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Techniques of Hysterectomy

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1. Introduction

Hysterectomy is the most common operation performed for gynecological disorders, second only to caesarean section. Annual medical costs related to hysterectomy exceed $ 5 billion in the US. Overall hysterectomy rates vary from 1.2 to 4.8 per 1000 women. Development of alternatives to hysterectomy like use of different energy sources for endometrial ablation and the availability of progestational intrauterine system for symptomatic uterine bleeding have led to a reduction in rates of hysterectomy in recent years. Besides, leiomyomas which have conventionally formed one of the important indications of hysterectomy in women in whom fertility conservation is not an issue, are now increasingly being managed by transcervical hysteroscopic resection (submucous myomas), transcatheter uterine artery embolization and magnetic resonance guided focussed ultrasound energy. These new, less invasive and safer management techniques coupled with the desire to avoid major surgery, have added to the reduction in hysterectomy rates.

1.1 Indications for hysterectomy

Even though alternatives to hysterectomy are being explored for benign conditions, hysterectomy continues to have a place in its definitiveness. Uterine myomas continue to form the indications for 40% of all abdominal hysterectomies, the others being endometriosis (12.8%), malignancy (12.6%), abnormal uterine bleeding (9.5%), pelvic inflammatory disease (3.7%) and uterine prolapse (3.0%). Prolapse forms the indication for 44% of all vaginal hysterectomies. In recent years, non – descent vaginal hysterectomy (NDVH) is being tried for most benign conditions and uteri of upto 12 weeks gestational size can be safely removed intact per vaginum. For moderate to large sized uteri with benign conditions, techniques like removal of wedge, bisection, coring and morcellation may be adopted in an attempt to reduce the uterine volume prior to removal. However, large leiomyomas, pelvic inflammatory disease, malignancy (invasive cervical cancer, endometrial carcinoma, ovarian and fallopian tube cancer and gestational trophoblastic tumors) and most suspicious adnexal masses may still be better approached abdominally.

1.2 Approaching the uterus: Abdominally or vaginally

The uterus may be removed abdominally or vaginally or by a combination of the two routes. Abdominal approach may further be categorized as open abdominal or laparoscopic.

Although abdominal approach continues to be the most common approach worldwide, uterine access by the vaginal route is associated with fewer complications, a shorter hospital stay, faster recovery and lower costs. Most patients with gynecologic malignances are operated by open abdominal route, though laparoscopic and robotic surgical techniques are increasingly being used for endometrial and cervical cancer surgery. Significant uterine enlargement and/or fixity, adnexal fixation and obliteration of the Pouch of Douglas are some other factors suggesting preference for abdominal approach.

1.3 Preoperative counseling

The clinician needs to communicate clearly and in the patient's language, the indication for surgery, the treatment alternatives available, the reason(s) for preferring hysterectomy over them and the preferred approach. Besides, the risks, benefits and the adverse effects must be reviewed. The woman should also be encouraged to clarify her doubts, particularly regarding the type of anaesthesia preferred, tentative duration of surgery, the recuperative time, the management of normal ovaries at surgery and subsequent possible hormone replacement therapy and any impact on sexual function. The surgeon may also encourage the woman's partner / supportive family members during the preoperative discussions to express their opinions / concerns regarding the procedure. Emotional stress after hysterectomy, if it occurs, is usually short lasting and self limiting in most cases and only occasionally, psychiatric consultation and pharmacotherapy may be necessary.

1.4 Preoperative preparation

After a complete history, physical examination and a recent Pap test, haematological tests like estimation of hemoglobin, bleeding and clotting times, urea, and sugar are carried out. Preoperative electrocardiogram and chest x-rays are particularly important for women with cardiorespiratory disorders or malignancy. The uterus and other abdominal structures are evaluated by an ultrasonogram, however, a computed tomography scan of abdomen and pelvis or intravenous pyelogram are indicated only in women with cervical or large uterine / extrauterine masses. A good bowel preparation would help gain exposure and (especially for laparoscopic approach) avoid bowel trauma caused by packing and retraction. However, antibiotic bowel preparation is not routinely indicated but should be done when concomitant intestinal involvement / surgery is a possibility.

There is good level of evidence to support use of prophylactic parenteral antibiotics like cefoxitin (2 mg intravenous), cefazolin (1-2 intravenously) or metronidazole (1gm intravenously). Although studies have shown no benefit of continuing antibiotics postoperatively, a second shot may be given if the procedure lasts more than 3 hours. Povidone – iodine douches and antibiotic scrubs do not provide any additional benefit when perioperative parenteral antibiotics have been used.

The operative site should not be shaved prior to surgery as it has been shown to increase risk of wound infection as a result of folliculitis. The pubic hair may be clipped rather than shaved for the same reason.

2. Total abdominal hysterectomy

The surgeon should, on the day of surgery, preferably see the patient and her immediate family members to reinforce emotional support and reassurance.

The woman is placed in supine position. After she is anaesthetized, a self retaining catheter is inserted in the urinary bladder. The abdomen is scrubbed with antiseptic solution from xiphisternum to the mid thighs and sterile drapes are applied.

Most uteri of upto 14-16 weeks gestational size can be removed by a low transverse / Pfannensteil incision. Large uteri and/or malignancies should be approached through an extendable midline vertical incision.The pelvic pathology is carefully evaluated followed by palpation of the abdominal organs. A Trendlenberg tilt can aid packing of intestines and omentum into upper abdomen.

2.1 Technique

After opening the abdomen and packing the gut into upper abdomen, self retaining retractors are placed. Two long straight clamps are applied on the left round ligament about 1 cm apart and close to the uterine attachment. The intervening tissue is divided and that in the lateral clamps ligated. This is followed by similarly doubly clamping, cutting and ligating the ovarian ligament. The procedure is repeated on the opposite side. If the ovaries need to be removed, the infundibulopelvic ligament should be doubly clamped, cut and transfixed bilaterally instead of the ovarian ligaments. This pedicle should be doubly ligated as troublesome bleeding from it is common. The peritoneum, from the round ligament pedicle is divided upto the refection of the uterovesical pouch (anterior leaf of broad ligament) on both sides and the urinary bladder is pushed down with the help of a small sponge held on ring forceps. If prominent, the central vesicouterine ligament and the lateral bladder pillars should be divided with scissors before attempting to push the bladder. The posterior leaf of broad ligament is then divided vertically from the ovarian ligament (or infundibulopelvic ligament in case of removal of ovaries) downwards and then over the posterior cervix. The fascia over the uterine vessels may be incised to expose the vessels clearly. The fundus of the uterus should be pulled upwards to keep it in anatomic position before clamping the uterine vessels. A pair of curved clamps are used to clamp these vessels at the level of internal os close to the uterus and at right angles to longitudinal axis of the uterus. This would minimize the risk of injury to the ureter which is around 1 cm deep and lateral to the uterine artery. At this point, the uterine artery crosses the ureter from lateral to medial side. The Macenrodt and uterosacral ligaments should then be doubly clamped, cut and ligated to free the cervix. The procedure is repeated on the opposite side. The anterior vagina is then opened by a stab incision which is extended all around with the help of scissors keeping close to the cervix to remove the uterus. Fig. 1 shows the opening of vaginal vault in a case of hysterectomy for large cervical myoma. The angles of the vagina should be held with the help of straight clamps or Allis forceps. At this step, a betadine soaked sterile roller gauze may be put in the vagina to prevent vaginal contents (secretions / antiseptic tablets or solutions) from coming into the operative field. The vaginal angles are secured and the vagina closed by interrupted or continuous sutures. Continuous catgut sutures have been reported to pucker the vault causing dyspareunia but the author has not had any such case after using continuous vaginal suturing for more than 15 years. It is no longer considered necessary to reperitonize the pelvis. However, in the author's opinion, reperitonization should be done at least in cases where the vaginal vault is left open (after passing an encircling continuous interlocking suture on the vaginal margins) to avoid prolapse of fallopian tube stump or bowel through it. In an attempt to provide anchorage to

the vault and consequently to avoid subsequent vault prolapse, the round ligament and uterosacral pedicles may be tied to the vaginal angle sutures. The abdomen is then closed after ensuring complete haemostasis and completing the instrument and sponge / gauze counts.
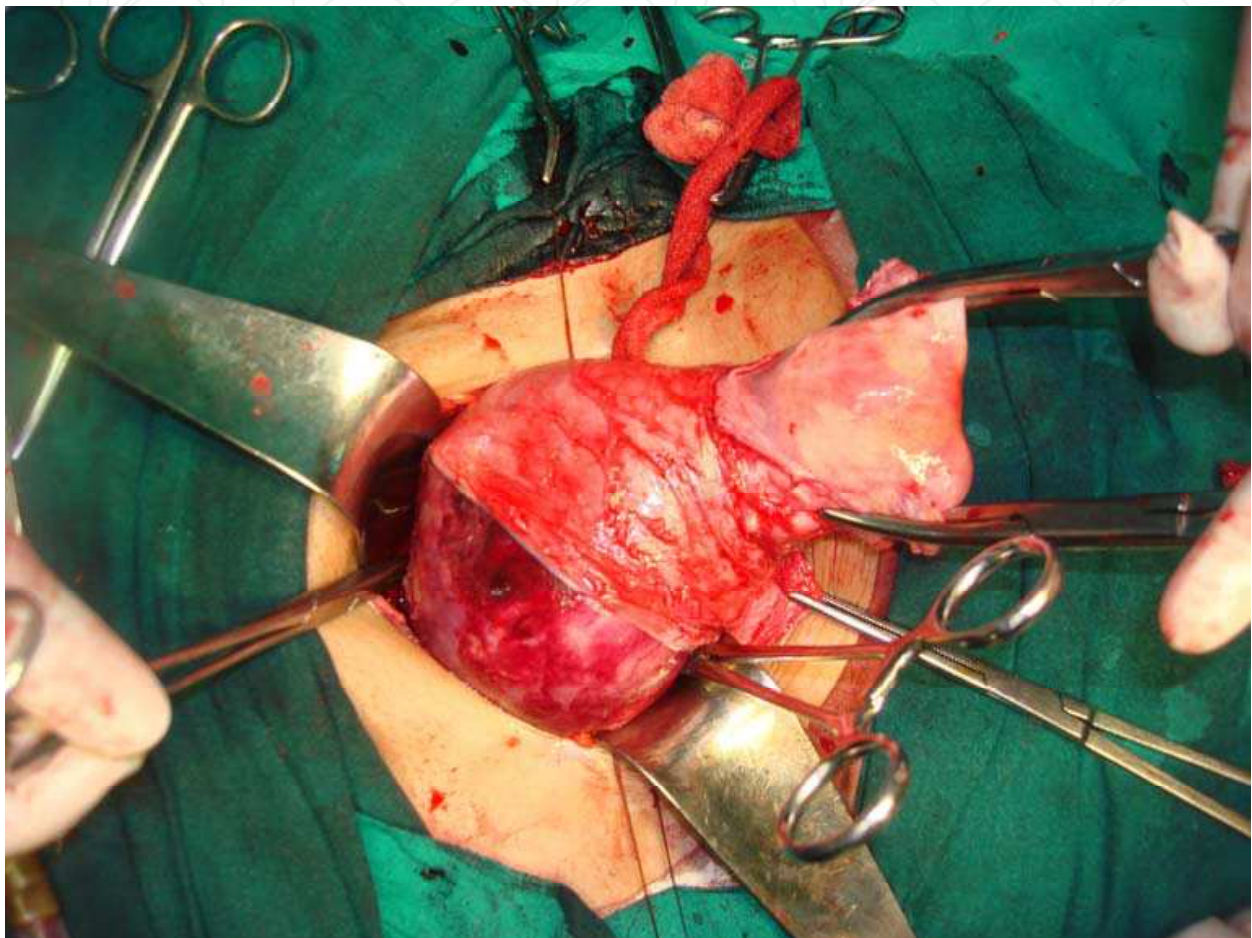

Fig. 1. Intraoperative picture showing a large cervical fibroid sitting atop a normal size body uterus at hysterectomy after opening the vagina.

2.2 Total versus subtotal hysterectomy

Total hysterectomy denotes the removal of body of uterus along with the cervix while subtotal procedure removes only the body of uterus. Subtotal hysterectomy is usually done in cases where removal of the cervix entails surgical difficulty due to dense adhesions and is a relatively quicker and technically easier procedure. Fig 2 is an intraoperative photograph of a total hysterectomy with bilateral salpingo-oophorectomy done for a clear cell carcinoma of the left ovary. Table 1 tabulates the differences between total and subtotal hysterectomy.
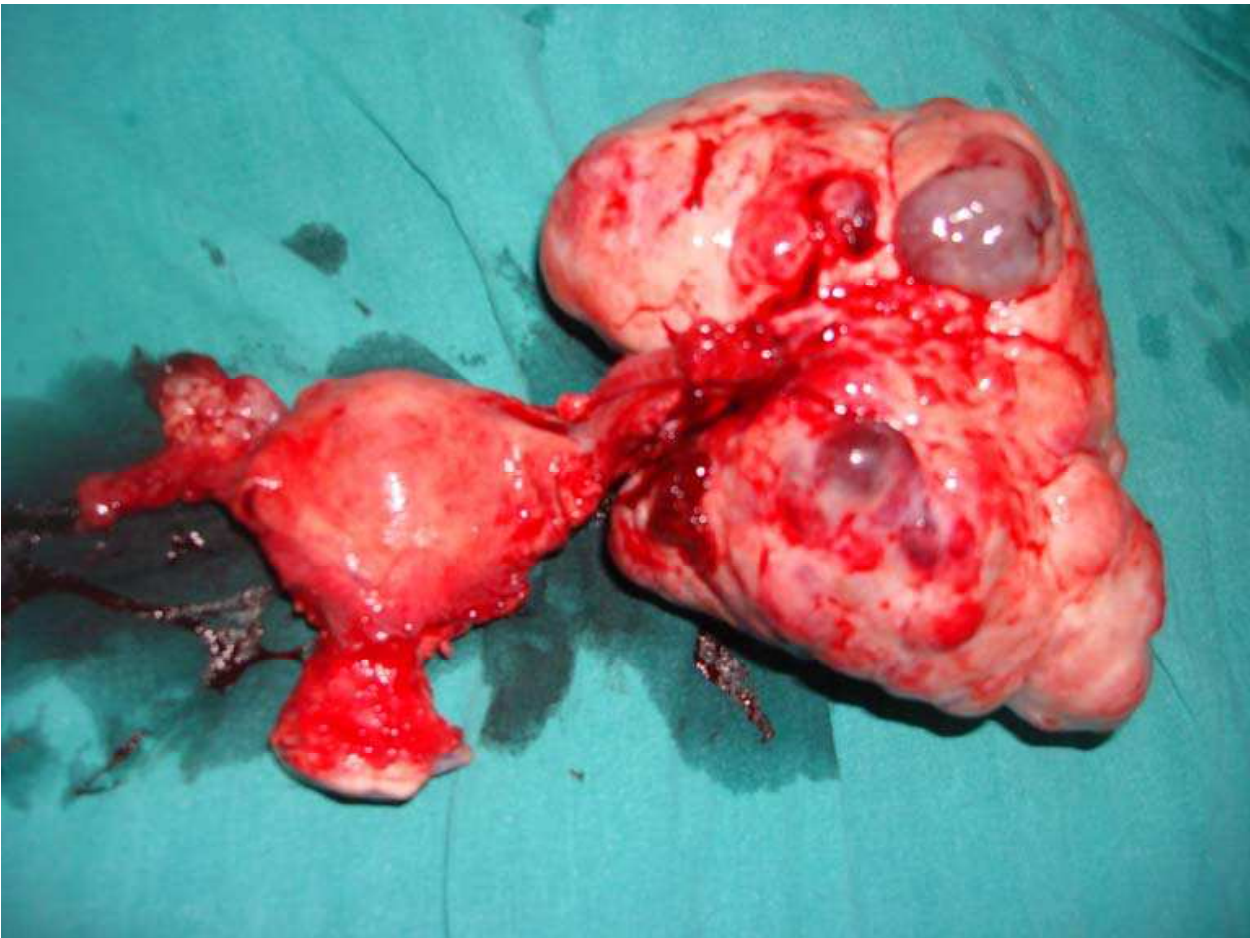
Fig. 2. A total hysterectomy specimen along with both tubes and ovaries for a left sided malignant ovarian tumor which later turned out to be a clear cell carcinoma.

Subtotal / supracervical hysterectomy	Total hysterectomy
1. Presence of cervix retains the uterine supports attached to it. Hence, vault prolapse is less common.	1. Division of Macenrodt's and uteroscral ligaments may predispose to vault prolapse
2. Easier and less morbid to urinary tract specially in the presence of dense endometriosis or chronic inflammation	2. Removal of cervix requires the urinary bladder to be well mobilized out of the field.
3. Coital function may be better retained in the presence of cervical secretions and roomy vagina.	3. Presence of sutures / chronic granulations may hamper coital function.
4. Requires comparatively less skill / experience on part of the surgeon	4. A skilled / experienced surgeon should be available.
5. Cancer of residual cervix occurs in 0.3% of all subtotal hysterectmies. Hence, cervical screening should be continued.	5. Cervical exfoliative cytology for cancer screening is no longer required.
6.Chronic cervicitis causing deep dyspareunia may persist in cervical stump.	6. No persistence of cervicitis or its sequelae.

Table 1. Comparison of total and subtotal hysterectomy

2.3 Special cases

1. Severe endometriosis : Extensive adhesion formation in this condition may prevent easy access to the uterus. The anterior wall of sigmoid colon is often adherent to the peritoneum on the posterior surface of the vagina and uterus and it must be mobilized before dividing the uterosacral ligament.

2. Cervical fibroids: The normal sized body of the uterus is commonly perched atop a large cervical myoma which is jammed inside the pelvis. These large fibroids tend to push the ureters high upwards so that they pass over the upper and lateral surface of the myoma. In these cases, the uterine vessels should be divided as high as possible, i.e. at the upper surface of the tumor and then drawn laterally by dissection from over the tumor surface. The ureters should then be identified at the upper and lateral tumor surface before proceeding to divide the peritoneum on the posterior surface of the tumor. Fig 3 shows a total hysterectomy specimen with a large cervical fibroid. Some surgeons prefer to carry out a myomectomy first (by a vertical central incision on the myoma capsule) and then proceed with hysterectomy. This debulking of the mass may also be achieved by sagittal hemisection of the small uterine body and shelling out of the cervical myoma. Removal of the myoma allows greater accessibility and eases the subsequent completion of hysterectomy.
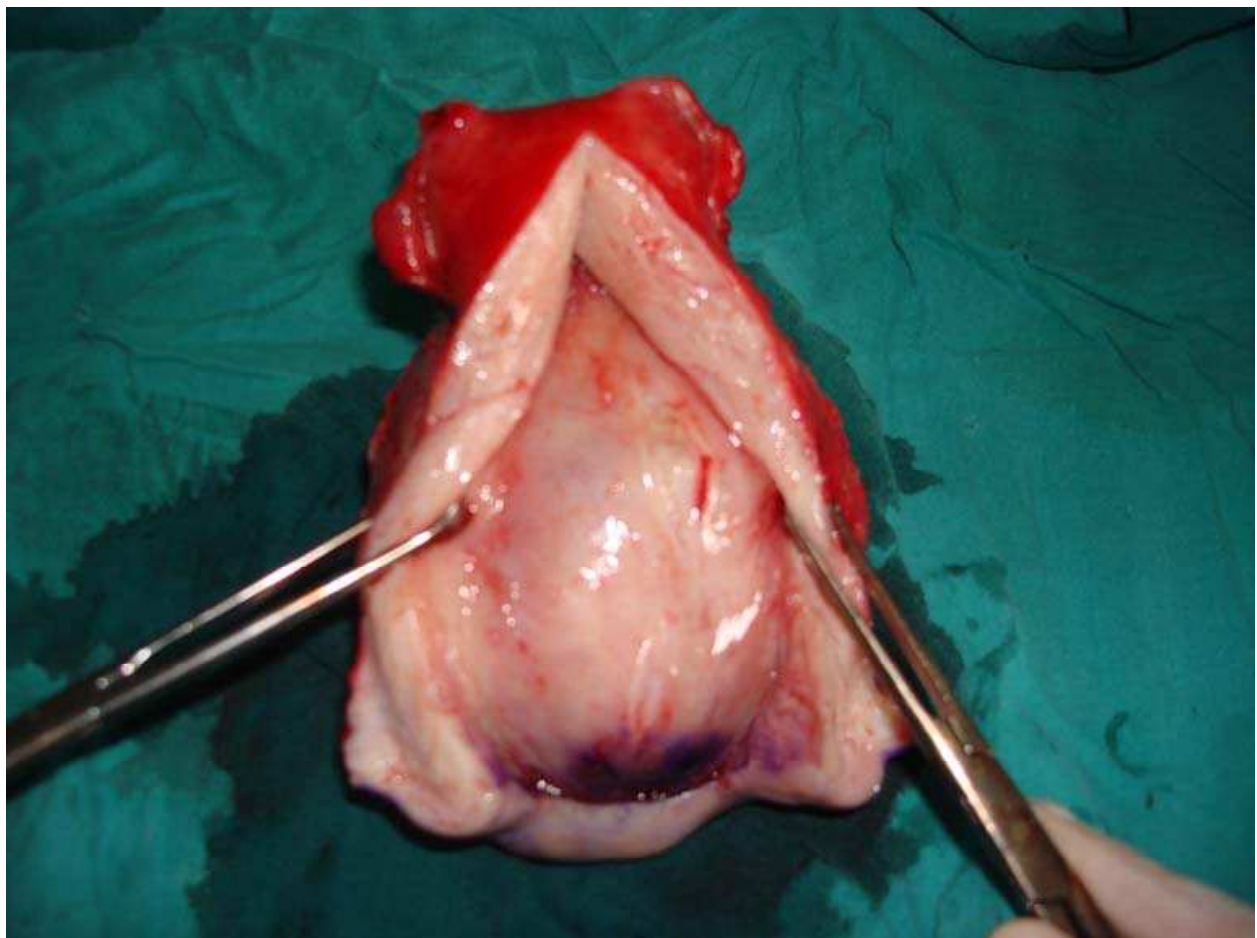

Fig. 3. A total hysterectomy specimen removed on account of a large cervical myoma causing urinary retention.

3. Isthmic fibroids

Fibroids arising from this region may present perplexing moments to the surgeon on the operating table and Fig 4 shows a large myoma arising from the anterior isthmus that had both intra abdominal and vaginal (coloured blue by methylene blue) extensions. Performance of hysterectomy in such a case would pose difficulty in assessing the anatomy of the pelvis and applying the lower clamps. Removal of myoma before proceeding with hysterectomy may be of immense help in such cases.
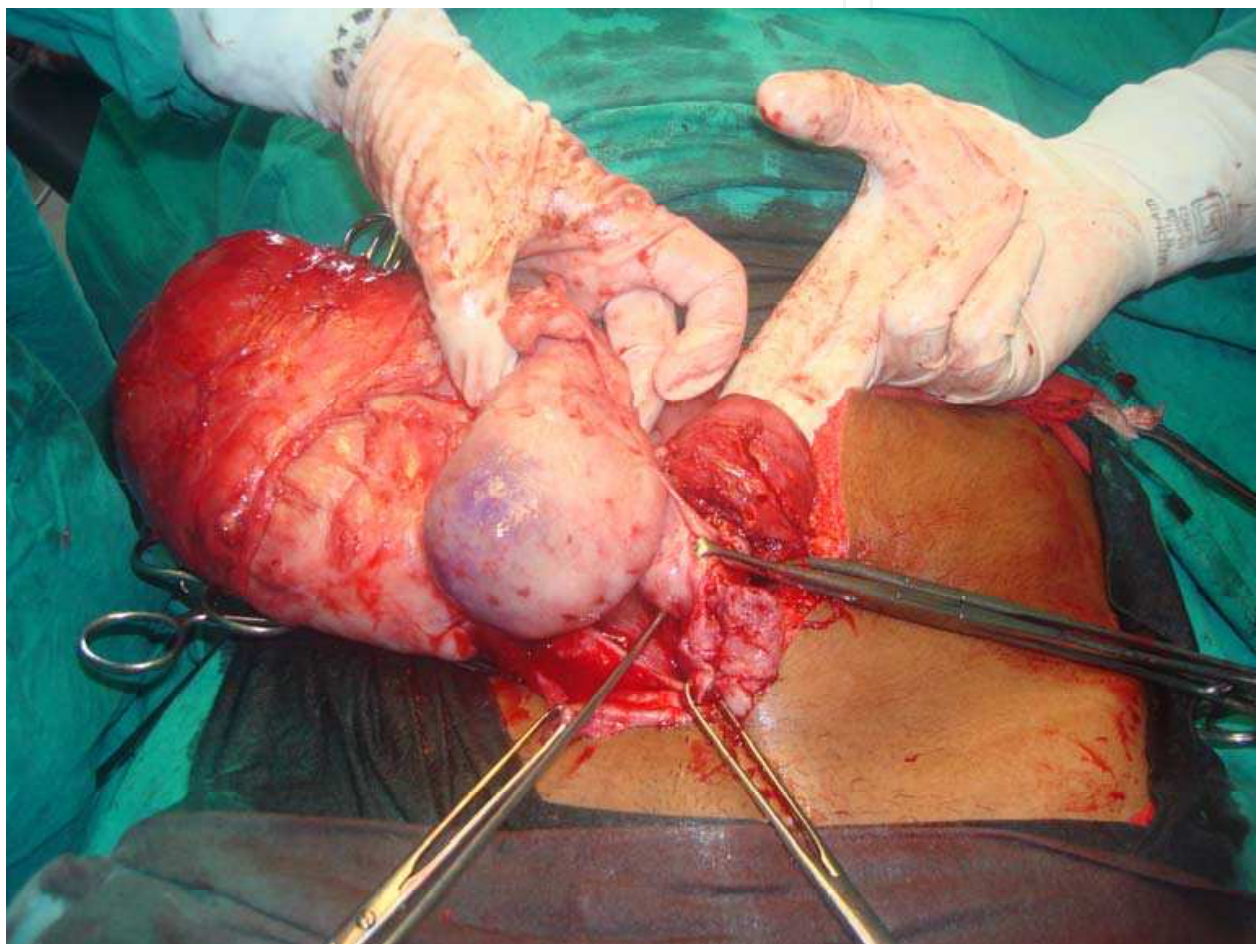

Fig. 4. An intraoperative picture of a large anterior isthmic myoma having a larger abdominal and a smaller vaginal extention.

4. Uterosacral tumors

Tumors (commonly myomas) arising from/near the uterosacral ligaments also predispose to ureteric injury if caution is not exercised. Fig 5 shows a hysterectomy in progress for a large myoma arising from one of the uterosacral ligaments.
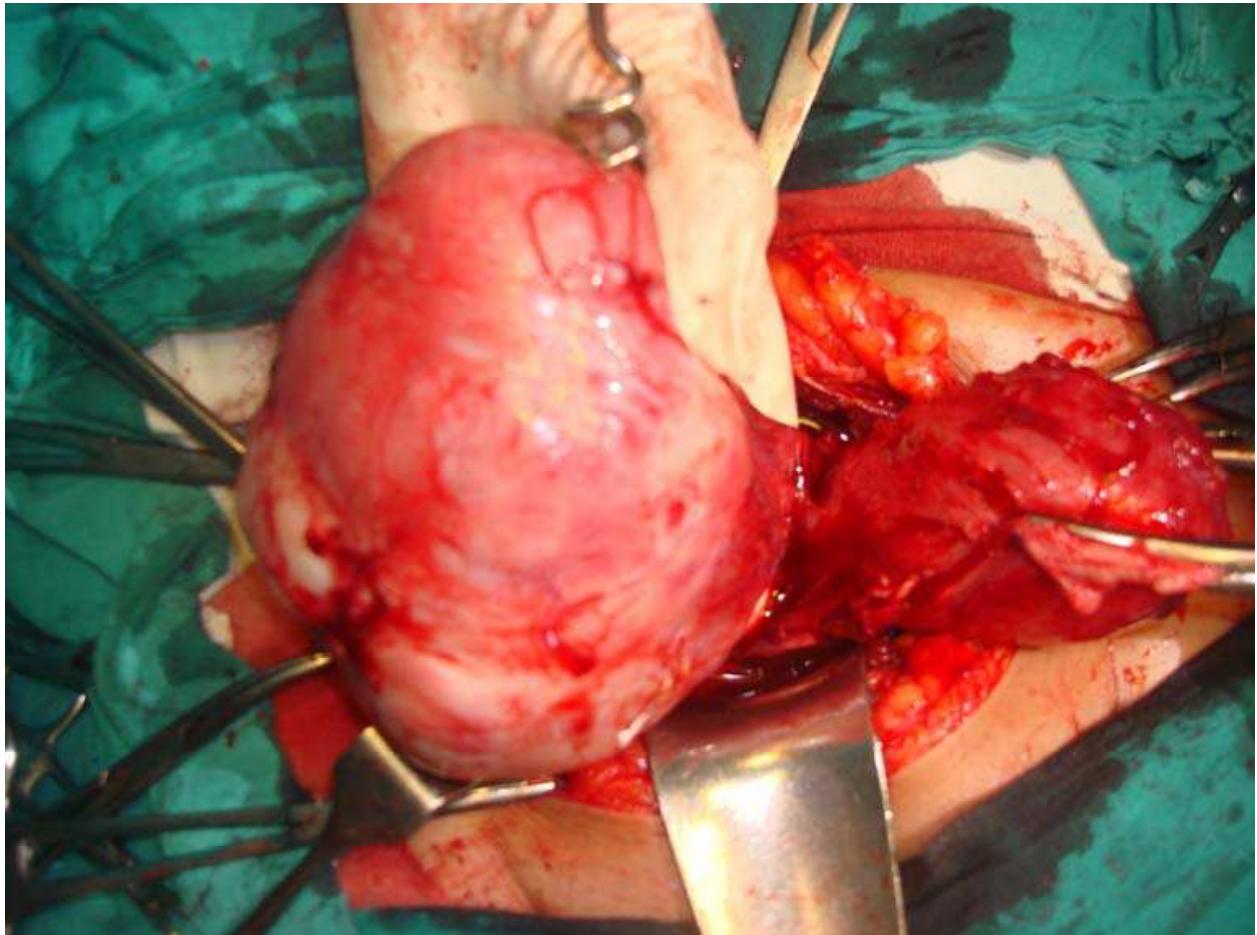
Fig. 5. Clinical operative photograph of abdominal hysterectomy for a large myoma arising from the right sided uterosacral ligament.

5. Broad ligament fibroids

Large broad ligaments fibroids may get impacted in the pelvis and may also distort the ureteric anatomy, depending on their site of origin (true or false broad ligament fibroids). It is important to identify the ureters tracing them from the pelvic origin downwards before clamping the uterine vessels in these cases. The ureter is usually medial to a true broad ligament myoma while it is lateral and superior to a false one. Fig 6 represents an intraoperative picture of a true broad ligament myoma in the process of being enucleated.
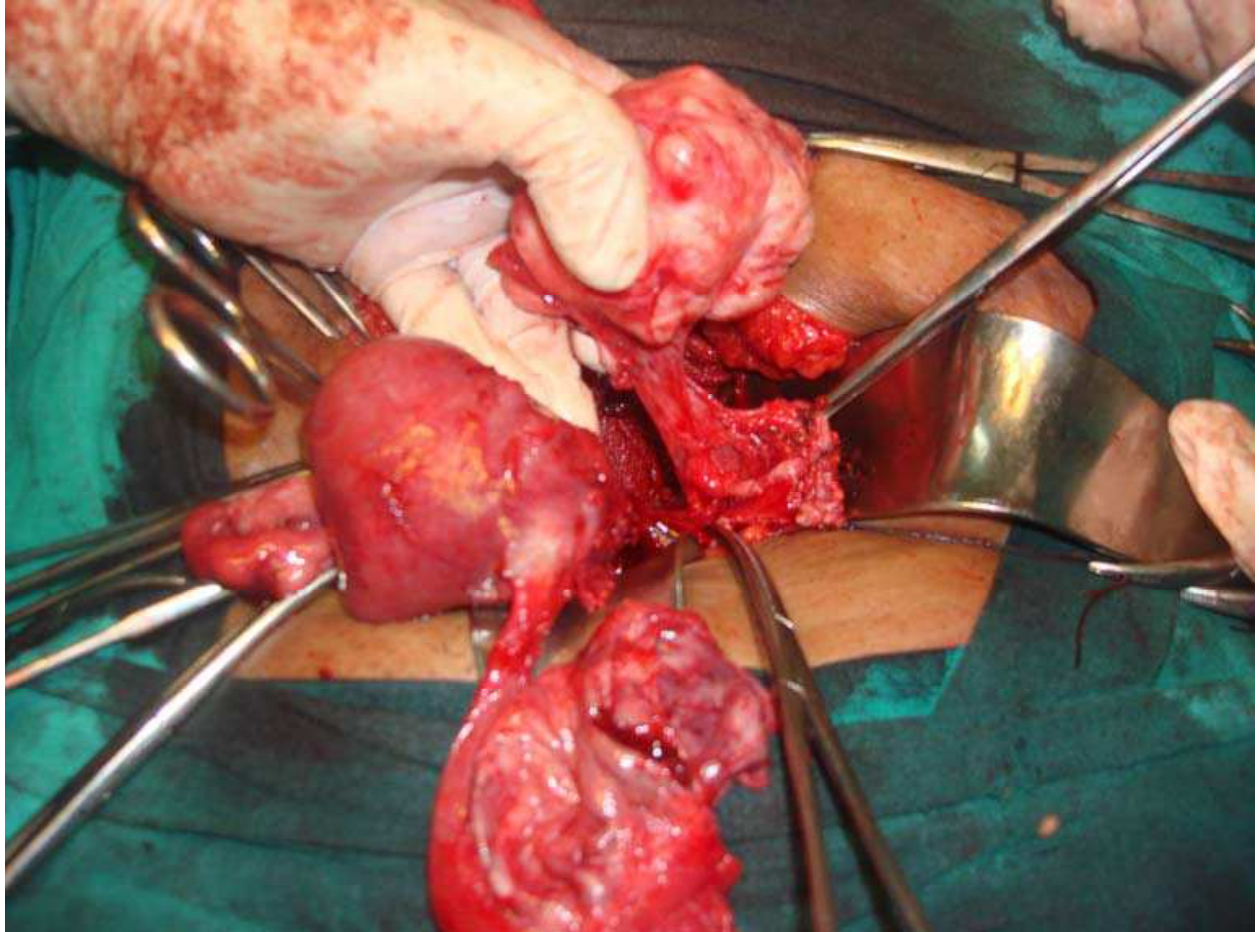
Fig. 6. Operative picture of enucleation of a true broad ligament myoma.

6. Pelvic inflammatory disease

Often the fallopian tube forms a hydrosalpinx and dense adhesions may bury the tube and ovary into the pouch of Douglas or bind it to posterior uterine surface. These must be mobilized before proceeding with hysterectomy. Adhesions between the sigmoid colon and posterior surface of uterus must also be divided. In cases of dense adnexal adhesions, conservation of ovaries may be more difficult than adnexal removal as the infundibulopelvic ligament is usually free of firm adhesions. In case of difficulty, sharp dissection and division of tuboovarian pedicle between two clamps is of help.

7. Anomalous uteri

Unilateral absence of the broad ligament in case of unicornuate uterus may make the development of retroperitoneal space impossible and the cervix may need to be cored by sharp dissection. A urorectal septum present between the two bodies of a didelphic uterus may need to be divided cautiously before proceeding further. Fig 7 shows a didelphic uterus with right horn enlarged by a myoma and the relatively smaller but hyperplastic left horn.
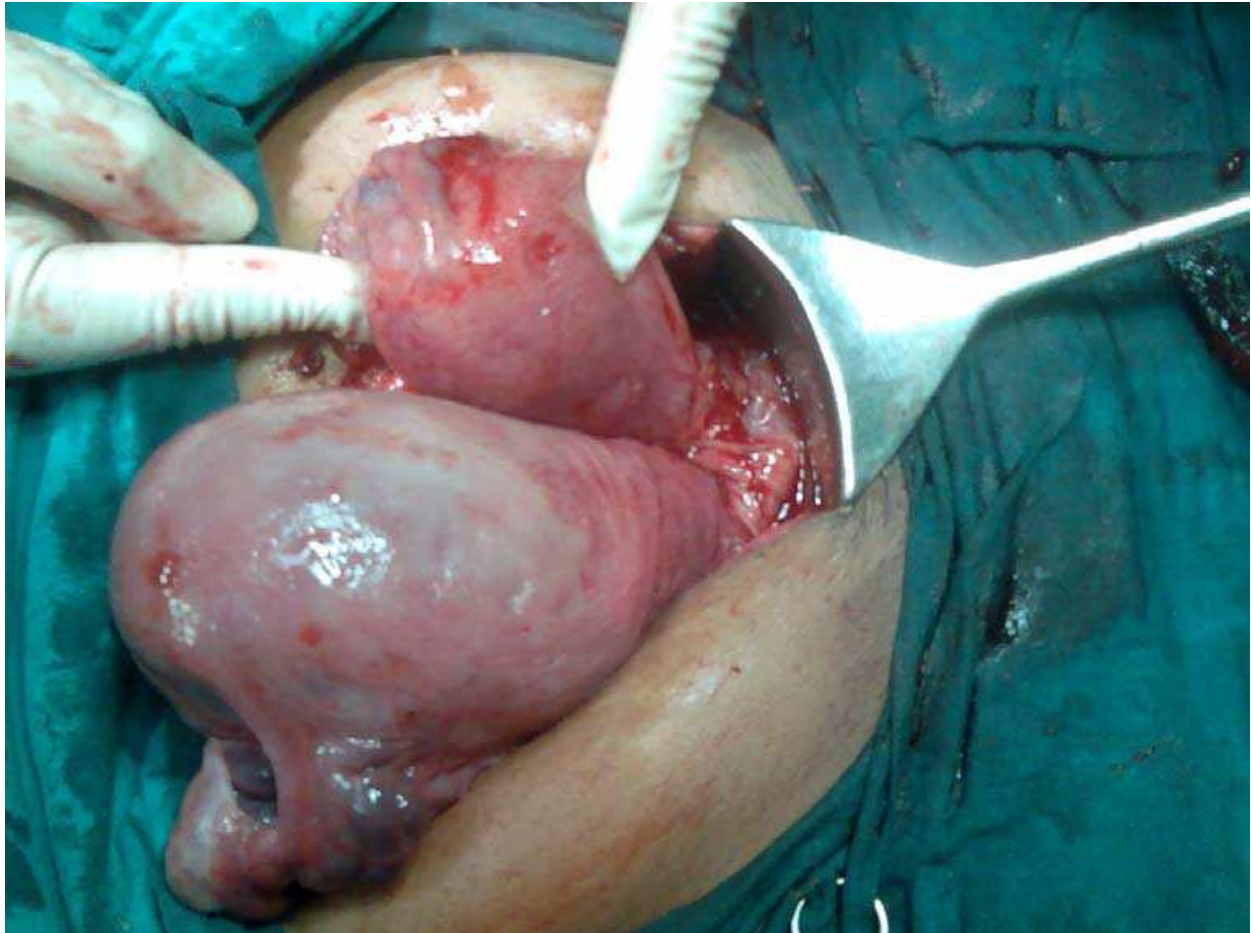
Fig. 7. Operative photograph of a didelphic uterus. The right horn is enlarged and congested as a result of a myoma while the left horn is relatively smaller.

8. Malignancy

Presence of uterine malignancy makes the uterus very soft, congested and friable. This could cause difficulty in application of clamps and passing/tying ligatures and these could easily cut through tissues and cause hemorrhage. Also the urinary tract is at greater risk of damage in such cases. Fig 8 shows a large leiomyosarcoma arising from the uterine body as seen at hysterectomy. A gentle handling of tissues, availability of blood and a multidisciplinary approach would be beneficial in such cases.
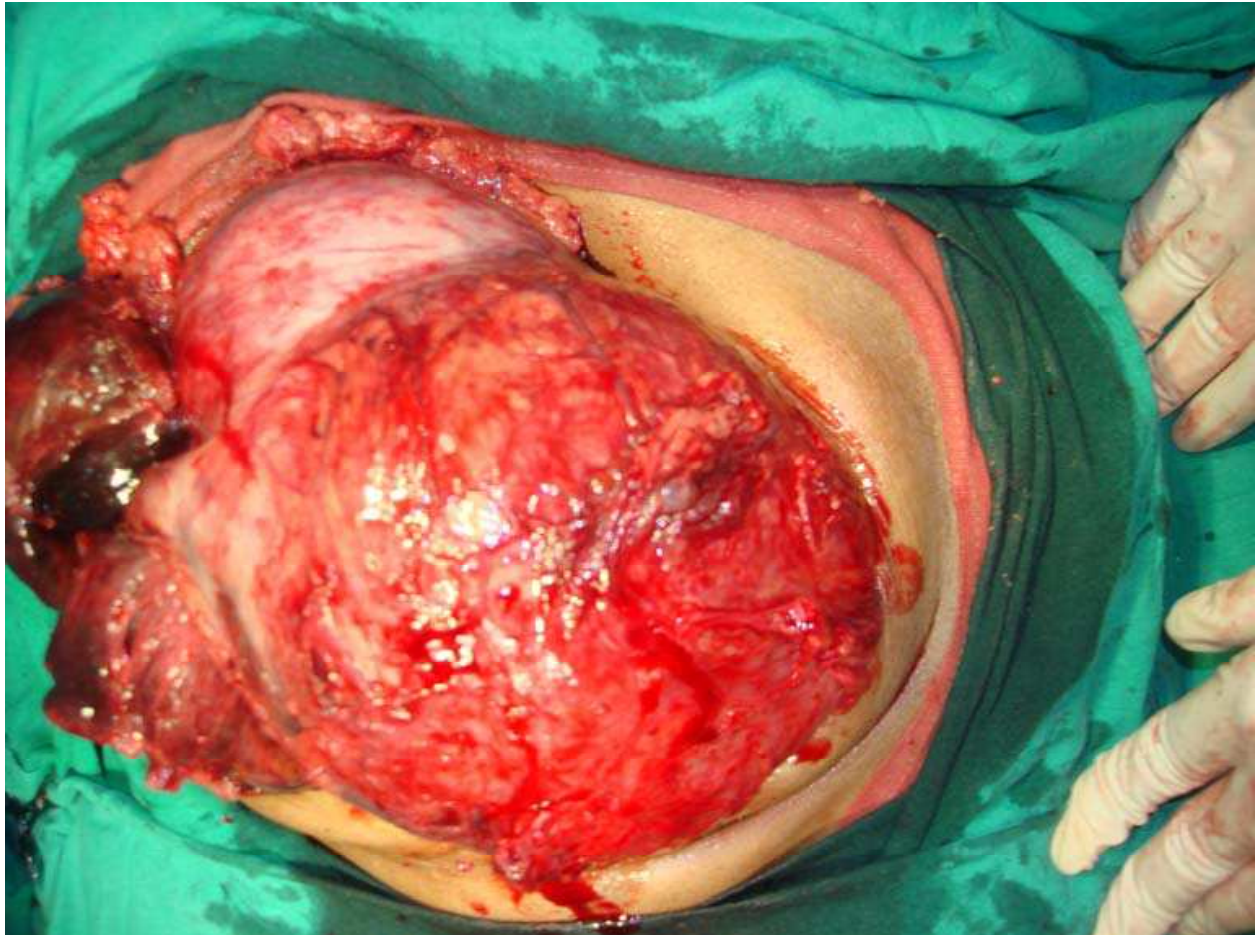
Fig. 8. A leiomyosarcomatous uterus at hysterectomy.

9. Complications of abdominal hysterectomy

9.1 Damage to the urinary tract

The urinary bladder may get damaged while pushing or dissecting it from over the cervix, particularly in cases of previous lower uterine surgery (Cesarean section commonly) or anterior myomectomy. The ureter may be injured near the infundibulopelvic ligament, near the uterine vessels or the anterior cervix. No pedicle should ever be clamped before defining both the ureters.

9.1.2 Injury to blood vessels

Ovarian or anastomotic vessels may be injured. All main vascular pedicles should be doubly secured to prevent slippage of ligatures..

9.1.3 Injury to bowel

Adherent bowel may be injured at dissection or clamping. For this, sharp dissection is usually better than blunt dissection. Use of electrocautery near adherent bowel may be avoided.

9.1.4 Infection of the wound, urinary tract, pneumonitis or thrombophlebitis

Infection of the wound, urinary tract or bronchopulmonary region usually responds to appropriate antibiotic therapy. Women at risk of thrombosis should be given thromboprophylaxis in the perioperative period in the form of heparin, apart from non-pharmacological measures like early ambulation, adequate hydration and stockings.

9.1.5 Psychological impact

Some women may develop depression after a hysterectomy procedure especially in the face of inadequate preoperative counseling.

9.2 Management of ovaries at the time of hysterectomy

Ovarian conservation should be discussed during preoperative counseling and patients wishes respected. Normal ovaries should not be removed if hysterectomy is being done for benign uterine disease irrespective of age. Rather, the only indications of concomitant bilateral oophorectomy in recent times are genital malignancies, extensive/ recurrent severe endometriosis, certain cases of breast carcinoma and women with familial predisposition to ovarian cancer. When ovarian removal is planned, the role of hormone replacement therapy must be discussed with the woman preoperatively.

10. Vaginal hysterectomy

A hysterectomy carried out by the vaginal route offers the advantages of fewer complications, shorter hospital stays and faster return to normal activities. Despite this, the abdominal approach continues to dominate the incidence charts world-over. The skill and experience of the surgeon plays a pivotal role in determining the approach route. The vaginal procedure has conventionally been done for women with uterine or pelvic prolapse. However, successful vaginal hysterectomies are being performed now in the absence of uterovaginal descent (called non descent vaginal hysterectomy – NDVH), often helped by uterine debulking techniques like coring, morcellation or bivalving. Laparoscopy is a useful aid for lymphadenectomy in cases of cervical or endometrial cancer, evaluating adnexal masses or endometriosis and aiding vaginal hysterectomy.

10.1 Preoperative preparation

The preoperative preparation continues to be the same as for the abdominal procedure with a few reinforcements. Bowel cleansing is very important for vaginal hysterectomy in order to evacuate solid stool from rectum, reduce the bacterial load of intestinal tract and to reduce the incidence of postoperative ileus and constipation. Prophylactic parenteral antibiotics, usually a cephalosporin, is administered an hour prior to the procedure after a test dose. Metronidazole is usually added in the postoperative period to take care of anaerobes. Betadine solution is used to clean the genitalia and vagina and alcohol based solutions should be avoided in the vagina. Sterile drapes are applied after positioning the patient.

10.2 Position

The patient, after anaesthesia administration is placed in lithotomy position, taking care to avoid neurovascular compression by the stirrups / leg holders. The buttocks should be brought to the edge of the table which is in zero horizontal position. The height of the stool / operating chair of the surgeon should bring the patient's pelvis at the level of the surgeon's eyes. The two assistants should stand within the stirrups, one on either side.

10.3 Technique

Two lateral sutures may be applied, one on either side, to retract the labia but are usually not essential in cases of prolapse.

The cervix is held with Valsellum forceps and the vagina is infiltrated with saline adrenaline solution (in strength of 1:200,000 to 1:400,000).

An inverted T-shaped incision is made on the anterior vaginal wall after holding the Fothergill's points on either side with Allis forceps. The horizontal limb of the T is placed at the cervicovaginal junction and the vertical limb extends from it to the level of neck of urinary bladder which may be made prominent by the bulb of a Foley's catheter placed in the bladder. The vaginal flaps are dissected on either side from urinary bladder keeping the fascia with the bladder. To free the bladder from the underlying cervix, the vesicocervical ligament is cut with scissors and the bladder is retracted with Landon's retractor to expose the uterovesical peritoneum which is incised transversely to expose the anterior uterine surface.

The cervix is now pulled forwards to expose the posterior vaginal wall. An inverted V-shaped incision is placed on the vaginal wall and peritoneum of Pouch of Douglas exposed and snipped to bring into view the posterior uterine wall.

The Macenrodt's and uterosacral ligaments are clamped between two long straight clamps, cut and ligated followed by the uterine vessels. It is important to remain close to the lateral uterine wall while applying the clamps. The uterine vessels should be doubly ligated bilaterally after cutting in between the clamps. The uppermost pedicle consisting of fallopian tube, ovarian and round ligaments is usually clamped with long curved clamps, cut and ligated. Each suture except that of uterine vessels should be transfixed. Before applying the upper most clamp, the fundus of the uterus should be delivered out usually through the pouch of douglas and the clamps applied under vision to avoid including omentum / gut loop in the tip of the clamp. Alternatively, the uterovesical pouch can also be used to deliver out the uterine fundus. The uterus is taken out along with the clamps. The anterior and posterior peritoneum may now closed with a continuous 00 chronic catgut suture, keeping the pedicles extraperitoneal. This would minimize chances of blood from any of the pedicles gaining entry into the pelvic cavity and would be revealed vaginally.

If an enterocele is present, the peritoneal sac of the enterocele may be excised and the posterior peritoneum closed as high as possible, preferably upto the level of yellow fat. This can be combined with a McCall culdoplasty which entails suturing of the uterosacral ligaments in the midline to obliterate the hiatus for enterocele.

The dissected anterior vaginal wall flaps may be excised. If a significant cystocele is present it may be repaired by passing multiple transverse polyglycolic acid (No. 2-0 or 3-0) sutures from the inner aspect of one vaginal flap to the other, including the fascia underneath the bladder (pubovesical fascia pillars). These are tied after all have been passed to support the bladder base with this fascia.

Alternatively, a purse string suture may be used to plicate this area, specially if cystocele is of minor degree. The vaginal incision is then closed vertically with interrupted or continuous chromic catgut sutures. A sterile betadine soaked gauze is used to pack the vagina for 24 hours. The self retaining catheter is left in place for 24-48 hours.

In the presence of a rectocele, the procedure may be combined with a posterior colpoperineorrhaphy.

10.4 Non Descent Vaginal Hysterectomy (NDVH)

The procedure is basically similar to that done for prolapsed uterus. However, in the absence of descent, the cervix and the pedicles tend to remain inside the vagina. Traction exposure plays an important role. Division of the lower ligaments (Macenrodt's and uterosacrals) provides the much needed mobility and the cervix is circumscribed at the cervicovaginal function followed by division of the vesicocervical ligament to expose the vesicocervical space. Fig 9 shows the descent of the cervix achieved after division of Macenrodt and uterosacral ligaments in a uterus with no preexisting descent. In the event of

Fig. 9. A nondescent vaginal hysterectomy in progress. The lower pedicles have been clamped, cut and ligated to provide some mobility to the otherwise undescended uterus.

difficult in opening the uterovesical peritoneum, the pouch of Douglas may be opened early which helps in securing the uterosacral ligaments. This is followed by clamping, cutting and transfixing the Macenrodt's ligament on both sides. Some surgeons prefer to use an aneurysm needle to ligate the Macenrodt and uterine vessels. Removal of the cervix and lower uterus helps to facilitate grasp and traction on the remaining uterus but this may not be required in all cases. Fig 10 shows the excision of cervix and lower part of uterine body before proceeding with remaining hysterectomy. Delivery of the fundus of uterus is usually easier through the pouch of Douglas than through the uterovesical pouch as more space is available in the sacral curve. However, normal sized uterine fundi may be delivered by the anterior route without much difficulty. Fig 11 shows the delivery of enlarged uterine body during NDVH. The pedicles are then exteriorized and the peritoneum closed followed by transverse closure of the vaginal incision. The sutures of the Macenrodt and uterosacral pedicles may be brought out through the vaginal edge and tied at the end of the procedure, in order to suspend the vaginal vault.
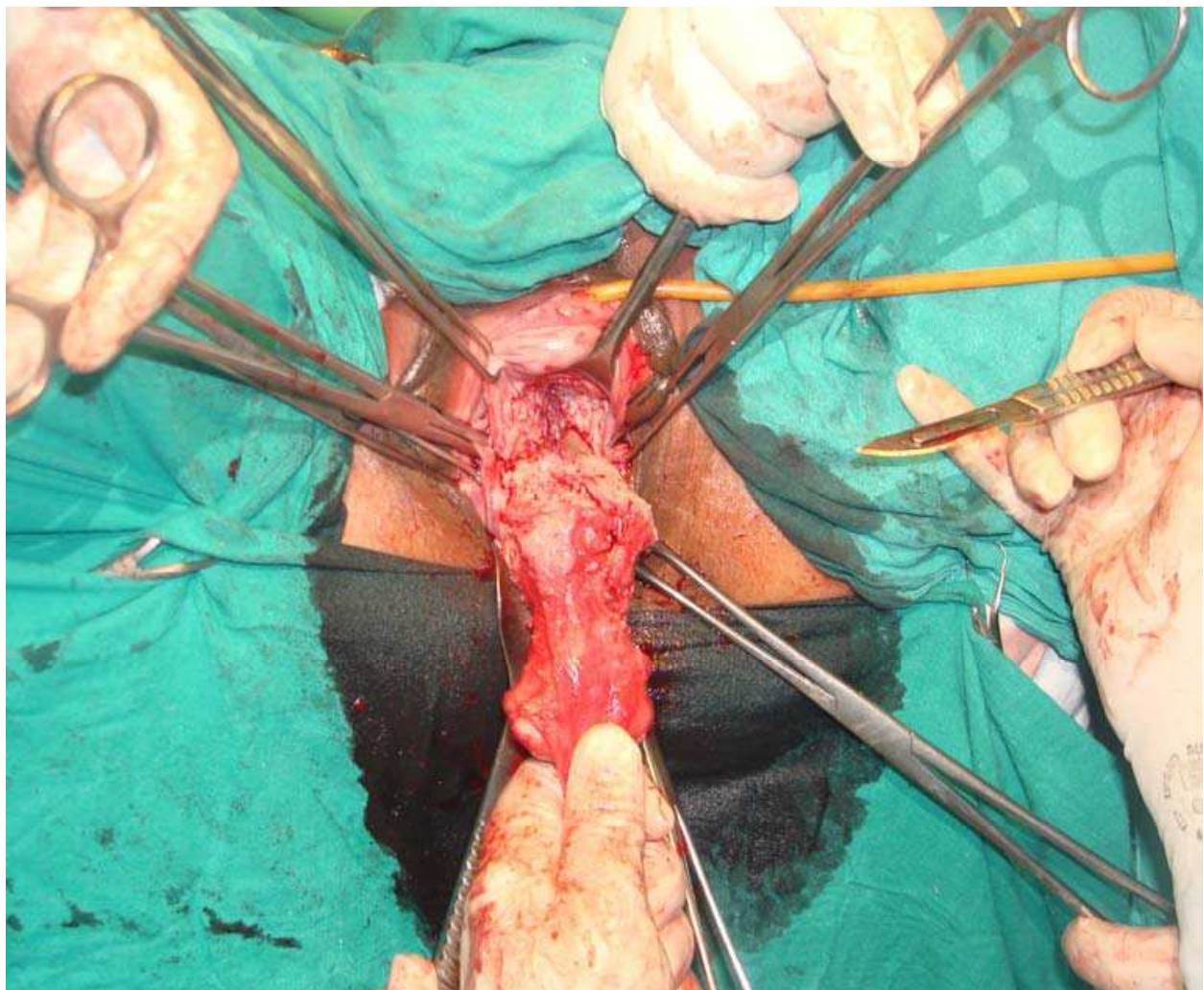

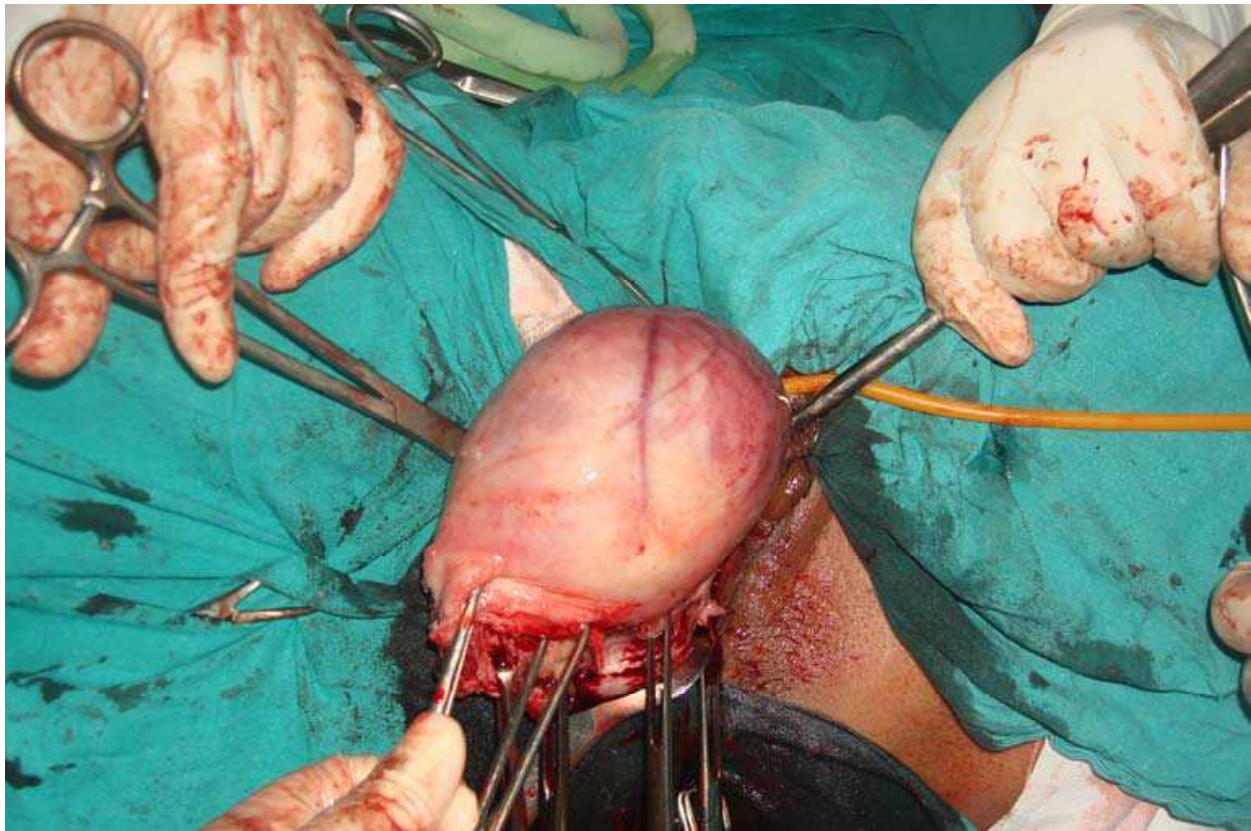Fig. 10. Excision of the cervix in progress at NDVH to facilitate grasp on the body uterus.

Fig. 11. Operative picture showing delivery of enlarged uterine body at NDVH.

10.5 Vaginal oophorectomy

Fear of restricted access to the ovaries and inadequate visibility of the adnexa at vaginal hysterectomy are responsible for avoidance of concomitant oophorectomy. Baden and Walker designed a classification for grading the degrees of ovarian descent after vaginal hysterectomy . Any ovary that is grade I or higher by this classification should be visible and accessible for transvaginal removal. Moreover, the use of laparoscope to perform an oophorectomy before a vaginal hysterectomy has been regarded as safe and easy.

11. Laparoscopic hysterectomy

Laparoscopy has been used to carry out Laparoscopic Assisted Vaginal Hysterectomy (LAVH), laparoscopic subtotal hysterectomy (LSH), total laparoscopic hysterectomy (TLH) and vaginally assisted laparoscopic hysterectomy (VALH). Raoul Palmer of France is credited with introducing operative laparocopy to gynecological practice in late 1950s. Reich et al published the first case of LAVH in 1989 and use of laparoscopy for hysterectomy has been rapidly growing since then.

11.1 Technique of LAVH

The patient, after administration of general anaesthesia, is placed in low lithotomy position. A bimanual vaginal examination is done to evaluate pelvic and vaginal dimensions and to assess the feasibility of removal of the uterus by this route. An intertuberous diameter of 9 cm or more, an obtuse pubic angle and a vaginal apex wider than 2 finger breadths is considered adequate for the procedure. A foleys's catheter is placed in the urinary bladder and the cervix is held with a Valsellum. An intrauterine manipulator is introduced to facilitate manipulation during the procedure. The laparoscope is inserted through an umbilical incision after creation of pneumoperitoneum (in lower lateral quadrants) with carbon dioxide. Two accessory ports (5 mm diameter) are used to insert operative instruments. A third accessory trocar may be placed on the primary surgeon's side 6 cm or more above the lower accessory trocar, to facilitate the surgeon to operate from one side.
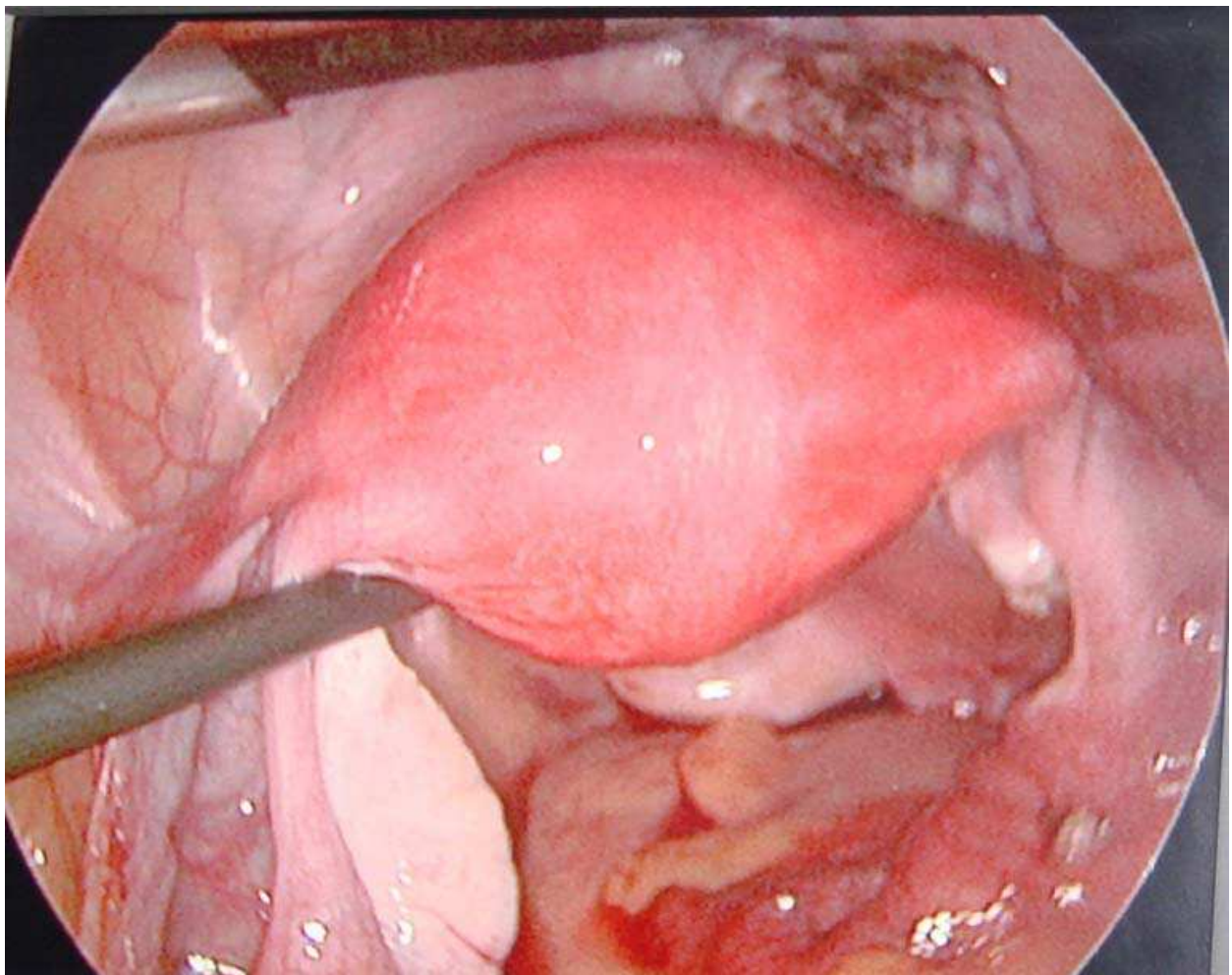

Fig. 12. Laparoscopic evaluation of pelvic organs at laparoscopic hysterectomy.

Fig12 shows the evaluation of uterus, adnexae and other pelvic structures at initiation of a laparoscopic hysterectomy. The uterine ligaments and vascular pedicles can be coagulated

and cut by using bipolar electro coagulation (e.g. Valley lab Ligasure), ultrasonic energy (Ethicon Harmonic Scalpet) or mechanical energy (using stapler – cutter devices like Ethicon Endopath ETS). The uterus is deviated to one side with uterine manipulator and round ligament followed by tubo ovarian (or infundibulopelvic ligament in cases of ovarian removal) pedicle is coagulated and cut on both sides. The peritoneum of anterior broad ligament is cut infero-medially to meet the opposite side at bladder reflection. The retroperitoneal space is also opened to allow identification of both ureters, the left sided is visible less easily than the right due to presence of sigmoid colon on the left side. At this point, the laparoscopic procedure is completed and the remaining surgery (including ligation of the uterine vessels) is done vaginally in the same manner as for a standard vaginal hysterectomy. There is loss of pneumoperitoneum once the vagina is opened and the laparoscope can be used to check for haemostasis after closure of the vaginal vault. The procedure is completed with removal of all laparoscopic instruments.

11.2 Vaginally assisted laparoscopic hysterectomy

In this method, the uterine vessels are also coagulated and cut laparoscopically. This requires adequate mobilization of the bladder and filling it with 100 to 200ml saline could aid in the identification of the bladder extent. Uterine vessels are skeletonised by opening the anterior and posterior leaves of broad ligament, before they are coagulated and cut close to the uterus. Colpotomy is then done transvaginally followed by ligating and cutting the uterosacral ligaments to deliver the uterus. The vaginal and abdominal incisions are then closed after removing all instruments.

11.3 Total Laparoscopic Hysterectomy (TLH)

This is an extension of the laparoscopic technique to include the colpotomy incisions after adequate mobilization of the urinary bladder. Anterior colpotomy incision is usually made first as the anteversion of the uterus required for posterior colpotomy incision would help maintain the pneumo-peritoneum by occluding the anterior incision. Various colpotomy and vaginal occluding devices are available which may be used along with uterine manipulators (KOH colpotonizer system has a vaginal extender and a vaginal balloon for occlusion, McCartney tube). However, TLH can also be performed using simple and inexpensive instruments like laparoscopic tenaculum, uterine manipulator and Deaver's retractor.

11.4 Laparoscopic Subtotal Hysterectomy (LSH)

The procedure of LSH is similar to that VALH till the level of uterine arteries. After these are secured, the body of uterus is amputated from the cervix at the isthmus level. It is better to dissect the urinary bladder from the cervix to ensure adequate occlusion of uterine vessels and amputation at the level of isthmus. Removal of the body of uterus after amputation may be effected by a posterior colpotomy incision, an extension of the umbilical incision or use of electromagnetic morcellator.

11.5 Postoperative care

1. For open abdominal procedures, the patient is kept on parenteral fluids for 24 hours, following which a light diet is started and this is replaced by normal solid/ semisolid

diet after another 24 hours. Women who have undergone laparoscopic procedures are started on normal diet on the day of surgery itself.

2. Early ambulation is encouraged.
3. Self retaining urinary catheter is usually left in situ for 24 hours after open surgery but is not essential. Continuous bladder drainage is not required in post operative period after laparoscopic procedures.
4. Change of antiseptic abdominal dressing may be done after 5 to 6 days. If unabsorbable sutures have been placed in the skin, they are removed after a week of surgery.
5. If the wound gets infected, antibiotics are started, depending on the culture report.
6. Full physical activity is actually resumed by the end of 10-14 days post operatively.
7. Coital abstinence is advised for 6 weeks.

11.6 Complications of hysterectomy

1. Intraoperative: Anaesthetic (cardiorespiratory) and surgical problems like hemorrhage, injuries to surrounding viscera are avoided by appropriate preoperative evaluation and ensuring senior and multidisciplinary help.
2. Rarely, postoperative ileus and destruction.
3. Urinary tract infection.
4. Bleeding per vaginum may occur after a week of surgery due to the vaginal sutures falling off or infection.
5. Wound infection and inflammation.
6. Venous thromboembolism: Early ambulation, adequate hydration and leg stockings are some of the non pharmacological measures that help prevent thromboembolism.

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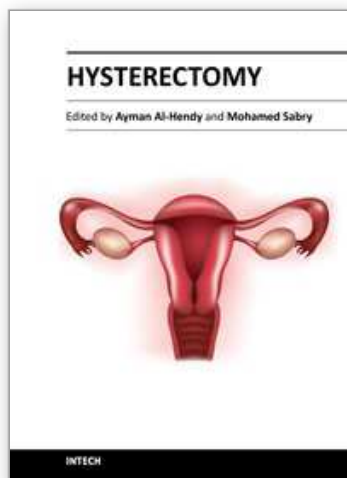
Hysterectomy

Edited by Dr. Ayman Al-Hendy

This book is intended for the general and family practitioners, as well as for gynecologists, specialists in gynecological surgery, general surgeons, urologists and all other surgical specialists that perform procedures in or around the female pelvis, in addition to intensives and all other specialities and health care professionals who care for women before, during or after hysterectomy. The aim of this book is to review the recent achievements of the research community regarding the field of gynecologic surgery and hysterectomy as well as highlight future directions and where this field is heading. While no single volume can adequately cover the diversity of issues and facets in relation to such a common and important procedure such as hysterectomy, this book will attempt to address the pivotal topics especially in regards to safety, risk management as well as pre- and post-operative care.

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