

## Radical Hysterectomy for Management of Cervical Cancer

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### Abstract

An alternative to classical radical hysterectomy performed by laparotomy is an endoscopic approach. These procedures can be performed fully by laparoscopy or robotically or in combination with a vaginal approach. Feasibility of both minimally invasive approaches, laparoscopic or robotic surgery, were well proven in early stages, locally advanced stages, old patients, obese patients. An endoscopic approach is associated with less blood loss and shorter hospital stays, but, on the other hand, longer operation times when compared with an open approach. Multiple approaches to performing a radical abdominal hysterectomy and bilateral pelvic lymphadenectomy have been described. The transverse Maylard or Cherney incision is used by some, whereas others prefer midline incisions. Orr and Scribner have reported shorter hospital stays when a Pfannenstiel incision is used. Currie has presented and published a technique using a transverse cosmetic incision with vertical fascial entry for selected patients. Most surgeons prefer a vertical midline incision made 3 cm above the umbilicus and extended inferiorly to the pubic symphysis.

**Keywords:** Radical Hysterectomy, Cervical Cancer

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### Introduction

The first attempts to surgically treat cervical cancer date back to the first half of the nineteenth century. The majority of these patients died during or shortly after the surgery [1]. The first hysterectomy with the resection of lateral parametria was described in 1895 by Clark [2]. Lymphadenectomy was not part of this procedure. Only 3 years later E. Wertheim performed the first radical hysterectomy in combination with pelvic lymph node removal in Vienna [3]. Mortality oscillated around 30% at the beginning and decreased quickly in time with his increasing skill to as low as 10% (as early as 1911 he reported 500 operations). Just a couple of years later Schauta developed a technique of vaginal radical hysterectomy that was first published in 1908 [4]. The principles were modified during the twentieth century by many other personalities: vaginal approach primarily by Amreich (1960); abdominal Wertheim's procedure by his successor Werner; W. Latzko [5] and mainly Okabayashi [6], who further increased the radicality of parametria

resection. An American, Joe V. Meigs [7], earned his place in history thanks to his abdominal approach promoting technique modification and increased lymphadenectomy radicality.

Indication

Radical hysterectomy is the most important surgical procedure performed at gynecological oncology as shown by Table 2 [8].

Table (1): Shows indication of radical hysterectomy

Indication	Extent of the disease
Invasive cervical cancer	Stage IA1 with lymphovascular invasion Stage IA2 Stage IB1 Stage IB2 (selected) Stage IIA (selected)
Invasive vaginal cancer	Stage I-II (limited to upper one third of vagina, usually involving posterior vaginal fornix)
Endometrial carcinoma	Clinical stage IIB (gross cervical invasion)
Persistent or recurrent cervical cancer after radiotherapy	Clinically limited to cervix or proximal vaginal fornix

Classification

Old Classification:

Piver et al. [9] classified radical hysterectomy according to the extension of the surgery either laterally towards parametrium or posteriorly towards uterosacral ligament or inferiorly towards vagina.

Table (2): Comparison of Extent of Resection for Surgical Procedures to Treat Early-Stage Cervical Cancer

Tissue	Total abdominal hystrectomy	Modified radical hystrectomy	Radical Abdominal Hystrectomy
Cervix	Completely removed	Completely removed	Completely removed
Corpus uteri	Completely removed	Completely removed	Completely removed
Ovaries and tubes	Completely removed	Completely removed	Completely removed

Parametria and paracolpos	preserved	Removed up to the level of ureter	Removed lateral to the ureter up to lateral pelvic wall
Uterine vessels	Ligation at the level of internal os	Ligation at the level of the ureter medial to it	Ligation at the origin of uterine art.from IIA
Uterosacral ligaments	Ligated at the uterus	Midway between uterus and rectum	Divided near rectum
Vaginal cuff	Not removed	1-2 cm	More than 2 cm

Table (4): ABCD classification system and corresponding historical types of radical hysterectomy

New classification system	Corresponding types
A	Extrafascial hysterectomy
B	Modified radical hysterectomy Type II radical hysterectomy
C1	Nerve sparing radical hysterectomy
C2	Type III radical hysterectomy Classical/standard radical hysterectomy
D	Laterally extended parametrectomy

#### Preoperative Evaluation and Preparation:

A young, healthy patient with a small cervical lesion requires an admission history and physical examination, chest radiograph and routine laboratory studies, and anesthesia consultation. If the patient is older, has medical complications, or has a larger or undifferentiated cervical lesion, the preoperative workup and preparation may be more involved and thorough. Most surgeons obtain a CT scan of the abdomen and pelvis with contrast, which also shows the course and number of ureters and also may provide additional information about nodal or other metastases. Larger lesions or those more likely to have metastases may be investigated by pelvic and abdominal CT scan or magnetic resonance scans. Likewise, cystoscopy or proctoscopy is rarely indicated or helpful in the preoperative evaluation of early-stage cervical cancer [12].

#### Surgical Approach

An alternative to classical radical hysterectomy performed by laparotomy is an endoscopic approach. These procedures can be performed fully by laparoscopy or robotically or in combination with a vaginal approach. Feasibility of both minimally invasive approaches, laparoscopic or robotic surgery, were well proven in early stages, locally advanced stages, old patients, obese patients [13]. An endoscopic approach is associated with less blood loss and shorter hospital stays, but, on the other hand, longer operation times when compared with an open approach [14].

### Open Radical Hysterectomy

#### Bowel Preparation

Patients are asked to start a liquid diet 24 hours before surgery. They also are given a mechanical bowel preparation if significant peritoneal adhesions are anticipated or there is a history of previous major pelvic surgery or radiation [15].

#### Positioning and Incision

After general anesthesia is given, the patient is put in a modified lithotomy with both arms tucked as for laparoscopic surgery. The legs are placed in boot-type stirrups, with no hip flexion and sufficient thigh abduction to expose the vagina [16].

After the patient is positioned on the operating table, a careful rectovaginal abdominal pelvic examination is done. The skin is prepared from the rib margin to the midhigh, with special attention given to the umbilicus, perineum, and vagina. The patient is draped, a transurethral Foley catheter is inserted into the bladder, and the operation is begun. Suction should be available to keep the field dry.

Multiple approaches to performing a radical abdominal hysterectomy and bilateral pelvic lymphadenectomy have been described. The transverse Maylard or Cherney incision is used by some, whereas others prefer midline incisions. Orr and Scribner have reported shorter hospital stays when a Pfannenstiel incision is used. Currie has presented and published a technique using a transverse cosmetic incision with vertical fascial entry for selected patients. Most surgeons prefer a vertical midline incision made 3 cm above the umbilicus and extended inferiorly to the pubic symphysis [17].

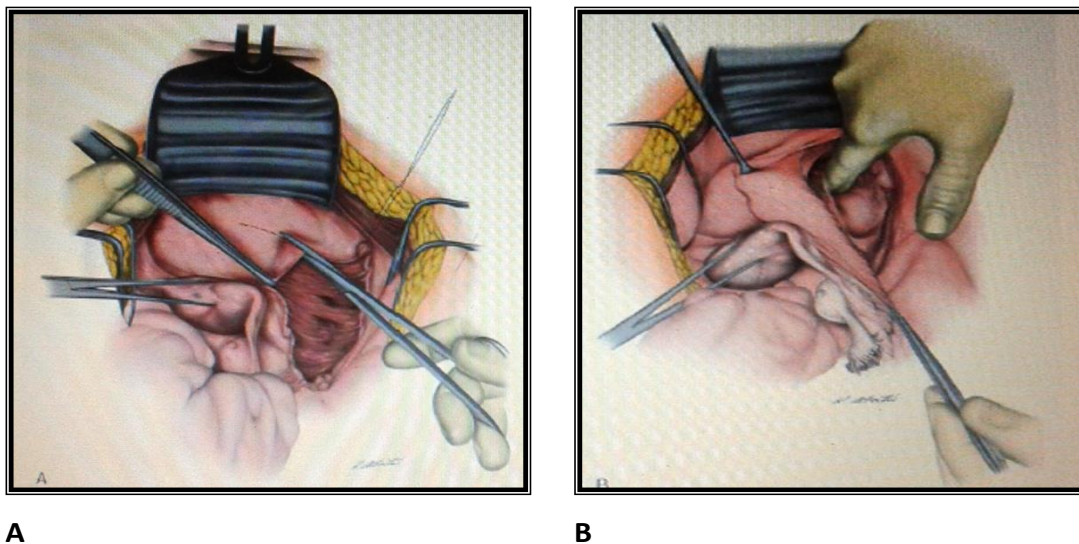
The midline incision is protected by a moist pack beneath each arm of the self-retaining retractor to avoid excessive compression of the epigastric vessels that course beneath the rectus muscles. The bladder is decompressed by an indwelling catheter throughout the procedure to facilitate exposure and maintain an accurate record of urine output [18].

Before initiating the pelvic procedure, the abdominal viscera and parietal peritoneum of the abdominal cavity are evaluated meticulously for possible evidence of metastatic tumor. Peritoneal washings for cytologic examination usually are not obtained because the yield is low and the prognostic significance is undetermined. At this point in the procedure, any adhesions in the pelvis are lysed, and the intestines are placed in the upper abdomen and held there with moist packs. A suitable self-retaining retractor can be used [19].

After the round ligaments are clamped, cut, and ligated, the utero-ovarian ligaments and medial fallopian tubes are clamped and doubly ligated. The infundibulopelvic ligaments are carefully mobilized, and the adnexal organs are packed out of the operative field with the intestine [20].

#### Opening of Paravesical Space:

After clamping and ligating the round ligament about midway along its course, the anterior leaf of the broad ligament is opened in an inferior direction, passing well into the pelvis before diverting the incision medially to reflect the bladder peritoneum from the lower uterine segment. The paravesical space can be entered without difficulty with gentle digital pressure, making certain that the dissection is initiated between the external iliac vein laterally and the obliterated hypogastric artery (lateral umbilical ligament) medially. The dissection is carried all the way down to the levator ani muscle (Fig. 10). With gentle digital dissection, the pelvic floor can be palpated and the posterior aspect of the space can be identified, including the anterior margin of the cardinal ligament. [21]



**Fig. (1): Opening of the anterior leaf of the broad ligament after ligation of the round ligament and infundibulopelvic ligament.**

#### Opening of the pararectal space:

The pararectal space lies beneath the pelvic peritoneum and extends between the cardinal ligament laterally and the uterosacral ligament medially. It can be entered by extending the incision in the anterior leaf of the broad ligament in a cephalic direction along the lateral margin of the infundibulopelvic ligament by retracting the infundibulopelvic ligament and displacing the uterus medially, the uterosacral ligament is placed on a stretch, and the pararectal space is widened. The medial border of the space is bounded by the uterosacral ligament and rectum, and the lateral border is formed superiorly by the piriformis muscle and inferiorly by the levator muscle. The sacrum forms the posterior margin of the space, and the ureter is attached to the peritoneum along the roof of the space before entering the medial aspect of the cardinal ligament. The hypogastric artery and vein are located in the deeper aspect of the pararectal space along the levator ani muscle [22].

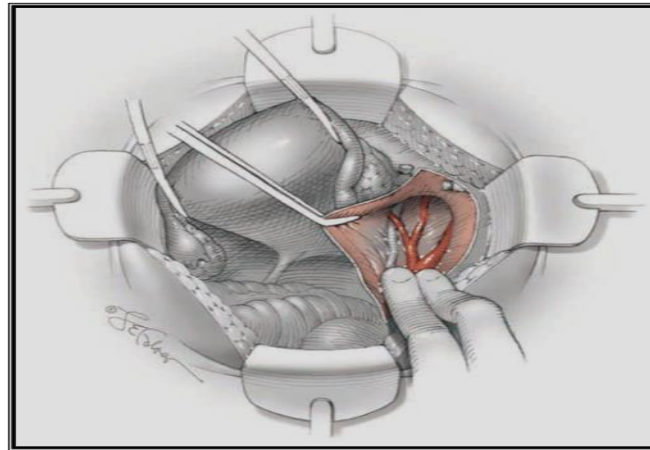


Figure (2)

(A): Extending the incision in the anterior leaf of the broad ligament in a cephalic direction along the lateral margin of the right infundibulopelvic ligament.

(B): Paravesical and pararectal fossae, with intervening base of broad ligament attached to pelvic floor and lateral pelvic wall.

#### Pelvic Lymphadenectomy:

Dissection of the lymphatic tissue along the iliac vessels can begin in the region of the bifurcation of the common iliac artery and extended superiorly to the bifurcation of the aorta and inferiorly to the inguinal ligament and deep circumflex iliac vein, or it can begin at another point along the course of the iliac vessels. The ureter is easily identified as it enters the pelvis at the bifurcation of the common iliac artery. The lymphatic tissue along the common iliac vessels is removed by sharp dissection with the points of the Metzenbaum scissors directed upward, while special care is taken to avoid trauma to the ureter. The ureter is reflected medially during the dissection of the common iliac vessels and left attached to the parietal peritoneum to maintain its blood supply. The external iliac vessels are carefully dissected down to the point where the deep circumflex iliac vein crosses over the external iliac artery. At this point, care must be taken to avoid injury to the inferior epigastric artery and vein, which arise from the anterior and medial side of the iliac vessels and course along the anterior peritoneum onto the lower abdominal wall [23].

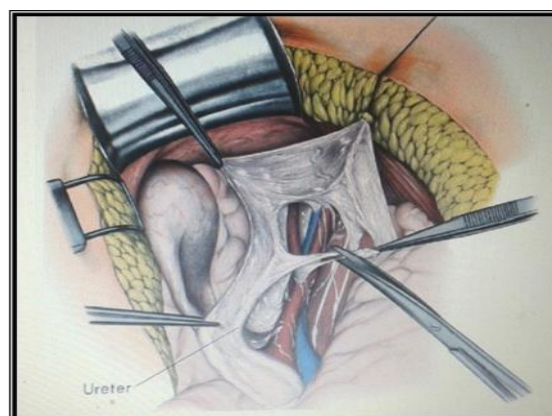


Figure (3): Pelvic lymphadenectomy with dissection of right common iliac vessels and their branches, including the external iliac and hypogastric arteries and veins. Note attachment of ureter to parietal peritoneum. The genitofemoral nerve courses along the psoas muscle.

Opening of the obturator space:

The obturator space is entered by reflecting the external iliac vessels medially away from the psoas muscle and freeing the areolar tissue that lies directly between these vessels and the lateral pelvic wall usually with blunt dissection. The obturator space is clearly exposed. The lymphatic and areolar tissue are dissected from the obturator space to the region of the pelvic floor, with particular care taken to avoid trauma to the obturator nerve and vessels.



Figure (4):

(A): Entry into obturator space by medial reflection of external iliac vessels.

(B): Dissection of obturator fossa, demonstrating obturator nerve with areolar tissue attached superiorly to external iliac vessels.

Dissection of the cardinal ligament:

The base of the broad ligament (the cardinal ligament) then can be excised from its attachment at the lateral pelvic wall. Sometimes, part of the ligament can be included in a single clamp. Sometimes, it is better to ligate or clip individual vessels. The ligament is excised with sharp scissors dissection and ligated with 2-0 delayed absorbable suture. A series of clamps are placed until the dissection is completed to the pelvic floor and along the paravaginal tissues.

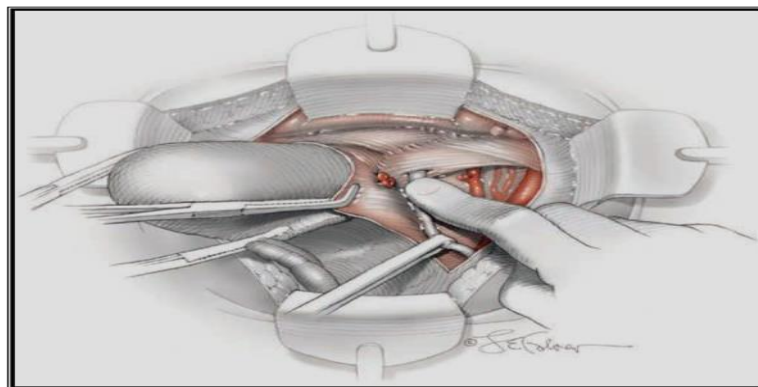


Figure (5):

(A): Clamping and incision of lateral portion of cardinal ligament adjacent to the lateral pelvic wall.

(B): Excised ligament showing pelvic floor and levator muscles. Dissected obturator nerve is seen in obturator space.

Dissection of the uterosacral ligament:

The uterosacral ligaments are stretched by sharply drawing the uterus forward. The peritoneal reflection of the cul-de-sac of Douglas then is incised, leaving a small segment of peritoneum attached to the anterior surface of the rectum. Care must be taken to avoid injury to the ureters, which are attached to the peritoneum just lateral to the uterosacral ligament. The rectovaginal space is opened by sharp scissors dissection and deepened by blunt and sharp dissection, the entire fascial bundle of the uterosacral ligament is identified, clamped as far posteriorly and close to the anterior rectal wall as possible, and cut and ligated [24].

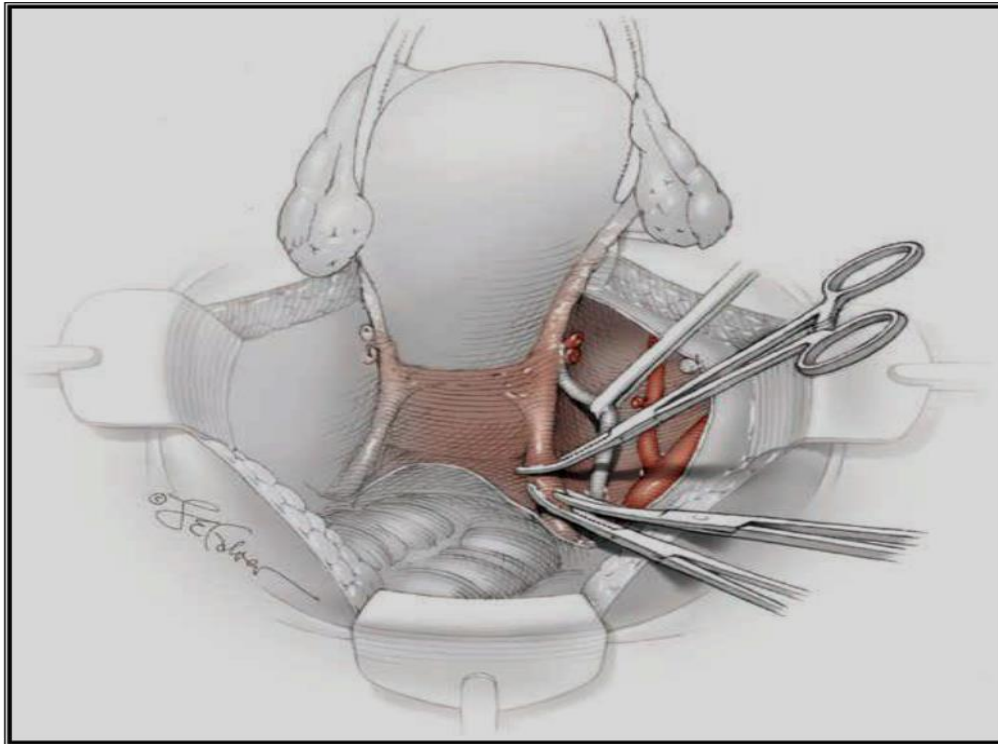


Figure (6):

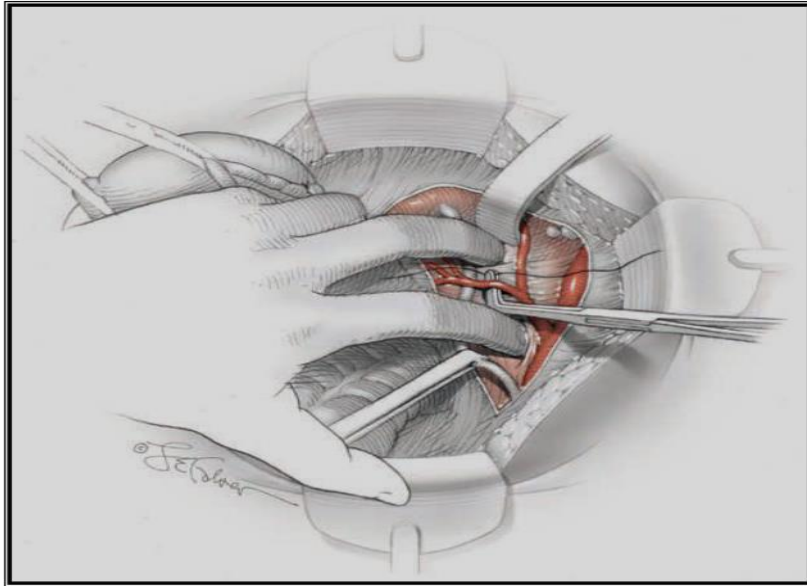
(A): Cutting the cul-de-sac peritoneum as it reflects onto the rectum. Ureters course laterally, devoid of peritoneum.

(B): Dissection of the rectovaginal septum with development of rectal stalks (uterosacral ligaments).

(C): Clamping the uterosacral ligament. The ureter is gently retracted to avoid trauma.

Uterine Artery Ligation:

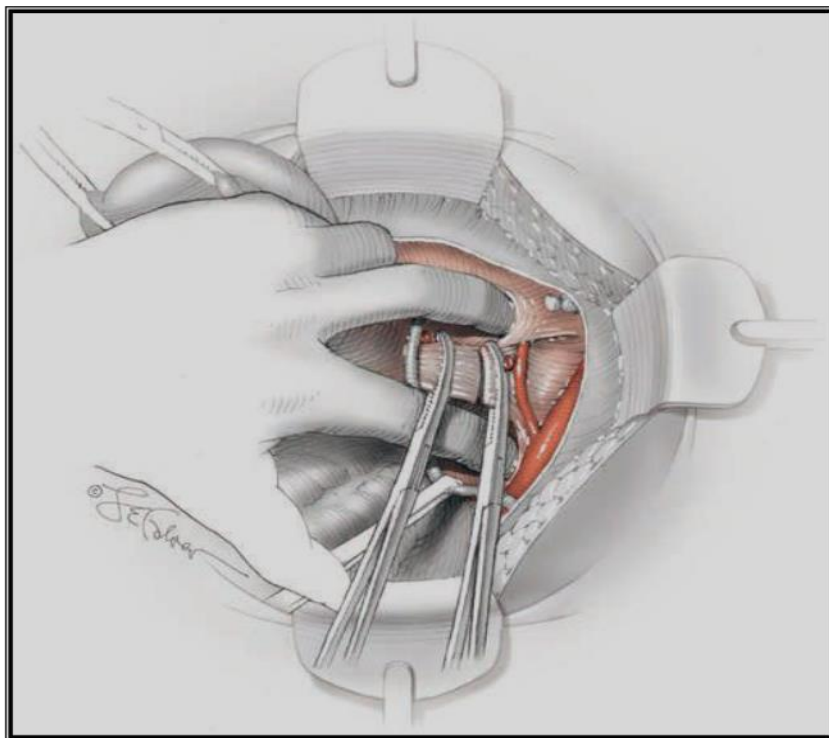
We ligate the uterine artery at its origin from the hypogastric artery. Whichever vessel is chosen, after double ligation, the distal branches traversing the cardinal ligament are removed with the specimen. The bladder then is reflected off the lower uterine segment by incising the bladder from its attachment to the uterus. The fascial adhesions of the base of the bladder are released from the cervix and upper vagina by electrocautery or sharp scissors dissection, and the vesicocervical space is developed inferiorly and laterally [25].



**Figure (7): Showing uterine artery ligation**

Deroofing of the Ureter:

The ureter tunnels between the anterior fascial bundles of the base of the broad ligament, commonly called the vesicouterine ligament. This fascial tunnel is carefully opened by sliding the Metzenbaum scissors or an Adson right angle clamp, with concave surface pointed upward, along the anterior and medial surface of the ureter, and by gently spreading the blades. Each of the fascial bundles is suture ligated for control of bleeding, and the ureter is dissected free of its attachment to the posterior leaf of the vesicouterine fascia [26].



**Figure (8): Showing deroofing of the ureter**

Closure

The vaginal angles are suture ligated separately to secure hemostasis, and then the remaining cuff is closed in an anteroposterior direction using a continuous or interrupted 2-0 or no. 0 absorbable suture. No additional attempt is made to support the vaginal vault because all of the fascial support of the uterus and vagina has been removed. The remaining vagina, which has been shortened by about 2 to 3 cm, is well supported by its attachments to the levator ani muscles and urogenital diaphragm and mainly by the effects of postoperative fibrosis during the healing phase. After the abdomen is closed, these catheters are connected to intermittent, low-suction drainage units [27].

#### Complication of abdominal radical hysterectomy

Currently, the mortality is minimal, the most frequent cause of death after radical hysterectomy being anesthesiological complications, rarely vascular injury, early postoperative bleeding or pulmonary embolism. It is well documented that the morbidity corresponds with the radicality of hysterectomy, in particular with the extent of parametrial resection [28].

#### Urinary complications:

Voiding dysfunction in the immediate postoperative period is nearly universal; denervation of the bladder during the operation results in transient hypertonia that is gradually replaced by hypotonia [29]. Bladder drainage can be achieved with suprapubic catheterization, intermittent self-catheterization, or indwelling urethral catheterization. For most patients, the ability to void returns within 2–3 weeks; however, voiding dysfunction may persist in approximately 5% of patients. In addition, a substantial number of patients develop persistent urinary incontinence postoperatively. Pure stress urinary incontinence, urge incontinence, and mixed incontinence have been reported, although the incidence and nature of preoperative voiding dysfunction in these patients is unknown [30].

Historically, urinary tract fistulas were among the most common postoperative complications. Interruption and mobilization of the vasculature of the bladder and ureters predisposes to ischemia that lends itself to fistula formation. The need for postoperative radiation therapy worsens this problem. Fortunately, the incidence of this troublesome complication is now quite low, occurring in less than 2% of cases. The diagnosis can be made by sequential inspection of a vaginal tampon after intravesical instillation of methylene blue followed by intravenous indigo carmine to determine whether a vesicovaginal or ureterovaginal fistula exists. Alternatively, an intravenous pyelogram or computed tomography may locate the fistula. Vesicovaginal fistulas, particularly those that are small, may heal spontaneously with prolonged bladder drainage; however, larger defects and those that fail to heal with conservative management need to be repaired surgically. Ureterovaginal fistulas require stenting; if a retrograde stent cannot be passed, percutaneous nephrostomy with antegrade stenting is required [31].

#### Anorectal complications:

Much less attention is paid to anorectal dysfunctions, which typically are not common but negatively influence quality of life. Among the most frequent symptoms are constipation and flatulence incontinence, mainly in cases with extensive resection of dorsal parametria or extensive vaginectomy [32].

#### Sexual Dysfunction:

The third area of late morbidity entails sexual dysfunctions. Their etiology is multifactorial, psychological, functional and anatomical changes all play a role. Shortening of the vagina has a negative effect on the quality of postoperative vaginal intercourse, surgical menopause as a consequence of BSO is associated with climacteric symptoms reducing libido, insufficient lubrication and dyspareunia, and cancer diagnosis as such is associated with anxiety and fear that sexual activity can cause disease recurrence. The main sexual dysfunctions after radical hysterectomy are sexual desire disorder, objective arousal disorder and dyspareunia [33]. Other frequent symptoms, such as the presence of lymphedema or lymphocele, is rather a consequence of simultaneous lymphadenectomy [34].

Other common complications of radical abdominal hysterectomy include:

**Ureteral injury** is not uncommon and can range from 2.2% to 3%. The injury usually occurs in the distal ureter close to the infundibulopelvic ligament or as a ureter crosses below the uterine artery, often from blind clamping and ligature placement to control hemorrhage [35].

**Infection** There is always a risk that an infection will develop after an operation. This could be a urinary tract infection, wound infection and occasionally vaginal infection.

**Bleeding** As with all major operations, there is a great risk of bleeding from injury of minor or major blood vessels that necessitates blood transfusion with a high risk of morbidity or mortality. Intraoperatively, the most common complication of radical hysterectomy is hemorrhage; the range of reported average blood loss is from 600 mL to 1900 mL. Injured vessels can be repaired with hemoclips or suture ligatures, although hypogastric artery ligation is sometimes required to control hemorrhage [36].

**Thrombosis.** The risk increases during a period of immobility.

**Premature ovarian failure** The average onset age of menopause in those who underwent hysterectomy is 3.7 years earlier than average even when the ovaries are preserved [37].

When only the uterus is removed there is a three times greater risk of cardiovascular disease. If the ovaries are removed, the risk is seven times greater. Several studies have found that osteoporosis (decrease in bone density) and increased risk of bone fractures are associated with hysterectomies [38].

**Vaginal prolapse** The risk for vaginal prolapse depends on factors such as the number of vaginal deliveries, the difficulty of those deliveries, and the type of labor. Overall incidence is approximately doubled after hysterectomy [39].

**Adhesions formation and bowel obstruction** The formation of postoperative adhesions is a particular risk after hysterectomy because of the extent of dissection involved as well as the fact that the hysterectomy wound is in the most gravity-dependent part of the pelvis into which a loop of bowel may easily fall [40].

#### Laparoscopic Radical Hysterectomy

Reich et al. [41] first reported the conduct of hysterectomy by laparoscopy using bipolar and electro-surgical instruments. Shortly thereafter, the first radical hysterectomy with laparoscopic pelvic and paraortic lymphadenectomy was performed in 1989 by Nezhat et al. and published in 1992 [42].

The advantages of laparoscopic procedures over laparotomy are well-documented. Many authors have demonstrated that laparoscopic hysterectomy was associated with less pain, reduced hospital stay, and, in most studies, shorter recovery time than abdominal hysterectomy [43].

Contraindications:

Patients with medical conditions that preclude the establishment and maintenance of a pneumoperitoneum, general anesthesia, or Trendelenburg position should not undergo any laparoscopic procedure. Similarly, women with severe hip disease precluding the use of the lithotomy position are better treated by a laparotomy approach.

Morbid obesity is a relative contraindication. Compared with women with a normal Body Mass Index (BMI), the conversion rate to laparotomy in obese women is higher. Moderate obesity is not a contraindication [44].

Preoperative evaluation:

Careful vaginal examination may detect pouch of Douglas nodularity or uterosacral thickening, which together may be considered diagnostic of severe endometriosis and a contraindication to the laparoscopic approach, in particular for the less-experienced surgeon [45]. Office ultrasound will provide clarification of the uterine size, presence of fibroids, and the existence of ovarian pathology before the route of hysterectomy is chosen. All of this information is essential when, in consultation with the patient, the surgeon decides to proceed with the laparoscopic approach [46].

Obesity:

Surgery on obese patients presents several challenges for the operator and the anesthesiologist, regardless of the type of surgery or the approach chosen. An abdominal approach to hysterectomy is associated with increased postoperative complications such as infection and wound breakdown [47].

The laparoscopic approach, however, has been shown to be associated with fewer such complications and may therefore be advantageous. Despite these advantages, difficulties specific to the laparoscopic approach remain and must be taken into consideration during the planning process [48].

Instrumentation and set-up:

Laparoscopic radical hysterectomy is a cost-effective procedure when performed with reusable instruments. The following instruments should constitute the standard set required for performing this procedure:

Veress needle or Hasson cannula (totally dependent on surgeon's choice).

Laparoscopic atraumatic forceps.

Laparoscopic grasping forceps.

Monopolar diathermy with spatula.

Bipolar coagulation forceps.

Laparoscopic curved scissors.

0° or 30° laparoscope; 5/10 mm (surgeon's preference).

Suction-irrigation device.

Laparoscopic needle holders.

Knot pusher.

Uterine manipulator (Valtchev or Pelosi or Clermont -Ferrand).

Completion of the procedure via the vagina will require those instruments traditionally used for vaginal hysterectomy as vaginal retractors and clamps [49].

The positioning of the patient is all-important. The procedure is performed with the patient in dorsal lithotomy with the legs in flexion and abduction. The arms should be placed across the chest or by the sides to prevent any nerve complications with abduction of the upper arm. There is no place for the use of shoulder supports. This positioning of the limbs will also allow correct position of the surgeon and the surgical assistant on each side of the patient [50]. A Foley catheter is placed in the bladder. Bladder catheterization also helps prevent injuries to the bladder.



**Figure (10): Positioning of the patient, with arms along the body, protected from contact with metal parts of the operating table. Thighs abducted to allow manipulation of the uterus.**

After creation of pneumoperitoneum, the patient is placed in sufficient Trendelenburg to allow adequate visualization and access to the pelvic organs. The uterus is instrumented to allow manipulation. Although a curette may provide adequate manipulation for many laparoscopic procedures, the uterine manipulator may be required. All patients receive prophylactic intravenous antibiotics at induction of anaesthesia [51].

Placement of the Trocars

Four trocars are placed. A 10 mm umbilical trocar, through which a 30° or 0° optic will be used, is introduced first. After placement of this trocar, the patient is placed in Trendelenburg, and the other three trocars are introduced under direct vision. Two lateral 5 mm trocars are inserted about 2 to 3 cm medial and superior to the anterior superior iliac crest. The final 5 mm trocar is placed in the midline about 8 cm below the umbilical trocar (Figure 18). Once the trocars are positioned, it is important to conduct a thorough inspection of the abdominal cavity, with special attention to the presence of peritoneal implants and lymphadenopathy [36].



**Figure (11): Positioning of the trocars in radical hysterectomies.**

#### Pelvic lymphadenectomy (Iliac and Obturator Chains)

The first step of the radical hysterectomy with pelvic lymphadenectomy is the dissection of the paravesical and pararectal spaces. The round ligament is exposed by uterine manipulation and traction, and then sectioned, after cauterization, along the pelvic wall. Once the round ligament is sectioned, the peritoneum is opened – laterally to the gonadal vessels – for about 5 cm. This is followed by the dissection of paravesical space by blunt dissection between the medial aspect of the iliac vessels and lateral aspect of the obliterated umbilical artery [52].

As an avascular virtual space, if bleeding occurs, it is likely that the dissection is being conducted in the wrong plane. The dissection of the paravesical space is extended until the internal obturator muscle is visualized. The same process of traction and countertraction is used in the dissection of the pararectal space, taking care so that the ureter is drawn along with the peritoneum medially; this is the medial border of the dissection of this space, and the internal iliac vessels constitute the lateral border [53].

After the creation of these spaces, the pelvic lymphadenectomy is started. Uterine manipulation is used to laterally displace the uterus to the side opposite the lymphadenectomy. Dissection begins with the external iliac artery, continuing laterally to the anterior aspect of the genito-crural nerve (lateral border) and distally to Cloquet's node, located internally to the hypogastric vein and superiorly to the internal iliac circumflex vein. Retracting the vessels medially and laterally, the obturator fossa and the obturator nerve are exposed. The dissection of the external iliac vessels is then carried out [18].

Once the lymphadenectomy of the external iliac vessels is completed, progressing across the inner portion of the pelvic wall, along Cooper's ligament, the obturator nerve is identified, and the lymphatic chain is sectioned. Using traction, it is possible to separate the lymphatic tissue of the obturator nerve with minimal bleeding, taking care not to damage the obturator vessels. The lymphadenectomy is then completed by dissection of the lymph nodes of the common iliac vessels, by medial traction of the peritoneum with the ureter and dissection of the region. The surgical specimens of the lymphadenectomy should be placed inside the fingers of gloves or endobags for later removal with the uterus [54].

### Radical Hysterectomy

Laparoscopic Radical Hysterectomy (LRH) begins with the sealing and sectioning of vessels of the infundibulopelvic ligament, aided by lateralization of the uterus by uterine manipulation. The sectioning of the posterior peritoneum of the broad ligament extends until close to the ureter. The uterus is pushed cranially in the midline in order to separate the bladder from the vaginal wall to the point at which the ureters enter the bladder. At this point, the uterine artery and vein are sectioned and ligated. The ureter is then completely dissected along its parametrial course to the point where it penetrates the bladder wall. Next, the paracolps, a portion of the lateral external parametrial tissue, inferior and laterally external to the ureter and posterior to the bladder wall, are dissected, allowing complete release of the parametrium and the lateral wall of the vagina [55].

The same steps are performed contralaterally, and then the uterosacral ligaments are sectioned along their complete length, and the rectum is freed from the posterior vaginal wall by applying posterior traction to the rectum and anterior traction to the peritoneum lining the pouch of Douglas.

We then proceed to the sectioning of the vagina, beginning preferably from the posterior wall, because of possible loss of the pneumoperitoneum, which could interfere with the sectioning. Once the vagina is sectioned, the uterus is extracted followed by the lymph nodes. After removal of the surgical specimens from the cavity, vaginal suturing can be performed laparoscopically or vaginally. The laparoscopic suturing of the vagina requires the obliteration of the vagina to prevent the escape of gas. For oncologic reasons, the uterus should not be left in the vagina [56].

Once the surgery is completed, lavage and thorough review of the cavity and pelvic structures is performed. The conversion rate of LRH is around 5%. Pellegrino et al. in their series of 107 patients operated between 2001 and 2007 required conversion in 6 patients (5.6%). In three cases, conversion was due to the presence of enlarged lymph node metastases; the other three were due to the presence of a large quantity of adhesions [57].

#### Postoperative care:

Early ambulation and return to a normal diet are mandatory if early discharge is to be achieved. Routine postoperative care, such as regular observations and analgesia, should be instituted. By the first or second postoperative day, they can be discharged. It is important to educate patients about the signs that may suggest complications so that they can return promptly to the hospital. After radical hysterectomy, the catheter should be kept in place for 5 to 7 days, and the patient should be instructed how to transition to self-catheterization. Measuring the post-void residue is important for determining when bladder function returns and self-catheterization can be discontinued. Deep vein thrombosis prophylaxis in the form of low-molecular-weight heparin and stockings should be considered with early ambulation and good hydration [58].

#### No Conflict of interest.

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