' the animals were killed, their lungs removed and fixed in 10% neutral formalin.

LPS preparations

The parent LPS was isolated by the phenol-water method [25] from the culture of *Escherichia coli* 089. For detoxification, LPS was suspended in distilled water at a concentration of 10 mg/ml and irradiated with 150 kGy ⁶⁰Co-gamma source [12, 13, 14, 15, 19].

TABLE I

Prevention of endotoxin (LPS)-induced leukocytic infiltration of the lung with radiodetoxified endotoxin (RD-LPS) pretreatment in rats

Group	No. of rats	Treatment	No. of neutrophil leukocytes mm ² \bar{x}
1	6	—	6 (3–9)
2	6	LPS 5 mg i.v.	227 (117–276)
3	6	RD-LPS 5 mg i.v.	45 (34–55)
4	6	LPS 100 μ g i.v.	81 (70–91)
5	6	RD-LPS 100 μ g i.v.	45 (34–55)
6	6	RD-LPS 100 μ g i.v. LPS 5 mg i.v. (+ 24 h)	67 (56–77)

Histology

Pulmonary specimens (4–6 μ) were stained using the combined haematoxylin-eosin trichrome method. Neutrophil counts per mm² area were recorded from different parts of lobes of the same lung and averages calculated with a $\times 400$ magnification.

Results

The lungs of the control, untreated rats (Group 1) showed no pathological changes (see Table I). Neutrophils were observed only occasionally. Five hours after i.v. administration of 5 mg LPS (Group 2) severe oedema developed in the lungs of rats. Alveolar septa were dilated, and proliferation of neutrophils was observed. Five hours after i.v. injection of 5 mg RD-LPS (Group 3) the histological changes in the lungs of rats were mitigated and the leukocytic infiltrates were less marked than in the LPS-treated animals. If 100 μ g LPS or RD-LPS was given to rats (Groups 4 and 5) only a slight leukocytic reaction was observed. The number of leukocytes was significantly higher in the LPS-treated (Group 4) than in the RD-LPS treated animals (Group 5) ($p < 0.001$). In the case of endotoxin-tolerance induced by RD-LPS (100 μ g intravenously 24 hours earlier) the LPS challenge (5 mg intravenously) could not provoke intensive pathological changes in the lung of rats (Group 6).

Discussion

The pulmonary lesions constitute a very important problem in post-operative care. They account for 25% of all hospital deaths [1, 5]. Acute respiratory failures are in a way related to bacterial LPS [1, 2, 3, 4]. The lung infiltration developing after LPS administration under experimental conditions can be accepted as a model of 'shock lung'. However, these results demonstrate that RD-LPS can diminish or prevent LPS-induced lung lesions in rats.

Although, this and earlier findings are valid in rats we suppose that RD-LPS (TOLERIN: HUMAN Institute for Serobacterial Production and Research, Hungary) pretreatment would be clinically, too a good and promising preventive intervention in the future.

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**Schutzwirkung der Vorbehandlung mit strahlendetoxifiziertem
Endotoxin (TOLERIN) bei der durch Endotoxin auslösbaren
leukozytären Infiltration der Lunge**

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Durch 5 mg bakterielles Endotoxin wird in der Rattenlunge eine schwere leukozytäre Infiltration zustandegebracht. Durch ähnliche Dosen von strahlendetoxifiziertem Endotoxin (mit 1,50 kGy ^{60}Co -Gamma Strahlung hergestelltes) wird nur eine sehr milde Infiltration verursacht. Das als Vorbehandlung verabreichte 100/ μg strahlendetoxifizierte Endotoxin vermag indessen die Entwicklung der mittels Endotoxin auslösbaren schweren leukozytären Infiltration zu verhindern.

**Защитное действие предварительно введенного детоксицированного
эндотоксина (TOLERIN) при лейкоцитарной инфильтрации легких,
вызванной эндотоксином**

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5 мг бактериального эндотоксина вызывает тяжелую лейкоцитарную инфильтрацию в легких у крыс. Лишенный облучением токсичности эндотоксин (обработанный дозой гамма-облучения ^{60}Co , равной 1,50 кГр), введенный в такой же дозе, вызывает лишь легкую инфильтрацию. В противоположность этому, детоксицированный облучением эндотоксин, будучи предварительно введен в дозе 100 мкг, может предотвратить развитие тяжелой лейкоцитарной инфильтрации легких, вызываемой эндотоксином.

Anatomical Bases of Musculocutaneous Skin Flaps (Preliminary Report)

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The history of development of musculocutaneous skin flaps, their anatomical bases, the essence of the method are presented which are indispensable for the clinical application of musculocutaneous skin flaps to be described in detail later on.

The medially pedicled deltopectoral skin flap reported by Bakamjian in 1965 has initiated an enormous progress in plastic and reconstructive surgery [1]. A better understanding of the blood supply of the skin has enabled the discovery and extensive use of pedicled skin grafts [2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 23, 25, 26, 28, 31, 33]. The blood supply of the pedicle skin graft is ensured by direct 'cutaneous' arteries passing to the skin. McGregor and Morgan [24] distinguished axial and random skin flaps on the basis of their blood supply. The regional pedicle skin flaps belonging to axial flaps have proved to be very useful. Repairs of a more complex nature could also be performed by using them and they were an invaluable aid in isolating the oral cavity, during more complicated operations, from the cervical dissection wound. Their application, although with an altered field of indications is also currently justified.

The conception has been prevailing for a long time that a regional pedicle skin flap for skin repair can be fashioned in the vicinity of each skin defect.

For this purpose the skin regions supplied by the direct cutaneous arteries have to be pinpointed. This way adequate skin flaps can readily be found and thus the problem of skin replacement seemed to be solved once and for all [21]. Progress has still not been made in this direction for the following reasons (i) there is only a limited number of skin regions which are supplied by the direct cutaneous artery having an independent vascularization and being suitable for obtaining skin flaps, thus regional pedicle grafts cannot be created in any number; (ii) Defects are, in many cases, not only erosions but a simultaneous lack of skin, muscle and bone for the anatomical replacement of which a simple epithelium is not sufficient.

It has long been known that the skin is supplied with blood by the musculocutaneous perforating branches present in the muscle underneath

it [19]. Its anatomical background has, however, been of no use in clinical practice. Nevertheless, nowadays, it seems to be very simple to elevate the skin together with the muscle underneath it and so its blood supply is ensured via the perforating branches and this keeps the skin viable. This conception was developed and fulfilled on anatomical bases by the Columbian surgeon Orticochea [29]. Prior to this, surgeons had not been completely unfamiliar with the musculocutaneous skin flap. Tansini [34] had already used by 1906 the latissimus dorsi musculocutaneous flap replacing soft part defects after mastectomy. Hutchins applied it in 1939 for treating lymphoedema with success [16]. In 1955, Owens used a sternocleidomastoideal musculocutaneous skin flap for repairing facial defects [30]. For the extensive clinical use of musculocutaneous skin flaps an accurate knowledge of the blood supply of

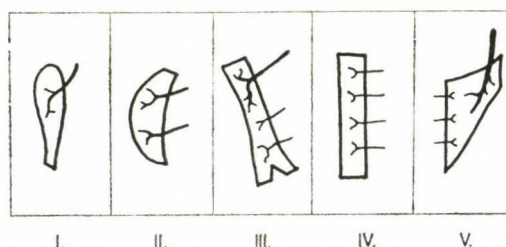


FIG. 1. Blood supply of the muscles according to Mathes and Nahai. I = a dominant artery; II = two dominant arteries; III = dominant and collateral arteries; IV = segmental arteries; V = a dominant and several segmental arteries

the skin and of the tissues underneath it [27, 33], the plastic method of regional pedicle skin flaps and the classification of skin flaps with various blood supplies were necessary. This information provided a theoretical basis for developing the musculocutaneous skin flap method.

McCraw and Dibbel [21] and McCraw et al. [22] worked out an experimental model for studying the independently vascularized musculocutaneous regions of the human body and they performed a series of investigations indispensable for clinical application with 13 muscles most frequently used for skin repair. Mathes and Nahai [20] classified the human muscles according to their blood supply, dividing them into five groups (Fig. 1).

The name of the skin flap derived from the word combination of the Latin *musculus* and *cutis*. The name myocutaneous (Greek: *mys* and Latin *cutis*) is also known. The musculocutaneous skin flap is an anatomical unit composed of skin, subcutaneous connective tissue and muscle.

Its dominant artery and the accompanying two veins (*venae comitantes*) provide the circulation of the skin flap. The artery supplies the muscle up to the anatomical borders with the musculocutaneous perforating branches per-

pendicularly running from this artery to the skin (Fig. 2). These perforating branches form a richer network in the subcutaneous and a poorer one in the subdermal layer, ending in a subpapillary plexus. The motor nerve runs in a part of the cases, together with the vessels and these together make up the well-preformed neurovascular bundle. By preserving the nerve, a late consequential muscle atrophy and contracture can be avoided. Lymph circulation in the marginal regions of the skin flap is restored within some days by revascularization. The point of entry of the dominant artery is the centre of rotation of the skin flap around which—like around an axis—the skin flap can be rotated at an angle of 360 degrees. The distance between the remotest point of the centre of rotation and the skin flap determines the length

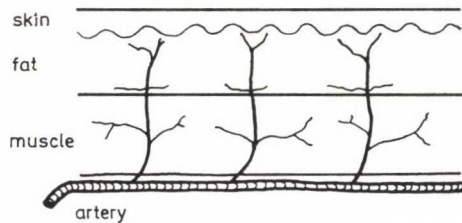


FIG. 2. Schematic drawing of the vascularization of the musculocutaneous flap

of the flap. The vessels, in particular the veins, are fairly sensitive to injury, kinking or overstretching.

One must be sure about the viability of the skin flap before grafting it on the defect. This can be judged with certainty from various physical signs. A skin flap with an adequate blood supply is pink, the filling of the capillary is adequate with notable bleeding from the muscle and the skin edge. If the skin of the flap is white, it has no arterial circulation, and this flap is very likely to necrose and so it should not be used. The venous circulation of a livid cyanotic skin flap is not suitable, it is likely to necrose.

There are two possible uses of musculocutaneous skin flaps: (i) a pedicle flap and (ii) a free flap. Free transplantation performed by microsurgery is a promising method of plastic reconstructive surgery but in Hungary it does not belong to the routine procedures since it requires special equipment, instruments and experts. Pedicle grafts can, however, be made in a traditional operating theatre by using traditional instruments. Numerous musculocutaneous skin flaps can be found in the vicinity of the face-neck region. Therefore this method is given preference. Two types of this skin flap can be distinguished (i) the traditional pedicle flap (Fig. 3) and (ii) the island flap (Fig. 4).

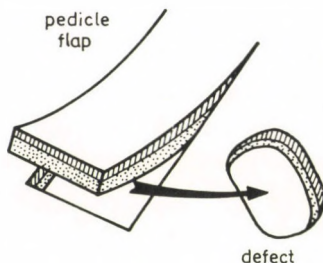


FIG. 3. Conventional musculocutaneous pedicle flap

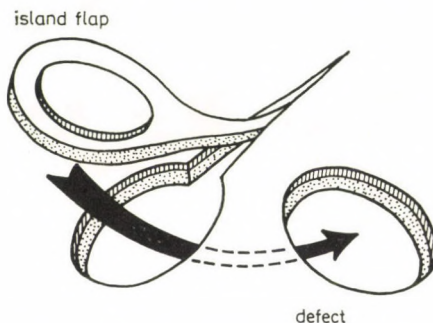


FIG. 4. Musculocutaneous island flap

In the face-neck region the following musculocutaneous flaps can be reckoned with: sternocleidomastoideal, temporal, platysmal, trapezial, greater pectoral muscle and latissimus dorsi muscle.

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Anatomische Grundlagen der muskulokutanen Lappen

L. BORBÉLY und A. KOVÁCS

Erläutert werden die Entwicklungsgeschichte und die anatomischen Grundlagen der muskulokutanen Lappen sowie das wesentliche der Methode die zur klinischen Anwendung dieser Lappen unerlässlich ist.

Анатомические основы мышечнокожных лоскутов

Л. БОРБЕЙ и А. КОВАЧ

Авторы знакомят с историей образования мышечнокожных лоскутов, с основами их анатомии, описывают суть метода, что совершенно необходимо для клинического применения мышечнокожных лоскутов, которое позже будет подробно описано.

Latent Virus Carrying Lymphocytes of Patients with Urological Tumours

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A considerable wealth of data suggest that a virus with oncogen character can play a part in the development or survival of tumours, by disturbing immune reaction. We studied this situation in urogenital tumours. Examining the latent virus carrier with an immunofluorescent method in 96 cases with malignant tumours and 70 control cases, it was found that more than 50% of the patients had latent adeno- or herpes simplex virus antigens in 1–3% of the circulating lymphocytes, whereas virus carriers occurred in hardly a few percent in the control group. Using a lymphocyte transformation test, the non-specific mitogen phytohaemagglutinin was able to transform only 10–50% of the lymphocytes of patients with malignant tumours into lymphoblast cells (the percentage also depending on the stage of the tumour). On the other hand, under the influence of phytohaemagglutinin 55–85% of the lymphocytes of the control group turned into lymphoblasts. The lymphocytes of the majority of patients with tumours became sensitive for specific adeno- and herpes simplex virus antigens, mainly the lymphocytes of those whose cells were virus carriers.

Several viruses are known to display great affinity to the immune system not producing the usual immune response but, under certain circumstances, to persist or even replicate in the lymphoid cells. Both adeno- and herpes simplex viruses are capable of attaching to lymphocytes as has been proven by in vitro and in vivo experiments. These viruses can interfere with the immune system, and — as they are potentially oncogenic — their presence in tumours cannot be excluded either [1–2, 4, 9–13, 15, 17–21]. Earlier we have observed a correlation between the persistence of adeno- and herpes simplex viruses and co-existing immune disorders in chronic recurring illnesses [16]. In our present experiments, this correlation was examined in patients with urogenital tumours.

Patients Examined and Methods

The peripheral lymphocytes of 96 patients with different urogenital tumours were examined. There were 70 controls, out of which some had general urogenital (non-tumorous) complaints, other medical patients and healthy individuals. We have taken blood samples anticoagulated with heparin, and the lymphocytes were separated by fibroglassfilter. Then a part of the lymphocytes was washed three times in physiological saline, centrifuged

and smear preparations were made from the cells on slides. Smears were dried at room temperature, then fixed with an equal proportion mixture of acetone-methanol. Smears were treated with immune sera raised in rabbits against adeno- and herpes simplex viruses. After the immune reaction they were thoroughly washed and dried, and anti-rabbit globuline conjugated with fluorescein isothiocyanate was added. Immunfluorescence examination for detecting latent virus carrying was performed with a Zeiss-Fluoval microscope at $1000\times$ magnification.

The other part of separated lymphocytes was cultured in Parker-199 solution in thermostat in the following way: the cell suspensions was divided into test tubes one of which served as the control culture. To the next, phytohaemagglutinin was added in order to decide if it can be stimulated non-specifically. To the third and fourth cultures adeno- and herpes simplex virus antigens were added to determine sensitivity. After 3 or 5 days of culturing, the supernatant of the lymphocytes was sucked off, smears were prepared from the cells on slides, stained with Giemsa and examined. By counting several thousand cells, the percentage proportions of small lymphocytes remaining unchanged during culturing, of intermediate cells, lymphoblasts, macrophage-like cells and changed cells were compared [5].

Results

Examining the lymphocytes without culturing for latent virus carrying with immunfluorescence method, it was found that almost 60% of patients with urogenital tumours are carrying adeno- or herpes virus components (antigens) in 1-3% of the peripheral lymphocytes. Latent virus carrying could be detected in only 1-5% of controls. The occurrence of these two viruses in tumorous patients was almost of the same proportion. That some patient were the carrying of lymphocytes is shown in Fig. 1. It can be seen, that between the numerous negative lymphocytes showing only autofluorescence, some cells display intense fluorescence. These lymphocytes contain virus antigen which binds to the added antiviral sera, then to the anti-rabbit globulin conjugated with fluorescent substance.

During the lymphocyte transformation tests it was observed that in tumorous patients there was a significantly decreased immune response to phytohaemagglutinin as compared to the controls (reactivity was usually depending also from the phases of the tumor). The lymphocytes of most tumorous patients displayed sensitivity against adeno- and/or herpes virus antigens, i.e. during cultivation they were transformed into lymphoblast, macrophag-like cells or into multinucleated cells. It was found characteristic, that mainly the lymphocytes of those patients were deformed who were latent virus carriers.

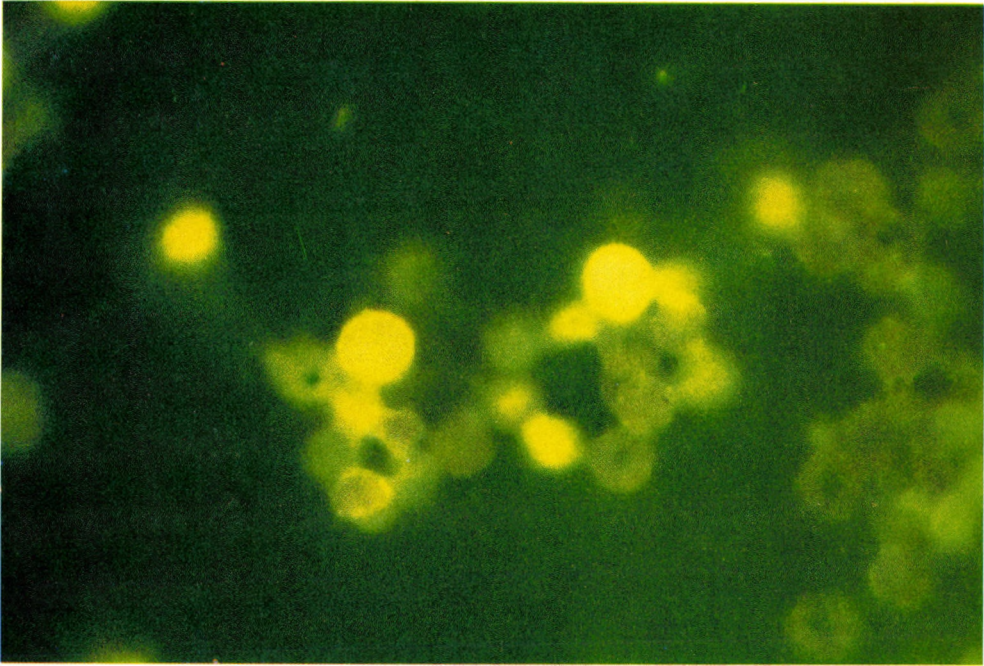


FIG. 1. Among negative lymphocytes, some cells shown positive fluorescence by immun-fluorescent method

Discussion

According to the data of the literature and our results, latent virus carrying is not indifferent for the organism. The danger is increased, if the virus is a potential oncogen and if it is in close association with lymphoid cells. As a result of the changed circumstances, persisting virus genes can be activated, causing acute illness, chronic relapses or even tumours [4, 6–8, 16]. We regard it significant that a substantial part of patients examined by us and having urogenital tumours carry oncogenic adeno- or herpes simplex virus antigens in some percent of their peripheral lymphocytes. It was proved earlier that the components of these viruses can be present in one part of the tumour cells of such patients [14], and that the sera of these patients contain antibodies against the tumour antigen of the oncogenic adenoviruses [3]. Our present investigation provides further data to the relation of urogenital tumours and viruses. Latent viruses were not only found in circulating lymphocytes, but the T-lymphocytes of patients displayed sensitivity to these viruses. It cannot be decided whether viruses having manifold connections with tumours play a role in the evolving of tumours — for example with decreasing the function of immune cells —, or the persisting viruses are built secondarily

into the lymphoid elements destroyed by the tumour, thus further decreasing immune response. The latter assumption is supported by the fact, that the cellular immune response of patients is significantly decreased as compared to the controls — like for example the response to the nonspecific mitogen, the phytohaemagglutinin. We regard it important therefore, to investigate the connections between viruses, tumours and immune functions from other viewpoints as well.

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Latentes Virustragen der Lymphozyten von Patienten mit urologischen Tumoren

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Viele Daten sprechen dafür, daß die über onkogene Eigenschaften verfügenden Viren durch Störung der Immunantwort in der Entstehung oder Weiterbestehung der Tumoren eine Rolle spielen können. Diese Korrelation wurde bei urogenitalen Tumoren untersucht.

Das latente Virustragen wurde mit der Immunfluoreszenz-Methode bei 96 tumorösen Patienten und 70 Kontrollfällen untersucht: Mehr als 50% der Patienten waren latente Träger von Adeno- oder Herpes-Virusantigenen, wie das in 1–3% der zirkulierenden Lymphozyten nachgewiesen werden konnte; bei den Kontrollen betrug die Zahl der Virenträger nur einige Prozente.

Mit dem Lymphozyten-Transformationstest konnte das nicht spezifische Mitogen, das Phytohämagglutinin (PHA) nur 10% bis 50% der Lymphozyten der an malignen Tumoren leidenden Patienten zu Lymphoblasten umwandeln (die Prozentzahl war auch vom Tumorstadium abhängig). Demgegenüber umwandelten sich unter der Wirkung von PHA 55% bis 85% der Lymphozyten der Kontrolle zu Lymphoblasten. Mit den spezifischen Adeno- und Herpes-Virusantigenen sensibilisierten sich die Lymphozyten der Mehrheit der tumorösen Patienten, in erster Linie diejenigen, deren Zellen auch Virusträger waren.

Латентное вирусоносительство лимфоцитов у больных с урологическими опухолями

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Много данных указывают на то, что, при нарушении иммунного ответа, вирус с онкогенными свойствами может играть роль в возникновении или поддержании опухолей. Нами исследовалась эта взаимосвязь при урогенитальных опухолях.

Исследовав иммунофлуоресцентным методом латентное вирусоносительство у 96 опухолевых больных и 70 контрольных лиц, мы установили, что больше 50% больных является носителем латентных антигенов адено- или герпесных вирусов в 1–3% циркулирующих лимфоцитах; тогда же вирусоносительство в контроле составляло едва несколько %.

С помощью теста трансформации лимфоцитов показали, что не специфический митоген фитогемагглютинин (PHA) у больных, страдающих злокачественными опухолями, был способен превратить в лимфобластные клетки только 10–50% лимфоцитов (процент зависит от стадии опухоли также). В противоположность этому, под влиянием PHA 55–85% лимфоцитов в контроле превратилось в лимфобласты. Лимфоциты большинства опухолевых больных sensibilizировались специфическими адено- и герпесвирусными антигенами, главным образом в тех случаях, когда у них клетки были также и вирусоносителями.

Changes in Bile and Lymph Composition Following Portacaval Anastomosis (PCA) in Rat

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The effect of PCA on bile and lymph composition in rats was studied. It was established that secretion of bile acid decreased significantly and this resulted in reduced bile flow. In studying lymph flow and protein content, the most important observation was a decrease in the protein concentration of hepatic lymph. It can be supported that hepatic blood flow decreased due to PCA is responsible for all these changes.

Portacaval end-to-side anastomoses (PCA) were made in a large number of patients with liver cirrhosis. This intervention has been shown to decrease effectively portal hypertension and to prevent the frequent bleeding to death due to the rupture oesophageal varices. However, controlled clinical studies have revealed that survivals are not too favourable [5, 6, 14]. This can partly be attributed to the consequences of the underlying disease, i.e. of cirrhosis, but also to the pathophysiological consequences of PCA.

Experiments on a large number of animals, with well-controllable pre- and postoperative parameters are of particular importance in PCA, i.e. a surgical intervention reducing hepatic blood flow by 55–65% [21, 22]. The pathophysiological consequences of PCA can partly be ascribed to the significant decrease of hepatic blood flow and partly to the fact that the diversion of the trophic factor present in the blood of the portal vein brings about these changes in liver function [8, 9, 25].

In our experiment a model has been chosen in which liver perfusion decreased significantly. Following this, several biochemical changes are apparent, namely, the accumulation of enzymes of hepatic origin in the blood [1, 12, 13, 17, 19, 27]. The changes in liver perfusion lead to biochemical, functional and occasionally morphological changes. Therefore, the effect of PCA on bile and lymph composition and on the morphology of the liver was studied.

Material and Method

PCA was made in 35 CFY type rats weighing 300–450 g under ether anaesthesia according to Lee's technique [16] by using 7–0 prolene (Ethicon) suture material.

In 9 rats only the common bile duct was cannulated. Bile was collected simultaneously with measuring. At the same time, a 7-0 thread was introduced under the efferent lymph vessels of the liver and all of them were ligated except for the main lymphatic trunk which was cannulated to collect lymph. The groups was considered to be the control group.

In additional 9 animals, the inferior vena cava was dissected along the subhepatic segment. Then the portal vein and the great veins were similarly compressed by vascular clamps as in PCA. After 15-20 minutes, the veins were released and when circulation became restored, the abdomen was closed. This was the sham-operated group.

The animal with PCA and the sham-operated ones were randomly reoperated 2, 4 and 8 weeks later, when the common bile duct was cannulated bile flow measured and the bile components determined from the collected bile. The overall bile acid concentration was assessed according to Murphy's method [20], while bilirubin by the method of Jendrassik and Gróf [2]. Phospholipid was estimated according to the Fiske and Subbarow' [24], and cholesterol according to the Schoenheimer and Sperry [24] method.

In half of the animals the thoracic duct was cannulated on the neck by the method developed by us [15]. In the other half, the main hepatic lymphatic trunk was cannulated as described above.

Lymph was being collected for one hour in heparinized tubes weighed in advance.

The protein content of the lymph and blood plasma was measured according to Lowry [18].

Finally, after excision of the anastomosis it was checked for patency and then the removed liver was weighed and histological samples stained with haematoxylin and eosin were studied.

The two-sample Student's test was applied, the values were averages with \pm S. E. M. the difference being significant if $p < 0.05$.

Results

Following PCA a significant decrease in liver weight could be observed in the animals (Fig. 1). The decrease amounted to 55% as compared to the controls.

After PCA bile flow decreased significantly ($p < 0.01$) on an average from 1.03 to 0.56 ml. In the sham-operated animals a non-significant 16% decrease in bile flow was observed ($p < 0.05$) (Fig. 2).

Among the bile components, the significant decrease in overall bile acid concentration was notable after PCA ($p < 0.01$). The decrease was 53% of the control values. In the sham-operated group, the overall bile acid con-

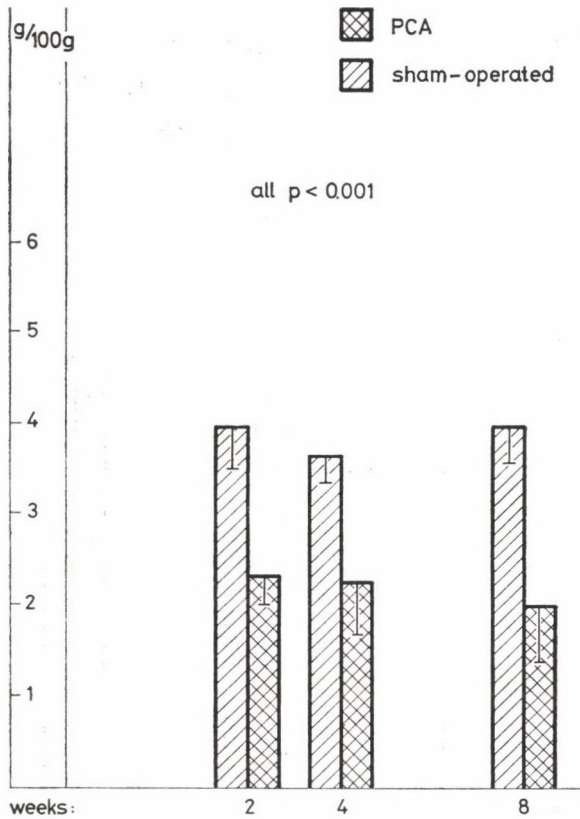


FIG. 1. Changes of liver weight after PCA

centration was reduced to 89% of the control values ($p < 0.05$). Bilirubin concentration increased significantly both after PCA as well as in the sham-operated group ($p < 0.01$) (Table I).

The decrease of bile acid excretion obtained by multiplying concentration by bile flow was pronounced and significant ($p < 0.001$) (Fig. 3). The decrease was 72.5% of the control value. On the other hand, in the sham-operated group, the bile acid output was reduced by 34%, which approaches statistical significance ($p \sim 0.05$).

Pigment excretion did, however, increase only moderately even at the end of the 8-week period as compared to the controls ($p > 0.05$) (Fig. 4).

After PCA lymph flow from both the thoracic duct and the hepatic lymphatic trunk decreased slightly with no significant changes in differences ($p < 0.05$) (Fig. 5). Following PCA, the protein concentration of the thoracic duct and the hepatic lymph became identical as a result of the reduced protein concentration of the hepatic lymph (Fig. 6).

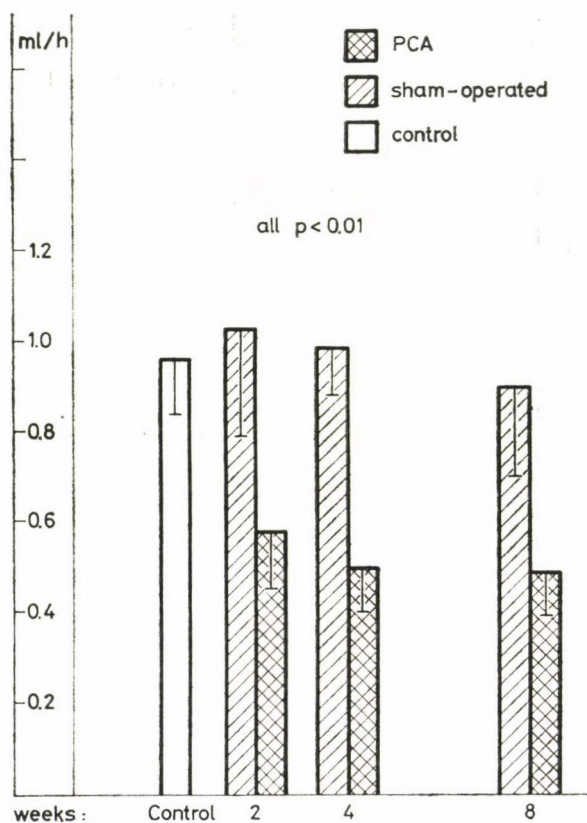


FIG. 2. Bile flow after PCA

TABLE I

Bile composition after PCA (n = 35)

Bile salts μ mol/ml				Bilirubin μ g/ml				Cholesterol mmol/l				Phospholipids mg%			
con- trol	2 w	4 w	8 w	con- trol	2 w	4 w	8 w	con- trol	2 w	4 w	8 w	con- trol	2 w	4 w	8 w
16.2	9.4	9.1	8.6	39	47	71	101	3.13	3.20	2.94	2.76	4.38	3.91	3.87	4.32
\pm 3.2	\pm 1.9	\pm 2.3	\pm 2.3	\pm 10.5	\pm 6.5	\pm 9.5	\pm 17.5	\pm 0.12	\pm 0.20	\pm 0.16	\pm 0.15	\pm 0.44	\pm 0.39	\pm 0.25	\pm 0.51
<i>Sham-operated animals (n = 9)</i>															
14.7	12.4	12.7	13.1	49.7	45.2	59.1	69.5	3.51	3.30	3.40	3.56	4.01	3.91	3.87	4.39
\pm 3.2	\pm 2.8	\pm 2.4	\pm 2.2	\pm 11.0	\pm 13.3	\pm 21.3	\pm 10.7	\pm 0.88	\pm 0.44	\pm 0.57	\pm 0.91	\pm 0.51	\pm 0.61	\pm 0.49	\pm 0.73

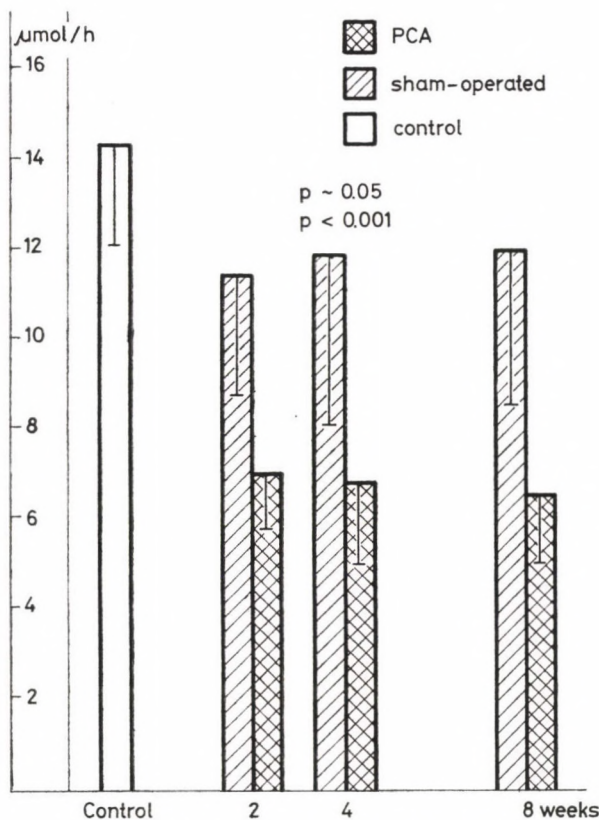


Fig. 3. Bile and excretion after PCA

Light microscopic study of the histological picture did not disclose any difference either before or after PCA (Figs 7 and 8).

Discussion

PCA in rats was used as a model for experimental chronic hepatic failure with special regard to the fact that the consequences can be ascribed to a marked and significant decrease in hepatic perfusion.

According to our studies, decrease in bile acid secretion was the most striking. Decrease in bile flow was only the result of a reduced bile acid secretion, namely a linear relationship has been shown to exist between the rate of bile acid excretion and canalicular bile flow [3, 4]. Undoubtedly, 60% of the amount of bile is secreted independent of the bile acid transport, however, bile flow in our experiment with PCA and in the sham-operated group changed parallel to the changes in bile acid concentration. The decrease of bile acid

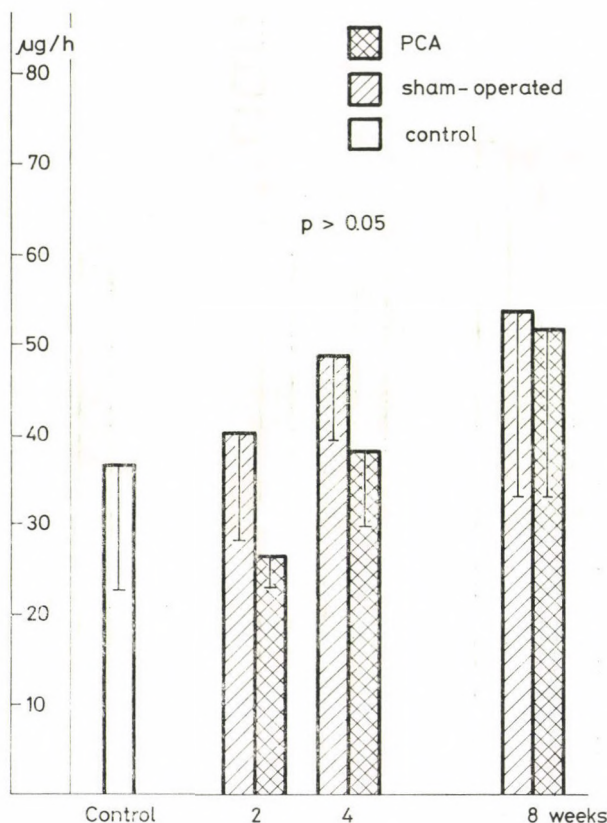


FIG. 4. Bilirubin excretion after PCA

output is likely to be due to the depression of the synthesis and of the transport processes through the bile acid hepatocyte, and to interruption of the entero-hepatic circulation [7]. Rubin's [23] observation that hepatic cytochrome P 450 content was decreased, may also offer an explanation.

In summary, it can be stated that PCA decreases the excretion of bile acid and consequently bile flow.

In rat the excretion of bilirubin into the bile is an energy-dependent excretory process [8]. The bile canaliculi are the sites of secretion of bilirubin and bile acids although the same site of excretion does not at the same time mean the identical excretory process as in our experiment the different behaviours of the bile acid and bilirubin outputs seem to be due to different excretory mechanisms.

After PCA, lymph flow and possibly also lymph production is slightly decreased, which, in view of the rate of decrease in body weight, more precisely in liver weight, is not a significant change. Mention should be made of

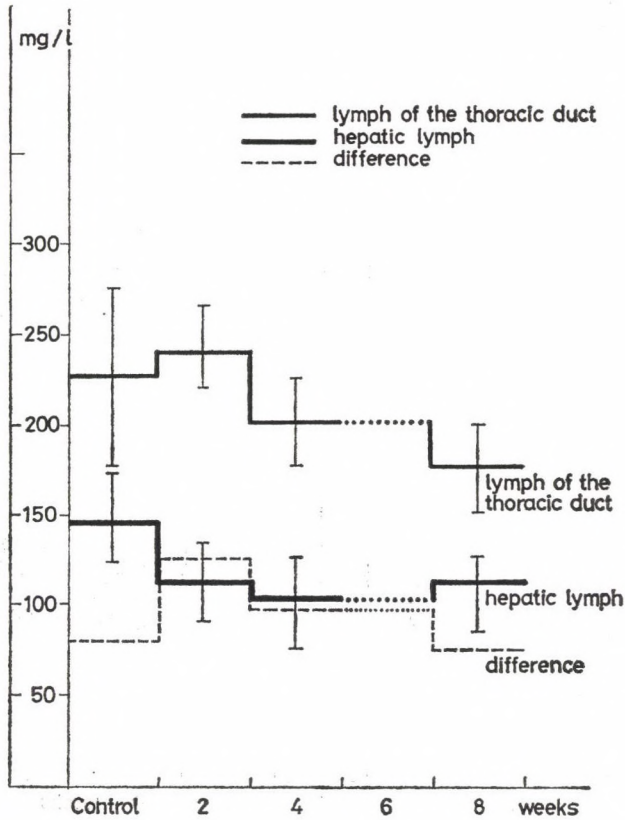


FIG. 5. Lymph flow after PCA

the reduced protein content of the hepatic lymph. This fact is unusual because the high, constant protein content of hepatic lymph in rat is well-known. The relationship between hepatic lymphostasis and hepatic circulation has been published in several reports [26, 27]. Still the effect of the changes in hepatic perfusion on hepatic lymph production requires further investigations.

Light microscopic studies revealed no morphological changes after PCA. This applies only to the 'rough' morphological changes observable by the light microscope. The relationship of function and morphology after PCA can be clarified by enzyme histochemical and induction, and by electron microscopic studies.

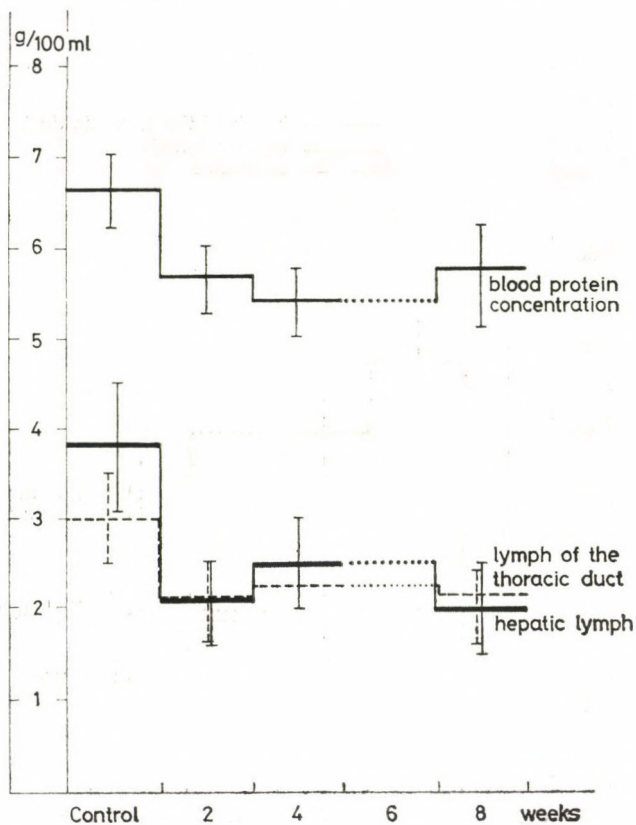


FIG. 6. Blood and lymph protein concentration after PCA

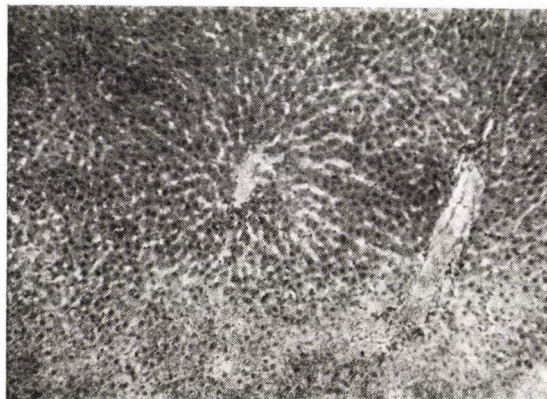


FIG. 7. Histological picture of the liver before PCA (control, H & E staining)

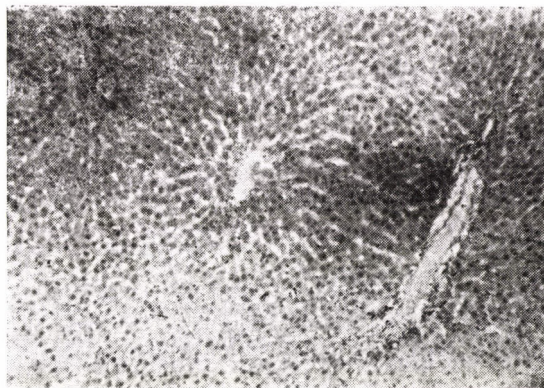


FIG. 8. Histological picture of the liver 8 weeks after PCA (H & E)

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Änderungen der Gallen- und Lymphzusammensetzung nach portokavaler Anastomose bei der Ratte

F. JAKAB, I. SUGÁR, A. ZÁBORSZKY und Judit HIDVÉGI

Untersucht wurde die Wirkung der portokavalen Anastomose auf die Gallen- und Lymphzusammensetzung bei der Ratte. Es wurde festgestellt, daß sich infolge der wesentlichen Abnahme der Gallensäuresekretion auch der Gallenausfluß verminderte. Die wichtigste Beobachtung im Laufe der Untersuchung der Lymphoströmung und des Eiweißgehalts war die Verringerung der Eiweißkonzentration der Leberlymphe. Es wird angenommen, daß für sämtliche Veränderungen die durch die portokavale Anastomose bedingte, verringerte Leberdurchblutung verantwortlich ist.

Изменения в составе желчи и лимфы после портокавального анастомоза у крысы

Ф. ЯКАБ, И. ШУГАР, А. ЗАБОРСКИ и Ю. ХИДВЕГИ

Авторы изучали действие РСА на состав желчи и лимфы у крыс. Установили, что секреция желчных кислот значительно уменьшается, следствием чего является уменьшение вытекания желчи. Самым существенным изменением, отмеченным при изучении лимфотока и содержания в лимфе белка, является снижение концентрации белка в лимфе печени. Можно предположить, что причиной всех отмеченных изменений является уменьшение печеночного кровотока вследствие РСА.

Examination of Lymph and Bile Composition Following Experimental Liver Transplantation in Rat

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(Received: December 15, 1985)

The lymph flow of the thoracic duct, the protein content of the lymph, bile flow and bile composition are studied during the first three hours of the recirculation phase in experimental liver transplantation. It is established that the lymph flow and the protein content of the thoracic duct decrease as a result of the interruption of hepatic lymph flow of a high protein concentration. The change in bile composition and flow is due to the reduced bile acid excretion of the transplanted hepatic tissue.

Although liver transplantation has already gone beyond an experimental phase and have become the clinical method of treating terminal-stage liver diseases—in the recent years with a 70–80% one-year survival rate—the experimental study of liver transplantation cannot be considered to have been outdated [9].

One of the basic problems of each transplantation is what happens to the lymph vessels of the transplanted organ which are to be transected or ligated. The fibrosis-inducing effect of the ligation of lymph vessels is well-known [8]. In the case of the liver, the lymph flow characteristics of which are well-known, this question is still more important: the role of the lymph of a high protein content accumulating around the transplanted liver has not been clarified so far concerning either rejection or the complications associated with liver transplantation.

In our experiment, the lymph flow and protein content of the thoracic duct and also bile composition were examined in the first, second and third hour of recirculation during transplantation of a rat liver. The production of A bile and of the lymph of a high protein content in the early phase of transplantation can be interpreted as a sign indicating liver function or at least its adequate perfusion. It is not only of physiological but also of prognostic importance.

Material and Method

Orthotopic liver transplantation was performed according to Kamada's method [4] under ether anaesthesia on Wistar rats of both sexes weighing 348 ± 49 g, with the modification that a cannula was introduced into the

common bile duct which was not reconstructed. Perfusion of the donor rat through the aorta was made by Euro-Collus solution (*Elektrolit Zusatzlösung zur Bereitung der Nierenperfusionslösung*, FRESSENIUS AG, Bad Hamburg) at 0–4 °C. In the recipient animal clamping time did not exceed 30 minutes. The system of the hepatic artery was not reconstructed.

A PE 50 polyethylene cannula was inserted into the common bile duct. Bile flow was measured every hour and bilirubin and bile acid concentrations were determined from the collected bile according to Jendrassik and Gróf's and to Murphy's methods, respectively [7]. The thoracic duct was cannulated according to our own method [2], by assessing the lymph flow and the protein content of the lymph according to Lowry [5] of a one-hour period.

Due to losses or low blood pressure, a total of 9 liver-transplanted and 5 control animals were evaluated.

For assessing statistical differences Student's two-sample test was used. The values were averages with a \pm S. D.

Results

Following recirculation (after completing the anastomosis of the supra-hepatic inferior vena cava and of the portal vein, and the perfusion of the liver via the portal vein was started), the lymph flow of the thoracic duct decreased significantly by the end of the first hour and remained at a low level as compared to the initial value.

Protein concentration was reduced significantly in the one-hour period then it was maintained at this reduced level (Table I).

The decrease of bile flow was significant already in the first hour and remained at the same level during the subsequent observation period.

TABLE I

Lymph flow and protein content of the lymph in the thoracic duct during the recirculation phase of experimental liver transplantation

	Basic value	1st hour	2nd hour	3rd hour
Lymph flow (mg/h)				
Mean	204	187*	150*	152*
\pm S.D.	49	44	119	90
$n = 9$				
Total protein (g/100 ml)				
Mean	3.05	2.79**	2.77**	2.72**
\pm S.D.	0.41	0.25	0.24	0.31
$n = 9$				

n = No. of experimental animals, * $p < 0.05$, ** $p < 0.01$

The total bile-acid concentration decreased by the end of the first hour of recirculation to half of the initial value and remained at this level throughout the observation period.

Decrease of bilirubin concentration was continuous and significant (Table II).

Regarding the excretions of bilirubin and bile acid, it was observed that during the first hour of recirculation the decrease was pronounced with a considerable decrease in the subsequent periods of observation (Table III).

TABLE II

Bile flow, total bile acid and bilirubin concentration in the recirculation phase of experimental liver transplantation in rat

	Basic values	1st hour	2nd hour	3rd hour
Bile flow (ml/h)				
Mean	0.92	0.44**	0.50**	0.42**
± S.D.	0.22	0.11	0.09	0.13
n = 9				
Total bile acid (μmol/ml)				
Mean	16.2	9.4*	9.1**	8.6**
± S.D.	3.2	1.2	2.3	2.3
n = 9				
Bilirubin				
Mean	39.3	27.6*	22.3*	21.1**
± S.D.	10.5	8.2	7.2	6.7
n = 9				

n = No. of experimental animals, *p < 0.01, **p < 0.05

TABLE III

Bilirubin and total bile acid excretion in the recirculation phase of experimental liver transplantation in rat

	Basic value	1st hour	2nd hour	3rd hour
Bilirubin excretion (μg/h)				
Mean	36.15	12.14*	11.15*	8.86*
± S.D.	8.92	7.63	5.11	5.42
n = 9				
Bile acid excretion (μmol/h)				
Mean	14.9	4.13*	4.55*	3.61*
± S.D.	2.16	1.08	1.99	0.95
n = 9				

n = No. of experimental animals, *p < 0.01

Discussion

The decrease in the lymph flow and protein content of the thoracic duct following liver transplantation seems to be a matter of course: the liver producing lymph of a high protein content does not participate in producing lymph in the thoracic duct. The question is, however, what is going on subsequently: do the lymphatics regenerate, do the lymph flow and the protein concentration of the thoracic duct normalize? Starting from this point, it can also be examined whether the study of the lymph flow and protein con-

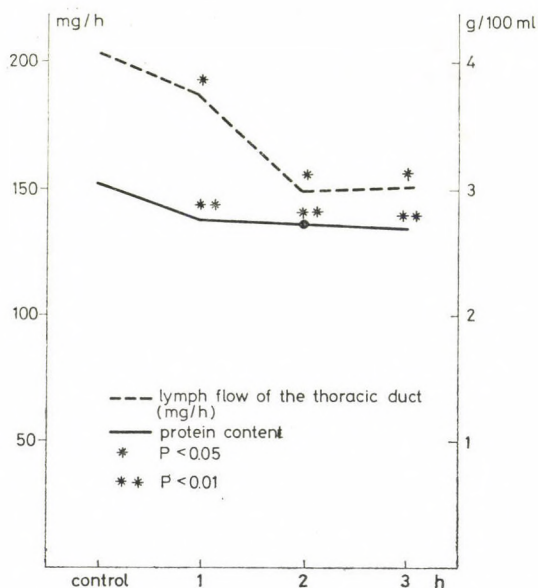


FIG. 1. Lymph flow and lymph protein content of the thoracic duct in the recirculation phase of liver transplantation

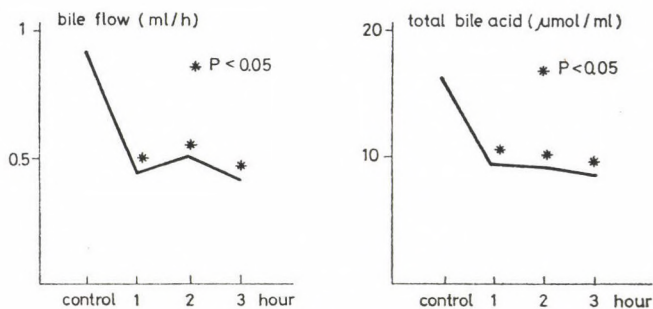


FIG. 2. Bile flow and total bile acid concentration in the recirculation phase of experimental liver transplantation in rat

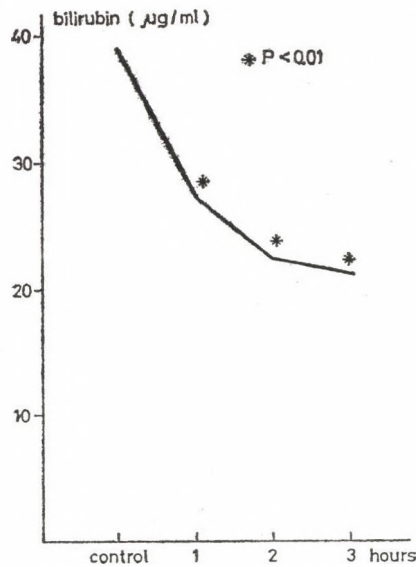


FIG. 3. Bilirubin concentration in the recirculation phase of experimental liver transplantation in rat

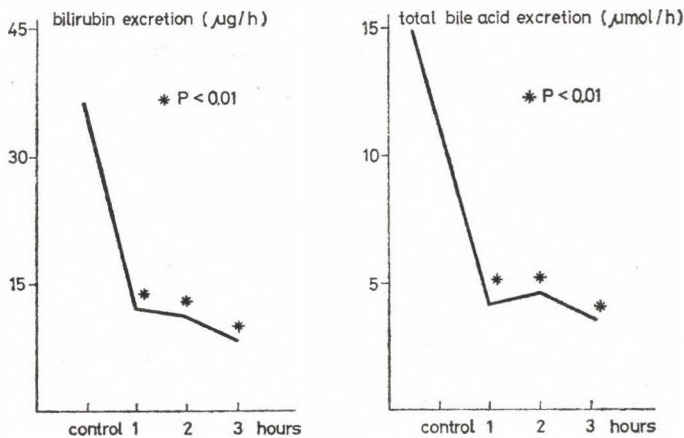


FIG. 4. Bilirubin and total bile acid excretion in the recirculation phase of experimental liver transplantation in rat

centration of the thoracic duct are of diagnostic value concerning the function of the transplanted liver. This is all the more intriguing because the pioneers in this field have been searching for the method of finding the unmistakable indication for the function of the transplanted liver.

Concerning bile composition, it can be established that the primary cause of the changes is the decrease in bile acid secretion. This can be followed

independent of bile acid, by the canalicular decrease of bile flow [1]. As regards bilirubin excretion, it is very likely to be a non-specific phenomenon: earlier it has been pointed out that, following PCA (portacaval anastomosis) there is a transitory decrease, then an increase in bilirubin excretion [3].

It has to be supposed that the hypoxia arising during liver preservation causes a reversible change in the cytochromoxydase P-450 system which manifests, in the recirculation phase, in the alteration of bile composition and flow. It is known from human practice that the successful recirculation of a well-preserved liver is characterized by a promptly starting bile production, however, the exact evaluation and analysis in this respect are not without difficulties [6].

The lymph flow and the protein concentration of the thoracic duct depend on several factors. Undoubtedly, the liver produces the lymph of the highest protein content, therefore the increased protein concentration of the lymph in the thoracic duct is in favour of liver function or at least of an adequate degree of perfusion. It is the task of further studies to decide whether these factors are of prognostic importance from the point of view of liver transplantation.

The causes of the decrease in bile acid secretion are not quite apparent since several factors may play a role: the interruption of the enterohepatic circulation, the fact that the system of hepatic artery is not reconstructed and that bile acid excretion is an energy-dependent process which may be impaired during liver preservation.

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Untersuchung der Lymph- und Gallenzusammensetzung nach experimenteller Lebertransplantation bei der Ratte

F. JAKAB, I. SUGÁR, Zs. ZÁVODSZKY, P. METZGER und T. UGHY

In den ersten drei Stunden der Rezirkulationsphase der experimentellen Lebertransplantation wurden die Lymphströmung des Ductus thoracicus, der Eiweißgehalt der Lymphe, die Gallenströmung und die Zusammensetzung untersucht. Es wurde festgestellt, daß infolge des Ausfalls der über eine hohe Proteinkonzentration verfügenden Leberlymphe die Lymphströmung und der Eiweißgehalt des Ductus thoracicus abnahmen. Die Änderungen der Gallenzusammensetzung und -strömung sind die Folgen der verringerten Gallensäureexkretion der transplantierten Leber.

Исследование состава лимфы и желчи после экспериментальной трансплантации перени у крыс

Ф. ЯКАБ, И. ШУГАР, Ж. ЗАДОВСКИ, П. МЕЦГЕР и Т. УГИ

В первые три часа фазы рециркуляции после экспериментальной трансплантации печени авторы исследовали лимфоток в грудном протоке, определяли содержание белка в лимфе, течение и состав желчи. Они показали, что лимфоток и содержание белка в лимфе грудного протока снижаются, являясь результатом выпадения печеночной лимфы с высокой концентрацией протеинов. Изменение, наступающее в составе и течении желчи, является следствием пониженной экскреции желчных кислот трансплантатом.

'Cuffed' Portacaval Anastomosis in Rat

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(Received: November 18, 1985)

Preparation of portacaval anastomosis (PCA) in patients suffering from portal hypertension has been an accepted procedure for reducing portal pressure. Recently, fashioning of mesocaval anastomosis has got preference. In the era of portacaval anastomoses numerous experimental works were concerned with the technique of performing them [1, 2, 3, 4, 5, 7]. During these experiments it was revealed that PCA produces considerable changes both in the metabolism and the circulation of the liver. Fischer et al. [1] state that, following PCA, the weight of the liver decreased, on an average by 55%, as compared to the controls. Ossenberg et al. [8] observed that after PCA liver perfusion was reduced by about 55–65%. Rubin et al. [9] demonstrated that the hepatic cytochrome P 450 content was significantly decreased and the function of the microsomal drug metabolizing enzymes markedly altered subsequent to PCA. All these data indicated that, as a results of the bypassing of portal inflow from the liver, PCA significantly influences liver function and the intervention in experimental animals, i.e. rats, can be used as a model for chronic hepatic insufficiency.

The technical difficulties of preparing microvascular anastomoses are well-known. Several complications may arise, bleeding, air embolism, etc. At the same time, while forming an anastomosis, it may most often occur that it does not prove to be of a sufficiently wide lumen. The resulting consequences may be a turbulent flow due to stenosis, stasis before the stenosis and a predisposition to thrombosis.

In our experiments we deal with changes of the hepatic blood and lymph circulation, a.o. after PCA, therefore the anastomosis techniques giving rise to occasional stenoses were not suitable to be used as basic methods and so a so-called 'cuffed' technique was developed for the purpose of an anastomosis.

Material and Method

For our experiments CFY type rats of both sexes weighing 180 and 270 g were used. For making microvascular anastomoses, KOSHLA (India) microsurgical needle holder, scissors and forceps were applied. For exclusion of the veins microsurgical bulldogs were employed. For suturing the anastomosis 8-0 prolene (Ethicon) thread was applied. The operation was made by using Zeiss binocular surgical glasses. The animals were given 50 IU of heparin in

5 ml physiological saline solution. At the end of the operation 50 IU of protamine was administered intravenously also in 5 ml physiological saline solution. This was used at the same time for substitution of volume.

From midline laparotomy dissection was carried into the segment of the inferior vena cava opposite to the right renal vein (Fig. 1). Then the right and left branches of the portal vein were explored separately (Figs 2 and 3). Here, special care must be taken that the hepatic artery running in the portal bifurcation not be injured, although in this region, the connection between the vein and artery is rather loose. On releasing the trunk of the portal vein, a particularly delicate portion is the tenacious connection between the left wall of the portal vein and the hepatic artery. The pyloric vein and the gastroduodenal vein have always been preserved in our practice.

After an adequate mobilization and release the suprarenal anterior wall of the inferior vena cava was excluded from circulation along a segment of about 7–8 mm in a way that circulation should not completely stop in the inferior vena cava but the excluded portion be sufficient for making the anastomosis (Fig. 4).

Exclusion was then followed by separate ligations of the right and left branches of the portal vein in the hepatic porta which were then transected. By transecting the septum between the two branches a wide 'cuff' was gained (Fig. 5). Then the segment of the inferior vena cava falling between the sutures was slit. The posterior wall of the portal vein was stitched by continuous sutures to the slit left edge of the vena cava, this was supposed to be the posterior wall of the anastomosis (Fig. 6). The posterior continuous thread was knotted to the suture, followed by the continuous suturing of the anterior wall which was knotted with the upper suture (Fig. 7). Before placing the final stitches into the anterior wall, the bulldog closing the portal vein was provisionally released in order to exhaust air from the anastomosis. The continuous sutures were placed loosely, and knotting was also deliberately loose, the first knot was placed 1–2 mm from the edge of the anastomosis. On releasing compression, the venous pressure tightened the row of prolene sutures and thus no secondary bleeding arose. Following restoration of the circulation, also that of the splanchnic region was restored within a few seconds.

Results

The so-called 'cuffed' PCA was made in 76 rats. The operation lasted, on an average, for 30 min from the incision up to placing the last suture. Initially, simultaneously with portal compression, for reducing mesenterial flow also the superior mesenteric artery was compressed. Later, with the improvement of the technique or with the shortening of clamping time, this auxiliary

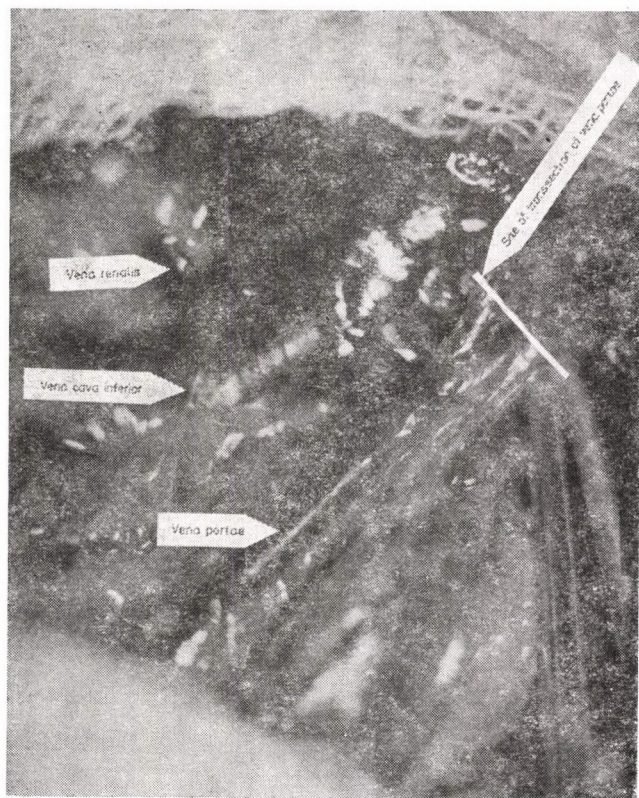
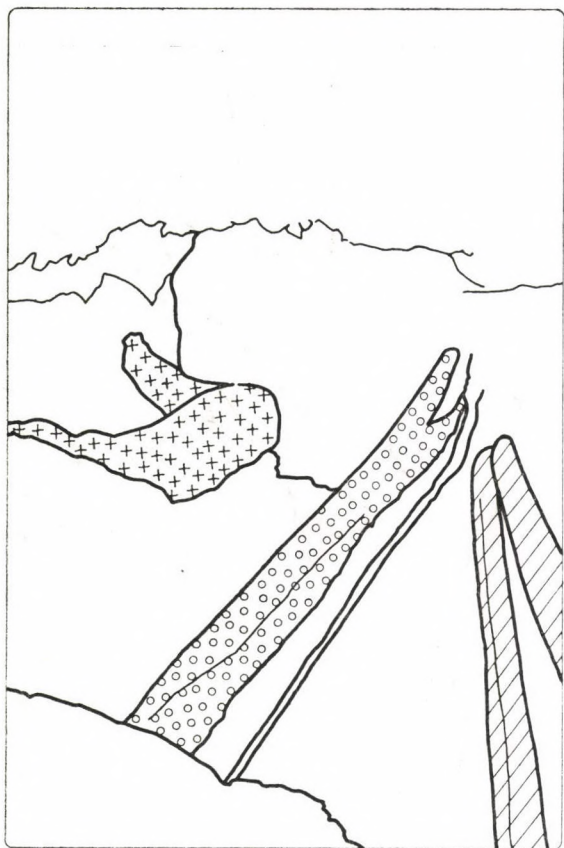


FIG. 1. The area of surgery as seen after laparotomy

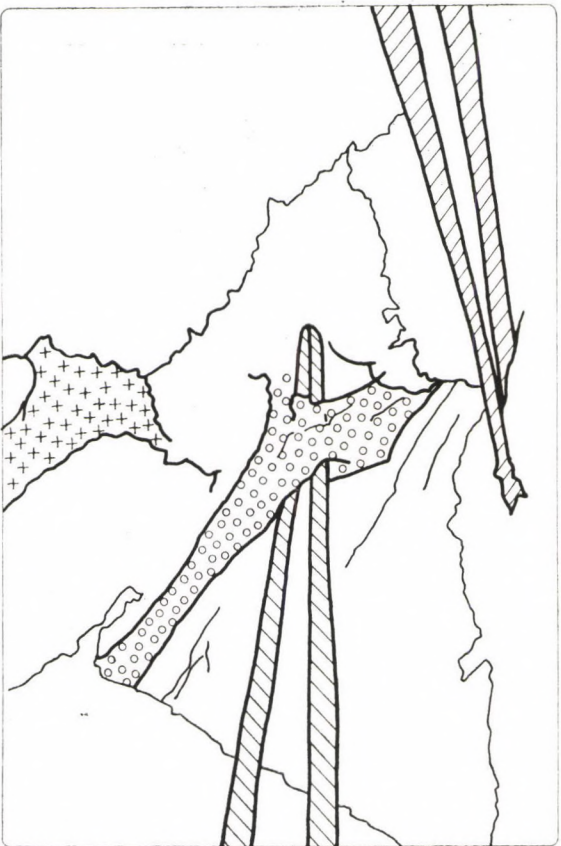
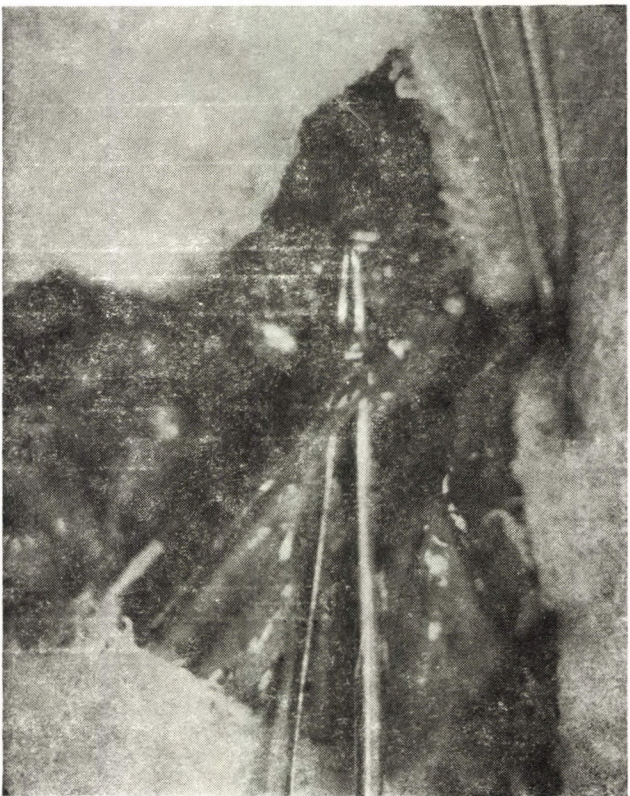


FIG. 2. Dissection of the left branch of the portal vein

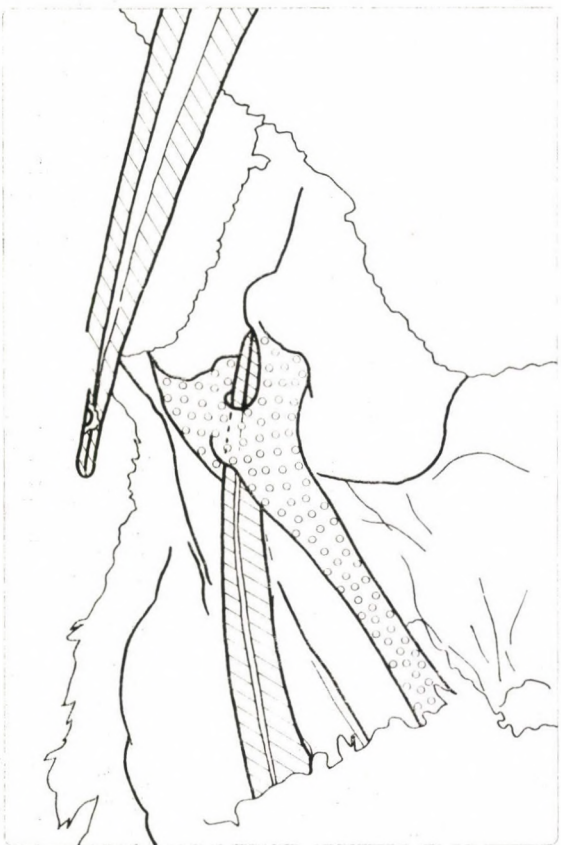
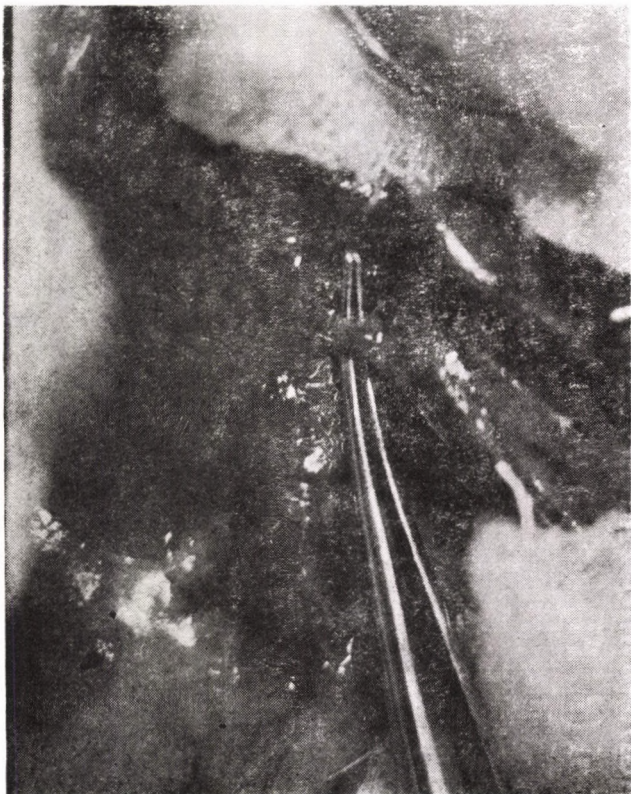


FIG. 3. Dissection of the right branch of the portal vein



FIG. 4. Exclusion of the portal vein and of the inferior vena cava from the circulation

procedure was omitted. The operation can be performed without assistance. Following a 'cuffed' anastomosis no stenosis was observed. Due to bleeding eight, while to air embolism, two animals were lost. In six animals cuffed anastomosis could not be made because of the abnormal course of the common bile duct or of the hepatic ducts.

Discussion

The study in the rat of the morphological and functional hepatic changes and of other pathophysiological implications following PCA deserves further attention because of the change in the hepatic circulation. The precondition of the sole effect of PCA is the preparation of a stenosis-free anastomosis. The pathophysiological implications of the stasis of the splanchnic region are well known. All this can, however, be avoided by making a stenosis-free 'cuffed' anastomosis.

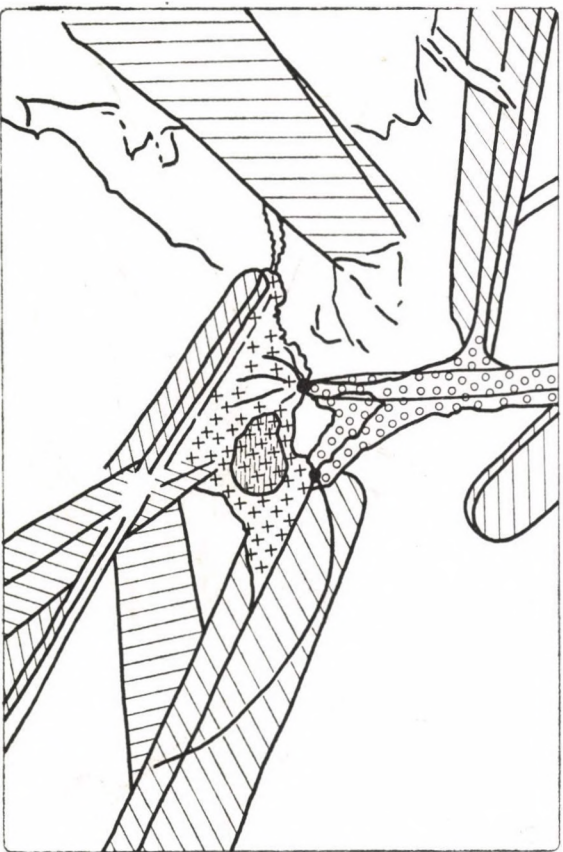


FIG. 5. Creation of a wide portacaval anastomosis: Suturing of the 'cuff' of the portal vein to the opened inferior vena cava

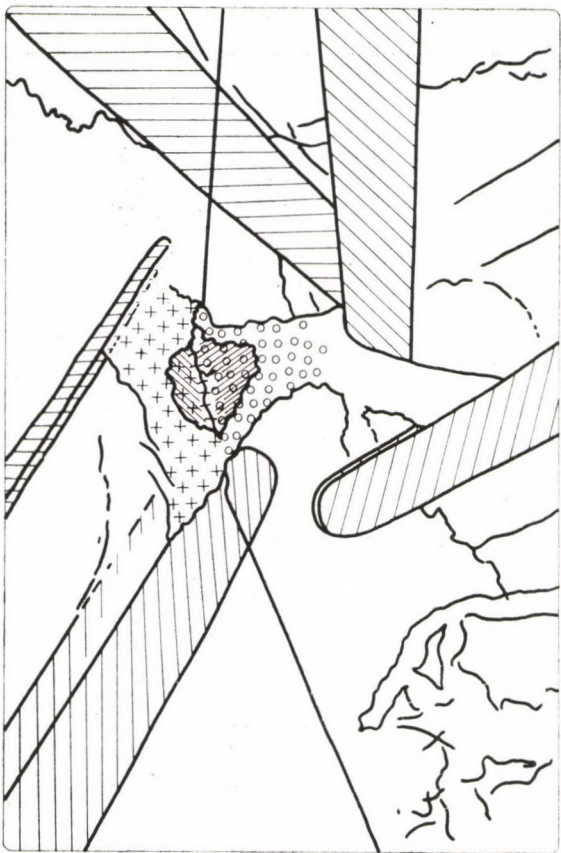


FIG. 6. The posterior wall of the anastomosis has been completed

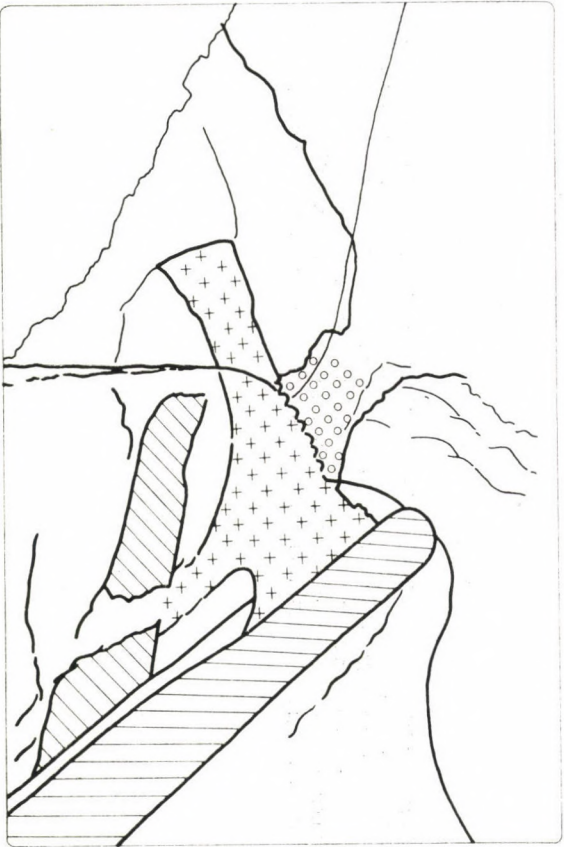


FIG. 7. The completed anastomosis

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Portokavale T-Anastomose bei der Ratte

F. JAKAB, A. ZÁBORSZKY und I. SUGÁR

Beschrieben wird die modifizierte Methode der Anfertigung der portokavalen Anastomose bei der Ratte. Das Wesentliche des Verfahrens ist, daß nach Herauspräparierung des Hilus in der Leberpforte, die Zweige einzeln unterbunden und durchgetrennt werden. Durch Durchtrennung des unter den Zweigen befindlichen Septums wird eine breite Basis gewonnen, die mit der V. cava gut anastomosiert werden kann. Die Methode erwies sich in 60 der 76 Fällen als erfolgreich. Technische Komplikationen meldeten sich nur in 10 Fällen, Stenose kam in keinem der Fälle vor.

Создание „стумнеподобного” портокавального анастомоза у крысы

Ф. ЯКАБ, А. ЗАБОРСКИ и И. ШУГАР

Авторы знакомят с улучшенным методом создания портокавального анастомоза у крыс. Суть способа заключается в том, что воротную вену препарируют у входа в печень, по отдельности перевязывают ее ветви и затем перерезают. При перерезке перегородки между ветвями образуется широкая „ступня”, которую можно хорошо анастомозировать с поллой веной. Свой метод авторы применяли в 76 случаях, из них в 60 с успехом. Технические осложнения наблюдали только в 10 случаях, стеноз не отмечался ни в одном случае.

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