NŐGYÓGYÁSZATI ONKOLÓGIA

Hungarian Journal of Gynecologic Oncology

A Magyar Nőgyógyász Onkológusok Társaságának hivatalos tudományos folyóirata

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A logot Mátyássy László tervezte. Egy nyolcszögből (octogon) és egy mandula alakú résből, ún. mandorla-ból áll. Az oktogon, vagyis a nyolcas szám az átváltozást (megújulást, újra születést), a mandorla pedig a szeméremtestet jelöli. A logo a női nemi szervek átváltozásának (pl. ismeretlen kimenetelű rákos megbetegedés) jelképe.

The embleme, designed by László Mátyás, symbolizes a transition related to the female genital system, such as gynecologic cancer of unknown outcomé. It is composed of an octogon and a mandorla. Octogon means eight, which is the number of transition (renewal, rebirth), the mandorla is an almond-shape aureole respresenting the vulva.

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The role of reconstructive surgery in the management of the female genital tract cancer

In collaboration with the Medical Department of the Hungarian Academy of Sciences
September 21st - 22nd, 1998 Budapest, Hungary

CHAIRPERSONS: PÉTER BŐSZE, M.D. - SÁNDOR ECKHARDT, M.D. - LÁSZLÓ UNGÁR, M.D.

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On behalf of the participants, our colleagues and patients I wish to express my sincere gratitude to the Hungarian Academy of Sciences for the understanding of the significance of the European School of Oncology Course held in Budapest in terms of education of the Hungarian medical doctors and in terms of patients care. I thank the generous support of the Hungarian Academy of Sciences, and acknowledge the very kind assistance of Kálmán Pannonhalmi. I gratefully appreciate the collaboration of the European Society of Gynaecological Oncology and the Medical Department of the Hungarian Academy of Sciences. I am most grateful to Károly Méhes, M.D., Chairman of the Medical Department of the Hungarian Academy of Sciences. I am also obliged to Szilveszter E. Vizi, M.D., Vice-president of the Hungarian Academy of Sciences, for being the Patron of this European School of Oncology course.

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Az ösztriolnak, az ösztradiolnál gyengébb a központi idegrendszerre és a méh nyálkahártyájára kifejtett hatása, viszont erősebb a hüvely epithel sejtjeire, valamint a cervix nyákza kifejtett hatása. Az ösztradiol fokozza az ásványi anyagok beépülését a csontokba. A két ösztrogén kombinációja az egymást kiegészítő hatás következtében lehetővé teszi a viszonylag alacsony ösztrogén adag alkalmazását.

A levonorgesztrel kifejezett gesztagén hatással rendelkezik, megakadályozza a rendszertelen vérzést és az endometrium hyperplasia kialakulását.

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Ellenjavallatok Terhesség, a májfunkció súlyos zavarai, Dubin-Johnson és Rotor-szindróma; fennálló vagy az anamnesisben szereplő: súlyos cardiovascularis és cerebrovascularis elváltozás, thrombophlebitis, thromboemboliás megbetegedések és ezekre való hajlam, emlő- vagy endometrium carcinoma, májdaganat; sarlósejtes anaemia, ismeretlen eredetű hüvelyi vérzés, súlyos hypertonia, súlyos diabetes mellitus, a méhnyálkahártya elváltozásai, lipidanyagcsere zavarok; kórelőzményben szereplő terhességi icterus, terhességi pruritus, herpes gestationis, otosclerosis (mely a megelőző terhesség/ek folyamán súlyosbodott).

Adagolás Naponta 1 drazsé (lehetőleg mindig azonos időpontban) *szabályos vérzés esetén* a ciklus 5. napjától kezdve, *szabálytalan vérzés vagy a vérzés teljes hiánya esetén* bármikor elkezdve 21. napon át. A 21. nap után 7 gyógyszermentes nap következik, melynek ideje alatt menstruációszerű vérzés jelentkezik. A következő 21 drazsé szedését a 7 napos szünet utáni 8. napon kell elkezdeni, akkor is, ha a vérzés ekkor még nem állt el.

A helyes szedési sorrendet először a fehér, utána a rózsaszín drazsék, számozás és nyilak jelzik a csomagoláson.

Ha a drazsé bevétele elmarad a szokott időben, úgy azt 12 órán belül pótolni kell. Ha 12 óránál hosszabb idő telik el az utolsó drazsé bevételét követően, akkor az idő előtti vérzés elkerülése miatt az elfelejtett drazsé/k/ kihagyásával kell folytatni a szedést a megkezdett csomagból.

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Preface

PÉTER BŐSZE, M.D.

Department of Gynecologic Oncology, Saint Stephan Hospital, Budapest

In spite of the trend towards minimal invasive approaches, extensive pelvic surgery and aggressive treatment modalities are still required in a number of patients with carcinoma, particularly for advanced tumors of the female genital tract. They can be mutilating and can damage the patient's self-esteem, sexual function, body image with poor quality of life. Therefore, management of the malignant tumors of the female genital tract often requires not only reconstructive plastic surgery and restoration of the anatomy but organ reconstruction as well unless organ spearing multimodality treatment is available. Large defects may only be covered by flaps. With the improved survival following pelvic exenteration there is an increased need for pelvic reconstruction. Flaps in the pelvis may also serve as means of reoxygenization of the anoxic tumor bed via neovascularization for the postoperative adjuvant radiation to be successful. Although organ reconstruction has been practiced for a long time, major strides have been made during the last decades in terms of improving the function of the reconstructed organs with significant decrease in failure rates and complications. Organ replacement is by no means a less important avenue of new surgical procedures. Improved techniques in repairing organ and blood vessel injuries, fistulas and vaginal stenosis due to pelvic irradiation have also been developed. Vaginal reconstruction and restoration of the anatomy of the abdominal wall have been accomplished in a more simplified and effective way. New innovations such as uterovaginal reunification or creation of an ortothopic bladder are on the horizon with the hope of sparing the uterus and childbearing capacity in early stage cervical carcinoma and improving the quality of life when urinary diversion is necessary. Restoration of the anatomy at the time of surgery or following treatment can prevent organ dysfunction, and results in improved body image, sexual function and quality of life that is becoming one the major endpoints of our efforts in managing cancer patients.

Cancer surgeons including gynecologic oncologists should be familial with the techniques of reconstructive surgery that allow them to be as radical as necessary in resection of the tumor, with the knowledge that reconstruction is available to cover large defect, to repair or reconstruct organs with acceptable morbidity, and to rehabilitate patients. We share the thoughts of *Maurice J Webb:* "Surgeons must be able to recognize and to deal appropriately with any complication that occurs during an operation. Even if definitive management is beyond the surgeon's expertise, the operator should still be familial with the appropriate management of any situation that may arise so that the problem can be dealt with expeditiously." We also believe that radiotherapists, medical oncologists and other physicians taking care of females with genital tract carcinoma should be aware of the scope and difficulties of the surgical approach. It is apparently a basic requirement of multidisciplinary treatment.

The major aim of this course is to give an up-date on reconstructive surgery attached to the management of the malignant tumors of the female genital tract for not only surgeons who perform the procedures but for all physicians and paramedical personal involved in the management gynecologic tumors. An other goal is to get together the different surgical specialist such as general, plastic, vascular and gynecologic surgeons to help them understand each other for the benefit of our patients.

Deeply impressed by, I include in the Preface the *Editor's Introduction of Dr. Carmel J. Cohen* prepared for the chapter on Reconstruction of the Urinary Tract.

"With improved supportive services providing advances in the field of antimicrobial therapy, anesthesia, endoscopic instrumentation and minimally invasive surgery along with rapid advances in imaging techniques, there are new opportunities for diagnosing congenital abnormalities in the female urinary tract. With cervical cancer remaining an important cause of death among women in the non-industrial world, and with aggressive attempts at eradication of cervical and other pelvic cancers with the use of radiation therapy, one can expect that there will be a continuing need to deal with fistulas of the female urinary tract as a result both of advancing disease and adverse effects of treatment. In addition, there will always be a segment of our world that suffers from neglected obstetrical experiences impacting on the health and integrity of the female urinary tract.

Fortunately such pathology has always stimulated new approaches to therapy and the medical world has produced distinguished pelvic surgeons who have developed expertise in bladder reconstruction and urinary diversion so that women can be spared the misery of incontinence and fistula, and their underlying pathology can be adequately treated. To this end we have several essays dealing with this subject and it is the hope of the editors that readers will be stimulated by these offerings and profit from them."

I would like to take this opportunity to extend my grateful appreciation to the contributors not only for their outstanding lectures but for their most interesting papers.

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Eddig több mint 70 HPV vírustípus ismert, amelyek nagyon különböző kórképeket hozhatnak létre. A HPV típusok között vannak olyanok is, amelyek a hámsejtekben malignus átalakulást hoznak létre. A cervicalis intraepithelialis neoplasiát (CIN) és az ebből kialakuló cervix carcinomát okozzák nőkben a HPV egyes típusai (HPV 16, 18, 31, 33 stb.). A legfrissebb vizsgálatok szerint a cervix carcinoma hátterében a HPV valamely típusa gyakorlatilag mindig kimutatható. Így a HPV és a cervix carcinoma közvetlen kapcsolata igazoltnak látszik, ezért a HPV viszgálata a cervix carcinoma diagnosztikájában és megelőzésében is óriási jelentőséggel bír.

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H-MED

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Principles of plastic surgery

GUSZTÁV GULYÁS, M.D.

Department of Plastic Surgery, National Institute of Oncology, Budapest

INTRODUCTION Interdisciplinary cooperation will be the main trend of medicine in the twenty-first century. Principalization and individualization is fundamental in modern medicine. The course of the European School of Oncology focuses on the basic principles of plastic surgery in the specialized field of gynecology and plastic surgery.

PRINCIPLES OF PLASTIC SURGERY The principles of plastic surgery are constantly transforming and changing theoretical guidelines. Modification of principles is caused by constant development of medical science and technology.

Recently, due to the explosive advancement in medical technology, significant differences developed in the field of plastic surgery. Modern plastic surgery requires: 1. diagnostic tools such as CT, MRI, 3D Ultrasound, PET, digital imaging, 2. surgical instruments including microscope, laser, ultrasound, endoscop, computer (CAD-CAM, stereo lithography), and 3. autologous and alloplastic materials (human keratinocytes, dermis, cartilage, bone, silicone, metals, ceramics, bioplastics etc.). Today, only surgical teams that have access to the most advanced medical technology are capable of adequately applying the continuously changing principles of plastic surgery.

WHAT ARE THE PRINCIPLES OF PLASTIC SURGERY IN SURGICAL ONCOLOGY?

THE ONCOLOGIST REMOVES THE TISSUE, THE PLASTIC SURGEON REPLACES IT Malignancies should be removed by the oncologist, reconstruction of the missing tissues should be performed by a specialized and experienced plastic surgeon. The reconstruction of both function and aesthetic form are equally important.

THE REMOVED TISSUES SHOULD BE REPLACED BY TISSUES OF THE SAME AMOUNT AND QUALITY The method of reconstruction with living tissues is superior to replacement with foreign material. The missing tissues should be replaced by those in the surrounding area (the characteristics of these tissues are most similar in colour, texture, vascularization, sensitivity and consistency).

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REQUIREMENTS FOR ADEQUATE ANALYSIS IN SOFT TISSUE REPLACEMENT

THE TISSUE DEFECT 1. Anatomical location 2. Dimension cm^2, volume cm^3 3. Depth 4. Cause/origin (tumor, mechanical, chemical, trophic, radiation, infection, burn, frost bite) 5. Condition of the anatomical structures of surrounding tissues (skin, vessels, nerves, tendons, bone, muscle) 6. Degree of contamination 7. Quality of the surrounding tissues

THE CHARACTERISTICS OF THE PATIENT 1. Age and gender. 2. Ability and willingness to cooperate and follow instructions 3. Physical and psychological condition 4. Other diseases 5. Obesity 6. Medicine, drugs, alcohol, nicotine 7. How much time has passed since the initial symptoms 8 . Morbidity of the donor area.

THE PLASTIC SURGEON COMPETENCE 1. Consultation and cooperation with other specialists 2. Anaesthesia 3. Alternative procedures 4.Postoperative treatment, follow-up.

THE DEPTH OF THE DEFECT IS THE PRIMARY CONSIDERATION FOR DRAWING UP TECHNICAL GUIDELINES Skin should be replaced by different types of skin grafts. Skin and subcutanaeous tissues,muscle, bone, mucous membrane should be replaced by different types of flaps.

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Ref. 1: Sandberg European Journal of Clinical Pharmacology (1988)
Ref. 2: Per Omvik et al. American Journal of Therapeutics (1994)

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Vulvar reconstruction in gynaecological oncology

JEFFREY J.H. LOW, MMED, NEVILLE F. HACKER, M.D.

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ABSTRACT Surgical resection is the mainstay in the management of vulvar cancer and precancer. Following extirpation of large primary or recurrent lesions, especially after radiation therapy, surgical reconstruction of the vulva and groin is of importance in improving tissue healing, reducing morbidity, restoring sexual function and improving the quality of life for the patient. This paper aims to outline the principles of reconstructive surgery, and to describe briefly the techniques used for skin grafting, and for the skin and myocutaneous flaps that are required in vulvar reconstruction.

Key words vulvar reconstruction, skin flaps, myocutaneous flaps

INTRODUCTION The treatment of vulvar cancer can have a major impact on a woman's self esteem, body image, sexual identity and sexual function (1). Modern therapy for the disease should aim at vulvar conservation whenever possible. For early stage disease, radical local excision is as effective as radical vulvectomy (2). For more advanced disease, pre-operative radiation (with or without chemotherapy), may also allow preservation of much of the vulva (3-5). However, with some large primary or recurrent cancers, radical vulvectomy or extended radical vulvectomy will be unavoidable and vulvar reconstruction will be necessary. This is particularly true for recurrent disease following radiation therapy. Reconstructive surgery in these cases requires careful consideration of sexual function, bladder and bowel integrity, in addition to the basic problems of primary tissue healing (6).

In a retrospective comparative study by *Landoni et al.* (7), patients submitted to radical vulvectomy with reconstruction had a significantly lower rate of wound dehiscence (26% vs. 64%), vaginal introital stenosis (2.8% vs. 10.4%), sexual dysfunction (10% vs. 50%) and urinary stream misdirection (1.4% vs. 6.5%), compared with those having radical vulvectomy without reconstruction.

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PRINCIPLES OF VULVAR RECONSTRUCTION Primary wound healing can only be achieved when the edges of a surgical wound are well vascularised and approximated without tension. In general, the simplest means to repair a surgical defect should be used. Small defects can be closed primarily. However, larger tissue defects will require skin grafting, local skin flaps or myocutaneous grafts. Secondary healing by granulation may be a reasonable or even preferred option in certain situations. For example, the periurethral area may be left open to granulate, which it will usually do over a period of 6 to 8 weeks (8).

The ideal method of reconstruction following a radical resection of the vulva should provide immediate anatomical restoration and preferably primary healing (9). The new vulva should have as many of the anatomical characteristics of the original vulva as possible. Reconstruction should minimize patient morbidity and pose no life threatening risks. The donor tissue should ideally be expendable and transferrable.

An extensive array of flaps have been described in the literature. The practicing gynaecologic oncologist needs to be familiar with a few flaps of each type so that all eventualities will be covered. A more detailed review of vulvar flaps and reconstructive techniques can be found in "Gynecologic Cancer Surgery" by *Morrow and Curtin* (10), and "Reconstructive Surgery in Gynecology" by *Knapstein, Friedberg and Sevin* (11).

FREE SKIN GRAFTS Skin grafting is useful following extensive superficial excisions or skinning vulvectomy for VIN, particularly VIN 3. For the graft to "take" the raw surface of the skin must remain in contact with the recipient site until a new blood supply is established. These vascular connections are very fragile until about 7 days post-operatively. The graft takes better when thinner, but if the graft is thicker, it will undergo less contracture, be cosmetically superior, more durable, and have better re-innervation. Success of a skin graft depends on an adequately vascularised recipient site, the absence of infection, good contact between graft and host, and immobilization of the

recipient site until a good vascular hook-up has been established.

There are 2 types of free skin grafts used in gynaecologic oncology split thickness and full thickness.

SPLIT THICKNESS SKIN GRAFTS

PRINCIPLES Split thickness skin grafts are suitable for covering fresh or healthy granulating superficial defects. The skin graft must be harvested under sterile conditions. The donor site most frequently used to obtain a split thickness skin graft is either the anterior or medial thigh, which is readily accessible with the patient in the low lithotomy position. Alternatively, the graft can be taken from the buttocks with the patient prone, and then repositioned. The buttock donor site has cosmetic advantages, but may be more uncomfortable in the postoperative period. The selection of the donor site should be made preoperatively after discussion with the patient.

A dermatome is used to harvest the skin graft. Several different types of dermatomes are available, including the Brown air-powered, electrically driven dermatome, and the Padgett hand-driven dermatome. The surgeon should select the instrument with which he or she has the greatest facility, as an equally good graft can be harvested with either one.

TECHNIQUE The graft width and thickness can be determined by adjusting the settings of the dermatome. In reconstructing the vulva, a graft thickness of 0.016 to 0.020 inch is recommended (10). When using the dermatome, the surgeon must apply firm steady pressure in order to harvest a graft of uniform thickness. To minimize friction, mineral oil is applied to the skin over which the dermatome is to be passed. The skin to be taken is stretched and flattened by the surgical assistant with the aid of a tongue depressor. A second assistant picks up the leading edge of the graft as it is being harvested. The graft is kept moist in saline solution while the recipient site is being prepared.

Figure 1. Split thickness skin graft placed over wide excision of posterior vulva and perianal area for VIN III. Note previous skin graft on anterior vulva following earlier resection

After complete haemostasis of the recipient site, the graft is placed on the defect without tension or wrinkles, cut to leave a slight overlap at the edges of the defect, and attached with interrupted vicryl sutures. The graft may be pie-crusted by making small incisions on the surface *(Figure 1)*. This maximizes the dimensions of the graft while permitting the escape of fluid that might otherwise accumulate between the graft and the recipient site. Extensive pie crusting may result in contracture.

A dressing of cotton wool is applied to the graft with light pressure to ensure that the graft conforms to the contour of the recipient site. Sutures are then tied snugly over this dressing to keep it in place. Excessive pressure between graft and host is potentially harmful. The donor site is covered with an Opsite film dressing and a pressure dressing is applied for 24 to 48 hours. The donor site heals spontaneously from an outgrowth of epithelium within the residual islands of epidermis, sweat or sebaceous gland ducts and hair follicles.

The graft and recipient site are immobilized for 5 days to prevent disruption of the vascular connections by shearing forces. The dressing is removed on the 6th postoperative day.

FULL THICKNESS SKIN GRAFTS These incorporate the epidermis and dermis, and are most suitable for filling small defects in the vulva. They should be applied to a fresh clean defect rather than a granulating wound. The graft may be taken from the inguinal region or the upper inner thigh and an ellipse of skin is removed with a scalpel to facilitate primary closure of the defect. Any fat is trimmed away to expose the underlying dermis. The graft is sutured to the recipient site as described for split thickness grafts.

SKIN FLAPS

CLASSIFICATION Skin flaps may be classified as follows:

1. transposition flaps, when the flap is passed over a portion of normal tissue to reach the defect e.g. rhomboid flap, perineal thigh flap, mons pubis flap;
2. rotation flaps, when the flap is turned in an arc to reach the defect;
3. advancement flaps, when the flap is moved in along a straight axis to reach the defect, e.g. V-Y flap.

Skin flaps may also be classified according to blood supply:

1. random pattern flaps - vascularised by a subdermal plexus of small blood vessels (most local skin flaps) e.g. rhomboi flap, perineal thigh flap;
2. axial pattern flaps - vascularised by a single anatomically constant subcutaneous artery e.g. mons pubis flap.

Random pattern flaps are limited with respect to their shape, because ischaemia and necrosis will occur if the length is more than 2 times the width of the base, whereas the axial pattern flap can be as long as the axial artery on which it is based. A flap is designated an island flap, when the flap of skin raised remains attached only by the vascular pedicle or muscle.

PRINCIPLES In principle, the suitability of a flap depends on its ability to cover the defect and also allow primary closure of the donor site. Poor micro-circulation due to prior irradiation, previous incision, vascular disease and cigarette smoking can all compromise the suitability of the skin for use as a flap. Postoperatively, bed rest for 5 days will reduce flap edema, while stress on suture lines, tension, pressure and creases on the flap must all be avoided.

TRANSPOSITION FLAPS

RHOMBOID FLAP

PRINCIPLES The most commonly used transposition flap in gynecologic oncology surgery is the rhomboid flap. This is a variation of the Z plasty (12-16) and its primary application is in closing perineal defects between the vagina and anus. It can also be used in the anterior and lateral vulva. Bilateral flaps are most appropriate for perineal repair, both for cosmetic symmetry and because of limitation of the adjacent tissue mobility. Its height and base are equal in length and because of this, flap necrosis almost never occurs.

TECHNIQUE A rhomboid is visualized over the defect. A line is drawn transversely as an equidistant continuation of the transverse diameter of the defect onto the adjacent skin. A line forming a 60 degree angle and also equidistant with this transverse line is then drawn upward or downward depending on the condition of the adjacent tissue and its mobility *(Figure 2)*. It is useful to place the origin of the transverse incision slightly more posteriorly and also to maintain as wide a V as possible to enhance the blood supply to the tip of the flap (17).

Bilateral flaps are recommended for defects larger than 4x4 cm. In such situations, a rhomboid figure is superimposed on each half of the defect and 2 smaller flaps (mirror images of each other) sutured together in the mid-line provide superior coverage to a single large flap, and maintain symmetry to the end result. Designing the flaps 0.5 cm larger than the defect will also allow for trimming the flap edges to fit the defect and permit closure with minimal tension.

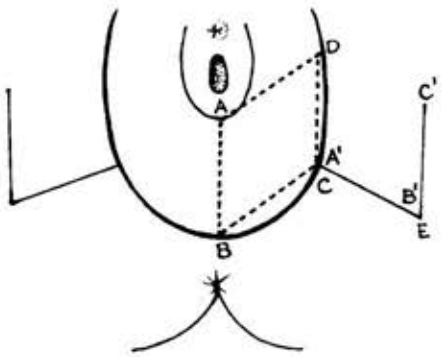

Figure 2. Diagrammatic representation of a rhomboid flap

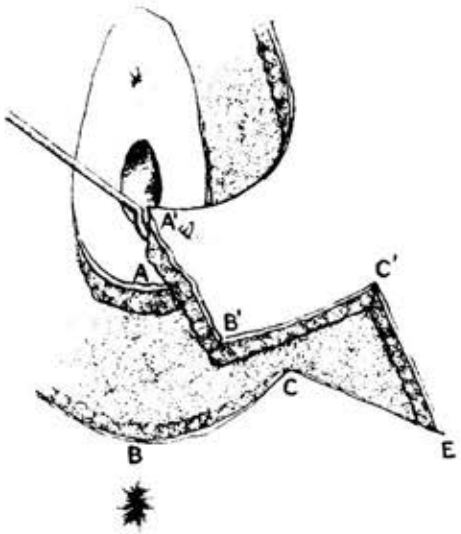

Figure 3. Diagrammatic representation of rhomboid flap being transposed to cover a perineal defect

Figure 4. Final closure of perineal defect with bilateral rhomboid flaps

The skin and subcutaneous tissue are incised along the transverse and vertical lines and the flap elevated. The flap is then transposed onto the defect *(Figure 3)*. Undermining the surrounding skin around the donor and recipient sites may be required to obtain maximum mobility of the flap, reduce tension and to obtain the optimal position of the flap within the defect. The donor site is completely closed with interrupted sutures and the flap sutured in position *(Figure 4)*. A paraffin gauze dressing is placed over the suture lines and a Foley catheter left in the bladder for 48 hours. Perineal irrigation with

normal saline is performed 3 times daily, followed by air drying with a hair dryer at low setting .

A literature review of rhomboid flaps for vulvar reconstruction by *Burke et al.* (17) reported no instances of flap necrosis or loss. Major wound disruptions occurred in less than 5% of cases. In a personal series of 15 rhomboid flaps in 13 patients (17), these authors reported minor wound separation in 13% of cases. There were no other early or delayed vulvar complications.

PERINEAL THIGH FLAP

PRINCIPLES The perineal thigh flap is a variation of the rhomboid flap using the maximum 2:1 length to width ratio with tapering at the tip to facilitate closure of the donor site (18). It is most useful when the margin of the vulvar resection extends out to the labial crural fold. The flap is taken full thickness and when feasible, the fascia lata is raised with it to provide strength to support the flap in its new position and perhaps improve its blood supply. When used to cover vulvar defects, the closer the flap corresponds to the longitudinal direction of the thigh the more readily the donor site can be closed. Nevertheless undermining the adjacent skin is almost always required for primary closure of the donor defect.

TECHNIQUE Unlike the classic rhomboid flap, the perineal thigh flap is based posterior to the mid diameter of the oval defect, and requires full use of the 2:1 maximal ratio for random pattern flaps. The length of the defect is measured and a line is drawn at 60 degrees and a flap maintaining the 2:1 ratio is fashioned to fit the defect. The flap is elevated after cutting through the deep fascia and rotated anteriorly onto the defect. The flap base and tissue around the donor site need to be undermined to cover the recipient and donor site. A key stitch is inserted at the point of rotation to take tension off the flap. The graft is sutured with interrupted absorbable sutures so that it lies in place without tension. A cone of tissue at the base of the flap due to rotation, constitutes part of the blood supply and must not be trimmed. This can be excised after complete healing.

AXIAL PATTERN FLAPS

PRINCIPLES Axial pattern flaps are vascularised by one or 2 single anatomically constant subcuticular arteries. The most useful example in vulvar reconstruction is the mons pubis flap which is a groin axial flap based on the superficial external pudendal artery (SEPA). It is particularly useful after a radical hemivulvectomy and will be described.

SEPA FLAP (MONS PUBIS PEDICLE FLAP) The SEPA flap is an axial skin flap based on the SEPA that can be vertically (19) or horizontally (20) orientated. Both vertically and horizontally orientated flaps can be rotated to cover a vulvar defect. In vulvar reconstruction, the transverse SEPA flap has the advantage that it can bring hair down from the mons pubis and is sensate.

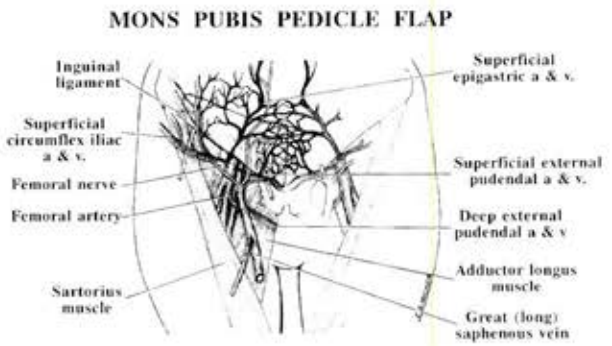

Figure 5. The mons pubis pedicle flap

TECHNIQUE The path of the SEPA is drawn as a curved line from the femoral artery 2.5 cm below the inguinal ligament, passing upward 1 to 2 cm medial to the pubic tubercle and continuing toward the umbilicus, staying about 2 cm from the mid-line. Anastomoses occur across the midline and with the superficial epigastric artery *(Figure 5).*

The goal of the flap is to bring hair bearing skin of the mons pubis to the vulva. The flap is outlined on the contralateral mons pubis and the width and length of the flap should equal the dimensions of the vulvar defect to be covered. The flap length should be parallel and superior to the inguinal crease. The skin and subcutaneous fat are incised along the superior and inferior aspects of the pedicle flap, down to Scarpa's fascia, and the underlying fascia over the mons and upper thigh is exposed. The flap is mobilized from the contralateral side and rotated on a pedicle of subcutaneous tissue and skin to the defect on the vulva. The flap is secured with vicryl suture to cover the donor site. The slight distortion of the mons sec-

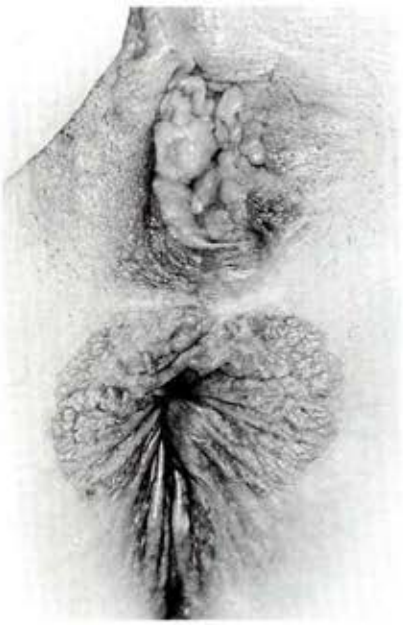

Figure 6. Extensive VIN III in the perianal area

Figure 7. Superficial resection of perianal VIN III.

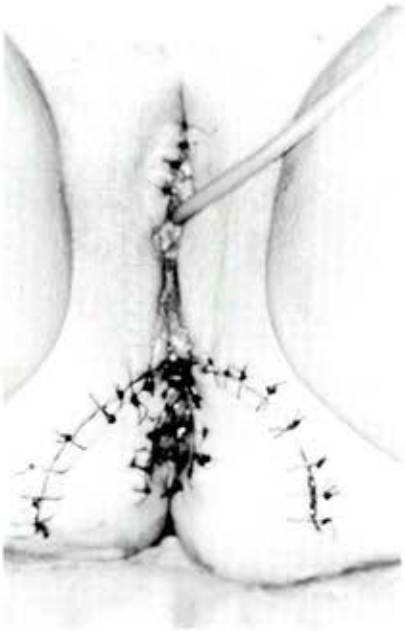

Figure 8. Final result after closure of rotation flaps to cover the perianal defect

ondary to rotation of the flap on a vertical base is hidden well in the pubic hair but can be revised subsequently if necessary. *Spear et al.* (20) and *Potkul et al.* (21) reported 4 cases in which the SEPA flap was used to cover a hemivulvectomy defect. One of the 4 flaps experienced a partial slough. All patients had normal sexual function and the authors judged the cosmetic results to be excellent. *Mayer and Rodriguez* (22), taking the flap a little higher have used it as an island flap, bringing it to the vulva through a subcutaneous tunnel. This flap cannot be safely used in the patient with a prior low vertical abdominal incision.

ROTATION FLAPS Rotational skin flaps are often the method of choice for vulvar defects that have a triangular or oval shape. *Figure 6* shows a patient with extensive perianal VIN III, while *Figure 7* shows the superficial resection. A semicircular skin flap is drawn adjacent to the defect. The length of this half circle is three times the diameter of the defect. The mobility of this skin flap is obtained with a back cut. After separating the skin and subcutaneous fatty tissue and undermining the surrounding tissue, the flap is rotated into the defect *(Figure 8)*. It is the back cut that lengthens the flap sufficiently for the edges to meet.

ADVANCEMENT FLAPS

PRINCIPLES Advancement flaps of many types have been described in the gynaecologic oncology literature (11, 18, 23-24) but they are in fact less commonly used in this specialty. Occasionally, the V-Y flap can be used on the vulva, especially in the elderly and the patient with redundant skin from weight loss. Also known as the kite flap, this involves move-

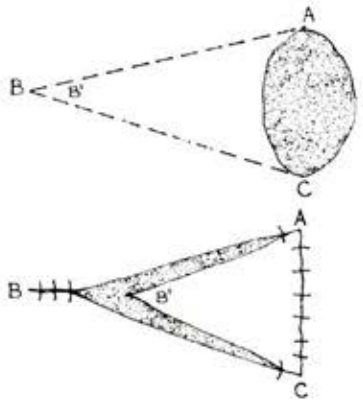

Figure 9. The V-Y advancement flap

ment of an island of skin on a subcutaneous pedicle. The distance it can be moved depends on the laxness of the skin tissue.

TECHNIQUE A triangle of skin oriented in the direction of the greatest mobility of the adjacent skin is drawn such that the edge of the defect forms the base of the triangle *(Figure 9)*. The length of the triangle is 1.5 to 2 times the diameter of the defect in the direction in which it is to be closed (25). If necessary, 2 V-Y flaps can be used to close the defect. After the flap has been defined, the skin and subcutaneous tissue are incised down to the fascia. For added mobility, the leading edge and the tail of the flap can be undermined. The donor defect created by advancing the triangular flap is closed side to side, making a kite shaped suture line.

Tateo et al. (26) reported 6 patients undergoing bilateral V-Y flaps with radical vulvectomy for SCC vulva. The average operating time for a single V-Y flap was 40 minutes and blood loss for complete construction was less than 100 ml. In 5 patients, the flaps were completely healed at discharge

after an average of 21 days for non-radiated patients. One patient experienced a partial diastasis at the vaginal edge. There were no delayed surgical complications and a satisfactory introitus was noted in all 6 cases.

MYOCUTANEOUS FLAPS

PRINCIPLES The skin derives its blood supply either directly from cutaneous arteries or indirectly from perforators, arising from arteries in the underlying muscles. The most important consideration in selecting the appropriate myocutaneous flap is its capacity to cover the defect (i.e. size and proximity). Secondary considerations are restoration of form and function at the recipient site, effect on function at the donor site, ease of closure of the donor site and overall morbidity.

Myocutaneous flaps have the great advantage of having a blood supply that is outside the field of radiation and away from the site of tumour removal. They are particularly useful when a new blood supply is needed to ensure healing because of prior radiation, or when the defect is too large for pedicle flaps.

The arc of rotation, size of flap and alignment of skin over the muscle must be accurately measured before the flap is elevated. The correct muscle must be raised with the flap and the blood supply preserved. Generalized vasculopathy as seen in diabetics or in smokers can impair circulation to potential flap sites. Hypothermia can also contribute to poor perfusion and necrosis, as can postoperative events such as haematomas, seromas, infection and position of the patient leading to pressure and tension on the vascular pedicle.

Flap viability is of paramount importance but can only be determined after raising the flap. Fresh bleeding is the best indication of satisfactory perfusion and focal compression of the skin should produce blanching followed by capillary filling. Flap viability can also be tested by a Woods ultraviolet light after IV fluorescein injection, where viable tissue is characterized by a bright yellow or greenish colour and non-perfused tissue appears dark or purple (27).

RECTUS ABDOMINIS MYOCUTANEOUS (RAM) FLAP

PRINCIPLES In gynaecologic oncology, the RAM flap is often regarded, as the flap of choice for covering groin and vulvar defects, especially if these areas were previously irradiated. The flap is vascularised by the superior epigastic artery and the inferior epigastric artery. The latter is larger and will support the entire muscle and overlying skin.

It is essential to the distally based flap that the inferior epigastric artery be intact. If the patient had previous radical pelvic surgery, especially a pelvic or groin node dissection, a urinary or intestinal stoma, or previous transverse abdominal incision, the integrity of the inferior epigastric artery must be documented.

The RAM flap is excellent for covering defects in the anterior vulva and contralateral inguinal region because of its reliability, size, range and many variations. Many papers (28-34) have reported very good results using the RAM flap for difficult cases including complete reconstruction after combined radical surgery and radiation treatment for advanced vulvar carcinoma.

When applied for closure of vulval skin defects alone, its bulkiness unfortunately can give rise to cosmetic and functional problems such as abnormal urinary stream, discomfort when walking and erosion due to friction. *Hatoko et al.* (35) reported 2 cases of RAM flap transfer with secondary liposuction to reduce the flap volume some 9 to 12 months post operatively with good improvement of symptoms, cosmesis and acceptability.

TECHNIQUE The skin and subcutaneous tissue are incised down to the external oblique aponeurosis, thus outlining the skin island. The caudal part of the medial incision skirts the umbilicus. The superior margin of the flap is incised down to and includes the anterior rectus sheath, identifying the lateral edge of the rectus muscle. Next, the anterior rectus sheath along the inferior margin of the skin island is similarly incised. This corresponds approximately to the level of the arcuate line. Next, the sheath is incised longitudinally over the rectus muscle 1 to 2 cm from its lateral and medial borders, thus defining the island of anterior rectus sheath that is to be elevated with the skin island. Next, the rectus muscle is transected at the superior margin of the island and dissected off the posterior sheath. The superior epigastric artery is identified and ligated superiorly. The anterior rectus sheath is divided in the midline from the arcuate line and caudally, allowing the rectus muscle to be further dissected off the transversalis fascia down to the symphysis pubis. The vessels that are usually located at the posterior aspect of the muscle have to be preserved. A wide tunnel must be created under the mons pubis and over the symphysis pubis. The completely mobilized muscle and skin island is tunneled through this space into the vulval defect.

The donor site is closed by repairing the anterior sheath with a heavy monofilament suture. Undermining of the lower abdominal wall skin is often needed to facilitate closure. A mesh may be required if the anterior sheath will not come together easily. A suction drain is inserted and the skin closed with staples.

GRACILIS MYOCUTANEOUS (GMC) FLAP

PRINCIPLES The GMC flap can be used for covering defects in the groin, vulva and perineum. The arc of rotation anteriorly allows the flap to reach the groin and the mons pubis, whilst its 180 degree posterior arc of rotation reaches the perianal area and vagina. The point of rotation is the proximal dominant vascular pedicle. This pedicle arises from the medial femoral circumflex artery, a branch of the deep femoral artery.

Common causes of failure include failure to centre the skin

Figure 10. Right sided gracilis myocutaneous graft used to cover a large vulvar defect

island over the muscle, unreliable vascularity of the distal one-third of the posterior medial thigh, vascular spasm secondary to tension and poor surgical technique. The reported complications related to the GMC flap for vulvar reconstruction are few, unlike the GMC neovagina.

TECHNIQUE The graft is harvested from the medial aspect of the thigh. A line is drawn from the pubic tubercle to the medial epicondyle, and a second line 2 cm posterior and parallel to this delineates the anterior margin of the graft. The posterior margin of the graft is a mirror image of the anterior margin but can run up to 2 cm below the posterior edge of the gracilis. The length of the flap is guided by the size of the vulvar defect.

The anterior skin edge of the graft is incised first, downward to the adductor longus fascia. The posterior incision is then carried out through the skin, subcutaneous tissue and fascia, after which the gracilis muscle is divided by diathermy, completely freeing the distal end of the flap. The vascular pedicle of the gracilis is invested by the fascial layer which separates the adductor longus and the adductor magnus muscles. The fascia to the adductor longus muscle is then progressively reflected, elevating the graft from its distal end and exposing the proximal vascular bundle of the gracilis muscle approximately 10 cm from the pubic ramus. The fascia of the gracilis muscle is dissected off the adductor magnus and brevis distally and posteriorly. The proximal dissection is continued between the gracilis fascia and the adductor magnus and brevis to the pubic ramus. The GMC flap is then transposed to the recipient vulvar defect. The donor site is irrigated with saline and haemostasis secured. The donor site closed by suturing the deep fascia, followed by interrupted sutures to the skin *(Figure 10)*.

TENSOR FASCIA LATA (TFL) FLAP

PRINCIPLES The TFL flap is a very reliable flap with a large skin territory and sensation. It has been used to cover groin, vulvar (36-37) and ischial defects. Its popularity in gynaecologic oncology has declined over the past decade because of the unavoidable deformity, difficulty closing the donor site, risk for lateral knee instability, and availability of more attractive alternatives for covering the vulvar and groin defects. The most important current indication for the TFL flap is to cover groin defects after resection of irradiated groin nodal metastases in patients with vulvar carcinoma when the contralateral RAM flap cannot be used, and to repair mons pubis defects when the ipsilateral gracilis flap is not suitable. The TFL flap is more reliable than the GMC flap for groin coverage because the full length of the GMC flap including the unreliable distal third may be needed to cover the groin.

The TFL flap is nourished by the terminal branch of the lateral circumflex femoral artery which is characteristically a branch of the deep femoral artery, and is located deep to the fascia lata between the rectus femoris and vastus lateralis. The skin territory is innervated predominantly by the lateral femoral cutaneous nerve. Injury to the nerve may result in meralgia paresthetica which is characterized by intractable pain or paresthesia mimicking a trapped nerve syndrome, a situation also seen occasionally after extensive groin node dissection. To avoid injury to the nerve, the anterior incision line should be along the rectus femoris muscle, elevating the nerve with the flap.

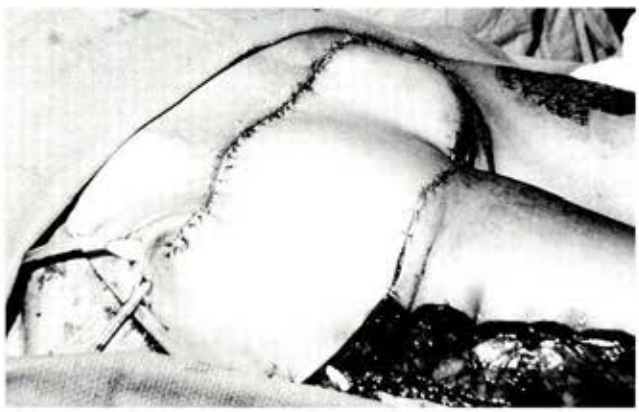

Figure 11. Large tensor fascia lata myocutaneous graft used to cover an extensive groin defect

TECHNIQUE The graft is obtained by harvesting a myocutaneous pedicle from its proximal origin at the anterior superior aspect of the iliac bone. The length of the proposed flap is determined by measuring the distance from the muscle's vascular supply, located 6 to 8 cm distal to the anterior superior iliac spine (ASIS) to the most inferior or distal point of the recipient site. The anterior border of the graft is defined as a line from the ASIS to the lateral condyle of the knee while the posterior border of the graft is defined as a line from the greater trochanter of the hip down to the knee. The distal border is located about 5 cm proximal to the knee. The width of the flap is determined by the width of the defect to be covered, but typically it is 6 to 8 cm with a length of up to 40 cm. The pedicle graft is harvested after the defect has been created in order to permit a

more accurate measurement of the flap. The flap is first incised distally, and care is taken to avoid injury to the proximal blood supply. Once the flaps are elevated, they are rotated into place and sutured from the most distal point to the proximal. The donor site is closed primarily *(Figure 11)*.

CONCLUSION In managing patients with vulvar disease, the gynaecologic oncologist must not only be a surgeon skilled in disease extirpation but also a physician sensitive to the patients' needs, expectations and goals. Vulvar reconstructive surgery, when indicated, reduces morbidity, restores form and function and improves the quality of life for the patient and should therefore be an integral part of the overall management plan in the surgical treatment of vulvar cancer.

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Vaginal reconstruction using the split-thickness skin graft and the omental J-flap technique

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ABSTRACT Reconstruction of the vagina is an option after radical surgical treatment of gynaecological cancers, or in patients with vaginal fibrosis and stenosis after radiotherapy. The success of the procedure depends strongly on the skills of the surgeon and the motivation of the patient and her partner. Vaginal reconstruction can be an important step in the sexual and psychological rehabilitation of selected patients. The operation should be offered as an option to all patients who intend to be sexually active.

The use of an omental J-flap in combination with a split-skin mesh graft is a feasible and relatively simple operation for reconstructing the vagina. The basis of the operation is a well vascularised graft brought into the radiated pelvis. This omental graft covers the anterior, posterior and side walls of the pelvis. This omental sack is lined with a split-skin mesh graft. The graft take is reported to be 80 - 100%. The technique is as successful as myocutaneous techniques, but easier to perform. Since only 45% of the patients use their vagina for sexual intercourse after the operation, it is necessary to provide intensive sexual counselling for the woman and her partner by a sex therapist/psychologist before the operation, to prevent disappointment and an unnecessary operation.

Key words neovagina, vagina reconstruction, split-thickness skin graft neovagina.

INTRODUCTION Reconstruction of the vagina is a rare surgical procedure that is sometimes suggested for women with congenital or acquired absence of the vagina. Vaginal reconstruction is one of several reconstructive operations that are available to the gynaecological oncologist (1). The main goal of recontructive pelvic surgery, according to *Lagasse et al.* (2), is: "to restore the anatomy to as normal a configuration as possible, to replace the viscera so that their function can be preserved, to conserve as much tissue as is necessary to adequately close all defects, to preserve body image and to provide support for the residual viscera." In gynaecological oncology, the loss of a functional vagina can be the result of ultraradical surgery and/or radiotherapy. The occurrence of vaginal stenosis after radiotherapy, especially after brachytherapy, is 15% (3). Vaginal reconstruction is indicated depending on the individual needs of the woman. Reconstruction of the vagina is an important step in the sexual and psychological rehabilitation of some patients, and so in the restoration of a normal self-image. Vaginal reconstruction should be offered to all patients who intend to be sexually active, and who desire such reconstruction. Counselling about the procedure should be done by a sexologist.

The oldest technique for vaginal reconstruction is the placement of split-thickness skin grafts which was developed by *McIndoe, Banister* (4) and *Wharton* (5). The basis of the technique is that a split skin flap can cover and epithelialize a surgically created space. In the pelvis, this space is located between the bladder and rectum after a radical resection of the vagina or after the resection of a fibrotic vagina, in cases of extreme radiation fibrosis. For the original *McIndoe* procedure, the presence of bladder and rectum is necessary to support the skin graft. Improved surgical technique and better perioperative care has led to more radical operations, resulting in "en bloc" removal of bladder, vagina and sometimes also the rectum for a small number of patients. In these cases, the split skin graft was insufficient because of the large surgical space that is left behind after emptying the small pelvis. This led to the use of myocutaneous flaps to fill in the large gap in the pelvis, and to reconstruct a skin-covered space that could be used as a vagina (1, 6-7). An advantage of these myocutaneous flaps is that they bring in vascularized tissue in an area with poor vascularization due to previous radiotherapy. This healthy tissue is needed to stimulate neovascularization and recovery, but also to prevent prolaps of intestine through the large defect. Later, the split skin graft became popular again in combination with an omental flap (3, 8-10), especially in those patients

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Figure 1. Completely obliterated vagina after radiotherapy

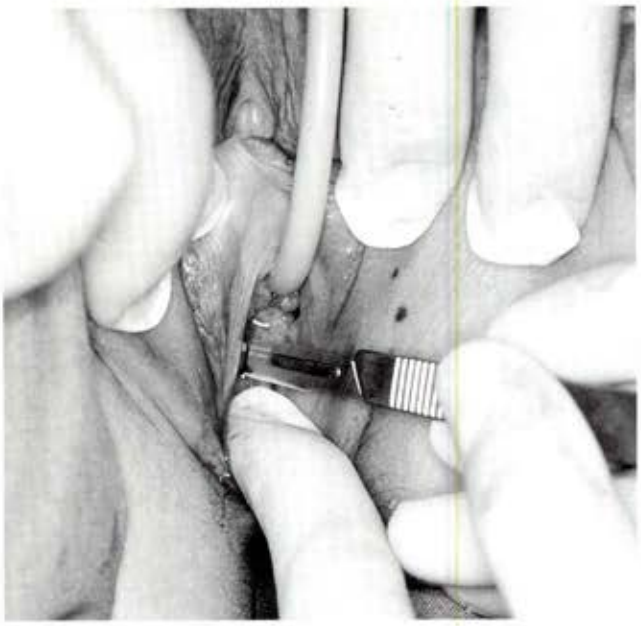

Figure 2. The vaginal resection is at 3 and 9 o'clock positions

where less radical resections were sufficient to eradicate the disease, smaller tissue volumes were necessary to fill in the defect and reconstruct the vagina. The omentum has, as have the myocutaneous flaps, the advantage of bringing well vascularised tissue into the radiated pelvis. For this reason the non-irradiated, well vascularised omentum is considered to be a more reliable bed for skin graft take, than the irradiated rectum wall. Another advantage, as reported by *Kusiak et al.* (10), is that the omentum " provides a soft, pliable, mobile layer of tissue between the skin graft and the rectosigmoid. This seems to prevent the uncomfortable sensation of rectal pressure and frank pain during intercourse."

Pelvic reconstruction in general, and vagina reconstruction in particular, requires a thorough knowledge of the type of operations that can be employed. It also requires a creative surgeon who can adapt his technique to the individual circumstances of this particular patient. Equally important for the success of the operation, is a motivated patient and a motivated partner.

TECHNIQUE The skin graft is harvested under sterile conditions. The preferred donor sites are: the anterior or medial thigh or the buttock. The easiest way to cut the graft is with an air-powered dermatome. If such a device is not available, a hand-held dermatome can also be used. The advantage of the buttock, is that it is easy to cover the donor site with clothes. The disadvantage is, that this place is more painful in the postoperative period and also that the graft has to be taken preoperatively before the patient is placed in the lithotomy position. For the upper thigh it is the opposite: the patient does not have to change position for harvesting the graft, the graft can be taken when it is needed and the location is less painful. The cosmetic disadvantage is only temporary, since in the long term most donor sites regain almost the same colour of the surrounding skin. For this reason, the upper thigh is preferred by the author.

The patient is prepared and draped in the usual fashion. The operation is best performed through a midline incision, extending above the umbilicus. In those women who still have a uterus, a hysterectomy has to be performed. In a combined vaginal-abdominal approach, the vagina is excised together with the paravaginal fibrotic tissue in the space between bladder and rectum *(Figure 1)*. In case of an exenteration, the vagina is excised together with the surrounding tissue. The vaginal resection can best be started at 3 and 9 o'clock and is proceeded to 12 and 6 o'clock positions *(Figure 2)*. It is important to create more space than strictly needed, because of the space required for the omental pedicle. Next, the omentum is examined. The omentum must have enough length and bulk to be suitable for vaginal reconstruction. If not, an alternative method has to be chosen. The transection of the omentum usually starts at the transverse colon, with the omentum being pulled up over the stomach and the avascular attachment to the colon being divided. (see also "The omentum and radical gynaecologic surgery p 139). Next, the transection of the colon is continued at the hepatic flexure of the colon and proceeds from right to left, identifying and ligating the right gastro-epiploic artery and the vascular arcades along the way. (see also p 140). The left gastro-epiploic artery forms the main blood supply to the pedicle and must be preserved. If a longer pedicle is required, a second incision down the pedicle can be performed. The omentum is now brought down into the pelvis along the left paracolic gutter. The omentum is sutured

Figure 3. The omentum is sutured to the resection margin of the vulvar pithelium

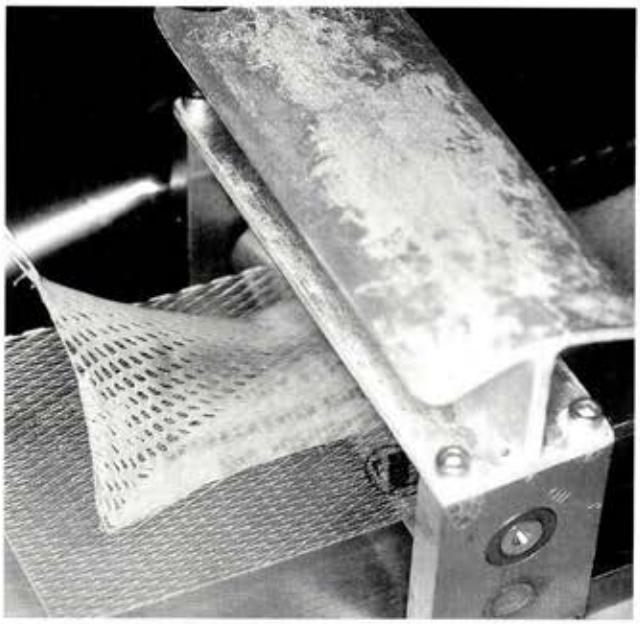

Figure 4. Changing of the split-thickness skin graft into a mesh graft

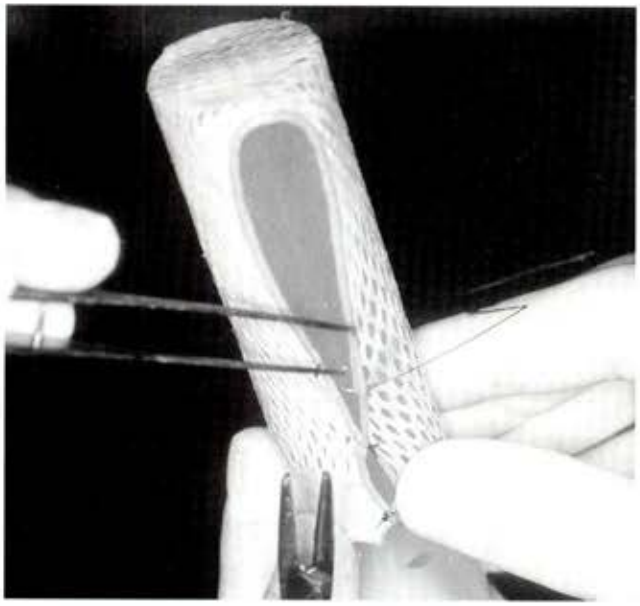

Figure 5. Suturing the mesh graft over a plastic cylinder

Figure 6. The cylinder is placed into the omental sack in the pelvic cavity

to the resection margin of the vulvar epithelium with interrupted atraumatic polyglycolic sutures 3-0 *(Figure 3)*. Now the plit-thickness skingraft of 10-12x8 cm is harvested from the upper thigh using an air-powered dermatome. The graft is changed into a mesh graft with an expansion factor of 1:3 *(Figure 4)*. The graft is now placed with the inside out, onto a plastic cylinder, rubbed with sterile paraffin and with an open top . We usually take a 60 cc plastic syringe and cut the top off. The graft is sutured over the cylinder with 4-0 atraumatic polyglycolic acid sutures *(Figure 5)*.

The cylinder is brought into the pelvic cavity and is now covered with omentum *(Figure 6)*. The omentum is sutured around the cylinder with interrupted 3-0 atraumatic polyglycolic acid sutures. The top of the omental cylinder is closed with a suture of the same material, and fixed with a few resorbable sutures to the sacrum. As much omental tissue as possible is left in the pelvis to fill the empty space around the neovaginal cylinder. A sterile gynaecological gauze (1 meter), soaked in sterile paraffin, is placed into the plastic cylinder. While the gauze is pushed into the cylinder, the cylinder is pulled back slowly.

The cylinder is removed and the gauze is now pushing the split skin against the omentum. The gauze is left inside for 5 days. After 5 days the gauze is removed and the neovagina cleaned with sterile saline. From now on the patient has to insert a stent 3 times a day for 20 minutes and at night to prevent retraction. We prefer to make such a stent from gauze wrapped around a wooden spatula and covered with a condom. After 1 week this stent is replaced by a plastic stent. Intercourse can start 6 weeks after the operation. We advise the patient to insert the vaginal stent 3 times a day for at least 6 months. Depending on the frequency of intercourse, this procedure can be stopped or reduced to 3 times a week during the next 6 months. In our experience the best prevention of retraction is dilation of the vagina once a day for 1 year after the operation. An example of a functional split-skin/omental J-flap neovaginais shown in *Figure 7 and 8*. In cases where only supralevator resections or a partial vaginectomy is required, the omental flap can be modified according to the reconstruction needed.

Pre-, per-, and postoperative care include: bowel preparation, prophylactic antibiotics, a good nutritional status, thromboembolic prophylaxis and mobilisation on the second postoperative day.

RESULTS OF THE OPERATION Vaginal reconstruction is a rare operation. This is mainly due to the fact, that many women who lose their vagina because of a gynaecological-oncological disease are not that young and many do not want the reconstruction. In our experience, only 10-15% of the exenteration patients request this operation after adequate counselling. The most important complications that can influence the result, are omental flap necrosis and stenosis. Omental flap necrosis can be prevented by mobilising the flap early during the procedure. At the time the flap is needed to create the pocket for the skin graft, the surgeon can clearly see if the whole flap is viable or not. Non-viable segments can be resected at this moment. Stenosis of the neovagina can occur as a result of incomplete graft take or because the woman discontinued the use of dilators. A graft take of at least 80 % is required for successful results. Only a few recent series about this operation can be found in the literature. *Berek et al.* (1) reports on a series of 16 patients, 100% graft take in 12 women, 80% in 2 and less than 80 % in 2. A satisfactory anatomical result was achieved in 14 women. Recently *Kusiak et al.* (10) reported their results in 20 patients who underwent a pelvic exenteration. Abdominal or split thickness skin graft donor-site complications did not occur. They reported a 10% mild prolapse incidence and no stenosis of the vaginal skin. With 4 patients, intercourse was not possible after they discontinued daily use of the stent early after reconstruction. My personal experience is by and large the same as those of *Berek et al.* (1) and *Kusiak et al.* (10). In 14 vagina reconstructions, we used the split-skin technique in 9 patients. With 7 patients we had a 100% graft take, 80% with one and less than 80% for one patient.

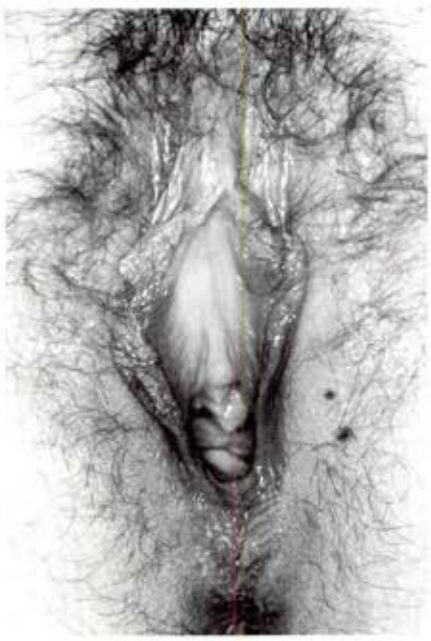

Figure 7. Neovagina 6 weeks after the operation

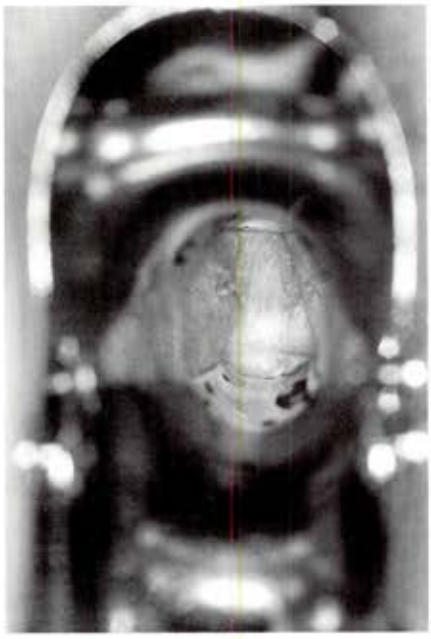

Figure 8. Neovagina 6 weeks after the operation with a vaginal speculum inside

PSYCHOSEXUAL ASPECTS OF VAGINAL RECONSTRUCTION Not much is known about the psychosexual consequences of vaginal reconstruction in gynaecological cancer patients, using the omental cylinder flap in combination with a split-thickness skin graft. In our series, 2 women could not have intercourse because they refused to use the vaginal dilator shortly after the reconstruction. Both were young women who had lost their vagina because of DES related vagina carcinoma. Both were virgins when the malignancy was diagnosed. The use of the dilator and the fact that intercourse might happen was so frightening to them that they could not use the dilator. Sexual coun-

selling could not change their minds and a vaginal stenosis occurred within a few weeks. These experiences convinced us that a sex therapist must be involved from the beginning, in the process of decision making as well as during the period afterwards. Reconstruction of the vagina, just to fill in the empty spaces after an exenteration is pointless. There are other surgical methods to achieve that goal.

Data from studies on the psychosexual wellbeing of women with vaginal agenesia who underwent some kind of vaginal reconstruction, clearly show that the positive result of the reconstruction is not only dependent on the fact that penetration is possible. The attitude towards sexuality is just as important. The consequences of the gynaecological cancer and its treatment, can make sexuality problematic (11-12). In our own experience, women report that the neovagina is an anatomical cavity with no sensibility inside. The important areas for sexual pleasure and orgasm are the external genitalia and the erogenic zones elsewhere on the body. In fact, there is no difference with the situation before the operation. The only, but just as important difference, is that having this vaginal cavity contributes to their self-esteem as women and improves their body image. It is important to discuss the experiences of others with the women and their partners before the operation. It gives them an idea of what can be expected and prevents decisions made on wrong expectations causing disappointment afterwards.

Another point that needs serious consideration, is the percentage of patients that resumed regular intercourse: most studies report a disappointing low percentage. *Kusiak et al.* (10) report "a functional potential for intercourse of 80%, but an actual intercourse rate of 40%." For myocutaneous grafts, these percentages are about 90% and 32%. In my own experience the intercourse rate in these patients is 40-50%. Meaning that the procedure was a waste of time, energy and money in nearly half of these patients. This also means that more attention should be paid to preoperative counselling and decision making. The reconstruction of the vagina must be the decision of a motivated multidisciplinary team including the patient, partner, sex therapist, and the gynaecologist; must be based on the wish to restore the possibility of vaginal intercourse and should not be performed as a routine after pelvic exenteration, or in other situations where the anatomy of the vagina is destroyed by cancer treatment.

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Vaginal reconstruction in the fibrotic pelvis

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ABSTRACT Vaginal reconstruction was performed in 7 patients who had developed vaginal stenosis as a result of extensive pelvic fibrosis, following either pelvic radiation (6 patients) or multiple vaginal procedures (1 patient). Six patients received split thickness skin grafts and 1 patient received an amnion graft in the creation of the neovagina. Five patients achieved a satisfactory final result. All of these patients were sexually active and described adequate sexual function. There was no serious morbidity associated with these procedures. Safe and successful vaginal reconstruction can be performed in the patient with a fibrotic pelvis.

Key words vaginal reconstruction, pelvic fibrosis

INTRODUCTION Vaginal reconstruction has been utilized in the management of congenital vaginal atresia for over a century. The use of split thickness skin grafts in this condition was initially described by *Robert Abbe* in 1898, when multiple small pieces of split thickness skin were applied to a cavity created between the bladder and rectum. Subsequently, several different approaches were described. In 1904, *Baldwin* (1), following his work on cadavers, described the theoretical possibility of using an isolated segment of ileum transplanted into the rectovesical septum to create a neovagina. Three years later, he reported on an actual case treated with this approach. Despite abundant, irritating, mucous discharge, frequent bleeding with intercourse and high mortality (2), the ileal transposition technique became the preferred management option for the next 3 decades, although other approaches continued to be proposed.

In 1908, *Graves* (3) used two labial flaps over a glass mould for vaginal reconstruction. *Graves* (3) also reported the use of up to four pediculated flaps from the thighs and buttocks which were sewn together to form a tubular structure. This structure was then inserted into the space created between the rectum and bladder. In 1914, *Schubert* (4) reported transposition of the rectum anteriorly to create the neovagina with simultaneous low anastomosis between the distal rectum and the sigmoid colon. In the same year, *Jewitt* again described the use of labial flaps to create a neovagina. In 1927, *Frank and Geist* (5) reported a modification of *Graves'* pediculated flap technique, using 2 handle shaped flaps from the inner thighs to create the neovaginal tube. They acknowledged that the best accepted procedures were the bowel transposition procedures of *Baldwin* (1) and *Schubert* (4), but they and other authors felt that these were far too morbid and could not be justified for the sole purpose of creating a "coital organ" (5-8). None of these flap or pediculated techniques proved to be entirely satisfactory and failure occurred primarily due to scar formation and contracture closing the lumen of the neovagina (7).

In 1938, *McIndoe and Bannister* (9) reported their experience with the use of a split thickness skin graft in a 22 year old woman with vaginal agenesis. They found that by using a vulcanite mould to continually stretch the graft, contracture could be prevented, thereby maintaining the patency and calibre of the neovagina. In view of its relative ease and safety, this method became the gold standard to enable normal sexual function in these unfortunate women.

Significant stenosis and occasionally even complete obliteration of a normal vagina can occur following pelvic radiotherapy, particularly brachytherapy. Stenosis can also be seen following vaginal repairs (10). This can cause severe dyspareunia or apareunia and associated psychological distress (11).

While it is a relatively simple matter to create an adequate cavity between the rectum and bladder in a patient with vaginal agenesis, restoration of normal function and form in a fibrotic pelvis, particularly after radiation therapy, can be a difficult. Vulvovaginoplasty, originally described by *Williams* (12) in 1964 has been considered a useful technique for the restoration of sexual function. It is technically quite simple and can be performed with minimal morbidity. It is, however, far from anatomically ideal as the direction of the neovagina is almost at right angles to the normal vagina. In addition, the length of this neovagina is commonly compromised. This procedure may also be less satisfactory in the patient who has

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Table 1. Patient characteristics prior to vaginal reconstruction

Patient	Age	Diagnosis	Stage	Surgery	Radiation	Length (cm)	Calibre (cm)
MB	39	ca cervix (stump)	2b	Subtotal hyst	Ext/ICC	4	2
SB	55	ca vagina	1	Rad hyst/ vag	Preop Ext	4	2
EK	36	ca vagina	1	nil	Ext/ICC	2	1
BP	53	ca cervix	1b	Rad hyst	Preop Ext	3	1
EA	53	ca endometrium	2b	Rad hyst/ nodes	Ext/ICC	3	1
VC	36	ca cervix	3b	nil	Ext/ICC	3	1
JF	60	benign	n/a	multiple vaginal repairs	nil	7	1

Hyst hysterectomy vag vaginectomy Ext external beam ICC intracavitary ca carcinoma

previously received radiotherapy to the vulva, as the perineal tissues may lack normal elasticity.

The creation of a neovagina using a split thickness skin or amnion graft has been documented previously in patients who have significant vaginal shortening and stenosis following radical treatment for gynaecological malignancy, but there is only a small amount of experience published in the literature (13-16). *Riva and Harding* (17) felt that previous radiotherapy was a contraindication to this procedure and that reconstruction must be carried out by means of pedicle flaps. We decided to review our experience with this technique at *The Royal Hospital for Women in Sydney.*

PATIENTS Between January 1987 and July 1997 seven patients underwent vaginal reconstruction for vaginal stenosis, secondary to either pelvic radiotherapy or previous surgical procedures. The records of these patients were reviewed for details of the primary diagnosis, the extent of vaginal stenosis, the operative procedure, associated complications, and outcome. The patient characteristics are shown in *Table 1.* Six patients had prior pelvic radiotherapy for cervical, vaginal, or endometrial cancer and 1 had multiple vaginal repair operations. Their ages, at the time of reconstruction, ranged from 36 to 66 years, with a median of 53 years. All patients had severe vaginal stenosis and none were able to have vaginal intercourse. In the 6 patients who had prior radiation, at least the proximal half of the vagina was completely obliterated. The length of the radiated vagina ranged from 2 to 4 cm with a median of 3 cm.

The surgical details are shown in *Table 2.* The operative time ranged from 120 to 180 minutes with a mean of 130 minutes. The estimated blood loss ranged from 100 to 1100 ml with a median of 200 ml. Six of the patients received a split thickness skin graft and one received an amnion graft. In the latter patient, the first graft take was only 50% and a repeat graft was performed 4 weeks later resulting in a 90% take and adequate patency.

OPERATIVE TECHNIQUE The vaginal reconstruction involved 4 steps: 1. resection of the scarred vagina and creation of an adequate space between the bladder and rectum; 2. harvesting of a split thickness skin graft from the inner thigh or buttocks, or collection of an amnion graft; 3. fashioning the graft into a hollow cylinder over a mould; 4. placement of the graft and mold into the newly created pelvic space with the cut surface facing outwards. Preoperatively, the patients received a Travad enema and a single dose of a cephalosporin antibiotic.

Table 2. Operative details

Patient	Procedure	Blood loss (ml)	Operating time (min)
MB	2 stage	1100	160
SB	1 stage	100	120
EK	2 stage	100	100
BP	1 stage/amnion	300	120
EA	1 stage	300	120
VC	2 stage	200	180
JF	1 stage	100	120

Under general anaesthesia, the patient was placed in the dorsal lithotomy position, appropriately prepared and draped, and the extent of vaginal stenosis carefully assessed. The labia majora were sutured to the inner thighs and exposure was usually further facilitated by making a Schuchardt incision. The vagina was then circumscribed with a scalpel through the full thickness of the wall, immediately distal to the stenosed segment. The anterior and posterior vaginal walls were then grasped with Moynihan (Littlewood) clamps and placed under traction to facilitate the vaginectomy. The lateral spaces were developed initially. Posterior dissection was performed with one finger in the rectum, while the anterior dissection was performed after a Foley catheter and 100 ml of methylene blue stained sterile water had been inserted into the bladder. Sharp Mettzenbaum scissors were used to completely remove the entire scarred vagina from the perivesical and perirectal tissues.

Following extirpation of the vagina, the soft tissues planes within the pelvis were invariably able to be developed without difficulty, to allow placement of an adequate sized mold. A decision was made regarding the adequacy of haemostasis prior to harvesting the skin graft. If there was any concern as to the degree of haemostasis, the grafting was delayed for 48 hours and a vaginal pack was inserted and sutured in place.

This occurred in 3 patients who then returned to theatre for completion of the vaginal reconstruction 2 days later.

The graft was prepared either as a split thickness graft or by the application of human amnion that had been collected immediately after delivery. The split thickness skin grafts were harvested from the medial thigh after applying mineral oil or Vaseline as a lubricant. The graft was obtained manually rather than using a power or drum dermatome, taking a graft with a thickness of approximately 18 one thousandths of an inch. In the case of amnion grafting, the amnion was previously prepared and stripped from the chorion. It was then rinsed in normal saline to remove all contaminants and stored at 4 degrees Celsius in a solution of crystalline penicillin prior to use. Care was taken that the donor was serologically negative for hepatitis and HIV.

Usually 2 grafts were taken, each approximately 5x10 cm in dimension. The 2 grafts were sutured together over a vaginal mould. The latter was created from a condom filled with foam rubber. Relaxing incisions were performed in the grafts to allow drainage *(Figure 1)*. The mold with overlying graft was inserted into the previously prepared vaginal space and retained by suturing the labia majora together with several sutures. A Foley catheter was left in situ and kept on continuous drainage. Subcutaneous heparin was given twice daily for 5 days. The patient was allowed to mobilize on day 2 and the mold was removed on the fifth post operative day in the clinic.

On removal of the stent, the graft was inspected, any redundant epithelium was excised and the neovagina was irrigated with saline. The patient was issued with a perspex vaginal obturator of appropriate size and instructed to lubricate it with dienoestrol cream and insert it into the neovagina 3 times per day for 10-15 minutes. The patient was also advised to douche with normal saline 3 times daily.

Following discharge, the graft was inspected weekly to assess progress. Sexual intercourse could usually be recommended 8 weeks post operatively. It was recommended to use adequate lubrication and continue with the use of the vaginal obturator nightly for the first 6 months.

Table 3. Surgical outcome

Patient	% take	Patency	Sexual function	Follow-up
MB	90	normal	good	> 5 yrs
SB	100	normal	good	DOD 4yrs
EK	80	stenosed	never active	DWD 4yrs
BP	50/90	stenosed	never active	>10yrs
EA	90	normal	good	2yrs
VC	90	normal	good	4yrs
JF	90	normal	good	9mths

DOD dead of disease DWD dead without disease

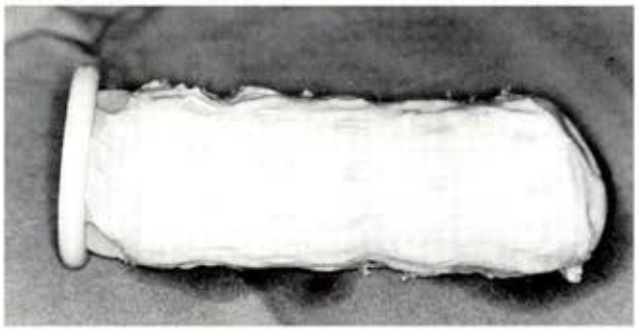

Figure 1. Split thickness skin graft sutured over a condom filled with foam rubber, prior to insertion into the space between rectum and bladder.

RESULTS Surgical outcome is shown in *Table 3*. Follow up ranged from 9 months to more than 120 months with a median of 48 months. The surgical outcome was determined in terms of both vaginal calibre and length and the ability of the woman to have satisfactory sexual intercourse.

The degree of the graft take was 80 to 100 % with a median of 90 %. Of the 7 patients presented, 5 achieved a satisfactory final result. All of these patients were sexually active and described adequate sexual function in continued follow up. All of these patients were assessed as having a neovagina of adequate calibre and length, and could accept an adult sized speculum.

There were two patients who had a final unsuccessful graft and neither of these patients resumed sexual intercourse at any stage postoperatively, although their vagina was initially of adequate calibre.

The first of these patients had lower genital tract field neoplasia. Following external radiotherapy and a radical hysterectomy for carcinoma of the cervix, she developed severe vaginal intraepithelial neoplasia (VAIN), which was treated by LASER. A grossly scarred and stenotic vagina was resected and revealed multifocal VAIN with very superficial invasion. She underwent an amnion graft for the vaginal reconstruction. The first graft only had a 50% take and a second graft was performed 5 weeks later. This graft had a 90% take. Unfortunately she developed a transitional squamous carcinoma of the distal urethra 2 months later which was resected and treated with orthovoltage radiation to a direct perineal field. She subsequently developed further stenosis and now requires regular urethral dilatation. It is now more than 10 years since her initial amnion graft and she has had no evidence of disease recurrence.

The other patient with an unsuccessful graft, received external pelvic radiotherapy plus brachytherapy for stage 1 of vaginal carcinoma. Although her vaginal graft had an 80 % initial take and post operative clinical assessment revealed an adequate

vaginal calibre, her vagina eventually completely stenosed again. This patient did not continue to use her vaginal obturator and was not sexually active due to medical illness and the poor health of her partner.

At the time of reporting, 5 patients are alive and free of disease, 2 are dead, one of disease and one of unrelated causes. Of the 2 patients that died during follow-up, 1 described normal sexual activity for 12 months until disease recurred locally. She died of local and regional disease recurrence, 4 years after vaginal reconstruction. The other was the second patient with an unsuccessful graft. She died of cardiac disease 4 years following her split thickness skin graft.

DISCUSSION Disabling vaginal stenosis is an occasional complication of pelvic radiation or vaginal repair (8). Surgical restoration of a functional vagina, allowing resumption of vaginal intercourse, is a rewarding experience for both patient and surgeon, yet many gynaecologists are unaware of the potential for surgical intervention in this situation. Others who are aware of the procedure are reluctant to undertake it, because of fear of injuring the bladder or rectum.

Personal experience and a review of the literature, suggest that creation of a neovagina in the fibrotic pelvis is a feasible procedure with acceptably low morbidity (13-16, 18). No bladder or rectal injury occurred in this series.

The key to successful extirpation is sharp dissection in the correct surgical plane. By transecting the full thickness of the vaginal wall and keeping the vagina under traction, the fibres of the rectum and bladder can be dissected off their point of attachment to the vagina. Sharp dissection is important in this situation as the surgical planes do not open up as readily as they do in the non-irradiated patient undergoing vaginal repair. There have been a variety of obturators or stenting materials used from foam rubber filled condoms described here to dental acrylic, gutta-percha, balsa wood, glass molds, various metals, silicon stents, partially inflated tissue expanders and the original vulcanite used by *McIndoe* (9). There have also been various types of dermatomes used to collect the graft from the chosen donor site. The preferred choice depends on the individual surgeon's expertise with a particular method. Undoubtedly the preparation of the graft over the mould and the close application of the graft to a bloodless recipient site, are the critical issues in the successful grafting, not the type of mould or stent that is used (16, 19-21).

The degree of graft take considered acceptable appears to be quite arbitrary. Most authors state that a minimum graft take of 80 % is required for adequate sexual function. *Beemer et al.* (13) reported on 51 patients treated with split thickness skin graft vaginoplasty. Of these patients, 94 % had a satisfactory outcome. Thirty-one patients underwent reconstruction in association with exenterative procedures, whilst 13 of the 51 patients underwent vaginectomy as a separate procedure. Forty-two of their 51 patients received radiation therapy before vaginal reconstruction. They found no significant difference in the graft take between the women with a successful versus an unsuccessful outcome. In addition, those patients that had received previous radiotherapy, had comparable outcomes to those patients who were radiation naive.

It is desirable to place the graft at the same time as the vaginal extirpation, provided adequate haemostasis can be obtained. If not, it is safer to pack the space for 24 to 48 hours before grafting. When a split thickness skin graft is used to create a neovagina in association with a pelvic exenteration, delaying grafting for several days may be desirable to allow a bed of granulation tissue to form and provide a better recipient site. However this is never necessary when the bladder and rectum have been left in situ (22). The vaginal space created following vaginal extirpation, must be capable of accommodate an appropriate graft. For this reason myocutaneous grafts are not suitable (22-23).

Full thickness skin grafts have been advocated by some authors as an alternative to split thickness grafts (24-25). They do not require the use of a dermatome, are more likely to resist contracture compared with split thickness grafts and do not require prolonged stenting. They probably require a better vascular bed and hence, this is of greater concern in the irradiated patient. The advantage of the split thickness graft is that it is thin enough to allow nutrients to penetrate by osmosis, whilst allowing improved neovascularisation in a region that has already had its vascularity compromised. Full thickness grafts are also probably more susceptible to infection, but they are less susceptible to the shearing forces that may disrupt split thickness skin grafts during their initial vascular take. They may also be associated with increased vaginal discharge due to sebaceous secretions from the full thickness skin. *Morley and DeLancey* (24) reported 10 patients treated successfully with full thickness skin grafting after developing an appropriate vaginal cavity. Two of their patients had previously received radiotherapy. They reported no serious complications nor any infectious morbidity. Similarly, we had no infectious morbidity in our series.

Amnion grafts have also been used in vaginoplasty (26-27). *Ashworth et al.* (26) reported the use of amnion grafting in 15 patients undergoing various forms of vaginoplasty. Twelve of these patients had either partial or complete vaginal agenesis and the other 3 developed stenosis secondary to previous vaginal surgery. None of their patients had received any form of radiotherapy. They reported that all patients had greatly improved length and calibre, and that the ultimate result was directly related to the patient's motivation and her dedication to post operative dilatation. Amnion as a graft is readily available, does not express histocompatabilty antigens and thus resists immune rejection, and the patient is not left with a donor skin

site. However, the impression we had was that the amnion graft is not sufficiently robust for use in those patients with a previously irradiated pelvis.

Carcinoma arising in a neovagina, although an uncommon event, has been reported in the literature (28-31). However, a healthy, capacious vagina following reconstruction is able to be adequately assessed clinically, and annual cytology should probably be performed if the patient has a past history of lower genital tract neoplasia.

Prior to surgery, the patient should be counselled that the reconstructed vagina may be less sensitive and may require added lubrication for sexual intercourse. With time, it is impressive how the grafted skin seems to take on the characteristics of a normal vagina, including the rugose surface contour and elasticity (32). It must also be stressed, that the grafted space may contract considerably if not regularly dilated. The continued dilatation of the newly created vagina with either regular sexual intercourse or a vaginal obturator is the most important factor in the long term success of vaginal reconstruction (7, 20-21, 26, 33). The most suitable candidates for surgery are those who are highly motivated and who also have a motivated and caring partner with whom they have regular sexual intercourse.

The creation of a neovagina has both psychological and physical advantages for patients with vaginal stenosis (11, 18, 34), and can be accomplished with acceptably low morbidity. For the practicing gynecological oncologist, it is an important procedure that one should be comfortable with and capable of performing safely.

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The transversus and rectus abdominis musculoperitoneal (TRAMP) flap

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ABSTRACT Due to sufficient vascular connections between the deep inferior epigastric artery, the superior epigastric artery and the lower posterior intercostal arteries within and below the rectus abdominis muscle, it is possible to raise a part of the inner abdominal wall composed of the rectus abdominis muscle, the epigastric part of the transversus muscle and the underlying fasciae and peritoneum as a composite flap reliably nourished exclusively by the deep inferior epigastric artery. This transversus and rectus musculoperitoneal (TRAMP) flap provides a tissue plate of an area at least 10 x 15 cm and 0.5 to 1.5 cm thickness, which easily reaches the deep pelvis and can even be transposed to the level of the vulva and perineum. Harvesting the flap is performed through a standard midline hypo/epigastric laparotomy. The anterior rectus sheath and the obliquus fascia which are the essential structures for supporting the strength and integrity of the anterior abdominal wall are left in place, thus donor site repair is not mandatory and morbidity is low.

The flat musculofascioperitoneal tissue plate of the TRAMP flap represents a versatile new means for pelvic support, compartmentalization and therapeutic angiogenesis with various applications, such as pelvic floor reconstruction, pelvic inlet plasty and pelvic wall plasty. The dimension and tissue compliance also render the TRAMP flap a novel attractive technique for vulvovaginal reconstruction after pelvic exenteration. Since the mesothelium of the peritoneal layer must be replaced by squamous cell epithelium from the adjacent tissues, a strip of unirradiated original vagina should be incorporated into the tubularized TRAMP flap for accelerating the completion of the squamous cell surface of the neovagina. The tubularized TRAMP flap with the peritoneal side endoluminally is therefore best suited for partial vulvovaginal reconstruction, after anterior or posterior exenteration. For complete vaginal reconstruction after total exenteration, the tubularized TRAMP flap with the muscular side endoluminally covered with a skin mesh graft appears to be a promising new procedure. We must wait for more experiences with more patients and long-term results for definitive evaluation.

Key words musculoperitoneal flap, TRAMP, vulvovaginal reconstruction, exenteration, pelvic reconstruction

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INTRODUCTION The TRAMP flap is the first representative of a new flap type derived from the inner abdominal wall layers. It was originally developed as a means for partial vulvo-vaginal reconstruction after anterior or posterior pelvic exenteration (1) based on the results of a cadaver study of the vascular anatomy of the inner abdominal wall (2). Five year experience with the TRAMP flap proved its reliability and broadened its application potential. The risk of stenosis and obliteration of the TRAMP neovagina during the process of exchanging the mesothelium for squamous cell epithelium, can be significantly reduced by using the muscular side of the flap (instead of the peritoneal side) together with a skin mesh graft.

VASCULAR ANATOMY OF THE INNER ABDOMINAL WALL At the musculoperitoneal level, the deep inferior epigastric artery (DIEA) nourishes the distal two-thirds of the rectus abdominis muscle. The DIEA anastomoses via choke connections with the terminal branches of the superior epigastric artery, which predominantly supplies the proximal part of the rectus abdominis muscle. The proximal 5-7 cm portion of the DIEA runs directly adjacent to the peritoneum in the umbilical fold, giving off several muscular and peritoneal branches, whereas the medial and distal segment of the artery is embedded in the rectus abdominis muscle.

The left and right DIEAs are connected to each other by various small-calibre arteries that cross the linea alba, epifascially or subfascially. Above the umbilicus, usually three or four main vessels of the DIEA branch off laterally to the adjacent transversus and obliquus internus abdominis muscles. They are

interconnected to the lower posterior intercostal arteries by various anastomosing vessels via choke connections.

Approximately 40% of the vessels of the anterior body wall run within or under the rectus abdominis muscle including the choke connections to the intercostal and superior epigastric artery.

FLAP DESIGN The TRAMP flap consists of the entire rectus abdominis muscle in continuity with an ipsilateral epigastric part of the transversus abdominis muscle, the posterior rectus and transversalis fascia and the underlying parietal peritoneum. Blood supply is provided by the DIEA. The segmental motor innervation by intercostal nerves is interrupted as a consequence of the flap elevation. Following transposition into the pelvis, the epigastric musculofascioperitoneal tissue plate is used

1. flat for plevic floor reconstruction, pelvic wall plasty or pelvic inlet plasty,
2. partially tubularized, peritoneal side endoluminal for partial (vulvo)vaginal reconstruction after anterior/posterior exenteration,
3. completely tubularized, muscular side endoluminal covered by a skin mesh graft for complete (vulvo)vaginal reconstruction after total exenteration.

SURGICAL PROCEDURE The elevation of the TRAMP flap necessitates a hypogastric and epigastric midline laparotomy. The umbilicus should be circumcised at the site of the planned TRAMP flap. The selection of either a right or left TRAMP flap is based on the site of scars of previous abdominal operations and overall reconstructive needs with respect to the ablative pelvic operations. In the case of a former right subcostal incision for cholecystectomy, a right TRAMP flap may not be safe. If ostomies are necessary for urinary or fecal diversion, the contralateral side is used for the TRAMP flap. The rectus abdominis muscle is first completely dissected from the anterior rectus sheath. In order to avoid shearing off, the posterior fascia and parietal peritoneum are anchored to the medial margin of the rectus muscle. The rectus muscle together with the posterior rectus fascia and parietal peritoneum is transected at the tendinous intersection closest to the costal insertion of the muscle. The dissection is then continued laterally to the linea semilunaris, which is separated craniocaudally from the rectus muscle and the transversus abdominis muscle in the epigastric region for a length of 10 to 12 cm. The preparation is then extended further laterally along the surface of the transversus abdominis muscle for 5-10 cm, taking care to include the distal posterior intercostal neurovascular pedicles into the TRAMP flap. The epigastric part of the transversus muscle with the overlying intercostal neurovascular bundles and underlying parietal peritoneum is cut through at the level of the anterior axillary line.

In the hypogastric region, the transversus muscle is no longer part of the TRAMP flap. The further caudal elevation continues by transection of the posterior rectus sheath and peritoneum towards the arcuate line. Between the arcuate line and the origin of the rectus muscle at the pubic bone, only the parietal peritoneum must be incised ensuring that the nourishing deep inferior epigastric vessels are not severed. Likewise, a minor branch of the epigastric vessels leading into the peritoneum at that location should be preserved and integrated into the TRAMP flap. The fully moblized flap can be easily transposed into the pelvis.

For pelvic floor reconstruction, the epigastric musculofascioperitoneal tissue plate is fixed, peritoneal side intraabdominally to the arcus tendineus at both pelvic side walls. By more cranial placement, the TRAMP flap can be used as pelvic inlet plasty to retain the small bowel from the lesser pelvic cavity, thus preventing its damage in case of postoperative high dose pelvic irradiation. The overall flap area can be enlarged by suturing the rectus abdominis muscle side to side medially. The tissue plate is then sutured to the psoas muscles, promontorium and symphysis. A TRAMP flap is favourable as pelvic wall plasty for the CORT treatment (3) in obese patients with a fatty omentum majus. In this situation, the muscular side of the TRAMP flap should face the tumor bed with the overlying guide tubes. An omentum majus flap is sutured to the peritoneal side of the TRAMP flap.

For vulvovaginal reconstruction following anterior or posterior exenteration, with an epithelialized strip of the original vaginal wall left in place, the epigastric musculofascio-peritoneal tissue plate of the TRAMP flap is proximally tubularized over a stent of the desired neovaginal size with the peritoneal side endoluminally. From the perineal route the proximally open TRAMP flap tube is then sutured to the remaining vaginal wall strip and the vulvoperineal resection margins. If the formation of a complete neogvagina after total exenteration is desired, the epigastric musculofascioperitoneal tissue plate of the TRAMP flap should be tubularized at full length with the muscular side endoluminally. After fixation of the distal TRAMP flap tube to the vulvoperineal resection margins, a split thickness skin graft is harvested from the inner thigh and meshed with an expansion factor 1:2. The skin mesh graft is then spread over a suitable perforated glass stent. By inserting the stent into the TRAMP flap tube, the muscular surface of the flap is completely covered with the skin graft.

The musculofascioperitoneal defect caused by the elevation of the flap is left untreated. The abdominal incision is closed by modified Smead-Jones sutures, incorporating only the anterior rectus fascia into the far and near stitch at the donor site of the TRAMP flap.

In the cases of pelvic floor reconstruction, pelvic inlet plasty and pelvic wall plasty, the viability of the TRAMP flap is checked in the first postoperative week by pelvic MRI with contrast media. If (vulvo)vaginal reconstruction has been per-

formed, the TRAMP flap should be inspected through the glass stent which is left in place for the first 7 to 10 days postoperatively. Thereafter the stent should be replaced and cleaned daily. In the second postoperative week, the stent should be worn day and night, in the third postoperative week it should be kept intravaginally only during the night. Thereafter, the patient is encouraged to begin regular intercourse or wear the stent overnight for further two to three months.

CLINICAL EXPERIENCE Since 1993 I have performed 16 TRAMP flaps for pelvic floor reconstruction (n=3), pelvic inlet plasty (n=2), pelvic wall plasty (n=3), partial vulvovaginal reconstruction (n=4), total vulvovaginal reconstruction (n=4). Flap survival was 100% in all cases. No donor site morbidity became apparent, except a visible epigastric abdominal wall bulging in a 71 year old patient, whose general laxity of the skin and subcutaneous fatty tissue was evident before the operation. The intended functional goals were reached in all cases of pelvic floor reconstruction, pelvic inlet plasty and pelvic wall plasty. All four patients with (vulvo)vaginal reconstruction following posterior or anterior exenteration retaining a strip of original vaginal wall, had excellent or good anatomical and functional results at a follow-up time from 27 to 54 months. Their reconstructed vaginas were 8-10 cm long, 4 cm wide and showed good tissue compliance. Three patients reported on having satisfying intravaginal intercourse. The mesothelial layer of the peritoneum was replaced by squamous cell epithelium from the adjacent vulvar skin and residual vaginal strip. After 3 months, no differences between original vaginal and neovaginal surfaces were clinically visible. At the border between original perineal skin and neoperineum, no superficial scar formation could be seen.

Despite an uneventful postoperative course, two total vaginal reconstructions performed with the peritoneal side of the TRAMP flap endoluminally became obliterated within 4 months. Because of these failures, I modified the surgical technique for total vaginal reconstruction by using the muscular side together with a meshed split thickness skin graft as neovaginal epithelial lining. The first experience with this procedure is promising, however, the results with more patients and longer follow-up are required for definitive evaluation.

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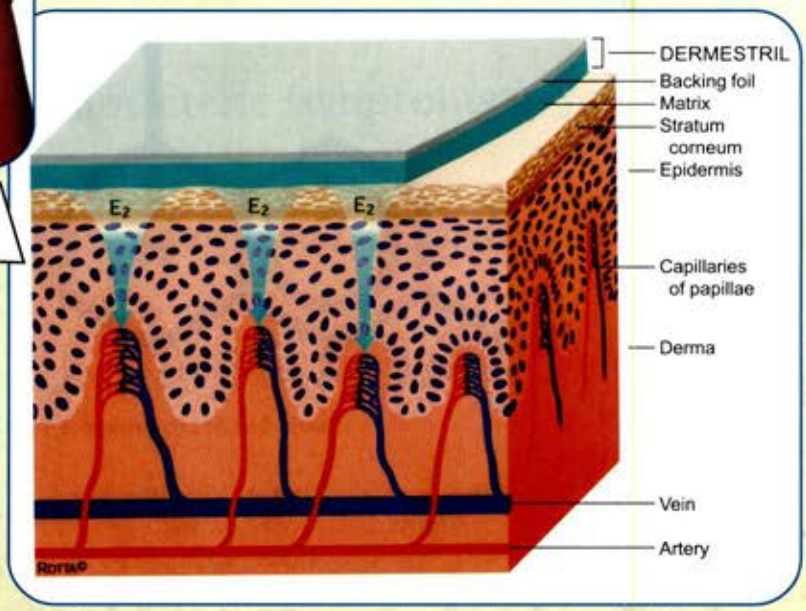

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Flaps used in the treatment of female genital tract neoplasms

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ABSTRACT Flap surgery is an integral part of modern operative gynecologic oncology. A full spectrum of flap procedures - generally pedicled tissue transfer from the abdominal wall, abdominal cavity and thigh performed in centers by gynecologic, general or plastic surgeons - is necessary for visceral and parietal pelvic reconstruction, protection and therapeutic angiogenesis in the treatment of female genital tract neoplasms.

Key words Flaps, gynecologic cancer, pelvic reconstruction

GENERAL CONSIDERATIONS Flaps are partially or totally detached tissues for use of transposition to another location of the body. Blood perfusion is ascertained by maintaining the connection to vessels of the donor area in *pedicled flaps* or by establishing microanastomoses to vessels of the recipient area in *free flaps*. Nervous supply may also be provided from the donor site or gained through anastomoses from the recipient site. Complete or partial denervation of flaps is required in some situations or may not be avoidable in others.

Prerequisite for raising flaps is the exact knowledge of the neurovascular anatomy of the donor tissues, especially the angiosomes, venosomes and neurosomes of the body (1-3). Flaps raised without respecting the vascular anatomy (*random flaps*) are much more limited in design and translocation. Numerous flap procedures, for a great variety of reasons, are performed in reconstructive surgery. In addition to visceral and parietal restoration, flaps are most commonly used for the obliteration of dead spaces, protection of exposed inner body structures, support, and therapeutic angiogenesis. The use of flaps is also an integral part in the treatment of female genital tract neoplasms as demonstrated in *Table 1*.

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In gynecologic oncology, flap surgery is performed with pedicled flaps of different tissues, such as skin flaps, muscle flaps, musculoperitoneal flaps, omental flaps, and bowel flaps. An anatomically precise description of the different types of skin flaps, depending on the vascular supply, has been elaborated by *Cormack and Lamberty* (4). Random skin flaps are designed without respect to the vascular anatomy, demanding a base width of at least 50% of the flap length. In axial pattern skin flaps, the course of a subcutaneous artery and the venae comitantes running parallel to the surface defines the central flap axis. Fasciocutaneous flaps composed of skin, subcutaneous fat and the underlying deep fascia recieve their blood supply from fasciocutaneous perforators of vessel systems running through the fascial septa between adjacent (generally long thin) muscles. These perforators form an axial vascular plexus within the superficial part of the deep fascia. Musculocutaneous flaps are composite flaps of skin, subcutaneous fat, fascia and muscle. The blood supply of this tissue unit comes from the vessel system nourishing the muscle, giving off perforators to the overlying subcutaneous tissues and skin. The representatives of the four types of skin flaps used in the treatment of female genital tract cancer are compiled in *Table 2* (4-14).

Table 1. Therapeutic goals of flap surgery in the treatment of female genital tract neoplasms

Visceral reconstruction	Vagina	
Parietal reconstruction	Endopelvis	Pelvic floor
	Exoplevis	Vulva, perineum
		Inguinal region
		Pubic region
		Gluteal region
Protection of exposed blood vessels, hollow organs		
Therapeutic angiogenesis		

With the exception of random flaps, these skin flaps can be elevated as peninsular flaps or island flaps, in order to achieve the best reconstructive results. In peninsular flaps, the flap base consists of the complete composite tissue unit including the skin, whereas in island flaps the skin is removed from the pedicle. Skin flap design with respect to neural anatomy, i.e. the motor and sensory nerve supplies, and the neural pattern

within the tissue unit to be transferred, is beginning to evolve in reconstructive surgery but has not been fully explored for its relevance in gynecologic oncology.

The most common flaps transferring tissues without skin applied in gynecologic oncology are listed in *Table 3* (15-23). These flaps also depend on one dominant vessel system (artery and comitant venes), sufficient for nourishing the whole isolated tissue unit. Muscle flaps can be raised with preservation of their motor nerve supply, to retain their contractile function and tissue integrity. Chronical electric stimulation of a fast twitch muscle through its motor nerve with a pacemaker can be applied to induce tissue changes resulting in a slow twitch muscle. This principle is used for the creation of neoanal sphincters from gracilis, gluteus maximus and semitendinosus muscle flaps (24-27). Without innervation, fatty degeneration of the muscle tissue will occur.

FLAP SURGERY AS MEANS OF THERAPEUTIC ANGIOGENESIS Flaps form vascular connections with blood vessels of the recipient bed, assuring their survival even if the nourishing pedicle is ligated 1-2 weeks after the tissue transfer (28-29). This ability can be exploited in situations of microcirculatory insufficiency of the recipient area, especially with late radiation damage. Transposing unirradiated, well perfused tissue to the area of radiation damage is a time-honoured principle in reconstructive surgery, which also has its indications in gynecologic oncology (30-31). Radiation-induced vaginal fistulae and ulcera, as well as scleredema of the vulva and perineum necessitate the transposition of unirradiated tissue for successful healing. Experimental studies have shown that muscle flaps as well as omentum flaps, most efficiently induce angiogenesis at the cut edges leading to significantly increased perfusion of a compromised recipient area, as soon as 3 days after the insertion of the flap (19, 29).

Therapeutic angiogenesis by means of the different types of pelvic wall plasty is regarded as the mainstay of the Combined Operative and Radiotherapeutic (CORT) procedure, allowing the secondary radiation of the tumor bed at the pelvic wall with radiation doses higher than the primary dose, without fatal sequelae (32). Likewise, in the case of complete tumor resection in an irradiated pelvis by ultraradical surgery, such as pelvic exenteration or Laterally Extended Endopelvic Resection (LEER) without additional tumor bed reirradiation, flap coverage of the denuded pelvis significantly reduces complications caused by impaired wound healing. The protection of ureteral and bowel anastomoses by wrapping with omental flaps is another application of flap induced therapeutic angiogenesis.

PROCEDURES The surgical anatomy, flap designs, techniques of elevation and transfer of the flaps used in the treatment of female genital tract cancer *(Tables 2 and 3)* are well described by the pioneering authors and those who successfully applied these procedures in a large series of cases (5-23). This information is easily accessible and will not be repeated here.

Table 2. Representatives of the four types of skin flaps used in gynecologic oncology

		Key references
Random skin flaps	Limberg flap	*Limberg (5)*
Axial pattern skin flaps	Groin flap	*McGregor et al. (6)*
	Anterior/posterior vulvar flap	*Cormack et al. (4)*
Fasciocutaneous flaps	Pudendal thigh flap	*Morton et al. (7)*
		Wee and Joseph (8)
		Giraldo et al. (9)
	Gluteal thigh flap (distal)	*Hurwitz et al. (10)*
	Tensor fasciae latae flap (distal)	*Nahai et al. (11)*
Musculocutaneous flaps	Inferiorly based rectus abdom. musculocutaneous flap	*Taylor et al. (12)*
	Tensor fasciae latae flap (proximal)	*Nahai et al. (11)*
Gracilis	musculocutaneous flap	*McCraw et al. (13)*
		Whetzel (14)
	Gluteal thigh flap (proximal)	*Hurwitz et al. (10)*

Table 3. Non-skin flaps applied in gynecologic oncology

		Key references
Muscle flap	Inferiorly based rectus abdominis muscle flap	*Kanavel (15)*
	Gracilis muscle flap	*Pickrell et al. (16)*
	Sartorius muscle flap	*Baronofsky (17)*
Musculoperitoneal flaps	TRAMP flap	*Höckel (18)*
Omentum flaps	Omentum majus flap	*Liebermann-Meffert (19)*
Bowel flaps	Ileocoecal flap	*Bürger et al. (20)*
		Turner-Warwick (21)
	Sigma flap	*Pratt and Smith (22)*
		Freundt et al. (23)

COMPLICATIONS In addition to common surgical complications, the elevation and transposition of flaps can be associated with specific complications summarized in *Table 4*. The major complication in flap surgery is flap necrosis. Most cases resulting in necrosis of a significant part of the flap, are due to technical faults in flap design, elevation or transposition. Errors in composite skin flap design and elevation are more frequent in short obese patients or older patients with marked skin relaxation. Inadvertent severing of the vascular pedicle should be recognized by missing capillary perfusion at the end of the elevation stage. The kinking or stretching of the vascular pedicle can lead to venous congestion, which is usually fatal if not detected early after the operation. As immediate surgical intervention can sometimes salvage the flap in such a situation, frequent postoperative flap inspection is recommended. The insertion of the flap into the recipient area should always be accomplished

Table 4. Specific complications of flap surgery

Flap necrosis (partial or total) due to	Incorrect flap design
	Incorrect elevation technique
	Compression/tension of the pedicle
	Scars in the donor area
	Impaired microperfusion/angiogenesis
	Vascular anatomic variants
Flap infection	
Donor site morbidity	Skin dehiscence
	Hernia (abdominal wall)
	Pseudocyst (thigh)
Sensory and motor disturbances	

without tension, and the patients should be placed on an airflow mattress after the operation if the flap or its pedicle may be compressed by the patients' body weight, to ensure uncompromised capillary perfusion. Previous scars interrupt the primary angioarchitecture of the composite tissue. Ignoring even small scars when designing the flap bears a significant risk of at least partial flap failure. A variety of conditions such as heavy smoking, diabetes mellitus, previous radiotherapy lead to rarefication of microvessels, microcirculatory insufficiency and/or impaired angiogenesis and therefore may endanger an otherwise reliable flap. The transfer of irradiated donor tissue to an irradiated recipient area should be avoided. Rarely, variants in vascular anatomy interfere with the viability of well designed flaps.

When partial or total flap necrosis occurs, wound debridement after demarcation is necessary. Thereafter, it is often preferable to await healing by secondary intention before further surgical intervention is planned. Flap infections can often be successfully treated with the proper antibiotic regimen. In severe cases, infection disturbs primary healing of the flap. In these situations, secondary healing of the intact flaps after infection has been mastered usually restores the surgical goal.

Donor site morbidity is most frequently manifested by wound dehiscence. The risk of hernia formation after raising flaps from the abdominal wall can be minimized by proper surgical techniques. The donor site of flaps raised from the thigh may need prolonged drainage to prevent the formation of large pseudocysts, which can become superinfected or may impair leg function. Sensory and motor disturbancies caused by flap surgery in gynecologic oncology are manageable through physiotherapeutic exercises and habitude in the majority of patients.

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Fasciocutaneous flaps in gynecologic oncology

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INTRODUCTION Despite the long natural history and early clinical manifestation, vulvar cancer is diagnosed at a locally advanced stage of the disease, in a significant proportion of women. In order to achieve optimal tumor resection with adequate disease-free margins, extended surgery at the level of the external genitalia is required. This results in considerable disfigurement of vulvo-vaginal and perineal anatomy, wide tissue loss and frequent wound morbidity (infection and dehiscence).

In order to restore an acceptable anatomy of the genital area and prevent wound complications, several reconstructive surgical techniques are available for gynecologic oncologists (1). Skin flaps, due to their simple execution, reliable vascular supply and durability allow successful coverage of most of the vulvoperineal defects with minimal morbidity. Several types of skin flaps have been described in the literature. Basically, they can be categorized by: blood supply (random pattern, axial pattern, fasciocutaneous and myocutaneous flaps), tissue composition (skin, fasciocutaneous and myocutaneous flaps) and the manner in which the skin flap arrives at the recipient site (free flaps taken from noncontiguous area of skin, and local flaps which can reach the adjacent recipient site by transposition, rotation or advancement).

In general, the simplest means to repair a surgical defect should be utilized (i.e. random pattern skin flaps). However, in a locally advanced tumor, where extended vulvoperineal dissection is performed, the random flaps, which must conform to a height-to-width ratio not exceeding 2.0 (in order to have adequate blood supply from the subdermal plexus), are unsuitable for repairing large tissue defects, or for covering irradiated and/or infected anatomical sites. In these cases, due to the unreliability of subdermal vascular plexus of irradiated tissue and skin ischemia which follow excessive suture tension, flap necrosis and wound dehiscence are frequently observed. Thus, in locally advanced tumors more sophisticated reconstructive techniques should be utilized, such as myocutaneous and fasciocutaneous flaps. These types of flaps, due to their substantial vascular supply, are less likely to suffer from the effect of preoperative radiotherapy. Furthermore, since the flaps can conform to a height-to-width ratio greater than 2, they are suitable for repairing wide tissue defects without suture tension.

Fasciocutaneous flaps have several distinct advantages over myocutaneous flaps: 1. simpler dissection, 2. reduced blood loss, 3. easier transposition, 4. minimal flap bulk, 5. mild contour defect of donor site, and 6. no functional impairment of underlying muscles (2). However, in particular situations such as very large tissue defect or heavily irradiated patients with microangiopatic diseases, myocutaneous flaps should be preferred. In these cases, they guarantee a higher success rate and a better cosmetic result than fasciocutaneous flaps.

FASCIOCUTANEOUS FLAP Fasciocutaneous flaps were first described as a distinct entity in 1981 by *Pontén* (3), who showed their feasibility and reliability in a consecutive series of patients with soft tissue defect of the lower leg. The delay in developing and introducing these innovative flaps into the clinical practice was due to the limited information provided by standard anatomy textbooks on the blood supply of the deep fascia.

A study by *Shafer* (4) showed that three different arterial systems can provide blood supply and excellent collateral circulation to the deep fascia: 1. *perforating arteries,* leaving the muscle or intermuscular septa, pass through the deep fascia, where they give off three to six small branches on the superficial surface that anastomose with the superficial fascial plexus; 2. *subcutaneous arteries,* which run deeply from the superficial fascia of the fatty tissue toward the muscle fascia, anastomosing with each other and the superficial fascial plexus; 3. *subfascial arteries,* which derive from the intermuscular septa and lie in the loose areolar tissue beneath the deep fascia. Besides forming the deep fascial plexus, these vessels anastomose with the superficial plexus through the fascia. Hence, interruption of one system is not deleterious, as the other two

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can sustain a good blood supply to the fascia and its dependent territories.

In the field of gynecologic oncology, at least three different fasciocutaneous flaps have been described for vulvoperineal and vaginal reconstruction, i.e. the medial-thigh flap (5), the pudendal-thigh flap (Singapore flap) (6) and the inferior gluteal flap (7).

MEDIAL-THIGH FLAP This flap, which can be as large as 9x20 cm, is a proximally based thigh flap including the skin and fascia over the medial compartment between the adductor longus and the adductor magnus muscles. Three to four vessels (direct branches of the superficial and deep femoral arteries, the musculocutaneous perforators from the gracilis, adductor longus and adductor magnus muscles), all located within 5 cm of the perineum, have been identified as afferent vessels to the suprafascial plexus of the medial thigh. In order to preserve the vascular supply (particularly the proximal gracilis musculocutaneous perforator), the flap base must be located within 5 cm of the perineum.

Medial-thigh flap can be utilized for both perineal and vaginal reconstruction. Primary closure of the donor site defect can always be successfully achieved. One total and three partial flap losses were observed by *Wang et al.* (5) in 15 flap elevations. However, as stated by the author, all cases were early clinical experiences in which flap necrosis was due to not including the proximal afferent vessels in the flap base. Surgical technique is described in major textbooks (1, 8).

PUDENDAL-THIGH FLAP This flap, also known as Singapore or posterior labial artery flap, is centered on the labial-crural fold (just lateral to the hair bearing area of the labia majora) with its base at the level of the perineal body. Pudendal-thigh flap can be up to 6 cm wide and 15 cm long, thus permitting both perineal and vaginal reconstruction. It is supplied by the posterior labial arteries which anastomose on the proximal medial thigh with branches of the deep external pudendal artery. In order to prevent disruption of the anastomotic network established between these vessels, the deep fascia over the adductor muscles must be carefully elevated. This also makes it possible to spare cutaneous innervation of the skin flap. Thus, one of the main advantages of the pudendal-thigh flap is that it is sensate. Primary closure of the donor site can always be achieved with good cosmetic results. In our experience, only one partial flap dehiscence was observed among 6 patients undergoing vulvo-perineal construction. These results are in accordance with the experiences of *Wee* (6) and *Woods* (9). Disappointing functional results were observed by *Gleeson et al.* (10) for vaginal reconstruction. Surgical technique is described in major textbooks (1, 8).

INFERIOR-GLUTEAL FLAP The flap is centered on the course of the descending branch of the inferior gluteal artery, from the point at which it emerges from under the gluteus maximus down to the posterior aspect of the knee. The cutaneous territory of this flap can be as large as 10x35 cm and is innervated by the posterior cutaneous nerve of the thigh, which runs deep to the fascia lata. Thus, in elevating the fascia, care should be taken in identifying and protecting the nerve which lies medial to the vascular pedicle. The flap is brought into the defect through a perineal subcutaneous tunnel. When a greater arc of rotation is necessary to cover a wide perineal defect, the gluteus maximus muscle can be split for 5-10 cm. Since the inferior gluteal artery is a tributary of the internal iliac artery, prior ligation or resection of this artery is a contraindication for the use of this flap. Surgical technique is described in major textbooks (1, 8).

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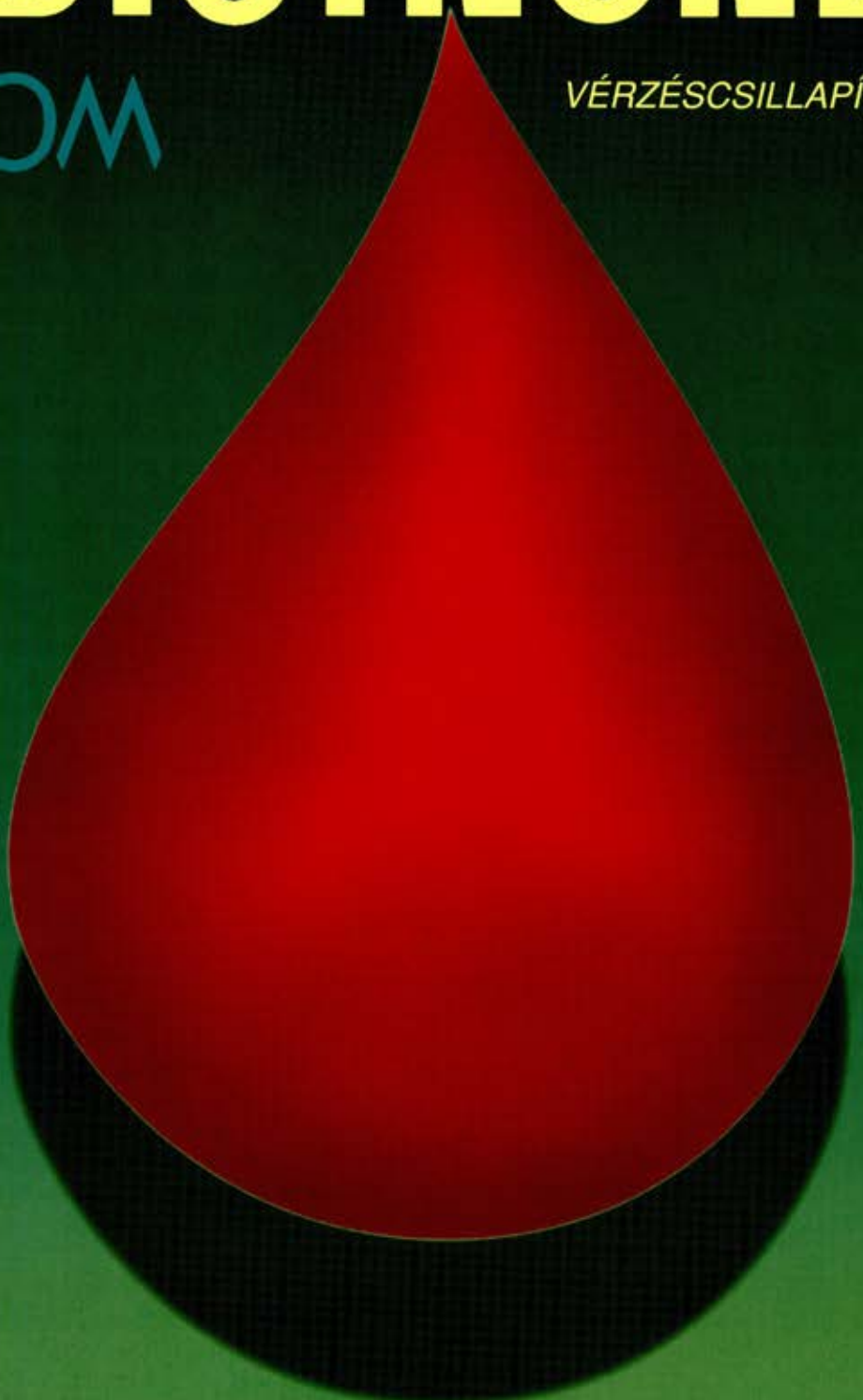

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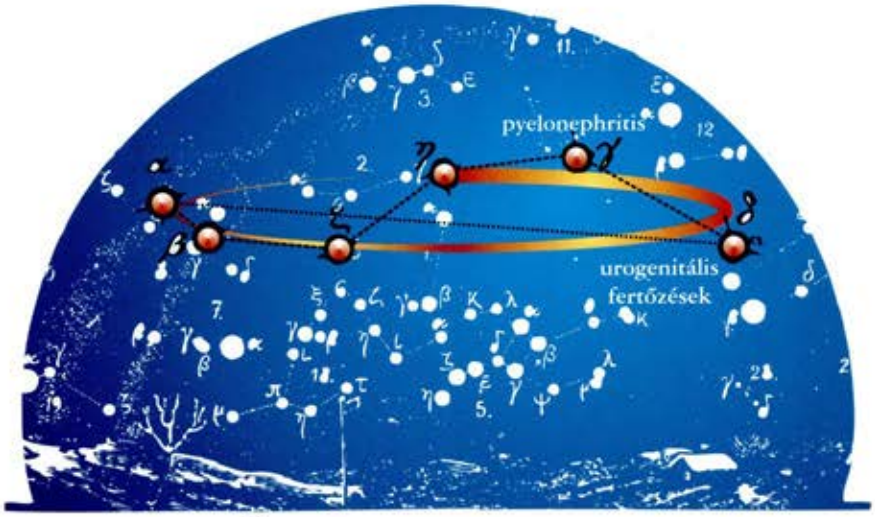

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The use of omentum in radical gynaecologic surgery

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ABSTRACT The omentum is a well vascularised fatty organ which extends from the lesser curvature of the stomach to the liver, and from the greater curvature of the stomach downwards. Its arterial blood supply comes from the right and left gastro-epiploic arteries. The richness of the blood supply allows mobilization of the omentum to form pedicle grafts. These grafts ("J" flap) can be used to cover the pelvic floor after a total exenteration, for the construction of a neovagina in combination with a split-skin graft, to cover vesico-vaginal fistulas and recto-vaginal fistulas, to cover intestinal anastomoses after radiation therapy, to keep the small bowel out of the pelvis during pelvic radiation.

Key words omentum, "J"flap,

INTRODUCTION There is a greater omentum and a lesser omentum. The greater omentum is commonly referred to as "the omentum." It is also the greater omentum that is removed (omentectomy) or used as a pedicle (omental pedicle) when performing radical gynaecologic surgery. The lesser omentum extends from the lesser curvature of the stomach to the liver. The greater omentum descends from the greater curvature of the stomach and passes downward for a variable distance before folding upward on itself and ascending to attach on the upper aspect of the transverse colon and the mesocolon *(Figure 1)*. The greater omentum contains fat and blood vessels and plays a role in the containment of intraperitoneal infection. Intraperitoneal malignancies, such as ovarian and bowel cancers, also commonly metastasize to the omentum.

The blood supply of the omentum arises from the right and left gastro-epiploic arteries, which form an arcade along the greater curvature of the stomach. The left gastro-epiploic artery arises from the splenic artery and the right gastro-epiploic artery arises from the gastro-duodenal artery. The omentum is very vascular which allows mobilization to form pedicle grafts. The blood supply of the omentum must be understood by the surgeon prior to performing omentectomy or omental pedicles *(Figure 2)*.

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OMENTECTOMY

INDICATIONS 1. Surgical staging of ovarian cancer. An omentectomy forms part of the FIGO staging procedure. When no other upper abdominal tumour is present, microscopic disease in the omentum represents stage IIIA disease, deposits ≤ 2 cm stage IIIB, and >2 cm stage IIIC. When most of the omentum is replaced by tumour, this is referred to as an omental cake. It is usual to perform an infracoloic omentectomy, but if macroscopic tumour is present then a gastro-colic omentectomy should also be performed. 2. Debulking of ovarian cancer. When the omentum contains tumour masses or is replaced by tumour ("omental cake"), an omentectomy is an important part of the cytoreductive surgery. 3. Other gynecologic cancers. Patients with stage I endometrial carcinoma have omental metastases in 8.3% of cases (1). Omental metastases are more common in endometrial cancer if there is adnexal spread, peritoneal involvement, papillary serous carcinoma, grade 3 tumour or positive retroperitoneal lymph nodes. The omentum must be inspected and an omentectomy considered. Omentectomy is also indicated in fallopian tube carcinoma.

PROCEDURE The operation is best performed through a midline incision, extending above the umbilicus. The procedure is usually started at the transverse colon, with the omentum being pulled up over the stomach and the avascular attachment to the colon being divided. The omentum is then peeled off the mesentery of the transverse colon, entering the lesser sac. This is done from the hepatic flexure of the colon to the splenic flexure. The omentum is then removed by clamping and tying the vascular arcades as they are encountered across the greater curvature of the stomach. This will remove the infracolic and gastrocolic parts of the omentum. If tumour is present or suspected in the gastrocolic omentum, then it should be removed with division occurring above the gastric arcade. If no tumour is apparent in the omentum, or the procedure is being performed as part of a staging operation, then only an infracolic omentec-

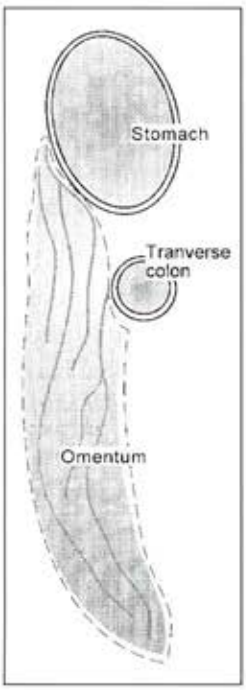

Figure 1. The greater omentum and its anatomical relations to stomach and transverse colon

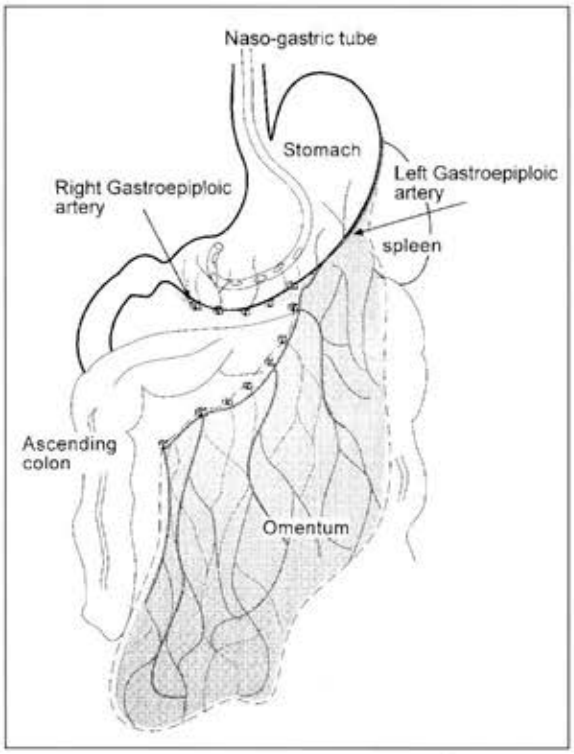

Figure 2. The arterial blood supply of the omentum from the left and right side allows the formation of pedicle grafts

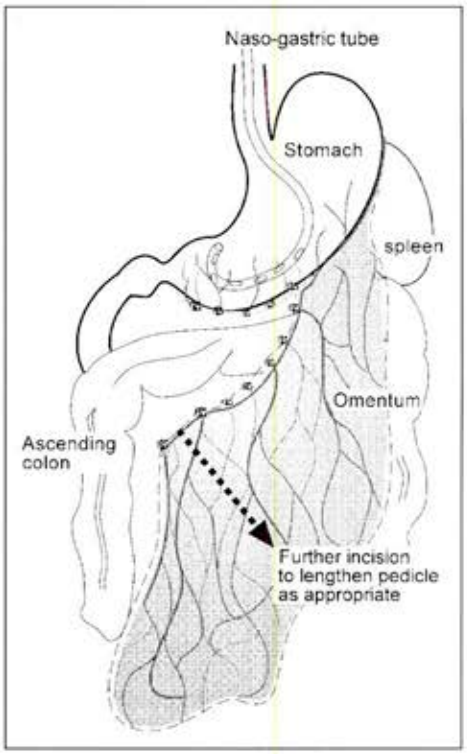

Figure 3. Omental pedicle: "J" flap

tomy can be performed. This a simpler procedure and the gastric arcade is preserved.

COMPLICATIONS

HAEMORRHAGE Bleeding may occur from a vascular pedicle or from rupture of the spleen. Haemostasis must be ensured before closing the abdomen. Rupture of the capsule of the spleen can occur if undue traction is applied to the omentum during omentectomy (2). This complication may be recognized intra-operatively, or in the immediate post-operative period. Splenectomy is usually required to control the bleeding. An adequate abdominal incision will help to prevent this complication.

GASTRIC DILATATION This may be acute, presenting with vomiting, aspiration, hypotension or collapse. Active resuscitation may be required. Gastric dilatation may be prevented by the intra-operative placement of a nasogastric tube when omentectomy is performed. This is left in place until the second or third post-operative day.

OMENTAL PEDICLE ("J" FLAP)

INDICATIONS The omentum can be placed over the denuded pelvic floor after a total exenteration (3). This ensures a new blood supply to the pelvis and reduces the incidence of small bowel adhesions, obstruction and fistula formation.

The omentum can be used in the construction of a neovagina (4). A pocket is created with the omentum into which a split skin graft, sewn over a vaginal stent, is inserted. This is a simple and useful technique in patients who have had a total exenteration.

The omentum can be used in the repair of vesico-vaginal and recto-vaginal fistulae, used to cover intestinal anastomoses, and to cover the bladder base after hysterectomy in patients who have received radiation (5-6). This helps seal and bring new blood supply to these areas, aiding the repair process. The omental pedicle may be used as a sling, being stitched across the pelvis to keep small bowel out prior to and during pelvic irradiation. Over the next few months this omental "diaphragm" slowly sags to reach the pelvic floor.

PROCEDURE A midline incision which adequately exposes the omentum and the greater curvature of the stomach is necessary. The omentum is transected starting at the hepatic flexure of the colon and proceeding from right to left, ligating the right gastro-epiploic artery and the vascular arcades as the pedicle is developed. The left gastro-epiploic artery forms the main blood supply for the pedicle. If a longer pedicle is required a second incision half way down the pedicle can be performed *(Figure 3)*.

COMPLICATIONS

NECROSIS OF THE PEDICLE This may be partial or complete, and can largely be prevented by ensuring an adequate blood supply

at the time of surgery. In 2.9% of persons, the epiploic arcade is anomalous which can result in necrosis of the distal half of the omental pedicle (7). When a non-viable pedicle is found, it should be removed.

HAEMORRHAGE AND HAEMATOMA FORMATION Continued haemorrhage will necessitate a repeat laparotomy. These problems can be prevented by meticulous haemostasis and the use of a drain when appropriate.

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Bowel reconstruction incidental to gynecologic procedures

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INTRODUCTION There is a need for gastrointestinal surgical procedures in gynecologic oncology for: 1. resection of primary or recurrent tumors and 2. management of intraoperative or postoperative complications. Bowel surgery constitutes an important part of gynecologic intervention, as tumor propagation does not respect the conventional borders of medical specialities.

Accidental injuries to the bowel and its mesentery may occur during the course of any gynecological intervention but are more frequent during operations for severe inflammations, endometriosis and malignant tumors, particularly in patients with a history of previous abdominal surgery. Intestinal injuries may also occur during laparoscopy and can be particularly serious if the bowel lesion is not recognized at the time of surgery, and the diagnosis is made only when signs of peritonitis are obvious.

Who should perform the bowel surgical procedures during gynecological intervention? According to our experience, bowel surgerical procedures can be performed successfully with a low complication rate by gynecologic-oncologists trained in bowel surgery. This consideration was also formulated in 1972 by the *Division of Gynecologic Oncology of the American Board of Obstetrics and Gynecology* that emphasized: "an understanding and capability to perform radical pelvic operations independently, including experience in operations on the intestinal and urological organs as related to gynecological cancer," are among the knowledge and skills to be acquired by the gynecologic oncologist.

GENERAL CONSIDERATIONS While performing an intestinal anastomosis, the surgeon has to keep in mind that complication free wound healing requires: 1. good blood supply of the intestine segments to be anastomosed, 2. good protein supply in the postoperative period, 3. perfect technical execution.

1. To achieve this goal, basic anatomy knowledge about the distribution of blood vessels is important. The preparation and resection of different bowel segments should be planned intraoperatively on this anatomical basis. 2. The sufficient protein supply depends on the preoperative preparation and proper postoperative care. 3. Regarding the technical execution of an anastomosis, one of the determinant factors is the quality of the suture material. Non-absorbable or slow absorbing atraumatic and monophilament suture materials, or modern staplers should be used. In procedures carried out on the large bowel, the mechanical preparation of the bowel and the use of antibiotic prophilaxis is important. In recent years, based on numerous studies, we preferred the short antibiotical prophylaxis, administered one or two hours before the operation, versus long (three days) administration. Other technical details constituting a matter of debate in the past, including the use of continuous or interrupted suture, or the application of one or two layers, is in fact less important.

STOMACH AND DUODENUM The stomach is rarely injured, except during laparoscopy and relaparotomies, when the organ might be adherent to the abdominal wall. Undetected, penetrating laceration of the stomach results in a severe postoperative peritonitis. Similarly, peritonitis would result from an unrepaired duodenal wound or if a duodenal fistula develops. Fluid from such a fistula is abundant and as it contains gastric juice, pancreatic exocrine secretion and bile, it will lead to a severe dehydration, electrolyte disturbance and skin laceration. If recognized, penetrating wounds of the stomach are easy to repair. Injuries during laparoscopy should be sutured at open operation. Small injuries of the duodenum can be repaired in two layers. If the laceration is large, the risk of fistula formation is high, or if the suture compromises the duodenal lumen, construction of a gastroenterostomy is a safer procedure.

SMALL BOWEL Most frequently, bowel injuries during gynecologic operations affect the small bowel. Accidental enterotomy usually appears during division of adhesions. For optimal repair, the strategy of dividing adhesions is very important. If

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accidental enterotomy appears, it should not be sutured immediately because other injuries might appear. The area should be marked and the dissection continued. After all the adhesions have been lysed, the bowel should be carefully inspected, to ensure that the wound or wounds are sutured, or if the bowel segment is compromised, it is better to resect the bowel and make an anastomosis. When using a hand sewing technique, we prefer the one layer inverting continuous Schmieden suture in both side-to-side or end-to-end anastomosis. For this we use an atraumatic, mono-philament, absorbable (PDS) suture material. When closing a penetrating wound, the suture line should lie transversely to the normal axis of the bowel to avoid narrowing of the intestine. In most cases, we perform a mechanical side-to-side anastomosis with a GIA type linear stapler. Large resection of the injured bowel segment is also indicated in the presence of a pre-existing disease e.g. malignant invasion, Crohn's disease and more frequently radiation ileitis.

Injuries to the small bowel mesentery requires prompt hemostasis. Then the intestine should be carefully inspected. If there are signs of ischemi, it is better to resect the affected bowel segment and to perform anastomosis.

LARGE BOWEL Penetrating large bowel injuries are always serious because the intestinal content is heavily infected with pathogens. If not repaired, these injuries will result in fecal peritonitis, or later in fecal fistula. In all cases of gynecologic surgical produceres, where an intervention on the large bowel can be anticipated, e.g. ovarian carcinoma, severe endometriosis, etc., a mechanical bowel preparation should be carried out preoperatively and prophylactic antibiotics should be administered.

A single clean-cut laceration can be sutured in two layers, without resection of the affected bowel segment and without protective colostomy. A drain should be positioned close to the suture line and left in place for 7 days. Antibiotics containing metronidazole also should be administered. Again, the suture line should be placed transversally to the axis of the intestine to avoid narrowing of its lumen.

In more extensive lacerations of the colon, the affected bowel segment should be resected. When the cecum or the ascending colon is injured, the terminal ileum and a part or the whole right colon should be resected. The bowel reconstruction consists of an ileotransversostomy or ileoascendestomy. We prefer a side-to-side mechanical anastomosis using two perpendicular shots with the GIA type linear stapler. Rarely, when using a hand sewing technique, we prefer a side-to-side, one layer, inverting, continuous Schmieden suture. When the injured transverse colon is resected, the hepatic and splenic flexures must be mobilized and a hand sewn end-to-end or a stapler anastomosis should be performed. In cases of resection of the rectosigmoid, the anastomosis can be accomplished in most cases. The hand sewing technique can also be used, but according to the literature and our experience, for low rectal anastomosis the stapler technique is safer than the best hand suture. Depending on the size of the laceration and the conditions of the anastomosis, e.g. the patient's general condition, the amount of fecal spillage, tension of the anastomotic site, bowel diversion with a defunctioning transverse colostomy, should be taken in consideration. If the anastomosis can not be performed safely a Hartmann operation is the simplest and safest alternative.

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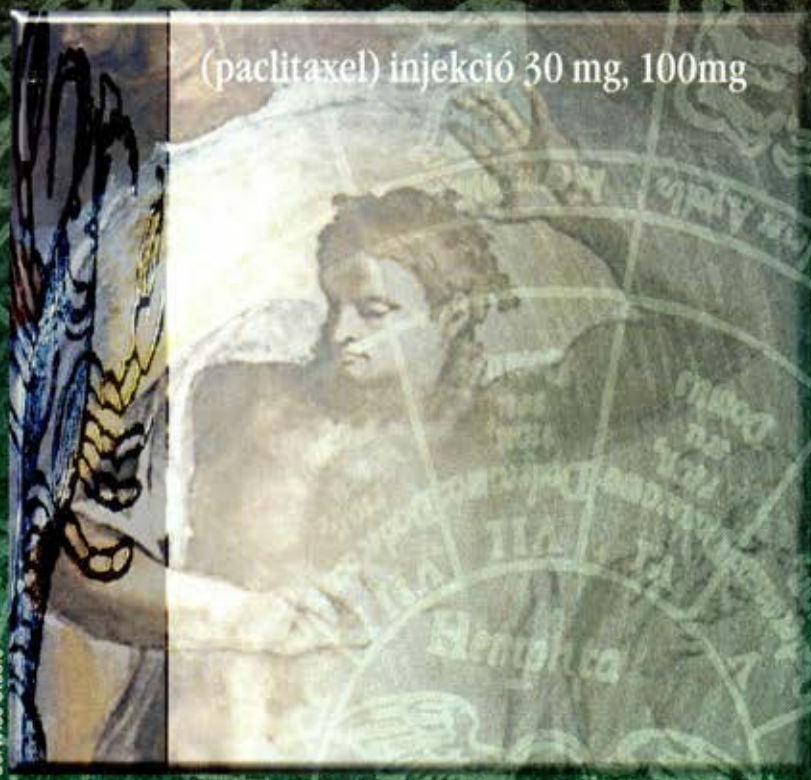

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ÉLETRE VALÓ

Low rectal anastomosis following pelvic exenteration

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INTRODUCTION Since the original description by *Brunschwig* in 1948, the pelvic exenteration has undergone many significant modifications in an effort to decrease postoperative morbidity and mortality. This has been accomplished with better selection of operative candidates, refinements in the procedure itself, and improvements in surgical technique, as well as improvements in intraoperative and postoperative care. With the significant decrease in postoperative morbidity and mortality over the past 40 years, we have seen an increase in long-term survivors and therefore, attention has recently been directed at improving these patients' quality of life, both physiologically and psychologically. Traditionally total pelvic exenteration and posterior exenteration have necessitated a permanent colostomy which is very disturbing to many women. Therefore, re-establishment of bowel continuity is an important consideration for these women.

The introduction of the end to end circular stapling device has greatly facilitated and popularized the performance of low rectal resection and anastomosis for a variety of general surgical and gynecologic malignancies. The automatic circular stapling device has many advantages over the traditional hand sewn anastomosis, including allowing use of a shorter anal or rectal stump, less tissue inflammation, higher collagen content, and faster healing time.

ANATOMIC AND PHYSIOLOGIC CONSIDERATIONS Removal of the rectum alters the physiology of stool storage and defecation. The rectum is the reservoir for collection of feces and transmits impulses to the sensory nerves to initiate the urge to defecate. Inhibitory reflexes from the rectum to the anus are necessary while the rectum is filling to ensure continence. Following resection, the reservoir capacity, sensation and the recto-anal reflex are significantly altered (1). The most important factor in restoring the normal bowel function is the reservoir capacity. Capacity can be increased by preserving as much rectum as possible or by a colonic J-pouch. The length of rectum necessary for return to acceptable function is 6 cm. or greater (2-3). When the anastomoses are above 12 cm. there is little alteration of function (5).

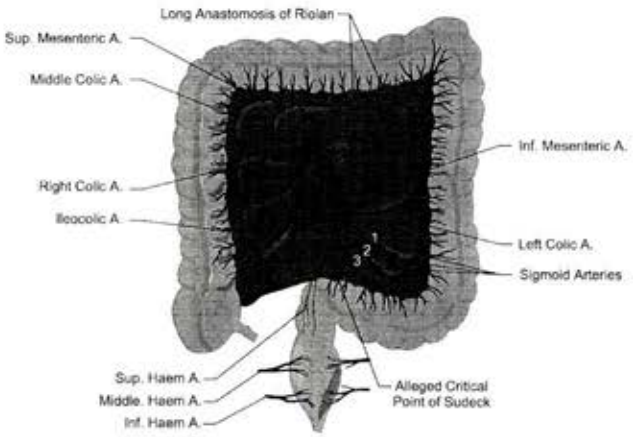

Figure 1. Vascular Supply to the colon and rectum

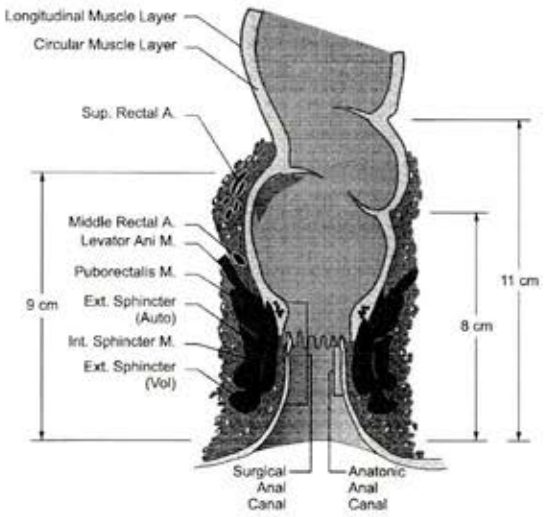

Figure 2. Anatomy of the anal canal and rectum

COLONIC J-POUCH The colonic J-pouch has been popularized

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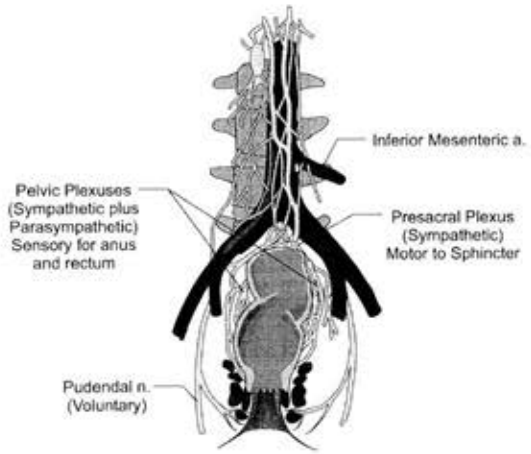

Figure 3. Enervation of pelvis

Table 1. Leake from stapled low colorectal anastomosis

Factor	Leak rate	Peritonitis
anastomosis/height		
<6 cm	37/203 (18%)	7/203 (7%)
>6 cm	1/73 (1%)*	0/73 (0%)*
Colostomy	13/175 (8%)	1/175 (0.6%)
No colostomy	11/62 (17%)*	7/62 (11%)*

* p = 0.05

Table 2. Rectal function after resection at 3 cm versus 6 cm from anus

Bowel function	3 cm group N = 26	6 cm group N = 42
Stool frequency	3 (1-8)	3 (1-6)
Flatus continent	15/26 (57%)	26/42 (62%)
Stool continent	8/26 (30%)	23/42 (55%)*

* p < 0.05

by colorectal surgeons to treat rectal cancer with low rectal resection. It has replaced coloanal anastomosis because of its superior results. Studies comparing colonic J-pouch to coloanal anastomosis have shown 1. decreased anastomotic leak rate; 2. better continent rate; 3. fewer stools per day; 4. better control of urgency; 5. better control of flatus. (6-9) Prospective randomized trials have now comfirmed the observational studies (10-11). *Kusunoki* (12) started a randomized trial but closed it due to superior results with the colonic J-pouch.

The most significant detractor from the colonic J-pouch is the inability of some patients to empty the pouch. This is most likely due to the length of the staple line to construct the pouch. *Hida et el.* (13) has prospectively randomized patients to a 5 cm. versus a 10 cm pouch and found the 5 cm to be superior to the 10 cm for evacuation without compromising the other parameters. The majority of publications utilize a diverting colostomy at the time of the colonic J-pouch. This has led to a decrease in the anastomotic leak rate.

Table 3. Functional outcome comparing colorectal versus coloanal J-pouch anastomosis

Factor	J-pouch n = 47	Colorectal n = 34
Stool frequency	1.57	2.79*
Incontinent feces	13%	12%*
Use of loperamide	4%	21%*
Restricted diet	14%	41%*
Use of suppository or enema	20%	6%*

* p = < 0.05
Dehni et al. (9)

Table 4. Randomized comparison of colorectal versus coloanal J-pouch in 100 patients

Factor	Colorectal n = 52	J-pouch n = 45	P
Anastomotic leak	8 (15%)	1 (2%)	0.03
Stool frequency	3.5	2	0.001
Incontinence score	5	2	0.001
Use of loperamide	19	1	0.001
Medication to induce stooling	10	21	0.07

Hallböök et al. (11)

Table 5. Randomized study of 5 cm J-pouch versus 10 cm J-pouch

	5 cm n = 20	10 cm n = 20	P value
Sphincter function			
Resting pressure	97.8	90.6	NS
Squeeze pressure	214	194	NS
Reservoir function			
Threshold volume	40	70	<0.001
Maximum volume	98	129	0.003
Evacuation ml within 5 minutes	430	279	<0.001

Hida et al. (13)

Table 6. Physiologic and clinical results after coloanal versus colorectal anastomosis

Factor	Coloanal	Colorectal	Control
Neorectal volume	54 ml	98 ml*	300 ml
Maximal anal pressure	18 cm H_2O	30 cm H_2O	44 cm H_2O
Stool frequency	4 per day	2 per day*	1 per day
Incontinent occasionally	8/11 (72%)	8/12 (66%)	0/10 (0%)

* *Lewis et al.* (13)

Table 7. Anorectal physiology before and after coloanal J-pouch anastomosis

	Before operations	After operations
Maximum resting pressure cm H_2O	66	63
Maximum volume (ml)	240	233
Stool frequency	1.8	2.1
Continence		
Normal	19	15
Minor seepage	0	4
Incomplete evacuation	-	7

Mortensen et al. (7)

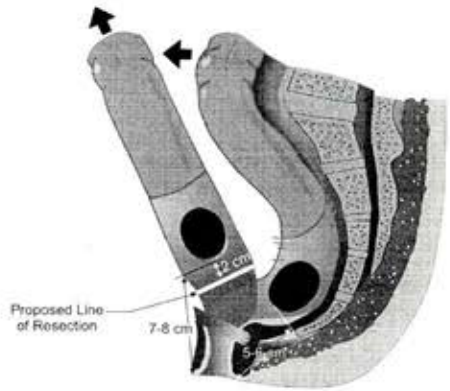

Figure 4. The height of the lesion changes when the rectum is placed on tension

Figure 5. End to side stapling technique without using the J-pouch

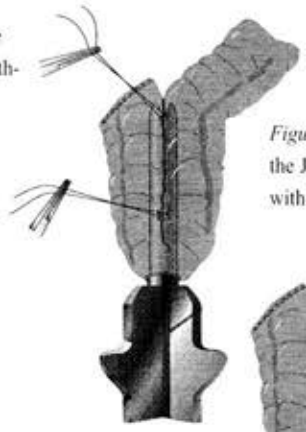

Figure 6. Establishing the J-pouch with GIA Stapler

Figure 7. End to side anastomosis of rectal stump to J-pouch

TECHNIQUE Pelvic exenteration candidates for rectal resection and anastomosis include those with disease limited to the cervix, upper vagina, bladder and/or the portion of the rectum immediately underlying the cervix and upper vagina. If disease involves the bowel or vaginal wall as far as the puborectalis portion of the levator muscle, the patient should be considered for a total pelvic exenteration. The uterine cervix overlies the rectum at approximately 11 cm from the anal verge. It is possible to conserve 4-6 cm of rectum if the lesion is small. This will make the anastomosis technically more feasible and will give better results. Resection as low as the anal verge is possible but if recurrent disease is that low, a total exenteration is recommended.

The upper resection is variable. It can be at the mid-sigmoid colon or anywhere above. The superior rectal artery is transected in order to gain the mobility to place the colon into the pelvis. The sigmoid can be used for either colorectal anastomosis or colonic J-pouch. Since most patients with pelvic exenteration will also have continent urinary diversion using the right colon, dividing the inferior mesenteric artery would be contraindicated. The choice of direct colon to rectum anastomosis versus a colonic J-pouch is determined by the length of rectum. Rectal length of 6-8 cm will function normally with direct anastomosis after 3-6 months. Rectal stump of less than 6 cm should have a J-pouch constructed to improve normal function.

PREOPERATIVE PREPARATION The patient is given both a mechanical bowel prep with 5 liters of Go-lytely and an antibiotic bowel prep with 1 gram of Neomycin and 1 gram of Erythromycin base orally at 6 and 11 p.m. If the patient is cachectic, she will have total parenteral nutrition for 5 days prior to surgery. She will be counseled concerning the management of urinary and bowel stoma, and the abdomen marked for those sites.

INTRAOPERATIVE CONSIDERATION There must be good mobilization of the sigmoid colon so there will be no tension on the anastomosis. The superior rectal artery must be sacrificed and occasionally some of the sigmoidal arteries. Full resection of the mesentery is not advised since this will help cover the sacral defect. If the cut end of the sigmoid does not bleed, then it should be trimmed until bleeding occurs.

A diverting colostomy should be performed for the following: 1. rectal length less than 6 cm; 2. tension on the anastomotic line; 3. active infection of the pelvis; 4. protein malnutrition; 5. postoperative radiation; 6. poor bowel prep; 7. poor blood supply.

An omental wrap has significantly decreased anastomotic leaks and subsequent fistula (14). It brings a new blood supply and fills the pelvic cavity. Likewise, myocutaneous flap reconstruction of the vagina also improves results.

RESULTS There are a few published articles on low rectal resection and anastomosis in oncologic literature. In 1990, we published the results from July 1979 and January 1989 at the University of Alabama at Birmingham. Thirty-one patients underwent pelvic exenteration and low rectal anastomosis. There were no operative deaths in the patients. Follow-up ranges from 10 months to more than 9 years. Survival of one year was 86% while overall survival was 68% (14).

Sixteen patients (52%) achieved normal bowel function. Six patients required permanent colostomies due to anastomosis break-down and 9 patients required a colostomy later due to fistula formation or recurrent cancer.

The length of the rectal stump influenced the rate of permanent colostomy. Patients with greater than 6 cm of rectum required a permanent colostomy in 25%. Patients with less than 6 cm rectal stump required a colostomy in 65%.

Thirteen patients had an omental wrap performed at the time of surgery. Eleven of these patients (85%) have normal bowel function. The use of an omental wrap in a rectal stump greater than 6 cm were the two most important factors in normal bowel function.

In this small series diverting colostomy was not associated with a higher rate of healing. Of 12 patients with diverting colostomies, 7 (58%) developed R-V fistulas requiring permanent colostomy. Of the 19 without protective colostomies, 8 (42%) developed R-V fistulas. Each group had two patients with recurrent carcinoma in the pelvis.

This series did not include any patients with colonic J-pouch. Based on the literature from the colorectal surgeons, the addition of the colorectal J-pouch should further improve the outcome of these procedures.

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Correction of bowel fistulas

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INTRODUCTION The majority of external gastrointestinal fistulas that develop in the postoperative period are the result of technical complications, primarily errors in construction bowel anastomoses, inadvertent and unrecognized direct injury to the bowel resulting in a full-thickness defect.

The integrity of gastrointestinal anastomoses is dependent on several critical factors, all of which are influenced by surgical technique. The initial and early integrity of the anastomosis is provided by the mechanical approximation of the edges /apposition of the mucosal layers/, by suture material or metallic staples to form a complete and watertight seal. The serosal layer of the bowel wall, when present, is strong enough to support suturing. Fibrin deposition in normal circumstances is also a factor which provides a sealing layer due to local inflammation. Intraluminal pressure or tension across the anastomosis proximal to an obstruction will lead to disruption. Similar results are created by sutures that are tied too loosely, failing to approximate the bowel edges, or when sutures are tied too tightly causing necrosis due to ischemia. Providing adequate blood supply to support normal inflammation and healing is probably the most important factor which should be kept in mind when constructing an anastomosis. Infection, such as gross purulence, fecal contamination, diffuse peritonitis is the other important factor, in the presence of which, creation of anastomosis should be avoided due to its potential for disruption by a secondary inflammatory process. Less common but considerable causes of fistula formation, are poor placement of drains with subsequent erosion into bowel, and entrapment of intestine within the fascial closure.

SPONTANEOUS CLOSURE The likelihood of spontaneous closure and the mortality associated with gastrointestinal fistulas is dependent on several factors: location in the gastrointestinal tract and fistula output, intestinal continuity, the number of external openings, the involvement of external organs, the length of the fistula, and the presence of local factors preventing healing. Generally speaking, the more proximal in the gastrointestinal tract the fistula is, the greater the output and spontaneous closure is less likely to occur. High-output proximal fistulas from the proximal jejunum result in large electrolyte and fluid losses. In addition, nutritional deficits are more common due to high protein losses in the secretions, as well as to malabsorption as a result of the loss of bile salts and pancreatic enzymes. Distal fistulas, in contrast, are usually the low-output type with adequate reabsorption occuring in the intact proximal bowel. Fistulas with multiple cutaneous openings are thought to be less likely to close spontaneously. In addition, if inadequately cared for, this situation may lead to large abdominal wall defects and may be associated with higher mortality rate. Fistulas arising from multiple organs (e.g., stomach, colon, jejunum) appear to have a lower spontaneous closure rates than single-organ fistulas. Fistulas longer than 2 cm are more likely to undergo spontaneous closure. This has been attributed to the higher resistance to flow generated by a longer tract, as well as a decreased likelihood of epithelialization occuring. Furthermore, fistulas associated with bowel wall defects greater than 1 cm at the tract origin are unlikely to close spontaneously. If healing occurs, bowel stricture often ensues. The presence of a foreign body, carcinoma, epithelialization of the tract, or irradiation of the affected bowel are local factors that inhibit healing.

MANAGEMENT The principles of gastrointestinal fistula management include fluid and elektrolyte correction, control of sepsis, control of fistula drainage and skin protection, bowel rest, and definition of fistula anatomy. Fluid and electrolyte therapy should be guided by quantitation of fistula losses as well as by measurement of both serum and fistula electrolyte levels. Sepsis is the most common cause of death in patients with gastrointestinal fistulas and must be controlled by identi-fying, localizing and draining intraabdominal abscesses when they occur. Localized abscess formation is more common with colonic fistulas, however, sepsis associated with proximal fistulas tend to be more severe because of the corrosive nature of digestive fluids secreted in the upper part of small bowel leading to a generalized peritonitis. Fistula drainage should be ensured by intubation of the tract. Quantitation of the fluid secreted and skin protection is also very important.

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To determine the site of origin, water soluble contrast fistulography is performed after the patient is stabilized. The length of the fistulous tract, associated abscess and condition of affected bowel can be determined. Bowel rest is provided by not allowing patients oral intake, but providing patients with parenteral nutrition.

Early surgery indicated only in the case of abscesses not amenable to percutaneous drainage techniques. On the other hand, after 6-8 weeks of conservative management surgical reconstruction is recommended. Mortality data shows the highest figures and highest fistula recurrence rates for operations performed between the first and sixth weeks following fistula formation.

Anastomotic leaks from small-intestinal anastomoses are uncommon due to the rich blood supply, low bacterial content and rapid epithelialization of the small bowel. Disruption may be followed by local abscess formation or peritonitis. Enterocutan fistula formation may occur as the process extends from the anastomosis to the abdominal incision or drain sites.

The majority of enterocutaneous fistulas are the result of operative complications in approximately 25% of cases, however, spontaneous fistula formation may occur due to inflammatory bowel disease, irradiation and vascular disease. The typical presentation involves cellulitis and purulence in the surgical wound about 5 to 7 days after operation, with drainage of intestinal content occurring in the next 2-3 days. On the other hand, bowel leakage will result in an abscess formation and peritonitis without a cutaneous fistulous tract. When total parenteral nutrition is administered, a higher rate of spontaneous fistula closure was observed. Somatostatin was shown to reduce higher fistula output, a spontaneous closure rate of 82%, and an average time to closure of 5.4 days. It was also shown that somatostatin in addition to total parenteral nutrition, allows spontaneous closure to occur earlier, though the rate of spontaneous closure is not increased. The operation of choice is resection of the fistula-bearing segment and primary anastomosis. The spontaneous closure rate of enterocutan fistulas ranges between 50 and 80% with a mortality rate of 28%. The success rate of operative closure may reach 90%.

Colonic anastomoses are more prone to disruption and leakage than that of small bowel anastomoses. The explanation may be the presence of large quantity of pathogenic bacteria within the colonic flora, slow recovery from ileus and a single thin layer of circular muscle to support sutures. The more distal the anastomosis in the colon, the greater the risk of leakage. Subclinical leakage can be demonstrated radiographically in 20%, and clinical leakage is present in 5% in rectal anastomoses, while leakage after ileotransverse colostomy rarely occurs. Colonic anastomotic leaks usually occur between 7 and 14 days after operation with symptoms of an intraabdominal or pelvic abscess. If infection is localized, percutaneous drainage of intraabdominal abscess is performed. Spontaneous closure is very likely with colocutaneous fistulas approaching 75%. Earlier operative intervention is indicated if peritonitis or septicaemia is present. Treatment consists of diversion of the fecal stream by proximal loop colostomy to prevent further soilage, and the establishment of pelvic drainage. The lack of spontaneous closure by 6 weeks is also an indication for surgical repair.

Definitive operative treatment consists of resection of the fistula and affected colonic segment, with primary anastomosis and temporary diversion of the fecal stream by colostomy with a success rate of 70 to 80 %.

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Bladder reconstruction and repair of bladder fistulas

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SURGICAL ANATOMY The bladder is a hollow organ for urine storage. Its capacity is 200-400 ml. It is composed of a relatively strong muscular wall, a mucosal lining and a virtual adventitia which is replaced by the peritoneum at the bladder dome. The full bladder is palpable as a supple mass. At the base of the bladder, there is the trigone which is fixed as opposed to the mobile upper part. The bladder lies behind the pubic symphisis. The uterus is located behind, and the vagina lies below the bladder. Occasionally, loops of the small bowels may reach the bladder dome. The levator ani and the obturator muscles can be found lateral to the bladder. In the fatty tissue behind the pubic bone, a venous plexus drains the bladder. The bladder is supported by the pubovesical and dorso-lateral ligaments, but are weak anatomical structures. The blood supply is provided by the vesical branches of the hypogastric artery. Vesical veins drain into the iliac veins. The regional lymph nodes are located in the triangle between the external and internal iliac arteries and the obturator nerve.

BLADDER INJURIES IN RELATION TO GYNECOLOGIC SURGICAL PROCEDURES *Sztakó* (1-2) reported on 30 intraoperative bladder injuries that occurred in the Department of Gynecology and Obstetrics of the Uzsoki Hospital, in the past 30 years. Five injuries occurred during vaginal hysterectomy and 25 were associated with laparotomy. Of these, in 8 cases, the bladder was injured in connection with the abdominal incision, and in 17 patients it was damaged during the intraabdominal procedure. Indications of these gynecologic interventions include: uterine fibroids (12 patients), carcinoma of the cervix (6 patients), endometrial carcinoma (2 patients), adnexal mass (2 patients), ovarian tumor (3 patients), ovarian cyst (1 patient), ectopic pregnancy (2 women) and one injury during a cesarean section. From the 30 incidental bladder injuries, 24 were repaired by gynecologic surgeons, and only 6 cases required consultation of a urologist. Thus, gynecologists are apparently prepared to manage such injuries.

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In general, injury to the bladder during gynecologic surgery is most frequently encountered at the time of 1. blunt dissection of the bladder during both vaginal and abdominal hysterectomy, 2. when the abdominal incision is made, 3. during secondary surgical intervention, and 4. when closing the peritoneum in the pelvis.

Diagnosing a penetrating bladder wound is not always easy, particularly in the case of a wide bladder, because there is no urine appearance in the operative field. Any suspected bladder injury must be investigated thoroughly and an appropriate repair completed without delay. Unrepaired damage and inadequate initial treatment may necessitate additional surgery, damage the patient's health and may even jeopardize survival. The repair should be performed under direct vision, thus possibly requiring sufficient tissue mobilization. Abdominal exploration usually gives adequate visibility for placing sutures. However, not only the recognition but also the closure of a penetrating bladder injury is more difficult during vaginal surgical procedures. For this reason, it may be desirable to convert the vaginal approach to laparotomy in the presence of extensive laceration. Fifty percent of bladder injuries occuring during vaginal surgery have been reported to be conclusively treated abdominally. Technically, the closure of the vesical wound is quite feasible. Unlike most gynecologists who repair the injury in two layers, we prefer to perform a one-layer closure with a running suture. After closing the bladder, the watertightness of the repair is tested by instilling 150-200 ml of sterile water into the bladder. A catheter is implanted for 6-8 days.

VESICOVAGINAL FISTULAS In our material, 60% of the vesicovaginal fistulas were causally related with simple gynecologic surgery, 30% with radical procedures and 10% with obstetrics intervention. Postirradiation fistulas are not infrequent following radiation therapy.

A vesicovaginal fistula is usually diagnosed by vaginal examination and are easily found in most cases. Localization of the fistula may be facilitated by filling the bladder with colored water, e.g. methylene blue, which can be seen in the vagina. For small fistulas, the leakage may not be evident until the bladder is completely filled. Cystoscopy is helpful in evaluating larger fistulas.

Vesicovaginal fistulas should be surgically managed, either by vaginal approach *(Figure 1)* or, in the case of large fistulas, by secondary transvesical closure *(Figure 2)*.

The principles of fistula closure are summarized as follows: 1. postpone the repair for 6 to 8 weeks after gynecologic procedure, until the operative field is free of inflammation and edema, 2. the fistula must be meticulously and completely excised, 3. watertight closure is important and best accomplished by utilizing two or three-layer closure, and 4. bladder drainage should be maintained with an indwelling catheter for 10-14 days.

Postirradiation fistulas are the most difficult to repair due to irradiation tissue damage resulting in impaired blood supply and fibrosis. The vesical and vaginal walls are fairly bloodless, fragile, fibrotic, and the margins, as a rule, cannot be approximated without tension. Thus, healing is severely compromised. Many authors believe that a new layer of tissue should be introduced into the closure to provide adequate blood supply. Alternatively,

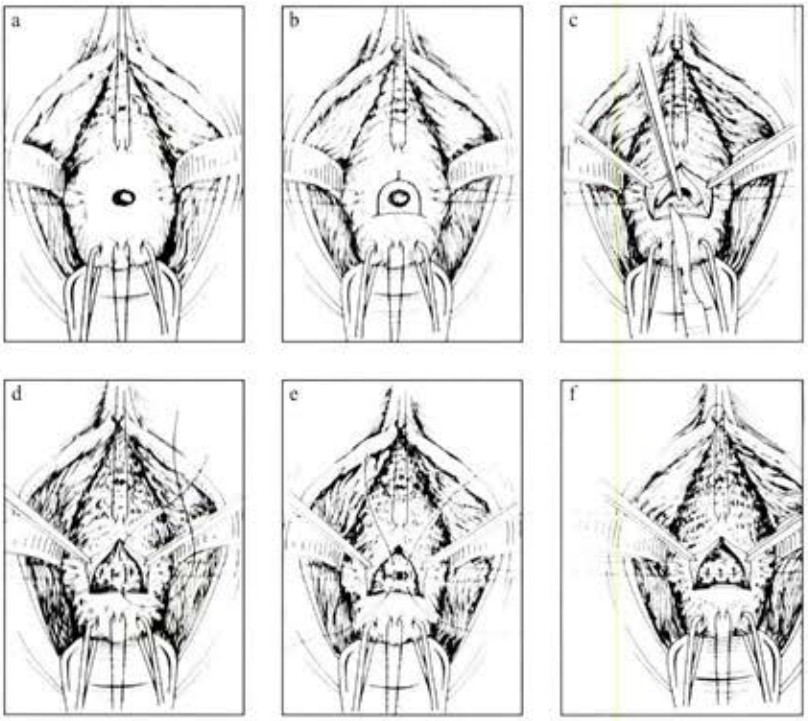

Figure 1. Vesicovaginal fistula repair. The fistula is seen from the vagina (a), and an incision is made around the fistula (b). The fistula is completely excised (c), followed by two-layer closure with interrupted fine sutures (d – first row of stitches, e and f – second row of fine sutures).

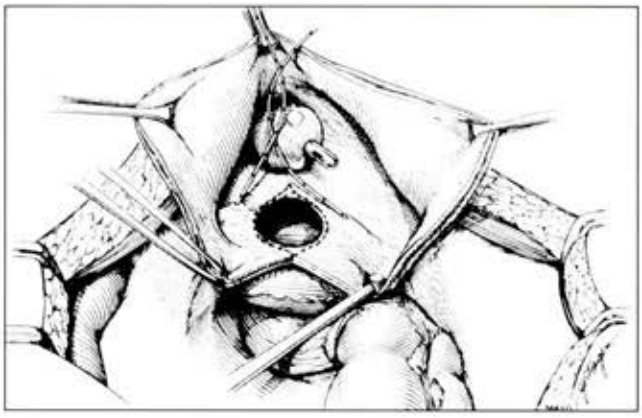

Figure 2. Large vesicovaginal fistula, best repaired by transvesical approach

one of the urinary diversion techniques can be utilized, and I am in favor of this approach.

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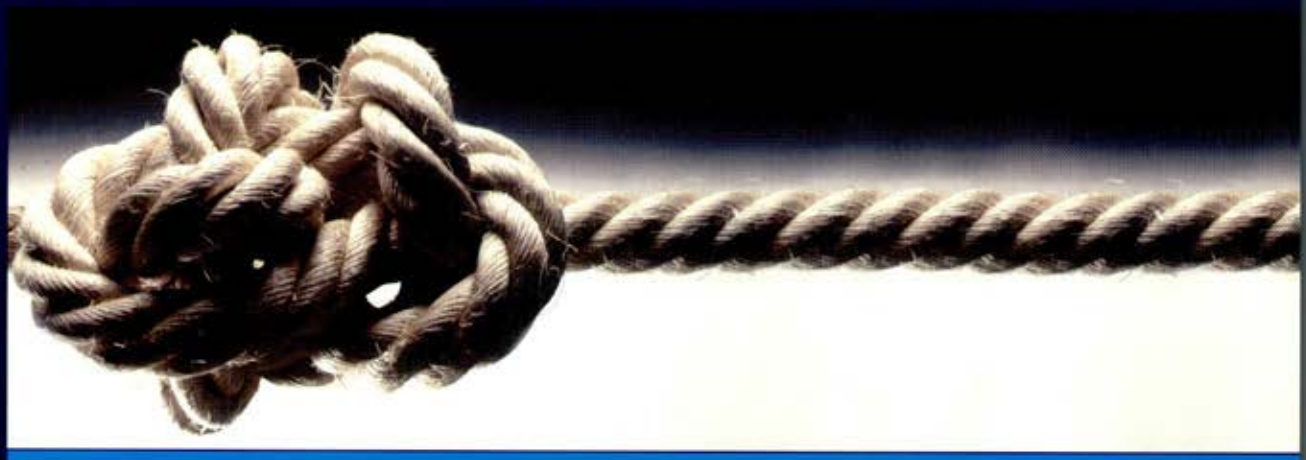

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Ureteral plastic surgery

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SURGICAL ANATOMY The ureter is a 24-30 cm long, thin duct that connects the renal pelvis and the bladder. The ureteral wall consists of an inner epithelial layer, smooth muscle, and adventitia. The muscle has a superficial longitudinal, a circular medial and a longitudinal deep layer. The upper (abdominal) ureters lie in the perirenal fat, more distally near the Gerota fascia. At the level of the third and fifth lumbar vertebrae, the infundibulopelvic ligaments containing the ovarian vessels cross over the ureters lying posterior to the mesentery of the descending colon on the left, and behind the cecum and ascending colon on the right. Distally they run on the psoas muscle and cross the iliac vessels just below the bifurcation of the common iliac vessel on the right, and just above it on the left. Below the pelvic brim (pelvic ureters), they run on the lateral pelvic wall, inferior to the infundibulopelvic ligaments attached to the medial leaf of the board ligament. Before passing through the vesicouterine ligaments (ureteral tunnel), the uterine arteries cross over the ureters lateral to the cervix at the level of the internal os. The ureters terminate in the trigone of the bladder *(Figure 1, 2, 3)*.

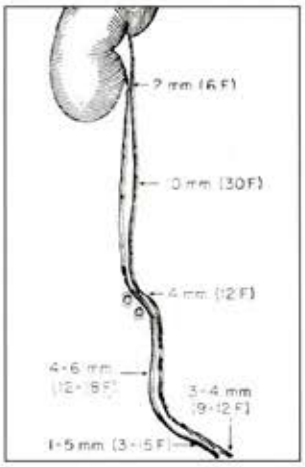

Figure 1. Anatomy of the ureter

URETERAL INJURY Albeit not common, injury to the ureter invariably occurs during gynecologic surgical procedure, and is of particular concern when performing radical hysterectomy. The most common sites of ureteral injuries include 1. pelvic brim where the ureter lies close and inferior to the infundibulopelvic ligament, 2. lateral to the cervix at the level of the internal os where the uterine artery cross over the ureter, and 3. lateral to the vagina where the ureter is in close proximity when entering the bladder *(Figure 4)*. Injury to the ureters is by no means less common during vaginal hysterectomy because of the significant changes in the anatomy, owing to the pulling down effect of the uterus *(Figure 5)*.

Coliform pain in the ipsilateral lumbar region, similar to renal colics caused by ureteral stones, is the primary symptom of ureteral occlusion. The significantly dilated proximal urinary tract above the obstructed ureter, can easily be detected on the ultrasonography. Occasionally, decreased gastrointestinal motility may accompany ureteral occlusion.

The incidence of injuries to the ureters in the Department of Gynecology and Obstetrics of the Uzsoki Hospital during the past 30 years, have recently been reviewed *(1-2)*.

Figure 2. Intravenous pyelography. Closed arrows indicate the crossing of the iliac vessels.
I upper, II middle, and III lower ureter
UPJ ureteral-pyelon junction UO ureteral orifice

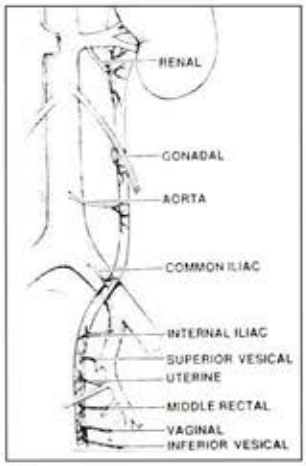

Figure 3. The blood supply of the ureters. The blood supply is segmental, highly variable and is provided by different arteries. The ascending and descending branches of the supplying arteries form a rich longitudinal anastomotic plexus in the adventitial tissue of the ureters. Because of the segmental blood supply and rich arterial plexus, it is possible to ligate some of the supplying arteries without compromising the ureteral blood supply. The adventitial sheath, however, may not be damaged.

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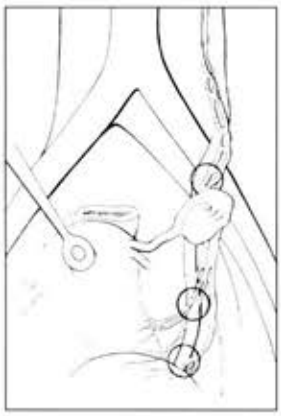
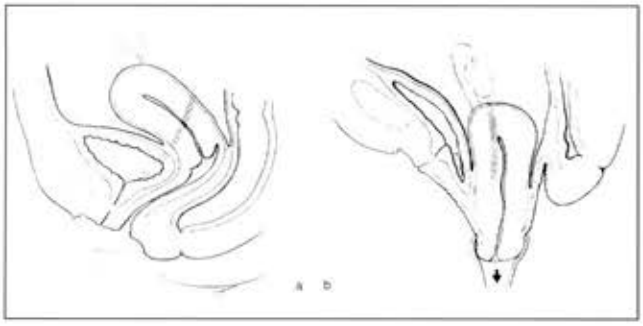


Figure 4. The most common sites of ureteral injuries during gynecologic surgery

Figure 5. The position of the ureter - dash line - has changed as a result of pulling down the uterus. Injury to the ureter may easily occur unless the bladder and the ureter are dissected far away from the uterus. *(a)* normal anatomy *(b)* anatomical changes when the uterus is pulled down at the time of vaginal hysterectomy



During this period, 13 ureteral injuries occured. Of these, one was bilateral, 9 lwere on the left, two occurred on the right side and one was associated with an additional injury to the bladder. The ureter was injured five times during dissection of an adnexal mass, twice during radical hysterectomy, and in six instances at the time of simple hysterectomy for uterine fibroids. In 7 cases the injuries were identified intraoperatively and during the postoperative period in six patients. Management of the ureteral injuries included removal of the obstructing stitch in six patients, ureterolysis in two, ureterouretero anastomosis in three cases and two nephrectomy were performed more than 20 years ago.

URETERAL ANASTOMOSIS There are various surgical techniques for ureteroureterostomy, *(Figure 6)* but the principles are similar: 1. the lacerated or necrotic portion of the ureter should be excised, 2. there should be no tension on the anastomosis, 3. the anastomotic site should be dissected free of the peritoneum, 4. the blood supply should be adequate, 5. the anastomosis should be watertight but not ischemic, and 6. the urine should be drained. In the past, prior to the introduction of stents, the anastomosis was protected with transrenal drainage *(Figure 7)*. Today the anastomosis is made over an ureteral stent *(Figure 8)*. The ureteral anastomosis should be performed using 3-0 or 4-0 absorbable suture. The sutures are placed 1-1.5 mm apart from each other. Skilled and gentle technique is essential, with no tension on the stitches. Uretro-uretrostomy is mostly indicated for injuries of the middle and upper ureter. Anastomosis of the lower segment of the ureter, 4 to 5 cm above the bladder, is more difficult and likely to be unsuccessful. The stent is usually removed after 3 to 4 weeks by extracting the distal end from the bladder with optical forceps.

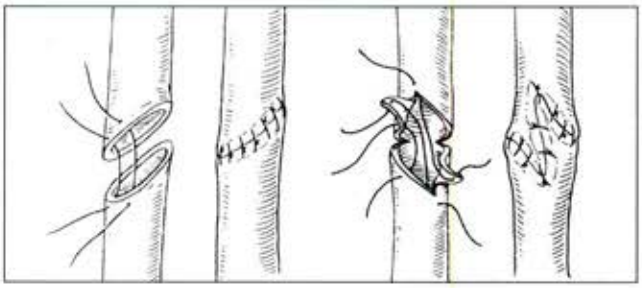


Figure 6. Various techniques of ureteral anastomoses

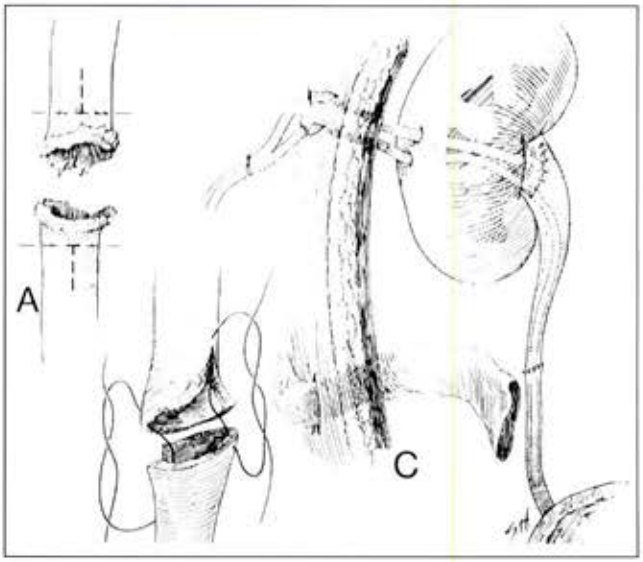


Figure 7. Ureteroureterostomy A The damaged edges of the ureter are cut, and the ureteral ends are spatulated to provide greater anastomotic diameter. C In the past, the anastomosis was protected by transrenal drainage. Another drain is placed at the site of the anastromosis

Figure 8. Ureteroureterostomy A double J ureteral catheter has been passed through the ureter extending from the renal pelvis to the bladder, to protect the site of the anastomosis.

URETERONEOCYSTOSTOMY "En masse" ligature may be treated by simple removal of the stitch or stitches during the secondary laparotomy, unless the ureter is lacerated or necrotic. In the presence of serious ureter damage, reimplantation of the ureter

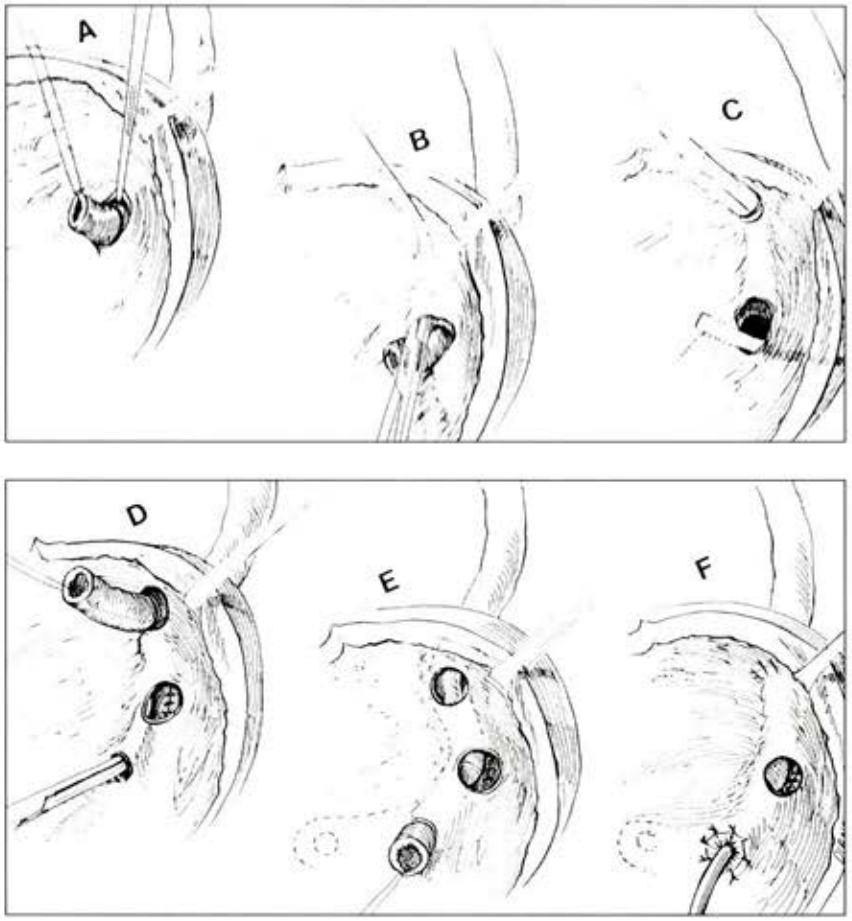


Figure 9. and 10. Ureteroneocystostomy (see text)

into the bladder is recommended. We utilise the Politano-Leadbetter technique. After opening the bladder, a clamp is used to create a submucosal tunnel through the bladder wall. We pull the ureter through the submucosal tunnel and fix it with a uretero-mucosal sutures. To stabilise the anastomosis, the ureter is sewn to the outer bladder wall (vesico-ureteral sutures). Spint catheter is used to protect the ureter implantation *(Figure 9, 10).*

URETEROVAGINAL FISTULA Partial opening of the ureter with forceps, scissors or stitches which has not been repaired may result urine leakage. The extravasated urine into the surrounding connective tissue will find its way toward the site of the vaginal closure, resulting in a ureterovaginal fistula. This is followed by relief of the lumbar pain and resolution of the dilatation of renal pelvis and the ureter. The urine leaks continuously into the vagina day and night. Attempt to pass a catheter into the ureter fails beyond 3 to 5 cm from the urete-rovesical junction. Surgical repair is usually recommended and includes reimplantation of ureter into the bladder. If the ureteral length is insufficient, the psoas hitch may be utilised. With more extensive injury or ureteral weakness, a segment of the ileum can be used for repair. With this technique, the entire ureter can be replaced from the pyelon to the lower bladder dome *(Figure 11).* I have performed this procedure only once in my practice.

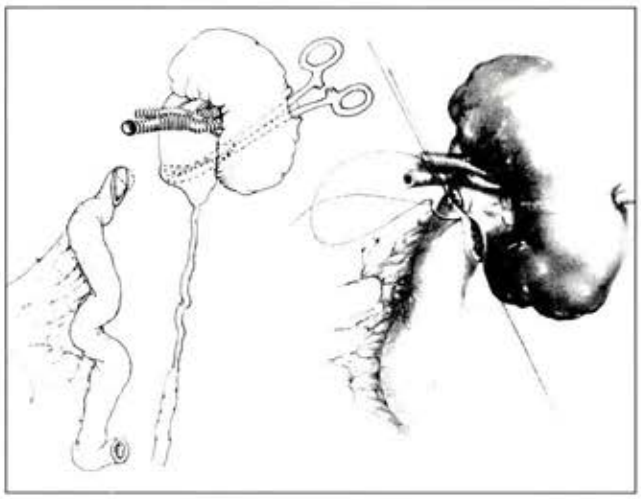


Figure 11. A segment of the ileum is used to replace the ureter

CONCLUSION In conclusion, it is important to emphasise that ureteral injury should be avoided whenever possible. The three major points in this context are: 1. adequate preoperative workup; including passing an ureteral catheter in the presence of upper urinary tract dilatation, 2. skilled surgeon, and 3. very gentle (atraumatic) surgical technique.

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Ureteral replacement

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INTRODUCTION Ureteral replacement in gynecologic oncology may be necessary in the following cases: 1. management of complications, e.g. accidental intraoperative injuries, or management of postoperative strictures or fistulae, and 2. resection of primary or recurrent pelvic tumors.

Resection of the terminal ureter with or without partial or total removal of the urinary bladder is frequently practiced by gynecologists as part of salvage surgery in recurrent cervical cancer. In recent years, based on the disappointing results of radiotherapy in cases where the Wertheim procedure was abandoned due to tumor involvement of the ureteric channel, we have performed more Wertheim Piver type 5 interventions, with resection of the terminal ureter and partial resection of the bladder, "en block" with the infiltrated parametrium.

Accidental injury to the ureter may occur in almost any type of gynecologic operation. In order to avoid ureteral injuries or to reconstruct the ureters without long term sequelae after accidental injury, the following basic principles should be taken in consideration:

1. Basic knowledge about the ureter anatomy and physiology is mandatory.

2. Ureteral injury can be avoided by careful pelvic dissection. In all cases where pelvic dissection is difficult, e.g. malignant tumors, endometriosis, extended adhesions, the ureters should be exposed at the beginning of the dissection, even if this procedure does not constitute an integral part of the planned intervention. The chance of ureteral injury is smaller, if they are exposed. The simplest way for gynecologists to localise the ureters is the following. After the round ligament has been divided, the peritoneum is incised cranially, lateral to the infundibulopelvic ligament. The infundipulopelvic ligament is pulled medially and the retroperitoneal space is dissected by blunt division of the space between the common iliac vessels and the posterior leaf of the broad ligament. This way, the ureter can be exposed easily on the surface of the posterior leaf of the broad ligament, beneath the ovarian vessels.

3. If ureteral injury is suspected intraoperatively, the dissection of the ureter is obligatory for immediate and proper repair.

4. In the postoperative period, the signs of ureteral injury should be recognized as early as possible in order to reconstruct it without impairment of renal function or late sequelae.

GENERAL CONSIDERATIONS In order to obtain adequate results, some basic principles of ureteral surgery must be respected in any reconstructive procedure of the ureters.

1. Ureters should be handled gently with noncrushing clamps and forceps, preferably with specially designed ureteric forceps.

2. In order to preserve ureteral blood supply, complete dissection of the ureter from its bed should be limited to that required for the operation, if possible, the peritoneal attachment should be preserved and the dissection plane should always be outside the adventitial sheath.

3. Dissection should be sufficient to make a suture line without tension.

4. One of the determinant factors regarding the success of the anastomosis or reimplantation, is the quality of the suture material. Non-absorbable or slow absorbing monophilament materials are preferred. In our practice, we mostly use PDS for this purpose. A watertight suture line should be made with the smallest possible amount of suture material.

5. Although there is controversy regarding the use of stents, in our practice, we always splint the ureteric sutures or reimplantations with a suitable stent. Most surgeons state that stents stabilize the ureters during healing and maintain a normal lumen, thus preventing stenosis. Other surgeons feel that stents are associated with inflammation, leading to suture breakdown or late stenosis. According to our experience, stents can be kept in place for a longer period of 4 to 6 weeks. Silastic tubes, single

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or double-end pigtail ("J") catheters are recommended. Plastic infant feeding tubes can also be used as ureteral stents. In recent years, we have been using plastic infant feeding tubes, fixing them to the inner bladder wall with one absorbable stitch. One of the ends of these stents is placed in the renal pelvis, or in case of infant feeding tubes pushed just 5-10 cm above the anastomosis, the other end is coiled in the bladder. The stents will be removed through cystoscopy.

6. In case of difficult repair, the result will be more successful if the site of anastomosis is surrounded with an omental pedicle. The well vascularized omentum prevents inflammation and fibrosis, thus preventing stenosis or fistula formation.

7. The site of the anastomosis should be drained to prevent accumulation of the eventually extravasated urine.

8. Antibiotics are generally advisable.

URETEROURETERAL ANASTOMOSIS Ureteroureteral anastomosis (anastomosis between the ends of the transsected ureter) and transureteroureterostomy (the "Y" anastomosis; the anastomosis of the upper part of the transsected ureter into the intact ureter on the opposite side), can be performed usually in cases of ureter injuries above the pelvic brim. Anastomosis in the lowest 5 cm is technically difficult, with unsatisfactory results. Even the decision to perform a ureteral anastomosis above the pelvic brim should be made with thorough consideration, as the ureteral suture has a higher risk of stenosis or urinary leakage than other safer procedures, such as the reimplantation with psoas hitch or ileum segment interposition. The "Y" anastomosis technique should be used only in carefully selected cases as the normal function of the contralateral urinary tract may also be compromised.

The principles of the technique are as follows. The ureter above and below the injury must have a good blood supply. Mobilization of the ureter on either side of the injury should avoid the damage of the adventitia. To ensure a tension-free anastomosis, the mobilization of the ureters should allow the two ends when brought together to overlap by 2 cm without tension. If the cut edges are not "clean" they should be freshened, excising the ureteral ends at the level of viable tissue. The free ends should be cut oblique or incised longitudinally for 4-5 mm, "spatulated", to ensure a wide anastomotic site. The oblique anastomosis is far less likely to stricture than an unspatulated one. The ureter is splint by inserting one of the stents mentioned above. The two ends are then sutured with 6-8 stitches of 4-0 slow absorbing monophylament material. The stitches should be tied gently without unnecessary tension. The suture should be watertight. Too many stitches should be avoided because they may produce ureteral stricture. Although not recommended in the literature, we have also used continuous running sutures with good results. The ureteral stent was left in place for six weeks.

THE BOARI FLAP One century ago, *Boari* described an ingenious technique for bridging the gap between the bladder and the ureter. The technique uses a bladder flap for a tension-free reunification of the ureter, cut in its distal portion with the bladder. The technique is still used, mainly by urologists, but most centers abandoned it in favor of the safer ureteroneocystostomy with or without psoas hitch. The Boari flap procedure is more often associated with reflux and carries a higher risk of stenosis, secondary to flap ischemia.

The main steps of the technique are as follows. A flap is excised from the bladder wall with its base on the side of the further ureteral implantation. To avoid ischemia of the tip, a good blood supply is crucial. The superior vesical arteries should be preserved. It must be kept in mind, that the longer the flap, the wider the base should be for sufficient blood supply. To avoid flap ischemia, the base is usually more than 4 cm wide. The ureter is implanted in the free end of the flap. The submucosal tunnel technique is recommended in order to prevent urine reflux. Stent is inserted. The flap is tubularized using interrupted stitches. The bladder is closed. A suprapubic catheter is inserted for proper drainage of the bladder. The pelvis should be drained.

THE PSOAS HITCH TECHNIQUE The psoas hitch procedure is also used for reconstruction of the lower portion of the ureter. This procedure is preferred by gynecologists as it is a simple, quick and reliable technique. It bridges the gap between the bladder and ureter by mobilizing and pulling the bladder towards the ureter, stretching and fixing the upper lattermost portion of the bladder wall to the psoas muscle. The main steps of this technique are as follows. 1. The bladder is freed from its peritoneal attachments on both sides. For this purpose, the paravesical spaces on both sides and the Retzius space are opened. The contralateral obliterated umbilical artery or even the superior vesical artery can be divided for a greater mobility. 2. The bladder is opened transversally, and with the fingers placed in its dome, the surgeon stretches it in a cephalad-lateral direction to the psoas muscle. Then the bladder wall is anchored with 4-5 interrupted stitches to the tendon of the psoas muscle. This way, the bladder is "lengthened" towards the ureter. The iliac vessels and the genitofemoral nerve should be avoided. 3. The ureter is implanted in the cranial part of the elongated bladder. The techniques of ureteric implantation are not detailed here as they constitute the subject of my co-lecturer. The submucosal tunnel, the "fish mouth" procedure can be used. Based on a large number of cases, we have good experience with the "split cuff nipple" technique as proposed by *Turner-Warwick* and *Ashken*. In this procedure, the ureter is simply pulled through the bladder wall, incised longitudinally about 1 cm and is everted while fixing it to the bladder wall. Thus a "nipple" is formed, assuring the antireflux mechanism. 4. The bladder is closed longitudinally. Suprapubic catheter is placed in the bladder and a drainage tube is left in the pelvis.

To bridge a larger gap between the ureter and bladder, the psoas hitch technique can be combined with the Boari procedure. Although in these cases, the bowel segment interposition is a more successful procedure.

ILEUM SEGMENT SUBSTITUTION In lesions of the upper two thirds of the ureter, or extensive resections where reimplantation is technically impossible, the interposition of an ileum segment is the replacement method offering the best long term results. The technique resembles the Bricker conduit procedure, but the distal end of the conduit is not brought out to the skin, but rather is anastomosed into the bladder. The method has further advantages: any length of ureter can be replaced, even the entire ureter from the kidney to the bladder, and if necessary, both ureters can be implanted in the ileum segment. The main steps of the procedure are as follows. 1. An ileum segment of optional length is isolated from the terminal ileum. When planning the ileum segment, isolation of the mesenterium should be transluminated in order to assure proper vascularisation of the bowel segment. The small bowel is reconstructed with an ileo-ileal anastomosis. In our practice, we perform a mechanical side-to-side anastomosis using a GIA type linear stapler. The mesenteric defect is closed with a few interrupted stitches. 2. The ureter or ureters are implanted in the oral end of the ileum segment. Again, the techniques of ureteral implantation will be discussed elsewhere. I would just like to note, that when both ureters are to be anastomosed to the bowel, we have had positive results with a large number of patients, using the less known Wallace technique. Briefly, this is as follows: the ureters are "spatulated", incised longitudinally about 1,5 cm. Thus forming two triangles on the ends of both ureters. The two ureters are first sutured together; the ureters are placed opposite each other, and one side of each triangle is sutured to the other. A "ureteric plateau" is then formed from the ends of the ureters. Two stents are placed in the ureters and pulled thorough the ileum segment. Finally, the ureteric "plateau" is sutured with a continuos running slow absorbing suture to the end of the bowel. The aboral end of the ileum segment is anastomosed to the bladder. In our practice, we prefer a one layer inverting continuos Schmieden suture, using an atraumatic, monophyhilament, slow absorbing suture material (4-0 PDS). In this type of anastomosis, the mechanical tension is uniformly distributed in the suture line, achieving a safe and watertight anastomosis.

In exenterative procedures, a sigmoid conduit might be used for the same purpose.

RENAL AUTOTRANSPLANTATION Theoretically, renal autotransplantation into the pelvis offers excellent results when performed by an experienced renal transplant surgeon. As far as we know, the method is not used in gyneco-oncologic operations.

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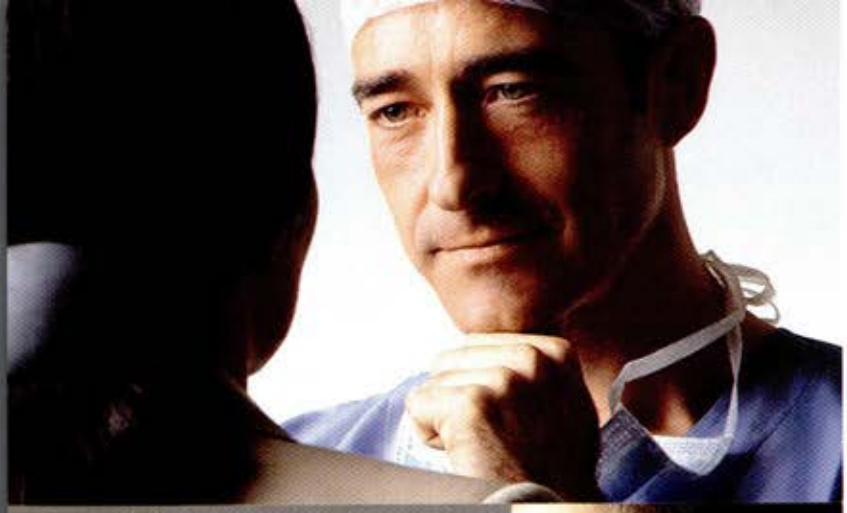

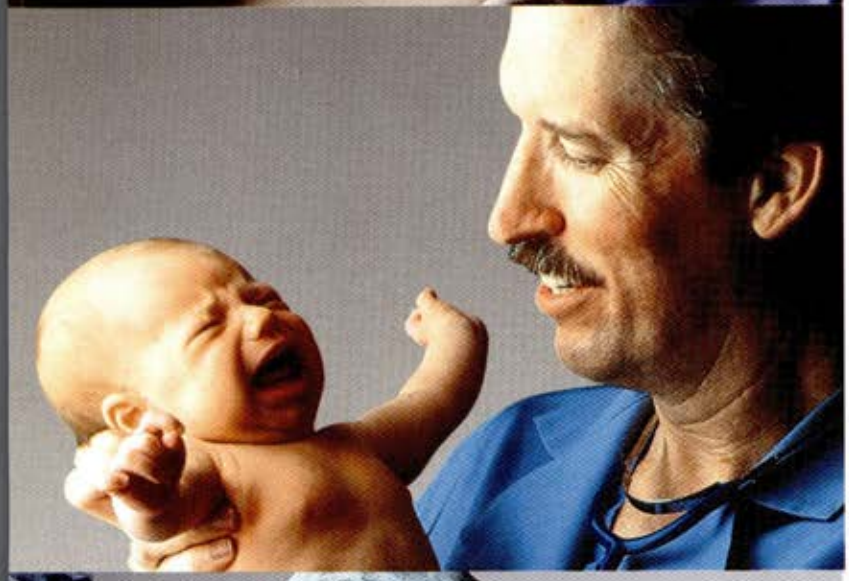

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Techniques of ureteral implantation

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INTRODUCTION Ureteral implantation is required in order to preserve the flow of urine from the kidney to the bladder when trauma, obstruction, or elective resection have disrupted ureteral integrity and function. In such circumstances, if urinary flow cannot be preserved by the placement of a ureteral catheter, then surgical correction of the pathology is required and the ureter must be "implanted". Since the type of implantation will be mediated to some degree by the anatomic location and etiology of the defect, it is appropriate to review the anatomy of the ureter and its blood supply.

ANATOMY The ureter emerges from the renal pelvis, descends along the anterior surface of the psoas muscle and crosses the pelvic brim. On the right side, the ureter is close to the lateral edge of the vena cava. This upper half of the ureter is considered the abdominal ureter and when the ureter crosses the iliac vessels at the level of the bifurcation of the common iliac artery, it becomes the pelvic ureter. The ureter is approximately 25-30 centimeters in length of which roughly half is abdominal and half pelvic.

The pelvic ureter passes along the posterior lateral pelvic wall, adjacent to the anterior border of the greater sciatic notch and slightly anterior to the hypogastric artery until it reaches deep into the pelvis at the level of the ischial spine. In this area, the ureter lies medial to branches of the anterior division of the hypogastric artery and lateral to the peritoneum of the cul-de-sac of Douglas, crosses along the lateral side of the uterosacral ligament to enter the cardinal ligaments. Approximately 1.5 cm lateral to the cervix and at the level of internal cervical os, the ureter passes beneath the uterine artery lying along the anterior surface of the levator ani muscle. As the distal portion of the ureter approaches the bladder, it passes medially over the anterior vaginal fornix before entering the trigone of the bladder.

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The blood supplies of the ureter derive from different sources based on its different segments. The renal and ovarian arteries provide for the superior segment, the middle segment derives its blood supply directly from the aortic branches and from the common iliac artery. The pelvic ureter is vascularized by multiple anastomotic vessels, including branches from uterine, vaginal, medial hemorrhoidal and vesicle arteries. The veins follow a similar intercommunicating network. Both arteries and veins can be easily seen as prominent longitudinal vessels that course within the adventitia of the ureter. The rich collateral blood supply of the ureter allows extensive mobilization from its retroperitoneal course as long as this longitudinal blood supply is not altered.

ANATOMICAL LOCATION OF URETERAL INJURIES Ureteral injury usually occurs in one of four strategic anatomical locations: 1. in the cardinal ligament when the ureter passes beneath the uterine vessels, 2. beyond the uterine artery where the ureter lies adjacent to the anterior vaginal wall and enters the base of the bladder, 3. at or below the infundibulopelvic ligament and 4. along the course of the broad ligament. The ureter can, of course, be injured in its abdominal segment, especially during aortic-caval lymphadenectomy or right colon surgery.

Several steps can be taken to prevent ureteral injuries. The most important aspect of this issue is familiarity with the anatomy, the physiology and contributing factors such as extensive endometriosis, adhesions, neoplasms and/or inflammation which could increase the risk of injury. Preoperative pyelogram or other imaging techniques including ultrasound, CT scan, or MRI can be helpful in the detection of ureteral abnormalities such as partial or complete obstructions, deviation, dilatation or congenital anomalies in certain patients with high probability. The value of preoperative insertion of ureteral catheters has been questioned and, in our experience, is not necessary in all cases. However, in certain cases, such as extensive pelvic endometriosis with retroperitoneal fibrosis or malignancy, or severe retroperitoneal fibrosis and adhesions, it

has been helpful in both laparoscopy and laparotomy for identification of the ureter.

When identification of the ureter intraperitoneally is not possible, the broad ligament can be opened by transacting the round ligament and extending the incision superiorly along the lateral border of the infundibulopelvic ligament. By reflecting the peritoneum medially away from the lateral pelvic side wall, the ureter can be visualized attached to the undersurface of the peritoneum. At laparotomy, the ureter can be palpated for confirmation. If identification is still difficult, the ureter can be located at the pelvic brim as it crosses the bifurcation of the common iliac artery. From this point the ureter can be traced inferiorly towards the back of the bladder as it passes beneath the uterine artery and vein. At laparoscopy we have found that the magnification provided by the laparoscope, video camera and the monitor makes identification of the ureter intraperitoneally much easier. However, if, due to intraperitoneal adhesions, endometriosis or obesity, identification of the ureter is difficult, the same technique of retroperitoneal dissection can be utilized for the identification of the ureter. We also have found that hydrodissection, which is done by injecting several ml of lactated ringer or normal saline retroperitoneally with laparoscopic needle or irrigator probe, can be very helpful. The peritoneum is elevated and an incision made over the peritoneum and the ureter can be identified. Dissection of the ureter can be continued from the pelvic brim to the uterine vessels. However, dissection of the ureter beyond the intact uterine vessels can be associated with bleeding and control of this bleeding itself could cause damage to the ureter. Hydrodissection is very useful during laser vaporization or excision of peritoneal pathology which overlies the ureter.

LOCATION AND INCIDENCE OF URETERAL DAMAGE Iatrogenic ureteral injuries are said to occur with a highly variable frequency. Among gynecologic procedures the figure is close to 2.5 percent as an upper limit. Most of these injuries occur during abdominal surgery; however, with the increased use of laparoscopically assisted vaginal surgery and with more extensive primary laparoscopic procedures, one can anticipate a higher rate of injury from the employment of thermal energy, laser energy, and endoscopic stapling devices.

The timing of ureteral implantation has traditionally been debated between those who suggest immediate repair and those who suggest nephrostomy with implantation delayed for weeks until the patient has recovered from the primary pathology. Modem studies have suggested that glomerular filtration is best preserved by rapid reversal of obstruction of the ureter, and function is best restored by immediate repair if possible.

RECOGNITION AND LOCATION Safe placement of clamps or sutures during oophorectomy or hysterectomy, especially during difficult cases, can avoid ureteral injuries. Newer techniques and instrumentation, such as laparoscopic linear staples or the application of thermal energies, have been utilized during laparoscopic procedures, and these demand familiarity, expertise and caution if injury to the ureter is to be avoided during pelvic dissections. The most common site of ureteral injury is in the distal 3 to 4 cm of the ureter between the uterine artery and the bladder. Application of clamps, sutures, staples or any kind of thermal energy in this area has to be done cautiously.

Trauma to the distal ureter can occur during extensive ureterolysis in the distal portion of the ureter during extensive pelvic surgery for malignancy, endometriosis and adhesions. In this situation, the injury results from stripping the blood vessels too close to the ureteral wall where the ureter is covered by the Waldeyer's sheet just before entering the bladder. The longitudinal veins and arteries provide an excellent collateral blood supply to the dissected ureter. However, should these vessels be traumatized, thrombosed or ligated in dissecting the ureter from its tunnel, a segment of the ureter may become avascular resulting in fistula or stenosis with obstruction.

Prompt recognition of ureteral injury intraoperatively is important considering that loss of kidney function has been greater when the damage is discovered postoperatively. Whenever there is a suspicion of ureteral injury intraoperatively, injection of intravenous indigo carmine (10 ml) with observation for spillage of the dye intra-abdominally, in our experience, has been very useful in diagnosis.

Kidney function can be quickly ascertained by inspecting the ureteral orifices and the bladder trigone with a cystoscope after intravenous bolus of 5-10 ml indigo carmine or methyline blue. This can be done by placing the scope through the urethra, or inserting a 30 degree scope through a small cystotomy incision. The dye will usually spurt from each ureteral orifice within three to five minutes. Should the ureteral orifice fail to spurt dye after the patient has been adequately hydrated, the ureter should be catheterized and its integrity be reassured. If obstruction is noticed, exploration of the ureteral course is required. In our experience intraoperative excretory pyelogram is cumbersome, time consuming and not helpful.

SURGICAL TREATMENT OF URETERAL PATHOLOGY Several factors must be kept in mind during the surgical repair of the ureteral injuries. 1. The ureter should always be handled gently, with noncrushing instruments. 2. Dissection of the ureter from its bed should be limited to that required for the operation. Unnecessary dissection has to be avoided to prevent compromise of the blood supply of the ureter. 3. Careful mucosa to mucosa approximation avoiding urine leakage and tension will allow the ureteral defect to be bridged by new growth of transitional epithelium and the growth of new smooth muscle across the gap in a few weeks. Most urologists and gynecologists prefer to insert a ureteral catheter for a few weeks post ureteral repair. Although different catheters are available, the

double end J catheter is the most popular, although this catheter usually requires insertion over a guide wire via cystoscopy. The soft silastic #8 tube can be inserted through the ureteral defect.

Diversion of the urinary stream above the repair usually is not necessary, as long as the ureteral defect is not large, the repair is technically satisfactory or the ureter is not lying in a bed of inflammation. A Jackson Pratt drain can be placed retroperitoneally at the time of the repair site, for prevention of the accumulation of urine which could interfere with the healing of the repair or anastomosis; but the drain should not provide strong suction at the anastomosis, lest a fistula be encouraged by continuous flow of urine from the anastomotic site to the drain.

Non-absorbable permanent suture material should never be used to repair the ureter. Number 4-0 delayed absorbable sutures are preferable. Careful approximation – not strangulating the tissue – without tension should be accomplished.

Based on the site of the ureteral injury or disease, ureteral anastomoses or ureteral implantation to the bladder should be performed.

There are several types of ureteral implantation available to the surgeon and the selection depends upon the distance from the ureteral defect to the bladder, and the condition of the vasculature to the ureter at the site of planned repair. The principles of each of these techniques will be discussed briefly in the remainder of this article.

URETEROURETEROTOMY IPSILATERAL The simplest ureteral implantation is joining two segments of ureter after there has been excision of a section pathology, or after the ureter has been severed either electively or inadvertently. Once the diagnosis has been made, the ureter is mobilized on both sides of the defect with care taken to preserve the vessels which run longitudinally on the surface of the ureter in its adventitia. Mobilization should be accomplished only for the purpose of being able to bring the two segments together without tension. If the defect between the two segments is too great, then ureteroureterotomy is not the choice for repair and other options should be considered.

An identifying suture is placed along the length of the ureter near the open end on each segment, and kept for traction. A # 8 ureteral catheter or soft silastic tube is passed cephalad through the ureteral defect to the hilus of the kidney and the other end is passed down through the distal ureteral segment to the bladder. The ureteral edges can be freshened by cutting across them with a scissor, until good vasculature has been identified and the edges are free of obvious pathology. Four sutures of 4-0 delayed absorbable suture material are then placed through the full thickness of the ureteral wall and are tied gently approximately 90% apart so that the ureter is brought together over the catheter or silastic tube. When possible, the ureter is then placed in the retroperitoneal space, and a Jackson-Pratt drain can be placed in the same space and brought through the abdominal wall where it is sewn in place and retained until there is no drainage postoperatively. Care should be taken to avoid placing strong suction directly near the ureteral anastomotic site, otherwise, such suction will pull urine through the anastomosis and encourage fistula formation. The bladder can then be opened and the intravesical portion of the ureteral catheter sewn to the bladder wall to prevent expulsion.

An alternative to the placement of conventional ureteral catheters or silastic tubes through the ureteral defect prior to anastomosis, is the placement a double J catheter from the bladder via a cystoscope by guiding this catheter tip to the kidney. The ureter is then anastomosed over this catheter as previously described. The advantage of the double J catheter is that it can be retained indefinitely without fear of extrusion and can be removed cystoscopically when healing is assured.

We recommend retention of the ureteral catheter for at least two weeks after the repair, and intravenous pyelography should be performed prior to removal to ascertain the health of the ipsilateral kidney. This same radiography should be repeated at intervals after the catheter has been removed to assure continued function without hydroureter or hydronephrosis.

URETEROURETEROSTOMY TRANSURETERAL On occasion, the ureter is injured or requires removal and only half its length can be preserved. One option for preserving the function of the ipsilateral kidney is the attachment of the remaining healthy portion of the ureter to the contralateral intact ureter. This can be done by mobilizing the ureter, again, with preservation of a blood supply, tunneling the ureter beneath the mesentery of the colon to the contralateral side of the abdomen. The intact ureter is then identified and mobilized sufficiently mesially, to permit excision of a 1 cm defect along its mesial wall. A ureteral catheter is then passed from the bladder up the intact ureter and out through the newly created defect into the abdominal cavity. A silastic "T" tube is tied to this catheter and drawn into the recipient ureter until one arm of the T is lodged in the ureter and the other arm remains extruded through the newly created defect. The ureteral catheter is then cut free and the long part of the T tube will now reside in the bladder. The cut end of the damaged ureter can now be anastomosed directly to the wall of the intact ureter, with one arm of the T tube stenting this new anastomosis by entering the ureter which is being attached. Again, 4-0 sutures are placed at 3, 6, 9, and 12 o'clock in a full thickness stitch to secure the two ureters together. When possible, the posterior parietal peritoneum is then closed over this anastomosis and the space is drained.

SKIN URETEROSTOMY On occasion, when a patient's prognosis is poor, or if there is wish to divert the ureter to preserve

kidney function when attachment to the bladder is impossible, a skin ureterostomy can be performed. The aim of this procedure should be to mobilize the ureter as little as possible consonant with preserving its blood supply and obtaining enough length to traverse the thickness of the abdominal wall. An exit site is selected which can best accommodate a stoma appliance and a button of skin is removed. The fascia is interrupted in cruciate fashion, a suture is placed at the ureteral edge along the ureter's long dimension, and the ureter is pulled through a stab wound in the previously prepared abdominal wall and brought to the skin opening. The adventitia is then anchored to the subcutaneous tissue or to the fascia, and a fish mouth incision is made from 3 to 9 o'clock in the ureteral edge. This flap is then sutured with fine delayed absorption sutures to the skin's surface, and a ureteral catheter or silastic tube is placed in the ureter up to the hilus of the kidney.

SUBMUCOSAL TUNNEL URETERONEOCYSTOTOMY The submucosal tunnel technique of ureteroneocystotomy has been found to be most useful in restoring the intramural anatomy of the ureter and in avoiding visocoureteral reflux. The ureter is carefully dissected from the site of the trauma or pathology and the devitalized tissue is removed. Adequate length of ureter is mobilized to avoid tension after the repair. Both sides of the bladder base and adjacent peritoneum are mobilized generously. After the dome of the bladder is opened transversely, the most dependent portion of the bladder wall that will reach the ureter without undue tension, is selected for the site of the submucosal tunnel. The tunnel is made from inside the bladder by making two small 5 mm parallel mucosal incisions, one approximately 1.5 cm above the other. The upper incision is extended to the bladder wall with a small scalpel blade and the free end of the ureter is brought in to the bladder by traction sutures. The submucosal tunnel is developed between the two mucosal incisions, following which the ureter is guided to the submucosal tunnel and sutured to the margins of the lower incision. The mucosa to mucosa anastomosis of the ureter to the bladder is performed be using number 4-0 delayed absorbable sutures and a silastic tube or ureteral stent is inserted. The upper mucosal incision of the tunnel is closed with two or three interrupted sutures, and the anastomosis is supported with delayed absorbable suture, placed in the muscularis of the bladder and seromuscular layer of the ureter. The bladder wall should be anchored firmly to the musculature of the adjacent pelvic wall or psoas muscle. The transverse incision in the dome of the bladder is closed longitudinally in one or two layers with 2-0 delayed absorbable sutures. The ureteral stent is kept in place for at least two weeks and, as mentioned earlier, the anastomosis site should be drained retroperitoneally with a Jackson Pratt drain for a few days.

DIRECT IMPLANTATION OF THE URETER INTO THE BLADDER The operation is frequently referred to as the "fish-mouth" procedure because the ends of the ureter are incised and splayed on each side for approximately 5 mm to produce two ureteral flaps that are sutured to the inside of the bladder wall. The ureter is dissected free from the site of the injury or pathology, and mobilized from its bed for a sufficient length to permit its implantation into the bladder without tension. The bladder can be mobilized to bring it up if the ureter cannot be mobilized sufficiently. The implantation is done as close as possible to the base of the bladder. An incision is made from 3 to 9 o'clock across the cut end of the ureter approximately 5 mm deep and a stitch is taken into each ureteral flap with a 4-0 delayed absorbable suture. A ureteral catheter is threaded into the ureter and is used as a guide for the suture placement. A small opening is made directly through the full thickness of the bladder wall, preferably close to the base of the bladder, the catheterized ureter is then passed through this hole in the bladder wall and the anastomosis performed by sewing each split end of the ureter to the mucosa of the bladder. The sutures are placed on opposite sides of the bladder incision so as to hold apart the slit end of the ureter. These sutures are tied, drawing the ureter against the mucosal surface. Anchoring sutures are placed in the external wall of the bladder and the adventitia of the ureter, to fix the ureter to the bladder wall. Any residual opening of the bladder wall is closed with interrupted delayed absorbable suture. The bladder wall can be anchored to the pelvic wall as close as possible to anastomosis, to relieve the tension on the ureteral vesical suture line. As mentioned before, a retroperitoneal Jackson Pratt drain is left for a few days and internal ureteral stent can be removed after two weeks. Intravenous pyelogram is performed approximately 4 weeks later to confirm proper healing of the anastomosis.

URETEROVESICAL ANASTOMOSIS FOR THE SHORT URETER Two techniques of ureterovesical anastomosis with psoas muscle hitch or Boari flap have been developed when the ureter is severely damaged or has to be resected more than 5 cm above the ureteral vesical junction. The lateral bladder peritoneum is incised from each side of the inferior ramus of the pubis and the bladder base is sharply dissected and mobilized from its fascial attachment to the upper vagina. The bladder wall should be freed from its peritoneal attachment on both sides. A horizontal incision is made on the anterior bladder wall and a finger is placed inside of the bladder. The cornu is elevated and anchored to the psoas muscle near the pelvic brim with a No. 2 delayed absorbable suture to ensure firm fixation. Following immobilization, funneling and anchoring the bladder wall to the psoas muscle, the ureteral anastomosis is performed by one of the methods described earlier, including direct mucosal to mucosal anastomosis, a fish-mouth procedure, or preferably the submucosal tunnel procedure. The ureteral and bladder mucosa are sutured together using a No. 4 delayed absorbable suture and an internal ureteral J tube catheter is inserted. The angles of the bladder incision are closed with interrupted seromuscular sutures. The implant is supported by three or four anchoring sutures of 4-0 delayed absorbable sutures in the seromuscularis layer of the bladder and the ureter. This technique has been suggested to be supe-

rior to the Boari flap technique, because the latter has been associated frequently with reflux and ischemia with secondary necrosis of the flap, especially if it is lengthy and the patient has received radiation.

URETEROENTEROSTOMY When the bladder has been removed or is deemed unfit for receiving a ureteral implantation, the ureter is generally placed in a segment of bowel which acts as a conduit to the skin, or the ureter is placed into a continent pouch most frequently constructed from an ileo-colic segment. The technique of ureteral implantation will vary depending on whether a tubal section of intestine is the target of ureteral implantation, or whether the ureters are to be implanted into a pouch.

Implantation into a bowel loop denies the surgeon an opportunity for sewing on the bowel mucosal side. Thus, the ureters are mobilized and spatulated as previously described. A section of bowel is identified for implantation which is generally away from the mesenteric blood supply to the bowel, and preferably on the ventral surface, if the bowel loop is to be stretched horizontally across the abdomen. A button of bowel wall is excised and hemostasis is secured. The spatulated ureter is brought beneath the bowel and a stitch is placed at the apex of the spatulated area of ureter, and a bite of this same suture is passed through the musculomucosal layer of the bowel inside the new enterostomy site. This will assure a mucosa to mucosa attachment of this first anchoring stitch. Three other sutures of 4-0 delayed absorbable material are placed, attaching the ureteral flaps to the bowel wall. An anchoring suture placed in the same direction as the ureter runs, is passed through the uretoadventitia and attached to the recipient bowel.

Before the ureter is sutured to the bowel, catheters are placed in the ureter, run up to the renal pelvis and passed into the bowel segment all the way out through the open end, which is to be created as the stoma. These ureteral catheters can be sewn into the stoma for longer retention post-operatively.

Should the ureters be implanted in a continent pouch, the ureter is brought through the wall of the pouch before the pouch is fashioned and thus after splaying the end of the ureter, a mucosa to mucosa attachment can be made to the floor of the pouch in the same manner that was employed when sewing the ureter into an opened bladder. Reinforcing external sutures are placed and drainage is established as previously described.

LAPAROSCOPIC URETEROURETEROSTOMY Since the introduction of video endoscopy to abdominal and pelvic surgery, complex procedures traditionally performed by laparotomy are being performed laparoscopically. Our experience in laparoscopic ureteral surgery has been in patients with severe pelvic endometriosis and iatrogenic ureteral injuries.

OPERATIVE TECHNIQUE The procedure is performed under general endotracheal, anesthesia with the patient in a modified supine position. The video laparoscope is placed intraumbilically and three suprapelvic portals are placed for introduction of ancillary instruments such as grasping forceps, bipolar electrocoagulator and the needle holder.

For patients with ureteral obstruction due to endometriosis or fibrosis, the combination of hydrodissection and high power CO2 laser or electrosurgery is used to treat any associated endometriosis, or fibrosis and to achieve adhesiolysis. The ureter is then dissected and freed from the surrounding tissue. The proximal portion of the ureter is transected and indigo carmine injected into the IV of the patient to confirm its patency. Next, transcystoscopically, a 7-8F ureteral catheter is passed into the distal ureter, and the obstructed portion is removed. When this is complete, the ureteral catheter is introduced to the proximal ureter and advanced to the renal pelvis. 4-0 polydioxanone sutures are used in an interrupted fashion placing them at 6, 12, 9, and 3 o'clock to approximate proximal and distal ureteral edges. A ureteral catheter is exchanged for the internal stent.

To repair a resected ureter, identify both ends of the ureter and hold them with the grasping forceps. The proximal end may be detected by injection of indigo carmine and observing the blue efflux. To identify the distal edge, introduce a ureteral stent cystoscopically gradually freeing the edges from the surrounding tissue and removing the devitalized tissue until adequate length and healthy tissue is found. The ureteral stent is passed to the proximal ureter. After this step is completed, 4-0 polydioxanone sutures should be placed as mentioned above at 12, 6, 9 and 3 o'clock using intracorporeal suturing and intracorporeal or extracorporeal knot tying. A Jackson Pratt drain is inserted through one of the suprapubic ports and placed in the pelvic cavity for draining of any possible urinary leakage. This drain can be removed on the second or third postoperative day, after assurance that there is no significant drainage. Postoperatively, the patient is given prophylactic antibiotics and the Foley catheter is discontinued on the second or third postoperative, day. The internal ureteral stent is removed four to six weeks later, followed by an intravenous urogram for evaluation of the integrity of the repair. Patients should have periodic follow-ups with an imaging technique such as pelvic ultrasound or intravenous pyelogram.

LAPAROSCOPIC URETERONEOCYSTOTOMY We have performed ureteroneocystotomy for patients with severe endometriosis and ureteral obstructions. The distal portion of the ureter is mobilized, again using high power ultrapulse CO2 laser and hydrodissection, removing any fibrosis and endometrial disease. A 1 cm transverse incision is made in the posterior wall of the bladder and the incision extended to the mucosa. The bladder is mobilized anteriorly, a cystotomy is made on the bladder dome and the bladder cavity is entered. The free end of the ureter is brought to the posterior incision and, under cystoscopic guidance, a 7 F ureteral catheter is passed through

the ureterovesical junction. Four interrupted 4-0 polydioxanone sutures are placed at 6, 12, 9, and 3 o'clock to approximate mucosa of the ureter and mucosa of the bladder using intracorporeal suturing and knot tying. The bladder, dome is then closed using interrupted 1-0 polyglactin sutures. One 4-0 polydioxanone anchoring suture is placed on the seromuscularis layer of the bladder and the adventitia of the ureter, to fix the ureter to the bladder wall.

If there is significant damage to the distal portion of the ureter and there is a short ureter, the psoas hitch technique is utilized. The distal portion of the ureter is mobilized, the damaged or involved segment with endometriosis and fibrosis is removed. The lateral bladder peritoneum is incised from each side and entry to the Retzius space permits anterior bladder mobilization. The ureteral reimplantation is performed as described above. Then the bladder is brought up and anchored to the psoas muscle with two sutures of 1-0 polyglactin sutures.

It has been customary to perform ureteroneocystotomy whenever there is damage to the lower one-third of the ureter. Our experience shows that, as long as there is adequate length of the ureter distally and proximally and there has not been significant vascular damage, ureteroureterostomy with internal ureteral stent post-operatively for four to six weeks has been successful. Direct ureteral implantation or psoas hitch reimplantation is employed only if there is a short ureter.

In any of the clinical situations requiring ureteral implantation, compliance with the principles of 1. gentle handling of tis-sue, 2. preventing tension on the anastomosis, 3. meticulous hemostasis, 4. proper drainage, 5. use of fine sutures placed along the ureteric length and 6. preservation of vascular supply, will improve successful outcome.

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Urinary diversion in gynecologic oncologic surgery

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INTRODUCTION Today, the pelvic surgeon has at his disposal a variety of methods for urinary diversion, providing a successful solution for almost every clinical situation. The major points to be considered are whether the diversion should be to the bladder or supravesical, and whether it should be incontinent or continent.

In gynecologic oncology, the most common indication for surgical urinary diversion are anterior or total pelvic exenteration. Vesicovaginal fistulae, mostly due to radiation therapy, that cannot be repaired constitute another important indication for urinary diversion. In patients with unresectable recurrences, generally percoutaneous nephrostomy is indicated.

The topic of this paper is surgical urinary diversion. Because the urinary bladder and the urethra are removed in the surgical treatment of gynecological cancers which have spread to the bladder, vesical forms of diversion will not be discussed. The method of diversion (continent or cutaneous) will depend on the patient's willingness to accept an appliance for urine collection, or to self-catheterize the stoma. The presence of colostomy, the previous treatment (chemotherapy and/or radiotherapy), and the life-expectancy of the patient are other factors in selecting the type of urinary diversion.

The major goals of urinary diversion are to preserve renal function and to provide a means for the disposal of urine that will least disturb the quality and duration of life. Characteristics of the ideal urinary diversion are unobstructed drainage of the urine from the kidney, continent storage of urine, separation of fecal and urinary streams, minimal reabsorption of urine and electrolytes, absence of reflux, maintenance of renal function, simplicity of technique and patient acceptance.

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During the past decades, the experience with supravesical urinary diversion has made it clear that separation of the fecal and urinary streams is necessary with acceptance of using an isolated bowel loop for this purpose. The intestinal segment is not meant to act as a reservoir, but rather as a conduit for conveying the urine to the outside. In the following paragraphs, the main techniques of urinary diversion will be briefly discussed.

ILEAL CONDUIT The first report of clinical application of conduit diversion was made by *Bricker* (1). He used an isolated segment of ileum for the conduit. Soon after, ileal conduit was accepted enthusiastically by surgeons who performed pelvic exenterations. The use of the intestinal segment as an extension of the ureter to the skin provides greater flexibility, adequate length and blood supply resulting in an improved stoma location and fewer stomal complications. Ileal conduit has the disadvantage that the bowel segment invariably lies within the pelvic field of radiation, a situation that increases the risk of dehiscence of both the ureteral and the small bowel anastomoses. Preoperative evaluation of the renal function is mandatory. If one kidney is not functioning (less than 5% of total glomerular filtration) the ureter should be ligated. In previously irradiated patients, the ileum and ureters should be carefully evaluated intraoperatively for radiation damage. When it is suspected, the conduit should be created from the transverse colon, proximal ileum or jejunum. The basic principles of technique, common to all urinary conduits, include 1. wide ureteroileal anastomoses to minimize the risk of stenosis, 2. the use an isoperistaltic intestinal segment not longer than necessary (15-20 cm), 3. a protruding stoma to optimize urine collection, 4. stabilization of the conduit to prevent displacement, and 5. an adequate size tunnel through the abdominal wall to prevent obstruction of the conduit. Preoperatively antibiotic and mechanical preparation of bowel is required, and the skin should be marked for the stoma. Surgical technique is reported in the major textbooks of gynecological surgery (2-3), and will not be described. Although the use of stenting the ureters is debated (7), we always use single-J stent passed through the stomas. Each stent is separately marked as right and left in order to monitor urine output from each kidney. The stents are left in place for 2 to 3 weeks.

Although urinary diversion by ileal conduit is technically not

the most difficult operation performed by the gynecologic oncologist, complications are frequent and the rate is strongly influenced by the general condition of the patient, prior radiation therapy and the extent of surgery performed in addition to the urinary diversion. Complications include urinary, vascular, and bowel complications. Urinary output from each kidney must be always monitored in order to detect low urinary output, which may depend on the physiologic response to surgical trauma and fluid management, and causes related to the urinary diversion. Conduit related causes include stent obstruction by clots or mucus, stent displacement and leakage from the uretero-ileal anastomoses. To exclude the former causes, irrigation of the stent should be performed. Persistent oliguria requires radiographic evaluation. Clinically diagnosed leakage of urine from the conduit occurs in about 5%-10% of patients (4-10). Stenting seems to be able to prevent leakage (11-13), but not in all patients. Symptoms of urinary leakage are 1. urine leaking from the perineum, from around the conduit stoma and from the intraperitoneal drain, 2. decreased urine output, 3. abdominal distention with fever and ileum. Diagnosis is usually made by CT scan with contrast and loopogram. Conservative management is the treatment of choice in nearly all patients because surgical intervention is associated with a mortality rate of 50%. The preferred method is to insert a stent anterograde via percutaneous nephrostomy, and to drain the associate intraabdominal urine collection. An indirect danger of urinary leakage from the conduit is the impaired healing of intestinal anastomosis, sometime resulting in a leak from the intestine. The most frequent vascular complication is infarction of the conduit from arterial or venous thrombosis, which may involve the stoma, the segment traversing the abdominal wall, or the entire conduit. This complication is managed by laparotomy with resection of the infarcted portion. Several cases of hemorrhage resulting from a fistula between the right common iliac artery and the ureter have been reported. The usual history is that of intermittent gross haematuria. This is managed by artery embolization or surgical closure, followed by emergency cross femoral by-pass. As for any laparotomy, ileus may complicate postoperative course. Prolonged ileus may be an indication of urinary and intestinal leaking, and of an abscess due to intestinal leaking. Fever may complicate this intervention as with any other, but specifically may be related to pelvic abscess or pyelonephritis. The latter complication has been reported in up to 20% of these patients. Bowel preparation, antibiotic prophylaxis and good hydratation help to reduce the postoperative risk of urinary infection.

Other specific complications are ureteral-intestinal stenosis, which may develop slowly and progressively, leading to a progressive silent hydronephrosis in about 10% of patients (4, 8, 12). The problem may be remedied by insertion of ureteral stent or, in more severe cases, by percutaneous nephrostomy. Repeated urinary infection may occur in 5-10% of patients. Both these complications may lead to the loss of kidney function. Specific late complications occurring in about 10-15% of patients are stomal stenosis and parastomal hernia.

SIGMOID CONDUIT The chief advantage of sigmoid colon conduit is avoiding a small bowel anastomosis with its potential for fistulization. Other advantages include fewer stomal complications and the suitability of the colon for a non-refluxing ureteral anastomosis. Disadvantages are: 1. it is not applicable in patients with diverticulitis, 2. an increased risk for carcinoma within the conduit, 3. reduce the possibility of a low rectal anastomosis, 4. the sigma lies in the field of pelvic radiation, thus may show radiation changes. For these reasons, the sigmoid colon conduit is rarely carried out.

TRANSVERSE COLON CONDUIT The transverse colon is normally outside of the pelvic irradiation field, thus the use of the transverse colon conduit appeared to ideally suite for patients undergoing pelvic exenteration after irradiation for gynecological cancer. Other advantages are the large diameter wich reduces the likelyhood of stenosis, its mobility which allows stomal placement in any abdominal quadrant, and its reduced probability to be the site of intrinsic disease (e.g., diverticula) as compared to the sigmoid colon. Furthermore, in this procedure, the ureters can be transected well above the field of pelvic irradiation.

The most natural location for the stoma of the transverse conduit is the left upper abdominal quadrant. In this case, the conduit is isoperistaltic. The stoma can be located in the right upper and right lower quadrants as an antiperistaltic conduit. Presumably, an antiperistaltic segment of colon would increase the intraluminal pressure. However, no unusual complications have been reported with the antiperistaltic colon conduits.

The literature data on transverse colon conduits is limited (5, 11, 14-15), and we do not know whether its complication rates differ from those of other conduit procedures. However, there is no reason to believe that they would differ significantly, particularly in patients who received radiation therapy.

CUTANEOUS URETEROSTOMY This procedure has been abandoned because of the technical problems in producing a single stoma, the risk of stomal necrosis, and the common development of long-term stomal retraction and stenosis.

ILEOCAECAL NEOBLADDER WITH MULTIPLE TRANSVERSE TAENIA-MYOTOMIES Although the use of intestinal segments for conveying the urine outside has improved, survival and the quality of life of patients undergoing pelvic exenteration, and the need for a permanent urine collector is a major disadvantage particularly during anterior exenteration. To overcome this drawback, several techniques of continent neobladder have been proposed, as reported in other papers on this topic. The basic idea is to create a continent, low pressure reservoir.

This is most commonly done by using a detubularized bowel segment in order to decrease intraluminal pressure and to avoid ureteral reflux. However, detubularization makes the surgical procedure more difficult, and increases the cost and the risk of complications as compared to the extirpative counterpart which is per se a difficult and time-consuming procedure (16). Recently, it has been reported that a continent, low pressure caecal neobladder can be created with multiple taeniamyotomies (16).

The distal 5-6 cm long segment of the terminal ileum and about 10 cm of the caecum are used to create the reservoir. The segment is isolated with great care in preserving the ileocolic artery. The ureters are anastomosed to the terminal ileum, and the ileo-caecal valve prevents antireflux. Multiple (5 to 8) transverse sections of the taeniae are performed to successfully relax the caecal wall. The original technique was modified by using the appendix as conduit between the caecum and the anterior abdominal wall. The lumen of the appendix is narrowed by invaginating sutures, and the appendix is sutured to the umbilicus. An ileo-colic anastomosis complete the intervention. This reservoir has a maximum capacity of 300-400 milliliters, which increases with time (17). Ureteral reflux has been reported to occur in about 10% of patients (17). Self-catheterization of the stoma is required. Continence of the neobladder was achieved in 3 out of 4 patients (9). Although more data is needed to validate this technique, its simplicity and the reduced operating time led us to believe that this is a useful technique.

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Reconstruction of the pelvic floor and management of the empty pelvis; correction of pelvic hernias

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RECONSTRUCTION OF THE PELVIC FLOOR, MANAGEMENT OF THE EMPTY PELVIS Since 1948, when *Brunschwig* (1) described the pelvic exenteration technique, following several technical improvements and constantly increasing survival rates, pelvic exenteration became an accepted method of treatment in certain forms of female genital cancer. Today, exenterative intervention is the method of choice in the treatment of post-radiotherapy, centrally located pelvic recurrences of cervical cancer. The en-block resection of the pelvic organs together with a portion of the pelvic diaphragm, leaves a large defect on the pelvic floor. This defect is different from that encountered with male patients following abdomino-perineal rectum resection, where tissues are not irradiated and the peritoneum can be closed.

Management of the pelvic floor is a critical step in the reconstructive phase of pelvic exenteration. Following evisceration of the pelvic organs, the small bowel will adhere to the denuded surface of the previously irradiated pelvic floor. As some of the small bowel loops are also previously irradiated, this condition commonly leads to small bowel obstruction, fistula formation or perineal herniation; a group of symptoms called "empty pelvis syndrome". These complications carry a high mortality rate. The percent of patients developing intestinal fistulae after exenterative surgery is generally estimated at 15%. About half of these patients die because of this complication, many of them being tumor-free, as pointed out by *Orr and co-authors* (2).

The purpose of covering the pelvic floor is to keep the small bowel out of the small pelvis and to prevent its adherence to the denuded, hypoxic, potentially infected pelvic floor. Because of the major interest in this area, a large number of techniques have been utilized to manage the pelvic floor after exenteration. Some of them are historical curiosities, e. g., the steel mesh used by *Schmitz* (3), or the silastic breast prosthesis implanted by *Sugarbaker* (4) in the small pelvis to fill it in. The more commonly used techniques are: peritoneal flaps or free peritoneal patch, omental pedicle, amniotic membrane, dura mater, sigmoid colon lid, muscle flaps, synthetic absorbable and nonabsorbable mesh, and different vaginal reconstruction procedures which fill in the pelvis with healthy, well vascularized tissues.

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OMENTAL PEDICLE This widely advocated and relatively simple method was described by *Rutledge et al.* (5). The omental pedicle formation involves detaching the omentum from the stomach and colon, dividing the right gastroepiploic artery, thus mobilizing the flap on the left gastroepiploic artery. The mobilized omentum is laid in the pelvis and fixed with a few stitches to the pelvic brim. The omentum apparently forms a carpet on the pelvic floor, preventing bowel adhesion. In addition, the omentum brings new, well vascularised tissue in the irradiated pelvis. The method has the disadvantage of allowing the small bowel loops to descend in the pelvic cavity. To prevent this, the omental pedicle technique can be combined with other methods, e.g. the use of synthetic mesh, to form a pelvic diaphragm with high tensile strength, covered with omental flap. Unfortunately, omentum is not always available for flap formation.

PERITONEUM *Perticucci* (6) reported the use of peritoneum flap to reconstruct the pelvic floor. He left the perineal defect open and packed it with gauze to ensure hemostasis and to support the peritoneal diaphragm. *Morley et al.* (7-8) have improved this technique by closing the perineal defect. They isolated the peritoneal flap from the anterior abdominal wall. The flap has its base on the distal part of the abdominal wall so that it can be rotated into the pelvis. They were also successful in using a free peritoneal patch as a pelvic lid.

SYNTHETIC MESH A variety of synthetic absorbable or non-absorbable materials have been used for pelvic floor reconstruction: Polyglactin 910 (Vicryl), Marlex, Teflon, Ivalon or Gore-Tex. These materials not only separate the bowel loops from the pelvic floor, but also keep them elevated out of the pelvis. Non-absorbable mesh serves as a firm diaphragm, but it cannot be used alone, because it tends to form adhesions. This disadvantage may be overcome by covering the mesh with an

omental layer. The Vicryl mesh is probably the most popular among the absorbable synthetic materials. Promising results were published by *Buchsbaum et al.* (9) and *Clarke-Pearson et al.* (10). Some surgeons feel however, that after the absorption of the mesh, the intestines will fall into the pelvis. Serial examinations after 6 and 12 months showed no prolapse, the bowels remained at the level where the Vicryl mesh was initially placed. Despite the absorption of the mesh, the granulation and fibrosis occuring on and under the mesh matrix results in the formation of a permanent pelvic diaphragm.

OTHER METHODS The current improvements in techniques for performing pelvic exenteration have made the procedures relatively safe, so that an increasing number of exenterations are performed with vaginal reconstruction. Numerous vaginal reconstruction techniques have been described. Most of them, such as the rectus abdominis, pudendal thigh, fasciocutaneous flap, gracilis, cecal, sigmoid, or omentum with split thickness skin graft neovagina, are used for pelvic reconstruction and treat the empty pelvis syndrome, as they fill the pelvic cavity with viable nonirradiated tissue.

PELVIC HERNIAS The promontorium and the linea terminalis constitute the pelvic brim. All hernias located distal to this line are "pelvic hernias." These hernias are rare, mainly because of: a) the structure of the pelvis: large bones, strong ligaments and muscles, and b) the inclination of the pelvis; the angle between the plane of the pelvic inlet and the horizontal plane is about 60°, so that the abdominal pressure is mainly on the inguinal region, and not on the bottom of the pelvis. Pelvic hernias occur mainly in cachectic, elderly, or in contrast obese patients, especially women. All foramens of the pelvis are potential hernial orifices. These are usually small hernias. As the pelvis is surrounded with a thick muscle and fatty tissue layer, the hernias usually remain asymptomatic unless they are strangulated. If they are asymptomatic they constitute an accidental intraoperative finding for the gynecologist. If they are strangulated, the patient is usually operated for ileus of unknown origin and the exact diagnosis is made intraoperatively. Pelvic hernias occur in the obturator fossa, the greater and lesser sciatic foramen and the perineum.

OBTURATOR HERNIA The hernial orifice is the canalis obturatorius on the upper part of the membrana obturatoria, where the obturator nerve and vessels leave the pelvis. If this aperture is dilated, it is protrured by small bowels. The hernial sac is covered by the huge muscular mass of the pectineal and adductor muscles, and therefore cannot be palpated. Unless strangulated, it is encountered only intraoperatively.

TREATMENT The canalis obturatorius is dilated bluntly and the hernial content is reduced in the abdomen. The intestine should be carefully examined to exclude necrosis. The simplest hernial repair is the *Kocher* procedure. The hernial sac (peritoneum) is pulled "invaginated" in the abdominal cavity, ligated and resected at its neck. The stump blocks the orifice. The peritoneum can be duplicated. If the hernial orifice is large, more sophisticated methods such as pectineus muscle plasty or prosthetic repair will be required.

SCIATIC HERNIA The hernial orifice is on the territory of foramen ischiadicum majus. Depending on location relative to the piriformis muscle, the sciatic hernia has two forms: the supra- and infrapiriformis hernia. The hernial sac is covered by the gluteus muscles and gluteal fat, making diagnosis difficult. Asymptomatic hernias are only encountered by gynecologist intraoperatively.

TREATMENT In the case of small hernia, the *Kocher* "invagination" procedure described above is sufficient. In the case of large hernias, prosthetic hernioplasty is needed.

PERINEAL HERNIAS They occur through the pelvic diaphragm and may be anterior or posterior to the superficial transverse perineal muscle. In women, the anterior perineal hernia passes into the labia major and can be confused with a Bartholin cyst. The posterior perineal hernia enters the ischiorectal fossa near the vagina.

TREATMENT The hernial orifice is dilated bluntly, the hernial sac content is reduced in the abdomen, the sac extirpated and the hernial orifice on the levator muscles sutured. If the defect is large, prosthesis plasty may be necessary.

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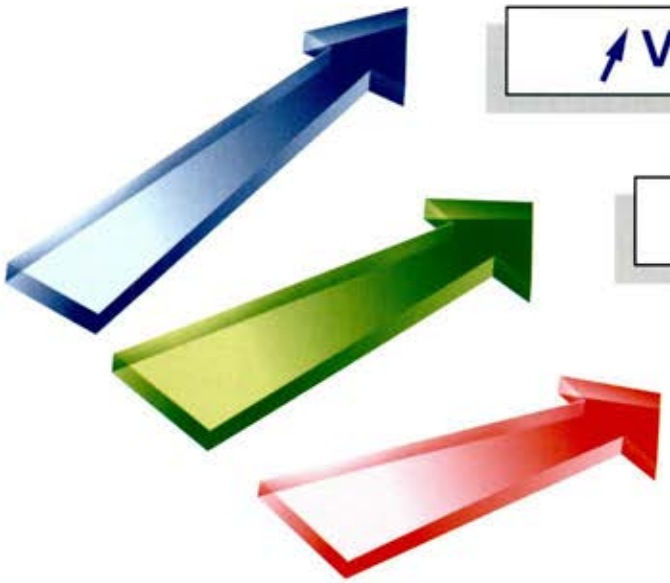

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– éjszakai lábikra görcsök
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VÁLOGATÁS A SIGVARIS SZAKKÖNYVTÁRÁBÓL

HOGY VAN A LÁBA, KEDVES KISMAMA?

Fáradtság, nyugtalanság, feszültség a lábban, „nehéz" láb, a lábikra fájdalmas görcse éjszaka, láthatóan duzzadt láb és az első visszerek megjelenése vagy a meglévők megnagyobbodása már a terhesség korai szakaszában problémákat okozhat a kismamának. Mindezen tünetek különösen akkor jelentkeznek:

- ha a vénás betegség gyakorta előfordult a családban;
- ha a leendő anyának már a terhesség előtt is volt valamilyen visszérbetegsége;
- ha nem az első terhességét viseli;
- ha a kismamának sokat kell állnia vagy ülnie (pl. munkahelyén);
- ha az időjárás különösen meleg.

A visszeres láb nemcsak kozmetikai probléma, nem csupán csúnya látvány, de veszélyes is lehet úgy az anyára, mint a születendő gyermekére

- mert érgyulladás vagy trombózis következhet be,
- mert rendkívüli terhet ró az anya és a gyermek keringésére is,
- nem kizárt, hogy tágabb értelemben hozzájárulhat egy esetleges koraszülés megindulásához is.

Nagyon fontos, hogy megértsük a terhesség alatti lábproblémák okát!

A fő okok:

- öröklött hajlam,
- a vér megnövekedett mennyisége,
- a vér megváltozott összetétele,
- a vér alvadékonyságának megváltozása,
- az izomtónus csökkenése,
- jelentősen megnövekedett nyomás a láb vénáiban, mely attól következik be, hogy a növekvő magzat nyomást gyakorol a medence vénáira.

Mit tegyen a kismama?

1. A terhesség alatt kerülje el az egy helyben állást, ülést.
2. Ne üljön túl alacsony székre, kerülje el, hogy éles, kemény peremű. széken kelljen ülnie.
3. Sétáljon, ússzon, biciklizzen minél többet.
4. Minden olyan esetben amikor sokat kell egy helyben ülnie (pl. munkahelyen, repülőn, vonaton stb.) mozgassa lábfejét, tornáztassa lábát, álljon fel, sétálgasson kicsit, és viseljen kompressziós gyógyharisnyát.
5. Ne fürödjön forró vízben.
6. Kerülje a hosszas napozást (ekkor a láb vénái méginkább kitágulnak).
7. Meleg időben, vagy különösen megerőltető napokon hűtse lábát langyos zuhannyal, először a lábfejet, majd lassan az egész lábat alulról felfelé haladva.
8. Éjjel, vagy ha lefekszik pihenni, lábát enyhén (15–20 cm-re) polcolja alá.
9. Minden reggel vegye fel SIGVARIS kompressziós harisnyáját.

A SIGVARIS kompressziós harisnyák hatását úgy alakították ki, hogy szoritó erejük a boka táján a legnagyobb, és felfelé a térdek, illetve a comb irányában fokozatosan csökken, ezáltal viselésükkor az izmok pumpáló működése hatékonyabbá válik, a vénák átmérője csökken, tehát a vénás vér áramlása felgyorsul. A trombózisveszély, a láb dagadása megszűnik.

Milyen harisnyát válasszunk?

Ha még nincsenek látható rendellenességek a lábon, elegendő úgynevezett megelőző (prevenciós) harisnyát viselni. Ezen harisnyák kompressziós értéke legalább 14–18 Hgmm legyen! Ajánlatos a harisnya hordását már a terhesség első hónapjaiban megkezdeni, és egészen a baba megszületéséig folytatni. A SIGVARIS cég DELILAH fantázianéven forgalmazza prevenciós harisnyáit, melyeknek kopmressziós értéke még a minimálisan ajánlottnál is magasabb, 20–25 Hgmm. A harisnya teljesen átlátszó, olyan, mint egy divatos üvegszálas harisnya. Valamennyi változata (félcombig érő harisnya, harisnyanadrág és kismama harisnyanadrág) 6-féle méretben, 10-féle divatos színben kapható.

Ha a kismamának nem ez az első terhessége, illetve ha korábban már voltak visszérproblémái, akkor nagyobb a veszély, hogy súlyosabb visszérgondok jelentkezzenek a terhesség előrehaladtával. Ebben az esetben SIGVARIS orvosi kompressziós harisnyák közül II. kompressziójú (30–40 Hgmm szorítóerejű) combtőig érő harisnyát, vagy kismama harisnyanadrágot ajánlunk, mely utóbbinak állítható derékköve és kényelmes betétje van a növekvő pocak részére.

Ezen harisnyák 3-féle anyagból (természetes gumi, pamut és műszál) 12-féle standard méretben készülnek, 5–6 féle divatos színben kaphatók.

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Az erősebb kompressziójú SIGVARIS harisnyák élvezik az OEP támogatását. A kismama részére érsebész, sebész vagy belgyógyász szakorvos írhatja fel a gyógyharisnyát. A vénynek tartalmaznia kell a SIGVARIS márkanevet, a harisnya fajtáját (térdharisnya, combtőig érő harisnya, harisnyanadrág stb.), a kompreszszió mértékét (II) és mennyiségét (1 pár vagy db.).

Hol?

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Reconstruction of the pelvic vessels - common aspects of gynecologic and vascular surgery

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INTRODUCTION Gynecologic and vascular surgery may have overlapping impacts in the pelvic area. For greater insight into this topic, it would be useful to review facts that influence planning and performing surgery for the reconstruction of vessels in the region, during removal of the female genital tract tumors.

There are three phases of pelvic gynecologic procedures when cooperation of a vascular surgeon can be helpful:

PREOPERATIVELY Expert evaluation of pelvic vessels may detect 1. vascular anomalies, 2. concomitant vascular diseases and 3. pathways of collateral circulation. This information may be useful in 1. planning surgery, 2. reducing risk of complications and 3. planning postoperative care.

INTRAOPERATIVELY The intraoperative benefits provided by the vascular surgeon include: 1. avoiding inadvertent injury to the vessels, 2. prompt control of hemorrhage, 3. reconstruction of important vessels, 4. extending surgical radicality of gynecologic tumors by vessel resection and 5. simultaneous reconstruction of diseased vessels.

POSTOPERATIVELY In the postoperative period, vascular surgery may be beneficial 1. for controlling bleeding, 2. treating arterial and venous occlusive complications and 3. preventing venous thrombosis and pulmonary embolism.

ANATOMICAL AND PHYSIOLOGICAL OVERVIEW OF THE PELVIC VESSELS The pelvic region includes arteries, veins and lymphatic vessels from the level of the lumbosacral junction down to the inguinal ligament. The upper point of the region in the arterial tree is the aortic bifurcation and the distal one is the external iliac artery at the origin of the epigastric arteries.

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The small median sacral artery has no major role in humans. The only large tributary of the pelvis is the hypogastric artery, providing nutritive circulation to the genital organs, the bladder, the distal colon and to the bony and soft pelvic compartments *(Figure 1)*.

The pelvic veins extend from the common femoral veins to the caval confluence conducting blood from the lower extremities to the inferior vena cava. They also collect venous blood from the hypogastric region. Normally, the veins do not have valves. Their circulation is maintained by the muscle pump of the lower extremities, by promotion from the arterial circulation and by the heart and respiratory movements *(Figure 1)*.

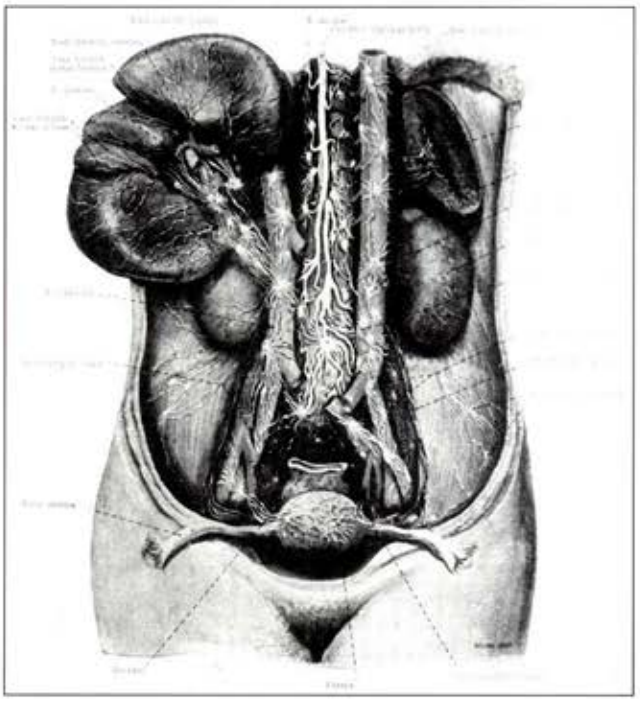

Figure 1. Anatomical overview of the pelvic vessels in female

The tiny lymphatic vessels accompany veins and connect hundreds of lymph nodes surrounding all pelvic organs. They drive lymph cephalad to the thoracic duct by undulation. Reflux is

normally prevented by valves. The cisterna chyli collects lymph from the mesenteric lymph vessels, then driven to the thoracic duct without reflux to the pelvic vessels *(Figure 1)*.

PATHOLOGY OF THE PELVIC VESSELS

CONGENITAL VASCULAR DISORDERS Congenital anomalies of the pelvic vessels are rare. Variations of the anatomy normally have no direct consequences, but should be known in surgical considerations. High or low division of the common iliac artery may lead erroneously to ligation at a wrong segment, causing severe ischemia of the lower extremity. A rudimentary ischiadic artery should also be recognized before its ligature. Congenital aplasia or hypoplasia of the abdominal aorta or iliac arteries compensated by huge and fragile collaterals may occur. The unusual anatomy carries real danger of unexpected bleeding during surgery *(Figure 2)*.

Congenital lack of venous segments or the presence of rudimentary iliac valves – venous spurs – are associated with venous collateral circulation. This may increase the risk of intraoperative bleeding and may present a subtle cause of postoperative pelvic vein thrombosis *(Figure 3)*. Atypical course of stem veins may cause problems in orientation during surgery *(Figure 4)*.

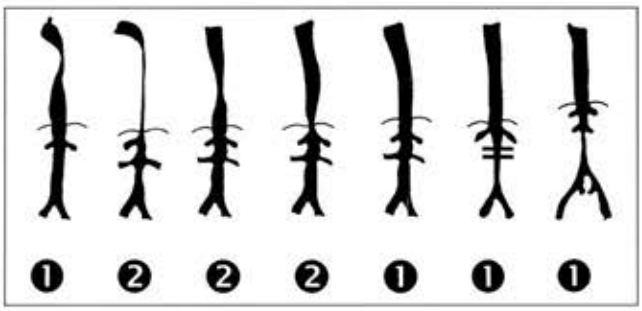

Figure 2. Various types of atypical aortic coarctation. All types facilitate development of rich collateral network changing vascular anatomy individually.

Congenital occlusion of the thoracic duct or chylous reflux, may appear as cavernous or interstitial primary lymphedema of one or both lower extremities, or may present as lymphorrhea through the mucosa of pelvic organs *(Figure 5)*.

Vascular malformations such as hemangiomas, can be purely venous, arterial or mixed. Due to erosion they may lead to bleeding into cavities. If arterio-venous fistulas are present, huge afferent and efferent vessels will be encountered. Ectopic organs such as pelvic kidney with unusual arterial, venous and ureteral connections can also occur, making pelvic surgery hazardous.

VASCULAR INJURIES Injuries during pelvic tumor resection are relatively common and may involve arteries, veins and lymphatic vessels. Arterial or venous iatrogenic injury occurs easily if the anatomy is abnormal, or normal arteries serve as collaterals in the case of an occlusive disease. Rough surgical technique may also cause inadvertent lesion. Ligation or uncontrolled stitches of arteries at the wrong site may compromise the nutritive blood supply to organs distal to ligatures. Thermal lesion with subsequent thrombosis can interrupt circulation, causing ischemic damage of the extremity, bladder, bowel and the pelvic wall.

Removal of large tumors may lead to injuries of large arteries and/or veins. Inexperienced management of these complications frequently results in hemorrhagic shock or thrombotic

Figure 3. Huge atypical venous collateral circulation in a young female patient as a result of complete aplasia of deep veins

Figure 4. Left side inferior vena cava crossing lower abdominal aorta ventrally

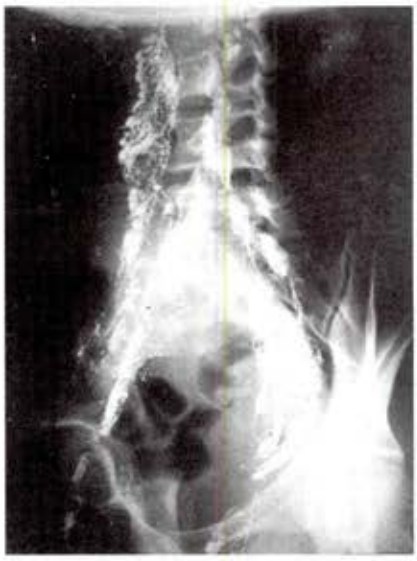

Figure 5. Occlusion of the thoracic duct. Stasis of contrast media in the retroperitoneal lymph vessels and nodes two years after lymphography.

occlusion of the vessels, with acute or chronic clinical manifestation. Furthermore, peripheral or pulmonary embolism may develop, thus jeopardizing the patient's life or her lower extremity.

DEGENERATIVE VASCULAR DISEASES Degenerative diseases mostly due to atherosclerosis are often present in occlusive or in dilatative aneurysmal forms. Aneurysms can be easily recognized by using the latest imaging modalities during pre-treatment work-up.

Data for occlusive disorders can be obtained from patient history. "High" claudication, especially in smokers or in diabetic patients may indicate potential coincidence of pelvic arterial occlusion. Lack of femoral pulses or systolic bruit over the abdominal aorta and iliac arteries discovered during physical examination may give cause for suspicion. Any sign of arterial obliterative diseases, even at remote sites, should be evaluated. Arterial occlusions - if developed in chronic form - are invariably associated with the development of collateral circulation. *Figure 6* shows some of the potential collaterals.

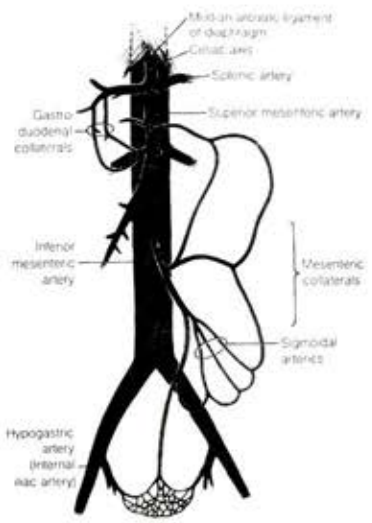

Figure 6. Anatomical sketch on potential collateral circulation of abdominal and pelvic organs

Figure 7. Chronic occlusion of the aortic bifurcation. Both iliac territories are refilled by hypogastric and lumbar collateral arteries.

The collateral circulation increases blood flow through arteries – insignificant under normal circumstances – in order to maintain viability of distal organs. The originally tiny arteries become large in diameter and their walls become fragile. The internal iliac arteries have rich connections to each other, to the left colic artery through the superior hemorrhoid artery and to the common and deep femoral artery through the pelvic and obturator arteries. Awareness of this collateral function of the hypogastric arteries is very important because their planned or inadvertent ligation may have severe consequences on distal circulation. *(Figure 7, 8, 9)*.

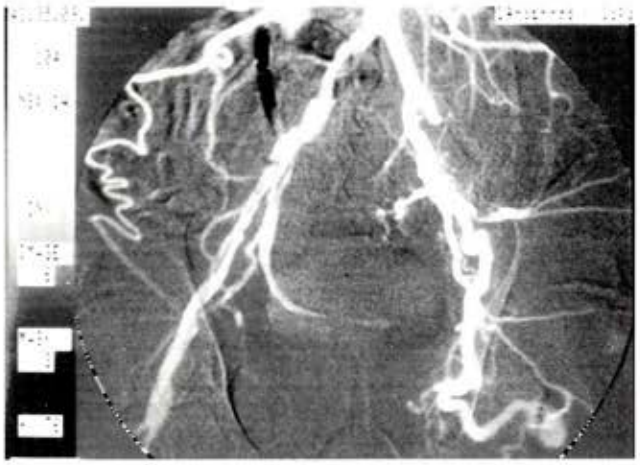

Figure 8. Atherosclerotic occlusion of the left external iliac artery. Enlarged homolateral obturatory artery fills up common femoral artery.

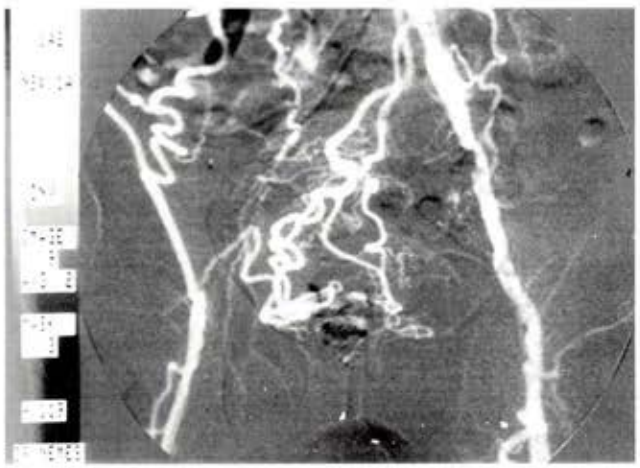

Figure 9. Occlusion of the right iliac artery. Epigastric artery, bilateral hypogastric and hemorrhoidal arteries serve as collaterals.

Sclerotic arteries with narrow lumen are prone to thrombosis and bleeding particularly when compressed by extractors. The operative risk is significantly increased in these patients. Reconstruction of sclerotic arteries requires vascular surgical skill, special instruments and materials.

Collateral veins following vena cava or iliac vein occlusion develop in the retroperitoneum or spectacularly at the suprapubic region or, in extended form, at the abdominal and chest wall *(Figure 10)*. Venous collateral circulation is also a potential cause of hemorrhage during surgery.

Figure 10. Enormous venous dilatation at the abdominal and chest wall of a male patient due to occlusion of the inferior vena cava

INFLAMMATORY DISEASES Inflammatory diseases of the arteries are commonly present as obliterations of various degrees and have similar sequels as atherosclerotic obliterations. Pelvic inflammation may lead to acute pelvic vein thrombosis, not uncommon in subclinical form. Dislodgement of a thrombus may be the first clinical sign and may cause fatal pulmonary embolism.

VASCULAR TUMORS Vessel tumors are rare. Leiomyomas or leiomyosarcomas of both arteries and veins have been reported to occur even in the pelvic vessels. Clinically, they appear as stenosis or thrombotic occlusions.

Since gynecologic tumors may dislocate, compress or invade adjacent vessels, vascular involvement should always be carefully evaluated .

DIAGNOSIS As outlined above, the medical history may direct attention towards concomitant vascular diseases of a patient with gynecological tumor. Careful physical examination may detect arterial and venous diseases. Noninvasive examinations using Doppler duplex scanning, CAT scan, MRI are very useful in diagnosing vascular involvement. Angiography provides accurate information of vascular anatomy. Invasive catheter techniques are not only suitable for proper diagnosis, but also for therapeutic procedures such as angioplasty, stenting, thrombolysis or embolization.

DECISION-MAKING If a pelvic vessel disorder is suspected or confirmed, involving a vascular surgeon in decision making is fully justified. In the presence of a significant pelvic vascular disease in a patient with gynecologic tumor, vascular diagnostic work-up and availability of a vascular surgeon is recommended. Consultation with a vascular surgeon regarding the intraoperative management of the diseased vessels and postoperative care is also highly recommended.

Silent pelvic vein thrombosis requires careful thrombosis prophylaxis using elastic bandages, postoperative anticoagulation with low molecular weight heparin and early mobilization in order to avoid exacerbation of the thrombotic process. Fresh thrombi in pelvic veins should be managed by placement of a caval filter, to prevent pulmonary embolism during and after the pelvic procedure.

TECHNIQUES OF VASCULAR SURGERY Should arterial hemorrhage be encountered during gynecologic tumor dissection, manual or blunt instrumental compression should be applied until accurate identification of the artery proximally and distally to the lesion can be achieved. Silastic loops around the exposed artery help control bleeding with or without atraumatic clamps and expose the lesion site *(Figure 11)*. If a small tributary without collateral function has been injured, simple ligation is permitted. Damage to large arteries without sufficient connection to the supplied territory, is best managed by reconstruction. Before clamping, regional or general anticoagulation is mandatory in order to avoid thrombotic occlusion of the clamped arteries.

Figure 11. Properly isolated and looped arterial segment occluded by a fresh cloth

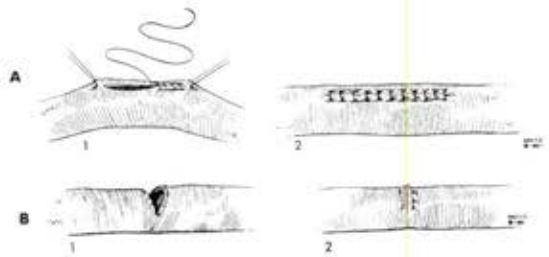

Figure 12. Scheme of direct suture of a vessel. Closure of the longitudinal and horizontal lesions are demonstrated.

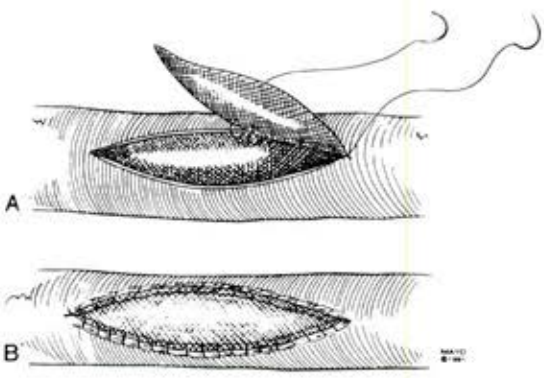

Figure 13. Patch plasty can be used to avoid stenosing sutures

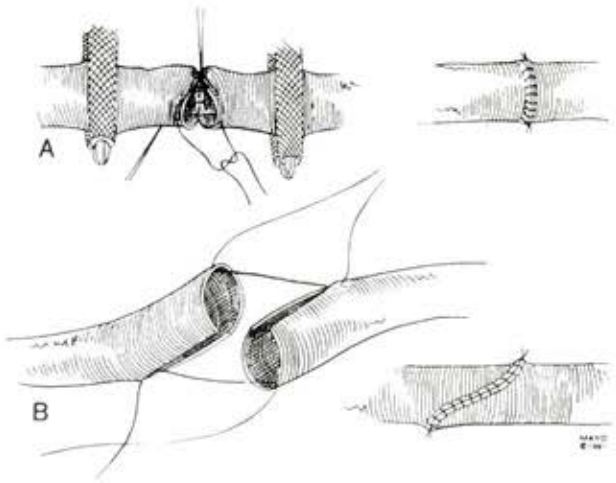

Figure 14. End to end anastomosis of vessels. Oblique anastomosis helps avoid stenosis of the suture line.

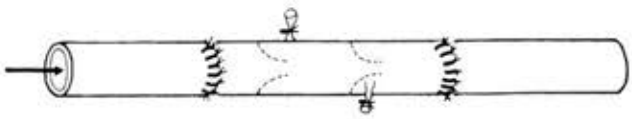

Figure 15. Scheme of an interposition graft using segment of the greater saphenous vein. Ensure correct position of valves. Vein should be reversed or valves should be destroyed.

Techniques of the arterial sutures are demonstrated in *Figure 12*. Direct suture repair is possible for arteries larger than 6 mm in diameter. To prevent technical narrowing of the lumen, an autologous or prosthetic patch can be inserted *(Figure 13)*. Monofilament 5-0 or 6-0 suture material is the most suitable for arterial closure. Circumferential lesions of arteries should be resected, and an end to end anastomosis can be made if there is no tension. Oblique anastomosis helps prevent stenosis *(Figure 14)*. When no end to end anastomosis without tension is possible for reestablishing the circulation, graft interposition or bypass procedure are the methods of choice *(Figure 15)*. The greater saphenous vein is the most preferred graft material, but prosthetic materials can also be used *(Figure 16)*. The same procedures are recommended if complete removal of a tumor requires resection of an arterial segment, or in the presence of concomitant occlusions. Extended resection of tumors together with the invaded vessels may enhance surgical radicality *(Figure 17, 18)*. In principle, the more the tumor mass is reduced, the more effective the adjuvant therapy may be. However, we cannot hope for major influence on tumor biology and life expectancy. On the other hand, vascular reconstruction in oncologic patients will undoubtedly result in an improved quality of life.

Figure 16. Intraoperative photo of PTFE graft interposition of the external iliac artery

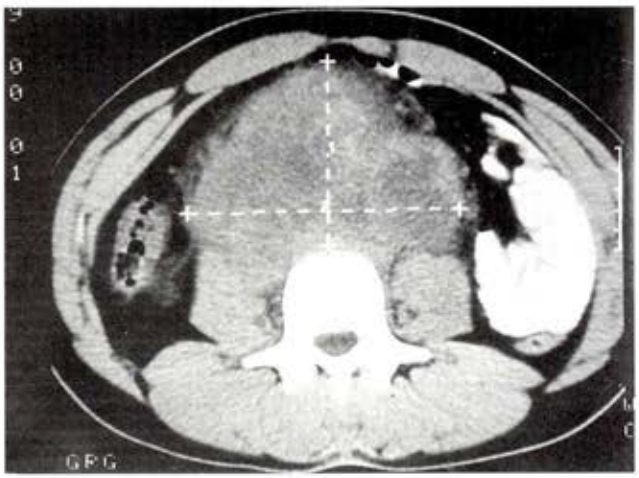

Figure 17. CAT scan of a huge metastatic thecoma invading the aortic bifurcation. Vessels can not be isolated from the tumor mass.

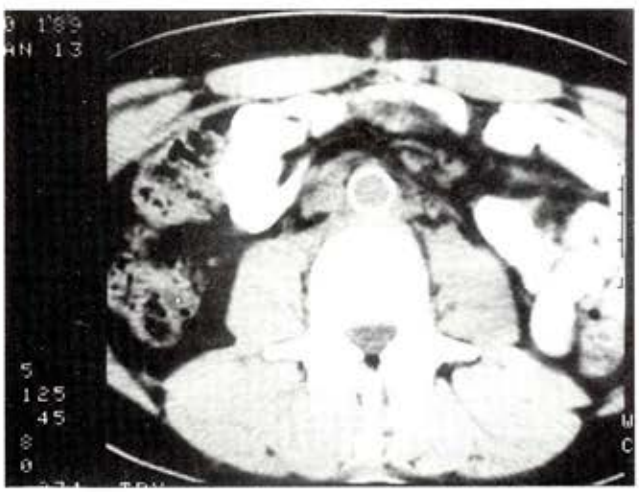

Figure 18. The same patient. CAT scan 6 months after removing the tumor with aortic bifurcation and replaced by PTFE bifurcated graft

Chronic occlusions of arteries can be recanalized before major pelvic surgery by endovascular dilatation, stenting or by endarterectomy *(Figure 19)*. Endarterectomy may also be performed in same stage at the aorta or iliac arteries. Unilateral sclerotic iliac occlusion can be managed by suprapubic iliofemoral cross over bypass from the patent side to the

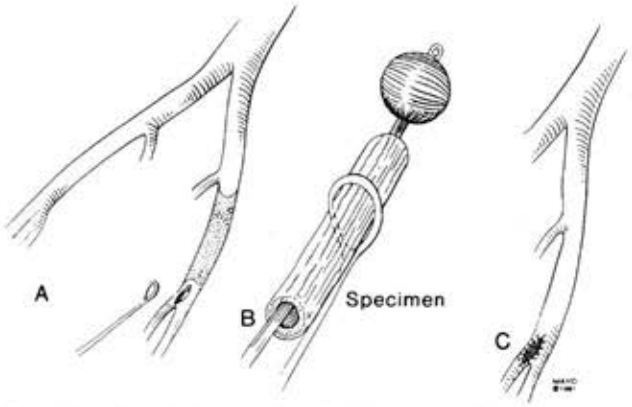

Figure 19. Schematic demonstration of endarterectomy of the external iliac artery using ring stripper

occluded side. This method can also be used for replacement of resected unilateral iliac artery.

It is easy to differentiate venous bleeding from arterial bleeding. The major sources include retroperitoneal plexus and lacerated major veins. Venous hemorrhage is best controlled by tamponade or stitches. Tributaries may be ligated. Stem veins, however, need to be reconstructed using similar principles and techniques as for arteries. Resection of venous segments may permit more radical or complete resection of pelvic tumors. Prosthetic materials inserted in these low pressure vessels do not provide long term patency. After venous reconstruction, meticulous bleeding control should be performed, because anticoagulation must not be reversed after release of circulation. Anticoagulation should be continued for at least six months postoperatively.

The correct isolation of vessels is repeatedly emphasized, because "en masse" ligatures may produce iatrogenic arteriovenous fistulas, ureteral or bowel lesions. Ligatures at wrong sites should be removed as soon as the injury site is recognized. Ligated arteries must be reopened and the appositional thrombi removed under visual control and by balloon catheters. Only the clearly isolated vessels can be properly reconstructed. If vascular reconstruction is foreseen or assumed, the operative field should be prepared for access to the greater saphenous vein.

POSTOPERATIVE VASCULAR COMPLICATIONS Massive postoperative bleeding can be managed in the same manner as intraoperative hemorrhage. Thromboembolic arterial complications are infrequent, but pelvic vein thrombosis is quite common after pelvic surgery. The major cause of hospital mortality in these oncologic patients is pulmonary embolism. Routine prophylactic anticoagulation using subcutaneous heparin for at least one week is mandatory. The other benefit of the thrombosis prophylaxis is the prevention of postthrombotic syndrome. Early mobilization, facilitating muscle pump and accelerating venous flow is also effective in preventing venous complications in the postoperative period. Postoperative pelvic vein thrombosis may require thrombectomy. Overpressure ventilation, oblique caudal position and use of balloon catheter prevent arteficial embolism during manipulation. Thrombectomy can be performed correctly when the thrombus is fresh, not older than one week. Repeated pulmonary embolization, despite correct anticoagulation, can be prevented by insertion of caval filters.

IN CONCLUSION, gynecologic oncology has a wide variety of possible vascular complications. In this borderline territory, close cooperation is the only way to reduce the rate of complications and provide better care for our patients.

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Bélelőkészítés

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BEVEZETÉS Régi megfigyelés, amelyet klinikai tanulmányok is egyértelműen alátámasztanak, hogy bélelőkészítést követő bélműtétek eseteiben sokkal ritkább a lázas, szeptikus szövődmény, és sokkal jobb a sebgyógyulás (1-2). Bélelőkészítés minden olyan esetben indokolt, amelyben előfordulhat, hogy bélműtétre is sor kerül, vagy amikor eleve bélműtétet tervezünk. Petefészekrák, exenteráció, kiterjedt bélösszenövések gyanúja, endometriózis, több előzetes hasműtét, súlyos bélgyulladás, sugárkezelés utáni szövődmények, bél kiszájaztatás és más bélműtétek eseteiben mindig javasolt. A mindennapi nőgyógyászati gyakorlatból újra külön kiemeljük a petefészekrák műtéteket. Az irodalmi adatok szerint az un. "optimális műtét" eléréséhez az esetek 20-30%-ában valamilyen bélműtétet kell végezni. Legtöbbször a sigma vagy a végső csipőbél szakasz eltávolítására kerül sor. A szerzők gyakorlatában 20%-ban történt bélműtét. Ezért feltétlenül szükséges, hogy minden olyan esetben, amikor a petefészek daganat gyanúja felmerül, bélelőkészítés után végezzük a műtétet.

Minden műtét könnyebben végezhető a jobb feltárás miatt, ha a belek viszonylag üresek. Ezért helyes, ha a műtétre kerülő beteg a műtét előtti napon már csak folyékony pépes ételt, délutántól pedig csak folyadékot fogyaszt. Általában beöntést is adunk. A béltartalom csökkentésének ez a módja azonban nem azonos az un. "bélelőkészítéssel".

BÉLELŐKÉSZÍTÉS A bélelőkészítés két részből, a belek mechanikus kitisztításából és antibiotikus előkészítéséből áll.

A BELEK KITISZTÍTÁSA A belek kitisztításának legfontosabb része a vastagbél kitisztítása, a formálódott béltartalom eltávolítása. Megkülönböztetünk hagyományos béltisztítást és az utóbbi időben egyre gyakrabban alkalmazott teljes bélmosást. A fizikai tevékenység a béltisztítás idején is fontos, ezért a beteget bátorítani kell, hogy sokat sétáljon.

HAGYOMÁNYOS BÉLTISZTÍTÁS A beteg a műtét előtti 2-4 napon olyan ételeket fogyasszon, amely után kevés béltartalom marad vissza. Ennek érdekében keveset és rostmentes ételeket egyen (pl. krumplipüré, passzírozott főzelékfélék, szűrt levesek), és bőségesen igyon folyadékot. Hús, gyümölcs kerülendő. A rostdús ivólevek kivételével minden fajta folyadék, beleértve a tejet is, fogyasztható. Ezt a diétát már a kórházi felvétel előtt elkezdheti.

A műtét előtt 2 nappal hashajtást végzünk. Erre a célra elsősorban a felszívódás gátlásával ható hashajtók, főleg a magnézium tartalmú készítmények (pl. 2 evőkanál keserűsó) a legalkalmasabbak. Megfelelő hatásuk azonban csak akkor van, ha legalább 2 napos diéta után adjuk. Mannitollal történő hashajtás nem szerencsés, mert a belek jelentősen gázosak lesznek, belfelületük pedig nedves marad. Az olajos hashajtók (ricinus, paraffin olaj) kevésbé hatásosak, ezek inkább felhígítják a formált bélsárt, és elsősorban a vastagbélben síkamlóssá teszik a béltartalmat. A vastagbelet izgató hashajtókat (phenolphthalein, szenna készítmények) műtéti előkészítésre ritkábban alkalmazzuk. A szenna tartalmú készítmények (Tisasen A+B, X-PREP oldat) főleg a vastagbél baktérium tartalmával keveredve fejtik ki hatásukat. Ennek következtében a vastagbél felső szakasza általában nem tisztul ki eléggé. A különböző támadáspontú hashajtók kombinált készítmények formájában is forgalomban vannak (Artin tbl, Bolus laxans tbl. MII-PAR emulsio). Ezek alkalmazása azonban nem terjedt el.

A műtét előtti napon a beteg csak folyadékot fogyaszthat, este pedig beöntést kap, amelyet addig ismétlünk, amíg a beöntő folyadék tisztán jön vissza. A folyadék veszteséget szükség esetén 2000 ml infúzió adásával pótoljuk. Éjféltől semmit ne fogyasszon. Beöntést a saját gyakorlatunkban reggel már nem adunk, vannak azonban osztályok, elsősorban sebészeti osztályok, ahol ez a gyakorlat még szokás.

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A hagyományos béltisztítás jól bevált, megbízható. Hátránya, hogy hosszadalmas, több napot vesz igénybe, az esetek kétharmadában hasi fájdalmak jelentkeznek, és a betegek egy részét kifárasztja. A több napos diéta hányingert eredményezhet. *Keighley és mtsai* (3) szerint a hagyományos bélelőkészítés legfontosabb két eleme: a 24-48 óráig tartó, szilárd ételektől mentes diéta és a magnézium tartalmú készítménnyel történő hashajtás. A kiegészítő beöntés lényegesen nem javít a módszer hatásosságán.

TELJES BÉLMOSÁS (WHOLE-GUT IRRIGATION, ORTOGRÁD BÉLMOSÁS) Elektrolit oldattal történő teljes bélmosást eredetileg a cholera kezelésére használtak. Műtét előtti béltisztításra, az így nyert tapasztalatok alapján csak később kezdték alkalmazni. Lényege, hogy a gyomor-bélrendszerbe elektrolit oldatot juttatunk, amely történhet gyomor-bélszondán keresztül vagy az elektrolit oldat megivásával. A műtét előtti napon déltől a beteg csak folyadékot fogyaszthat, éjféltől semmit. Gyomor-bélszondán történő bélmosás esetén déli 12 órától, óránként 1 liter oldatot juttatunk a bélrendszerbe addig, amíg a végbélen kifolyó folyadék tisztává nem válik. Hat liternél több folyadékot azonban soha ne adjunk. Az első órában rendszerint formált, majd híg, végül vízszerű béltartalom ürül. Hashajtó és beöntés adása nem szükséges.

Teljes bélmosásra eredetileg élettani só oldatot használtak, amely elektrolit veszteséget eredményezett, és 10-12 órát vett igénybe. Ma már olyan oldatokat használunk, amelyben 125 mmol/liter Na, 20 mmol/liter HCO3 és 10 mmol/liter K, valamint ozmotikus hatású készítmény (mannitol, polythylene glycol) van. Az ozmotikus oldat hatására a szervezetből jelentős mennyiségű folyadék kerül a bélbe, és ezáltal az előkészítési idő 3-4 órára lerövidíthető. Megfelelő elektrolit tartalmú ozmotikus oldatok alkalmazásával a teljes béltisztítás kevés mennyiségű oldat megivásával is megbízhatóan elvégezhető. (Ezek az oldatok hűtve, gyümölcslé hozzáadásával vagy ízesítéssel kellemesebben fogyaszthatók.) *Ellis* (4) fél pohár vízben oldott Picolax adását javasolja a műtét előtt egy vagy két nappal reggel 8 és délután 2 órakor. Ezen a napon a beteg óránként igyon meg egy pohár vizet. A Picolax natrium picosulphatot, magnézium oxidot és citromsavat tartalmaz. Használhatók továbbá más összetett gyári készítmények (GoLYTELY, elektrolit vagy hűtött polyethylene glycol oldat), illetve házilag összeállított oldatok (5-6). Az utóbbiakból legalább 4 litert kell meginni 2 óra alatt. *István* (7) szerint egy liter 10%-os Mannisol, egy vagy másfél óra alatt történő megivásával is jó hatás érhető el, jóllehet vannak megfigyelések, amelyek arra utalnak, hogy ilyenkor több bélgáz képződik.

A teljes bélmosással a bél hatásosan kitisztítható, és viszonylag szárazzá tehető. A módszer ugyanolyan jól használható, mint a hagyományos béltisztítás, és jól elviselhető. Nagy előnye, hogy tulajdonképpen egy egynapos előkészítés. Hátránya, hogy jelentős folyadék veszteséggel járhat, amelyet infúziók adásával pótolni kell. A betegek egy része a nagymennyiségű folyadék elfogyasztását nehezen tűri. Gyomor-bélszonda alkalmazása esetén, amelyre ma már csak elvétve kerül sor, gyakori a hányinger, hányás és kifáradás.

Bélelzáródás vagy annak gyanúja esetén béltisztítás nem lehetséges, legfeljebb egy gyomor-bél szonda segítségével csökkenthetjük a béltartalmat. Ilyen esetben vastagbél anasztomózist csak akkor készíthetünk, ha a vastagbelet műtét közben átmossuk. Ellenkező estben a bél kiszájaztatatása szükséges. Nem végezhető bélelőkészítés bélátfúródás és gyomor- vagy bélvérzés esetén sem.

ANTIBIOTIKUS ELŐKÉSZÍTÉS A belek folyadékkal történő kitisztítása, bármilyen módon végezzük is, nem távolítja el a baktériumokat. A belek baktérium tartalma több tényezőtől függ, amelyek közül a legfontosabb a béltartalom pH értéke, nyák és epesavak jelenléte és a bélmozgások gyorsasága. A gyomor és a felső vékonybél szakasz az epesavak jelenléte, alacsony pH érték, és a viszonylag gyors mozgások miatt gyakorlatilag steril, ha nincs elzáródás. Az alsó vékonybél szakaszban már anaerob és coli baktériumok találhatók, ezek száma azonban nem jelentős. A vastagbél pH-ja magas, benne epesavak már nincsenek, mozgása pedig lassú. Ennek következtében a vastagbélben mindig található szignifikáns mennyiségű baktérium.

A műtéti fertőzések kialakulásában egyrészt a bőrről származó baktériumok játszanak szerepet. A bélműtétek során fellépő fertőzéseket azonban döntően a béltartalomban lévő baktériumok okozzák. A fertőzéseknek a bélvarrat elégtelenségek kialakulásában is meghatározó szerepük van, és itt nemcsak a bél szélek gyulladása, hanem a bél varratok környékének gyulladása is meghatározó. A bőr csirátlanítása mellett, tehát a belek csiramentessé tétele is nagyon fontos.

A belek un. csirátlanítása azonban egy régi elképzelés, amely soha nem érhető el. Bármilyen tisztítást és antibiotikus kezelést is alkalmazunk, a tápcsatorna csak baktérium szegénnyé tehető. A bél nyálkahártya nem lesz csiramentes.

A hagyományos 3 napos antibiotikus előkészítést, amely a belek csirátlanítását volt hivatott elérni, felváltotta a közvetlenül a műtét előtt adott antibiotikus előkészítés. Ennek magyarázatát az a megfigyelés adja, hogy 1. a belek csirátlanítása a hosszú ideig tartó antibiotikus kezeléssel sem érhető el, és, 2. hogy a fertőzések és a bélvarrat elégtelenség megelőzése szempontjából az a legfontosabb, hogy abban a pillanatban, amikor a bélvarratokat készítjük – függetlenül attól, hogy kézzel vagy varrógéppel – a vérben és a szövetekben az antibiotikumok a lehető legnagyobb mennyiségben legyenek jelen. Ezt a célt legjobban közvetlenül a műtét előtt egy adagban, nagy mennyiségen adott antibiotikumok bevitelével érhetjük el.

A hagyományos, 3 napos, bélelőkészítésre az antibiotikumok egész tárházát kipróbálták. A belek baktérium tartalmát a leghatásosabban a klion és a neomycin csökkenti. Jelentős hatással rendelkezik azonban az erythromycin és a szulfonamidok egy csoportja is.

A szerzők jelenleg az egyszeri (one shot, egylövetű) antibiotikus előkészítést alkalmazzák. Ennek során a beteg a műtét előtt egy harmadik vagy negyedik generációs cephalosporint kap pl. 2g Rocephin-t adunk intravénásan és 1000 mg Klion infúziót folyatunk le 1 órával a műtét kezdete előtt. Szövődménymentes esetekben az antibiotikus kezelést nem folytatjuk. Vannak, akik a műtét után 12 órával mégegyszer adnak antibiotikumot. Ez az un. biztosító (two shots, kétlövetű) antibiotikus megelőzés azonban semmivel nem hatásosabb, mint az egyszeri, műtét előtti antibiotikus előkészítés.

IRODALOM

1. Burton RC. Postoperative wound infection in colonic and rectal surgery. Br J Surg 1973; 60:363.

2. Irvin TT, Goligher JC. Aetiology of disruption of intestinal anastomoses. Br J Surg 1973; 60:461.

3. Keighley MRB, Lee JR, Ambrose NS. Indications and techniques for bowel preparation in colorectal cancer. Int Advances Surg Oncol 1983; 6:257.

4. Ellis H. The cause and prevention of postoperative intraperitoneal adhesions. Surg Gynec Obstet 1971; 133:497.

5. Crapp AR, Powis SJ, Tillotson P. Preparation of the bowel by whole gut irrigation. Lancet 1975; 2:1239.

6. Beck DE, Harford FJ, Dipalma JA, et al. Bowel cleaning with polyethylene glycol electrolyte lavage solution. South Med J 1985; 78:1414.

7. István G. Személyes közlés.

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TÁRSASÁGI HÍREK

A Magyar Nőgyógyász Onkológusok Társaságának munkája

BŐSZE PÉTER DR.

A Magyar Nőgyógyász Onkológusok Társaságának elnöke

MAGYAR NŐGYÓGYÁSZ ONKOLÓGUSOK TÁRSASÁGÁNAK I. KONGRESSZUSA A Magyar Nőgyógyász Onkológusok Társaságának (MNOT) első kongresszusára 1998. december 11-12-én kerül sor Budapesten a Sunlight Hotelben. Nagy megtiszteltetés számunkra, hogy a Kongresszus fővédnökeiként Dr. Pusztai Erzsébet egészségügyi minisztériumi államtitkárt és Prof. Dr. Mikó Tivadart, az Országos Egészségbiztosítási Pénztár főigazgatóját üdvözölhetjük. A Kongresszus tiszteletbeli elnökei Prof. Dr. Eckhardt Sándor és Prof. Dr. Gáti István akadémikusok. A Kongresszus elnöke Prof. Dr. Bősze Péter. Tudományos Szervező Bizottság: elnök: Dr. Ungár László, tagok: Dr. Artner Attila, dr. Berbik István, Prof. dr. Bodó Miklós, Dr. Csermely Gyula, Prof. Dr. Doszpod József, Prof. Dr. Gardó Sándor, Prof. Dr. Hernádi Zoltán, Dr. Karácsony István, Dr. Kornya László, Prof. Dr. Kovács László, Dr. Krasznai Péter, Dr. Krivácsi Gábor, Prof. Dr. Krommer Károly, Prof. Dr. Papp Zoltán, Prof. Dr. Paulin Ferenc, Dr. Pálfalvi László, Dr. Siklós Pál, Prof Dr. Szabó István. A Kongresszust a MedCongress (2500 Esztergom Pf. 18) szervezi.

Az MNOT első tudományos kongresszusát alapvetően azzal a céllal rendezzük, hogy képet alkossunk a nőgyógyászati onkológia körébe tartozó betegségek hazai ellátásáról, megtárgyaljunk ellentmondásos kérdéseket, keressük az új irányzatok helyét mindennapi gyakorlatunkban, és, hogy minél több kollegának adjunk lehetőséget tudományos és gyakorlati tevékenységének bemutatására. Az előzetes tudományos programot a meghívóban ismertetjük. Külön felhívjuk a figyelmet, hogy a Kongresszus keretében három kerekasztal megbeszélésre (szimpózium) kerül sor. Az egyik a "támogató" kezeléssel, és ezen belül az amifostine (Ethyol) jelentőségével, a másik a fogamzásgátlók és a rák, illetve a hormonpótló kezelés és a rák kapcsolatával foglalkozik. A harmadik kerekasztal megbeszélés a nyirokcsomó áttétek kérdését taglalja, felvetve azt a kérdést, hogy vajon a nyirokcsomó áttétek sebészi vagy nem sebészi megbetegedésnek tekinthetők-e. A Kongresszus mérföldkövet jelent a Társaság életében, és abban a reményben, hogy eléri célját, minden kollégát szeretettel várunk. Ezúton is szeretném őszinte köszönetemet kifejezni mindazoknak, akik meghívásunkat elfogadták és tudásukat, tapasztalatukat megosztják velünk. Nem kevésbé vagyok hálás a Kongresszus többi résztvevőjének sem. Tényleges közreműködés nélkül egyetlen rendezvény sem valósulhat meg. Köszönet illeti a Kongresszus támogatóit is.

EURÓPAI RÁK ISKOLA BUDAPEST 1998 Rendkívüli esemény volt az Európai Rák Iskola budapesti tanfolyama, amelynek szervezésében a Magyar Nőgyógyász Onkológusok Társasága és az Európai Nőgyógyászati Onkológiai Társaság is részt vett. Rendkívüli megtiszteltetés, hogy a tanfolyam a Magyar Tudományos Akadémia Orvosi Osztályának támogatását élvezte, amiért külön köszönettel tartozunk *Prof. Dr. Méhes Károly*, a Magyar Tudományos Akadémia Orvosi Osztályának elnöke és *Prof. Dr. Gáti István* akadémikus uraknak. Nem kisebb megtiszteltetés, hogy a rendezvényt *Prof. Dr. Vizi E. Szilveszter*, a Magyar Tudományos Akadémia alelnökének védnöksége alatt tarthattuk a Magyar Tudományos Akadémián.

Az Európai Rák Iskola budapesti szemináriumát 1998. szeptember 21-22-én tartottuk. Általános vélemény, hogy a szimpózium nagyon sikeres volt. A tanfolyamon 105-en vettek részt, a magyar kollegák száma 101 volt. Azt hiszem, valóban jelentős, hogy ismét 101 hazai orvost lehetett kiemelkedő színvonalú továbbképzésben részesíteni.

A szimpózium a nőgyógyászati rákos megbetegedések kezelésében és ellátásában, elsősorban, de nem kizárólagosan a betegek életminőségét javító, un. helyreállító műtétekkel foglalkozott. Címe: "The role of reconstructive surgery in the management of the female genital tract cancer". Az előadók között kiemelkedő hazai és külföldi szakemberek szerepeltek. Meggyőződésem, hogy mindnyájan nagyon sokat tanultunk. Hasonló rendezvényre még nem került sor. A rendezvény anyagát csaknem teljes terjedelmében a "Nőgyógyászati Onkológia" jelen számában közreadjuk.

Örömmel nyugtázhatom, hogy ez volt a nyolcadik Európai Rák Iskola rendezvény, amelyet Prof. Dr. Eckhardt Sándor

akadémikus úrral Magyarországon rendezhettem meg. Ez azért jelentős, mert az Iskola közép-kelet európai tanfolyamait az Iskola bécsi központja rendezi.

EURÓPAI RÁK ISKOLA TANFOLYAMAI:

1991 *Course Around the World* Carcinoma of the lower genital tract
Chairpersons: Péter Bősze and Sándor Eckhardt

1992 *Postgraduate Course* The role of drugs in gynaecological malignancies
Chairpersons: Péter Bősze and Sándor Eckhardt

1994 *Course Around the World* Surgical techniques in gynaecological malignancies
Chairpersons: Péter Bősze, Sándor Eckhardt and László Ungár

1995 *Course Around the World* Hormone replacement therapy and cancer
Jointly organised with the Hungarian Society of Gynaecological Oncology
Chairpersons: Péter Bősze, Sándor Eckhardt and István Marton

1996 *Training Course* The place of radiation therapy in the management of gynecologic malignancies and breast cancer
Jointly organised with the Hungarian Society of Gynaecological Oncology and the European Institute of Oncology, Milan
Chairpersons: Péter Bősze, Sándor Eckhardt, Roberto Orecchia and Sergio Pecorelli

1996 *Advanced Seminar* Gynaecological Tumours
Bristol-Myers Squibb sponsored seminar
Chairperson: Péter Bősze

1997 *Training Course* Molecular genetics in gynecologic and breast cancer and its clinical implications: bridging the gap
Jointly organised with the Hungarian Society of Gynaecological Oncology and the Federation of Hungarian Medical Societies
Chairpersons: Andrew Berchuck, Péter Bősze, Sándor Eckhardt and Edit Oláh

1998 *Training Course* The role of reconstructive surgery in the management of the female genital tract cancer
Jointly organised with the Hungarian Society of Gynaecological Oncology, Medical Department of Hungarian Academy of Sciences and the European Society of Gynaecological Oncology
Chairpersons: Péter Bősze, Sándor Eckhardt and László Ungár

Invitation

11th International Meeting of Gynaecological Oncology (ESGO11)

EUROPEAN SOCIETY OF GYNAECOLOGICAL ONCOLOGY

DATE 8-12 May, 1999
LOCATION Budapest, Hungary

Dear colleagues,

On behalf of the Executive Council of the European Society of Gynaecological Oncology, I wish to extend an invitation to you to attend our 11th International Meeting of Gynaecological Oncology, ESGO11, in Budapest, Hungary from May 8-12,1999.

The organising committee will make every effort to continue the tradition of excellence set in previous meetings of the Society.

The scientific programme will be structured in topic-oriented-sessions. Each will cover one topic from basic science to clinical practice on a multidisciplinary basis - including reviews, debates, free papers, and poster presentations - within the guidelines set out by the Session Chairperson. Most sessions, therefore, will be of interest to the entire spectrum of the audience. The chosen themes will focus not only on the most recent advances made in the prevention, diagnosis and treatment of neoplastic diseases of the female genital tract and breasts, but also on the rapidly changing concepts pertaining to the development of cancer, and the ground-breaking and innovative approaches to cancer management based on the discovery that cancer is a genetic disease. Management of tumours which do not originate in, but are related to, the female genital tract will also be discussed. Other scientific features include Teaching Lectures, Symposia and Posters, with the main emphasis of the latter. There will be no parallel sessions. In addition, following the tradition of ESGO lO, a wide variety of pre-congress courses will be organised, all with the aim of helping you improve your care of cancer patients. ESGO11 will offer to participants the opportunity to meet experts and colleagues from all corners of the globe.

For information and registration:

Péter Bősze, M.D.
1301 Budapest, PO Box 46, Hungary
Phone (36 1) 275 2172
Fax (36 1) 275 2172
E-mail bosze@mail.matav.hu

As an indicator of the interest this event is attracting, it is my pleasure to acknowledge that such a large body of International Societies and other organisations have cordially accepted to participate. This amounts to a guarantee of the high scientific level of the Meeting.

As for the venue, Budapest offers warm hospitality, with lots of cultural and tourist attractions. Participants will have an opportunity to experience some of them. The City is proud to host the llth International Meeting of Gynaecological Oncology.

We are looking forward to welcoming you to Budapest - and look forward as well to your invaluable contribution to ESGO11.

Sincerely,
Péter Bősze, M.D., ESGO11 President

THE CITY OF BUDAPEST With its over 2 millon inhibitants, Budapest, the capital of Hungary, is the largest city in a country of 11 million people, and is also the richest in attractions. The city lies in the heart of Europe, on both banks of the river Danube.

Thanks to its favourable geographical position, the place was, even in ancient times and the Middle Ages, an important road junction and a major settlement. If we take into account its Roman predecessor, Aquincum, we can say that it is 2,000 years old. However, Budapest did not officially come into being until as recently as 1873, when the three independent towns of Pest, Buda and Óbuda (Old Buda) were united. Thus, a settlement with over two thousand years of history has only been 'Budapest' for the past 125 years.

The beautiful setting of the city, its artistic monuments dating from so many different periods, its lively cultrual life and numerous medicinal baths, its fine food and drink, and its animated population and warm hospitality - these assets deservedly attract more and more foreign visitors each year.

CONGRESS VENUE: PESTI VIGADÓ This over 130-year-old building is one of the best existing examples of the Hungarian romantic style, and was designed by Hungarian architect Frigyes Feszl. It is located right in the centre of Budapest at the Danube, in the vicinity of first-class hotels.

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* CDC 1998 Guidelines for Treatment of Sexually Transmitted Diseases, PID, MMWR 1998; 47 (No. RR1): 79-86

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MEGHÍVÓ

MAGYAR NŐGYÓGYÁSZ ONKOLÓGUSOK TÁRSASÁGA
I. Kongresszus

1998. december 11-12.
1999. Budapest Hotel Sunlight (1121 Budapest, Svábhegy, Eötvös u. 41.)

A Kongresszus fővédnökei Dr. Pusztai Erzsébet államtitkár, Egészségügy Minisztérium és Prof. Dr. Mikó Tivadar főigazgató, Országos Egészségbiztosítási Pénztár. A Kongresszus tiszteletbeli elnökei Prof. Dr. Eckhardt Sándor akadémikus és Prof. Dr. Gáti István akadémikus. A Kongresszus elnöke Prof. Dr. Bősze Péter.

Előzetes Tudományos Program

Péntek, 1998. december 11.

11.00.-11.20. Megnyitó, köszöntések

11.20.-11.40. Hazai irányzatok a női nemiszervek és az emlők daganatainak ellátásában
Prof. Dr. Paulin Ferenc

11.40.-12.00. Wertheim Centenárium
Dr. Pálfalvy László

12.00.-13.00. Schering-Plough Szimpozium: Ethyol - új lehetőségek a szupportív kezelés területén
Üléselnök *Prof. Dr. Bősze Péter*
Bevezető *Dr. Falus Katalin*
Ethyol (amifostine) pretreatment in second and third-line paclitaxel chemotherapy in ovarian and breast cancer
Dr. Brigitte Prohl-Steimer
Amifostine (Ethyol) védelmében adott cysplatin-cyclophosphamide kezelés ovarium carcinomás betegeknél: magyarországi multicentrikus vizsgálat keretében szerzett tapasztalataink
Prof. Dr. Hernádi Zoltán

14.00.-15.45. Kerekasztal beszélgetés: Pozitív nyirokcsomók méhnyakrákban: sebészi vagy nem sebészi megbetegedés?
Vezető *Dr. Ungár László*
Résztvevők *Prof. Dr. Borsos Antal, Dr. Nagykálnai Tamás, Prof. Dr. Papp Zoltán, Dr. Pálfalvi László*

16.15.-18.00. Kerekasztal megbeszélés: A sugárkezelés helye a korai stádiumú méhtestrák ellátásában
Vezető *Dr. Pálfalvy László*
Műtét előtti sugárkezelés a múlt?
Résztvevők *Prof. Dr. Krommer Károly, Prof. Dr. Thurzó László, Dr. Póka Róbert*
Kiegészítő sugárkezelés, IA stádiumú mirigyrák
Résztvevők *Prof. Dr. Mayer Árpád, Dr. Vereczkey Gábor*
Kiegészítő sugárkezelés, IB stádiumú mirigyrák
Résztvevők *Dr. Naszály Attila, Dr. Artner Attila*

Szombat 1998. december 12.

09.00-10.20. Előadások

10.20.-11.20. **Referátum**
Detralex-el szerzett tapasztalatok a vénás keringési elégtelenség kezelésében
Prof. Dr. Acsády György

11.20.-12.20. Előadások

12.30.-13.30. Nőgyógyászati-onkológiai konszenzus konferencia: A helyes tájékoztatás szempontjai hormontartalmú készítmények (fogamzás gátlók, hormonpótló terápia) rendelésekor
Vezető *Prof. Dr. Bősze Péter*
Résztvevők *Dr. Balogh Ádám, Prof. Dr. Egyed Jenő, Prof. Dr Gardó Sándor, Prof. Dr. Kovács László, Prof. Dr. Marton István, Prof. Dr. Rákóczi István, Prof. Dr. Siklósi György*

13.30. A Kongresszus zárása *Dr. Ungár László*

Minden érdeklődőt szeretettel várunk.
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Telefon/Fax (36 33) 314 861, mobil: 309 349 727
E-posta H9383LIS@Ella.hu

RENDEZVÉNY HÍRMONDÓ

1998. december 12-15.
21st Annual San Antonio Breast Cancer Symposium
San Antonio Texas USA
Jelentkezés: L. Dunnington CTRC 8122 Datapoint, Suite 250, San Antonio, Texas 78229-3219 Fax (1 210) 6165912

1999. január 8-12.
The Steroid Receptor Superfamily (An AACR Special Conference)
California USA
Jelentkezés: AACR Public Ledger Building Suite 826, 150 South Independence Mall, West Philadelphia PA 19106-3483 USA
Fax (1 215) 4409313

1999. január 30.
Cervical Cancer: an Old Problem with New Solutions?
Antwerp, Belgium
Jelentkezés: J. Vermorken, University Hospital Antwerp Wiljikstraat 10, 2650 Edegen, Belgium
Fax (32 3) 8250564

1999. február 2-5.
9th International Congress on Anti-Cancer Treatment
Paris, France
Jelentkezés: Prof D. Khayat Hopital de la Salpetriere 47 Boulvard de la Hopital 75651 Paris Cedex 13
Fax (33 1) 42160477

1999. február 26.
International Symposium on Advanced Ovarian Cancer: Optimal Therapy Update
Valencia, Spain
Jelentkezés: Ultramar Express Congresos, Gran Via Marques de Turia 49 7L3 46005 Valencia, Spain
Fax (34 96) 3941158

1999. március 10-14.
90th Annual Meeting of the American Association for Cancer Reserach
Philádelphia, USA
Jelentkezés: AACR, Public Ledger Building, Suite 816, 620 Chestnut Street, Philadelphia, PA 19106, USA
Fax (1 215) 40 9313

1999. március 11-13.
1st International Viennese Conference on Clinical Experimental Oncology (Clexo 1)
Vienna, Austria
Jelentkezés: Austropa Inter Convention, Währinger Strasse 6-8,
A-1090 Vienna
Fax (43 1) 3155650

1999. március 12-14.
6th International Cambridge Conference on Breast Cancer Screening
Cambridge, UK
Jelentkezés: Marie Curie Cancer Care 17 Grosvenor Crescent, London SW1X 7XZ, UK
Fax (44 171) 2352243

1999. március 15-18.
The Team Approach to Cancer Management (Second UICC Cancer Management Meeting)
Antwerp, Belgium
Jelentkezés: Mr. A.J. Turnbull, Executive Director UICC, 3 rue Conseil Général, 1205 Geneva, Switzerland
Fax (41 22) 809 1810

1999. március 20-24.
30th Annual meeting of the Society of Gynecologic Oncologists, SGO.
San Francisco, USA.
Jelentkezés: SGO Headquarters, P.O. Box 809165, Chicago IL. 60680-9165. Tel (1 312) 6446610, E-mail sgo@sba.com, Internet http://www.sgo.org

1999. március 25.
ESSM
Brussels, Belgium
Jelentkezés: EORTC-Data Center, Avenue E. Mounier 83 Bte 11, 1200 Brussels
Fax (32 2) 7723545

1999. március 27-28.
EORTC-GCCG meeting
Leuven, Belgium
Jelentkezés: I. Vergote, University Hospitals Leuven, Dept. Gynaecological Oncology, Herestraat 49 3000 Leuven
Fax (32 16) 344629

1999. április 7-10.
1st International Congress on the Sentinel Node in Diagnosis and Treatment of Cancer
Amsterdam, The Netherlands
Jelentkezés: Congress Secretariat Congrex Holland BV, P.O. Box 302 1000 AH Amsterdam Fax (31 20) 5040225

EGY ÚJ ORVOSI FOLYÓIRAT

CME JOURNAL OF GYNECOLOGIC ONCOLOGY

Editor-in-Chief *Péter Bősze*
Associate Editor *George D. Wilbanks*
Managing Editor *Terézia Barabás*

A CME (Continuing Medical Education) Journal of Gynecologic Oncology egy nemzetközi, független, nem nyereség-érdekelt, orvostovábbképző újság, amelyet a Nőgyógyászati Rák Alapítvány hozott létre. Az újság a hazánkban még kellően nem elterjedt, un. folyamatos orvostovábbképzés szellemében készül, és a női nemiszervek, emlők daganatos megbetegedéseivel foglalkozik, felölelve a határterületi kérdéseket is. Fejezetekből áll, és minden fejezet egy témával foglalkozik, amelyeket részletekbe menően tárgyal. Ugyanarról a témáról többen is írnak, vagyis sok az ismétlés. Ez nem csak a tanulást segíti, hanem lehetőséget biztosít arra, hogy egyazon téma több nézőpontból is megvilágításba kerüljön. A közleményeket a világ vezető szakemberei írják. Minden fejezetnek van egy szerkesztője, aki bevezetőjében rámutat a téma ellentmondásaira, és rövid történeti áttekintést ad, a fejezet végén pedig összefoglalóan írja le a jelenlegi álláspontot, és egy rövid gyakorlati útmutatót, irányvonalat nyújt. Az Újság eredeti közleményeket nem közöl, a szerzők felkéréses alapon működnek közre. Szerkesztésében egy rangos INTERNATIONAL ADVISORY BOARD működik közre.

A CME Journal of Gynecologic Oncology megrendelhető a kiadótól (PRIMED-X KIADÓ, Budapest 1301 Budapest, Postafiók 46. Tel/fax: (36 1) 275 2172). Az Újság szerkesztősége úgy gondolja, hogy a CME Journal of Gynecologic Oncology az orvosi folyóiratoknak sok vonatkozásban egyedülálló, teljesen új típusa, amely alapvető elméleti ismeretek mellett a mindennapi betegellátásban hasznosítható ismeret anyagot is tartalmaz, ezért rendkívül kívánatos, hogy a magyar szakemberek számára is állandóan hozzáférhető legyen. Ezért abban a meggyőződésben, hogy a CME Journalból szerzett ismeretek a daganatos megbetegedésben szenvedő betegeink hasznára válnak, a magyar kollégák számára jelentős árengedményt biztosítunk. Az folyóirat egy éves előfizetési díja hazai egyéni előfizetőknek 89 USD helyett csak 6000 Ft, közületeknek 154 USD helyett 16 000 Ft. Az ár az ÁFA-t és a postázási költséget is magában foglalja. PRIMED-X Kiadó.

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Felhívás!

Tisztelt Olvasóink, Kedves Kollegák!

A Nőgyógyászati Onkológia szerkesztősége örömmel tudatja, hogy támogatók jóvoltából az újságot 1998-ban magánszemélyeknek térítésmentesen tudja elküldeni. A lap térítési díja közületek, könyvtárak, rendelők részére jelképes, az önköltség alatt van, évente 3.000.- Ft. Ez évben a Nőgyógyászati Onkológia mindegyik száma már 1600 példányban kerül kiadásra. Kérjük azokat, akik a tudományos folyóiratot szeretnék megkapni, a szerkesztőség felé jelezzék igényüket.

Az elmúlt időszakban a lap terjesztésével komoly nehézségek voltak. A zökkenőmentes terjesztés érdekében kérjük a mellékelt kérdőívet kitöltve visszaküldeni. A folyóiratot a továbbiakban csak azoknak küldjük, akiktől visszajelzést kaptunk.

Szerkesztőség

A kézirattal kapcsolatos tudnivalók

A KÉZIRATOK ELKÜLDÉSE A kéziratok teljes anyagát ábrákkal, táblázatokkal együtt *két példányban* a főszerkesztő címére (Prof. Dr. Bősze Péter, 1301 Budapest, Pf. 46. Tel/fax: 36 1 275-2172) kérjük küldeni. A kéziratok anyagát a számítógépes szerkesztés megkönnyítése és a szerkesztésből eredő hibaforrások csökkentése céljából kérjük, hogy amennyiben erre a szerzőknek lehetőségük van, egy megfelelően jelzett mágneslemezen (3 1/2 disk, IBM MS-DOS) is küldjék el. Mágneslemez helyett a kéziratok anyaga E-mail-en is küldhető (E-mail bosze@mail.matav.hu). Az eredeti kézirat minden esetben szükséges. A kéziratokat *kísérő levéllel* együtt kell küldeni.

KÍSÉRŐ LEVÉL A kísérő levél tartalmazza a szerzők nevét, a közlemény címét és a levelező szerző adatait (név, munkahely, postacím). A kísérő levél aláírásával a levelező szerző kijelenti, hogy a mellékelt munka más helyen nem került és nem is fog közlésre kerülni. Ugyanannak a közleménynek idegen nyelvű folyóiratban történő megjelentetése csak a szerkesztőség *írásbeli beleegyezésével* történhet. A levelező szerző a kísérő levél aláírásával kijelenti továbbá, hogy a kézirat közlését a társszerzők a kéziratban foglaltak szerint jóváhagyták, „személyes közlésbe" (personal communication) az idézett szerző beleegyezett, és, hogy a szerzők a szerzői jogot átruházzák a szerkesztőségre.

KÉZIRATTAL KAPCSOLATOS FORMAI KÖVETELMÉNYEK A kézirat formája feleljen meg a nemzetközileg elfogadott, Uniform Requirements for Manuscripts Submitted to Biomedical Journals (Ann Intern Med 1988; 108:258–265.) előírásoknak.

GÉPELÉS Ha a kézirat szövegszerkesztővel készült, a kívánt jelölések, pl. kiemelés, dőlt betű stb. a szövegszerkesztővel megoldhatók. Magyar ékezetes betűket használjunk. Hagyományos gépelés esetén, kérjük a megfelelő részt aláhúzni és a szöveg szélén a kívánalmakat írásban megadni, pl. apró, félkövér vagy dőlt betű, aláhúzni stb. Gépelés vagy nyomtatás mindig csak egy oldalon történjék.

CÍMOLDAL A címoldal tartalmazza a közlemény címét, alatta a szerzők teljes nevét, a szerzők munkahelyét (az osztály vagy intézet vezetőjének nevét nem kell külön megadni), egy rövidített címet, amely ne legyen hosszabb, mint 50 karakter, és a levelező szerző postacímét, telefonszámát.

A MÁSODIK OLDAL egy magyar nyelvű összefoglalót és 3–4 kulcsszót tartalmazzon. A kulcsszavak csak az Index Medicus Medical Subject Headings szavai lehetnek. A harmadik oldalon az összefoglalónak és a kulcsszavaknak angol nyelvű változatát kell megadni. Az angol nyelvű összefoglalóban szerepeljen a dolgozat angol címe és a szerzők neve is.

SZÖVEG Az *eredeti közleményeket* hagyományos módon: bevezetés, anyag és módszer (vagy betegek és vizsgáló módszerek/kezelések stb.), eredmények, megbeszélés, irodalom kell tagolni. *Esetismertetés* esetén a közleményt bevezetés, esetismertetés, megbeszélés és irodalom részekre bontsuk. *Minden más esetben* a közlemény felépítését a szerzők választják meg. Az irodalmi hivatkozások azonban mindig a közlemény végére kerüljenek.

IRODALOM Az irodalom idézése a szövegben zárójelbe tett arab számokkal történjen a hivatkozás előfordulásának sorrendjében, és nem abc szerint. A szövegben a szerzők nevét dőlt betűvel írjuk, ilyenkor a vonatkozó szám a szerző neve után jön. Ha a szerző neve nem szerepel a mondatban, a hivatkozási szám a mondat végére, de még a pont elé kerül. A hivatkozási számot csak akkor kell a pont után tenni, ha az az egész bekezdésre vonatkozik. Az irodalmi adatokat az „irodalom" részben, amely a szöveges rész után következik, az idézés sorrendjében írjuk az alábbiak szerint.

FOLYÓIRAT ÉS KÜLÖNSZÁM Monaghan JM. The role of surgery in the management of granulosa cell tumours of the ovary. CME J Gynecol Oncol 1996; 1:116.
Webb MJ, Symmonds RE. Site of recurrence of cervical cancer after radical hysterectomy. Am J Obstet Gynecol 1980; 138:813.
Creasman WT, Morrow CP, Bundy BN, et al. Surgical pathologic spread patterns of endometrial cancer. Cancer 1987; 60:2035.
Magrina JF. Intestinal surgery in gynecologic malignancies. Magy Nőorv L 1995; 58 (Suppl. 2):55.

KÖNYV László J, Gaál M. Nőgyógyászati pathológia. 2. kiadás, Budapest, Medicina Könyvkiadó. 1976:33.

KÖNYVFEJEZET Egyed J. Diabetes és terhesség In: Doszpod J, szerk. A szülészet és nőgyógyászat aktuális kérdései. Budapest, OTKI, 1982:87.

Az irodalmi hivatkozások pontosságáért a szerzők felelősek. Ha a szerzők száma hat vagy annál kevesebb, az összes szerző nevét soroljuk fel. Ha hatnál több, csak az első hatét, és utána az „és mtsai" (idegen nyelvű közlemény esetén „et al") kifejezést írjuk. Egyszavas folyóiratok nevét teljesen ki kell írni, egyébként a folyóiratok nemzetközileg elfogadott rövidítéseit, amelyet az Index Medicus tartalmaz, alkalmazzuk. A Nőgyógyászati Onkológia rövidítése: Nőgyógy Onkol.

A **KÖSZÖNETNYILVÁNÍTÁS**-t, az irodalom után írjuk.

TÁBLÁZATOK A szövegben a táblázatok számozását megjelenésük sorrendjében, zárójelbe tett arab számokkal írjuk pl. (*1. táblázat, Table 1*). A táblázatokat, a táblázat felett megszámozva külön oldalakon kérjük. A számozás után a táblázat címe következik. A táblázat alá rövid magyarázó szöveg kerül. Ide írjuk megfelelő jelöléssel a táblázatban előforduló rövidítések magyarázatát is. Más szerzőktől vett táblázatok csak az eredeti szerzők vagy a szerzői jog tulajdonosának engedélyével idézhetők.

ÁBRÁK Mindig az eredeti ábrákat, fényképeket kell beküldeni két példányban. A szövegben az ábrák számozását megjelenésük sorrendjében, zárójelbe tett arab számokkal írjuk pl. (*1. ábra, Figure 1*). Az ábrák hátoldalán vékony ceruzával vagy ragasztható cédulán tüntessük fel a sorszámot, a szerző nevét és az ábra irányát kis nyíl segítségével. Kontrasztos, jó minőségű fekete-fehér fényképeket kell küldeni. Szükség esetén színes képet is elfogadunk. A rajzolt ábrák fekete tintával fehér háttér előtt készüljenek. Az ábraaláírásokat külön lapon kérjük. Ebben az ábrán használt jelzések magyarázatát is adjuk meg. Más szerzőktől vett ábrák csak az eredeti szerzők vagy a szerzői jog tulajdonosának engedélyével idézhetők. A beküldött ábrákat csak a szerzők külön kérésére küldjük vissza.

MÉRTÉKEGYSÉG A mértékegységeket „méter rendszerben", SI egységekben kell megadni.

RÖVIDÍTÉSEK A rövidítéseket a szövegben először jelentésük teljes kiírása után zárójelben adjuk meg, és csak ezután használjuk önállóan. Az összefoglalóban (Abstract) ne legyen rövidítés.

HELYESÍRÁS **Törekedjünk magyar orvosi kifejezések használatára, az idegen kifejezéseket, amikor csak lehet, kerüljük el. Az orvosi kifejezések magyarítása kívánatos.** Nem magyar eredetű szavak írása az eredeti írásmód szerint történjen. Magyaros helyesírással csak a köznyelvben meghonosodott (pl. krónikus, akut) szakkifejezéseket írjuk. Egyazon közleményben következetesen kell alkalmazni a magyaros vagy klasszikus írásmódot. Angol nyelvű szövegben az angol és az amerikai helyesírás is alkalmazható.

Instructions to authors

The original manuscript „together with a cover letter" must be submitted to the Editor-in-Chief (Péter Bösze, M.D., 1301 Budapest, P.O. Box 46, Hungary. Tel/Fax: (36-1) 275 2172, E-mail address: bosze@mail.matav.hu). Authors are encouraged to e-mail their manuscripts or submit them on a floppy disk with adequate labeling and information (3 1/2 diskette in IBM MS-DOS). In either case, an accurate hard-copy print-out must be sent (v.c.), as well. The Editor-in-Chief requires the original manuscripts and cover letters. By signing the cover letter, the authors certify that the same work has not been published, and is not under consideration for publication elsewhere, that its submission for publication has been approved by all of the authors, and that any person cited as a source of personal communications has approved such citation. By signing the cover letter, the authors transfer the copyright to the Publisher. Manuscript decisions will be based on peer review.

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The ***Hungarian Journal of Gynecologic Oncology*** guidelines are based on instructions set forth in the **Uniform Requirements For Manuscripts Submitted to Biomedical Journals** (Ann Intern Med 1988; 108:258–265).

TITLE PAGE The title page should contain the article title followed by the author's first, middle and last names, residence of the author(s) (the name of the head or director of the department or institution is not required), a short running head of not more than 50 characters, and the complete mailing address including e-mail and telephone numbers of the single author to whom correspondence should be sent. ***Page 2*** should contain a short abstract followed by 3 to 4 key words for index purposes.

TEXT Original articles should incorporate the following sections: Introduction, Patients and Methods, Results, Discussion and References. The organization of the text of review papers is up to the author(s). However, all articles should contain References. *Acknowledgements* follow the References. Pages should be numbered in succession, the title page being page one.

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JOURNAL ARTICLE AND SUPPLEMENT Monaghan JM. The role of surgery in the management of granulosa cell tumours of the ovary. CME J Gynecol Oncol I 996; 1:116.

Webb MJ, Symmonds RE. Site of recurrence of cervical cancer after radical hysterectomy. Am J Obstet Gynecol 1980; 138:813.

Creasman WT, Morrow CP, Bundy BN, et al. Surgical pathologic spread patterns of endometrial cancer. Cancer 1987; 60:2035.

Magrina JF. Intestinal surgery in gynecologic malignancies. Magy Nöorv L 1995; 58 (Suppl. 2):55.

BOOK DiSaia PJ, Creasman WT. Clinical Gynecologic Oncology. 3rd edn. St. Louis, The C.V. Mosby Company, 1989:211.

CHAPTER IN A BOOK Schwartz PE, Naftolin F. Hormone therapy. In: Berek JS, Hacker NF, eds. Practical Gynecologic Oncology. 2nd edn. Baltimore, Williams and Wilkins,1994:613.

Accuracy of reference data is the responsibility of the author(s). All authors should be listed when there are six or less; with seven or more the first six should be given followed by „et al.". Single word journal titles should be spelled out, all others should be abbreviated according to Index Medicus.

TABLES Tables are numbered consecutively using Arabic numerals in brackets *(Table 1)*, in the order cited in the text. They should be typed double-spaced on separate pages and should be accompanied by a short caption. All abbreviations should be explained in a footnote.

FIGURES The original illustrations and line drawings should be submitted and numbered using Arabic numerals in brackets *(Figure 1)* consecutively as they appear in the text. Line drawings should be in black ink on a white background or clear glossy prints, with lettering of high standard and large enough to be legible when reduced. Color or black-and-white photographic prints must be glossy and provide sharp contrast. Color illustrations are accepted when appropriate. On the back of each illustration or on a label affixed to the back of each figure indicate the author's last name, figure number and the "top" with an arrow. Never use labels on color figures, and never use ink on the front or back of any figures. Captions should be on a separate page and should include the figure number and a brief description of the illustration. Explain all symbols used in the illustration. Scale bars (when appropriate) should be provided on the photographs. Figures that are reproduced from another published source require written permission from the authors and copyright holders. Submitted illustrations are returned on request only.

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CÉLKITŰZÉS ÉS INFORMÁCIÓ A **Nőgyógyászati Onkológia** a Magyar Nőgyógyász Onkológusok Társaságának hivatalos lapja. Azzal a céllal jött létre, hogy a nőgyógyászati onkológiának, a szülészet–nőgyógyászat és az onkológia önálló szakmájának, hazánkban is tudományos fórumot teremtsen. Nőgyógyászati onkológiai folyóirat más országokban és nemzetközi szerkesztésben már évtizedek óta létezik, ezért a **Nőgyógyászati Onkológia** megjelentetése az orvostudománynak ezen a területen a haladó világhoz történő felzárkózásunkat jelenti. A szakmai célkitűzések mellett a magyar orvosi nyelv művelése, jobbítása is a lap alapvető feladata.

A **Nőgyógyászati Onkológia** a női nemi szervek, az emlők és a határterületek daganatos megbetegedéseivel, valamint az ezekhez kapcsolódó általános, elméleti és gyakorlati kérdésekkel foglalkozik. Tárgyalja továbbá a nőgyógyászati onkológiát, mint szakmát, beleértve a szervezési, a képzési és anyagi meggondolásokat is. A lap eredeti, összefoglaló és szerkesztőségi közleményeket, esetismertetéseket és beszámolókat közöl. Különös hangsúlyt fektet a képzésre, amelyet nemcsak elméleti, de gyakorlati szinten is meg kíván valósítani. Orvostörténeti ismereteket ad annak tudatában, hogy nincs jelen és jövő a gyökerek ismerete nélkül. Társasági hírek, kritikák, megemlékezések, események ismertetése és más hírmondás a folyóirat szerves részét képezik. Határterületi kérdések és betegtájékoztatók szintén a célkitűzések közé tartoznak. A **Nőgyógyászati Onkológia**, mint a Magyar Nőgyógyász Onkológusok Társaságának hivatalos lapja, a Társaság állásfoglalásait, hírleveleit és más kiadványait közli.

A felkért közlemények kivételével minden közlést két bíráló véleményez. Ennek alapján a **Nőgyógyászati Onkológia** is az ún. „bírálóan átnézett" (peer-reviewed) folyóiratok közé tartozik. A bírálók javaslatot tesznek módosításokra és a közlemény elfogadására vagy elutasítására, amelyet a szerkesztőség messzemenően figyelembe vesz. A bírálók személyét nem fedjük fel. **A közleményekben megfogalmazott vélemények, javaslatok nem a szerkesztőség, hanem a szerzők véleményét, állásfoglalását jelentik.**

A **Nőgyógyászati Onkológia** alapvetően magyar nyelvű. A kis népek létezése azonban megköveteli a kétnyelvűséget, ezért a lapban a közlemények összefoglalóját és a fontosabb adatokat angol nyelven is ismertetjük. Elfogadunk angol nyelvű közleményeket, egy-egy nemzetközi rendezvény előadásait pedig teljes egészében angolul adjuk közre.

SCOPE AND INFORMATION With the rapid advances of radical sugrery, clinical technologies, anasthesia, modern blood banks, antibiotics, medical oncology and radiotherapy, and with the explosion of molecular biology it has been recognized that the usual training of gynecologists-obstetricians was insufficient to provide optimal care for patient with malignancies of the female genital tract and breast cancer. This recognition has led to the development of the subspecialty of gynecologic oncology with board certification in many countries worldwide.

Since the establishment of our specialty, a plethora of information has been accumulated with the recognition that in the rapidly expanding field of gynecologic oncology it is becoming almost impossible to be up-to-date with issues of concern. The spectrum of gynecologic oncology is broadening each day and includes among others advanced surgery, fundamental understanding and practice of drug- and radiation therapy and an in-depth knowledge in pathology and molecular biology. The gynecologic oncologists should keeppace with these exciting basic and clinical advances. The explosion of scientific information brought about by molecular and cellular biology should be reflected in patient's care at bedside. Cancer treatment and molecular biology cannot be separated any longer. These are some of the major reasons of establishing national and international journals devoted to gynecologic oncology.

In Hungary, gynecologic oncology has been officially recognized as a specialty of obstetrics and gynecology. This was followed by the foundation of the Hungarian Society of Gynecologic Oncology in 1991. During the last 5 years, there has been a growing need for a national venue for publications focusing on clinical and basic gynecologic oncology. Thus, the foundation of the **Hungarian Journal of Gynecologic Oncology** with the aim of providing a sole forum for gynecologic oncology in Hungary. The **Hungarian Journal of Gynecologic Oncology** is the official journal of the Hungarian Society of Gynecologic Oncologists.

The **Hungarian Journal of Gynecologic Oncology** will provide a natioanal archive to high quality papers that deal with tumors of female genital tract and related organs, and with the benign and malignant diseases of the breasts. Reports of investigations relating to any aspect of these fields, including etiology, epidemiology, pathology, diagnosis, treatment, follow-up and basic science will be considered. Such contributions may come from any of the disciplines with interests in gynecologic oncology.

The **Hungarian Journal of Gynecologic Oncology** will publish original articles, invited reviews, brief reports, papers focusing on the history and on the professional aspect of the specialty, news, comments, critique, book reviews and letters. Education with particular emphases on continuing medical education is one of the major aims of the journal.

The language of the **Hungarian Journal of Gynecologic Oncology** is basically Hungarian. However, paper written in English will also be accepted.

The original manuscript together with a coverage letter must be submitted to the Editor-in-Chief (Péter Bősze, M.D. 1302 Budapest, P.O. Box 46, Hungary. Tel./fax: (36-1) 275-2172, E-mail address: bosze@mail.matav.hu). The authors are encouraged to E-mail their manuscript or submit the article on a floppy disc with adequate labelling and information (3 1/2 diskette in IBM MS-DOS). In either case an accurate hard-copy print-out must accompany. The Editor-in-Chief requires the original manuscripts and the cover letters. By signing the cover letter, the authors certify that the same work has not been published, that it is not under consideration for publication elsewhere, that its submission for publicatioan has been approved by all of the authors, and that any cited as a source of personal communications has approved such citation. By signing the cover letter, the authors transfer the copyright to the Publisher. Manuscipt decision will be based an peer review.

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