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CHAPTER 8.2

Gynecology/Infertility Surgery

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Dilatation and Curettage (D&C)

Surgical Considerations

Description: During dilatation and curettage (D&C), the endometrial lining of the uterus and coexisting lesions (myoma, polyp) are removed. This procedure is performed to diagnose and treat bleeding from uterine and cervical lesions, to complete an incomplete or missed spontaneous abortion, or to treat cervical stenosis. It is used infrequently as a method for pregnancy termination. A D&C is performed less frequently with the advent of the office endometrial biopsy and medical management of bleeding problems.

With the patient in the dorsal lithotomy position, the surgeon initially performs a bimanual examination under anesthesia to obtain information about both the presence of adnexal pathology and anatomic detail of the uterus. A speculum is inserted into the vagina, and the cervix is grasped with a clamp. The cervix is pulled gently toward the operator, who then uses a uterine probe to delineate the length of the uterus and the angulation between the cervical canal and uterus. The uterine cavity is reached by dilating the cervical canal with progressively larger dilators (Hegar's or Pratt) to an 8- to 9-mm diameter. A ureteral stone forceps is often used at this stage to remove existing polyps; and a curette is used to systematically remove the endometrial lining ([Fig. 8.2-1](#)).

Usual preop diagnosis: Uncontrolled uterine bleeding refractory to hormonal treatment in young women; abnormal uterine bleeding; incomplete, missed, or induced abortion; pregnancy termination; cervical stenosis causing dysmenorrhea or obstruction of menstrual flow.

Summary of Procedures

Position	Dorsal lithotomy with stirrups
Incision	None
Special instrumentation	To prevent peroneal nerve injury, the area of the leg leaning against the stirrup should be well cushioned. Following induction, perineum is positioned at the very end of the table to ensure optimum exposure. During the cervical dilatation, a vasovagal response can occur, with subsequent bradycardia and ↓BP. Uterine perforations will often manifest as severe postop pain.
Unique considerations	None
Antibiotics	5–15 min
Surgical time	50–100 mL
EBL	Minimal
Mortality	Postop fever: 1.7% Uterine perforation: 0.63%



Morbidity

Severe immediate postop bleeding (caused by either uterine artery perforation or cervical injury): < 1%
3–5

Patient Population Characteristics

Age range	20–80 yr
Incidence	> 1/50 females
Etiology	Dysfunctional uterine bleeding
Associated conditions	Obesity; HTN

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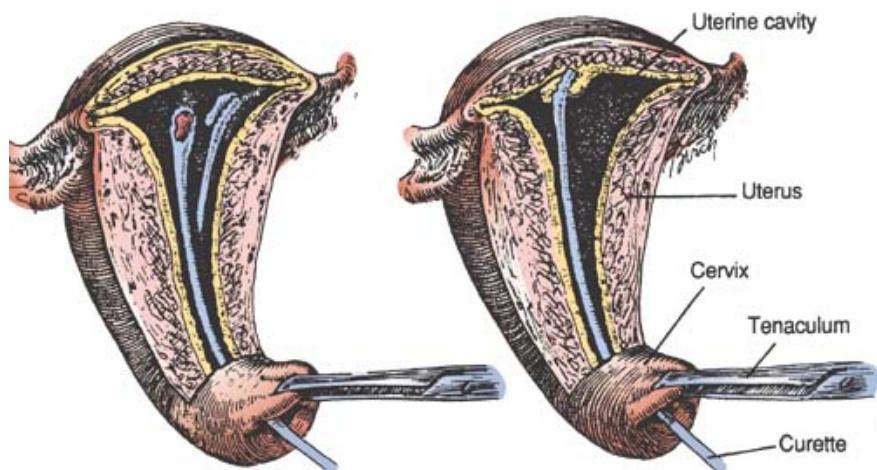


Figure 8.2-1. 1. Curettage of endometrial lining. (Reproduced with permission from Rock JA, Thompson JD, eds: *TeLinde's Operative Gynecology*, 8th edition. Lippincott Williams & Wilkins, 1997.)

■ Anesthetic Considerations

See [Anesthetic Considerations following Therapeutic Abortion, Dilatation, and Evacuation, p. 789.](#)

Suggested Readings

1. Bulter WJ: Normal and abnormal uterine bleeding. In *TeLinde's Operative Gynecology*, 9th edition. Rock JA, Jones HW, eds. Lippincott Williams & Wilkins, Philadelphia: 2003, 457–82.
2. Mackenzie IZ, Bibby JG: Critical assessment of dilatation and curettage in 1029 women. *Lancet* 1978; 2(8089):566–8.
3. Stovall TG: Early pregnancy loss and ectopic pregnancy: In *Berek & Novak's Gynecology*, 14th edition. Berek JS, ed. Lippincott Williams & Wilkins, Philadelphia, 2007, 601–36.

Therapeutic Abortion, Dilatation, and Evacuation (D&E)

■ Surgical Considerations

Description: Therapeutic abortion (TAB) is the elective termination of a pregnancy prior to viability (usually considered to be 24 wk). In 1982, 1,574,000 legal abortions were performed in the United States, a ratio of 426 abortions per 1,000 live births. **Suction**



curettage is the most efficient method to terminate pregnancies during the first trimester (< 12 wk), and the great majority of abortions are performed this way. Few (< 5%) of first trimester abortions in the United States are performed with a sharp curette. Increased operative time and blood loss is seen with this method, resulting in its being practiced mainly in locations where a suction apparatus is not available. Suction curettage for a spontaneous abortion is performed in a manner identical to a regular TAB, except that a cervical dilatation might not be needed and the blood loss is usually 2–3 times greater. Very early termination (< 4 wk following LMP) can be performed without anesthesia via medical termination.

The **TAB procedure** consists of a standard cervical dilatation (required for gestations > 6 wk), followed by vacuum aspiration of the uterine contents, using a plastic suction curette (Fig. 8.2-2). Alternatively, the cervical canal can be (*Print pagebreak 788*) dilated > 6 hr prior to the operation with laminaria or synthetic osmotic dilators which, after insertion, swell to provide dilatation. A sharp curette often is used at the very end to gently verify the emptiness of the cavity, followed by reaspiration. Due to the risk of missing the pregnancy, most physicians wait until 7–8 wk following the LMP before performing the operation. Ergonovine maleate (0.2 mg im) and oxytocin (Pitocin) 20–30 U/1000 mL iv is often used during the procedure to reduce bleeding, although the efficacy of oxytocin has been questioned. The procedure is performed under either local with or without iv sedation or GA; it is generally felt that local is safer. Regardless of the method used, the obtained product of conception (POC) is sent for histological examination to exclude the presence of trophoblastic neoplasm or ectopic pregnancy.

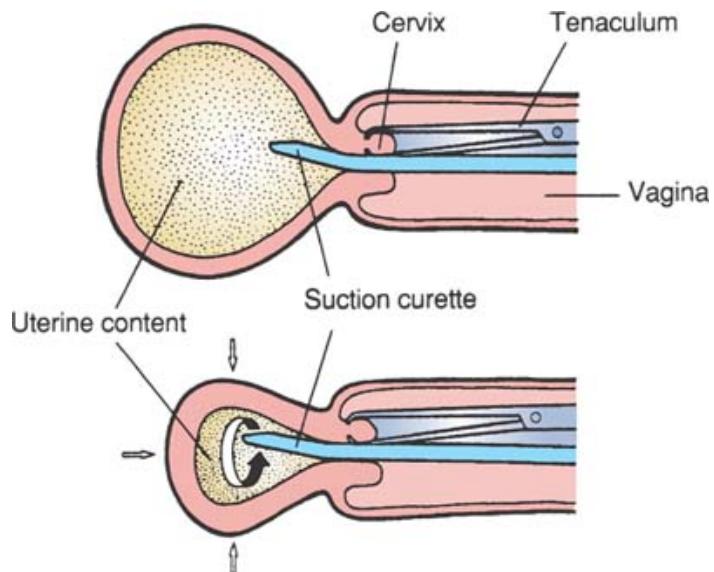


Figure 8.2-2. 2. Uterine aspiration. Top—uterus at beginning of procedure; bottom—at conclusion of procedure.
(Reproduced with permission from Rock JA, Thompson JD, eds: *TeLinde's Operative Gynecology*, 8th edition. Lippincott Williams & Wilkins, 1997.)

Variant procedure: Dilatation and evacuation (D&E) remains the safest method for mid-trimester pregnancy termination. It is performed similarly to first-trimester suction curettage with the addition of using large-ring forceps to grasp and remove fetal parts intermittently. This procedure is often performed under GA.

Usual preop diagnosis: Pregnancy (viable or nonviable): 52% within 8 wk estimated gestational age; 90% within 12 wk estimated gestational age.

Summary of Procedures

1st-Trimester Suction Curettage OR 2nd-Trimester D&E

Position	Dorsal lithotomy with patient in Allen stirrups. Following induction, perineum positioned at end of table to ensure optimum exposure.
Incision	None
Special instrumentation	Suction; + large-ring forceps for 2nd trimester D&E
Unique considerations	To prevent peroneal nerve injury, the area of the leg leaning against stirrup should be well cushioned. During cervical dilatation, a vasovagal reaction can occur → ↓HR + ↓BP. During injection of lidocaine for paracervical block, seizures may occur if > 12 mL of 1% solution are

Antibiotics	injected. Uterine perforations often will cause excessive postop pain.
Surgical time	Doxycycline 100 mg iv 5–15 min; 15–45 min (2nd trimester D&E)
	No. wk gestation: 1–4 – 10 mL 5–8 – 10–30 mL 9–10 – 30–80 mL 11–12 – 80–200 mL 13–14 – 200–400 mL 300–500 mL (2nd trimester D&E)
EBL	
Postop care	PACU
Mortality	0–3.1/100,000; 13/100,000 (2nd trimester D&E) Mild infection Resumption day of surgery Resumption subsequently Cervical stenosis causing amenorrhea
	1/216 1/553 1/596 1/6,071
Morbidity	Cervical incompetence Underestimation of gestational age Convulsive Sz (after local anesthesia) Incomplete abortion Sepsis Uterine perforation Vaginal bleeding Inability to complete Coexisting tubal pregnancy Total
	1/9,444 1/15,454 1/25,086 1/3,617 1/4,722 1/10,625 1/14,166 1/28,333 1/42,500 1/1,405
Complications requiring hospitalization	for 2nd trimester D&E: T > 38° for > 1 d Cervical injury Cervical tear Retained POC Hemorrhage UTI
	13.4/1,000 11.6/1,000 10/1,000 9/1,000 7.1/1,000 1.8/1,000
Pain score	for 2nd trimester: D&E: Endometritis Uterine perforation Need for laparotomy Need for blood transfusion
	8.5/1,000 3.2/1,000 2.1/1,000 1.9/1,000
	5

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Patient Population Characteristics

Age range	15–45 yr
Incidence	Abortions: 21.3/1000 women age 15–44 yr in the United States. (2000)
Etiology	Desire for pregnancy termination

■ Anesthetic Considerations for D&C, TAB, D&E

▲ Preoperative

These are among the most common procedures performed in gynecology. Patients presenting for these procedures are generally healthy; however, bleeding and sepsis may alter ASA status.

Cardiovascular

Hemodynamic status may be impaired 2° preop uterine bleeding, and patient may be septic from retained uterine products. BP and HR.

Laboratory

Premedication

Tests: As indicated from H&P.
Hb/Hct; Consider T & S/T & cross; other tests as indicated from H&P.
Consider midazolam 1–2 mg iv

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Intraoperative

Anesthetic technique: Local/MAC, regional, or GA all may be appropriate. In the younger patient population, spinal anesthesia may be less desirable because of increased incidence of postdural puncture headache (PDPH).

Local anesthesia: Some obstetricians/gynecologists perform these procedures under local anesthesia. Paracervical block has the potential for inadvertent iv administration, with consequent toxic reaction.

Regional anesthesia: A T10 sensory level is sufficient to provide anesthesia for procedures on the uterus.

Spinal

0.75% bupivacaine 7.5–12 mg in 8.25% dextrose. (See [Anesthetic Considerations for Cesarean Section, p. 819](#).) If spinal anesthesia is indicated, a pencil-point spinal needle (e.g., Whitacre or Sprotte) should be used to decrease the incidence of PDPH.

Epidural

1.5–2.0% lidocaine with epinephrine 5 mcg/mL, 15–20 mL; supplement with 5 mL as needed. Supplemental iv sedation. (See [Anesthetic Considerations for Cesarean Section, p. 819](#).)

CSE

Combined spinal/epidural (CSE): An alternative technique combining the rapid onset and density of spinal anesthesia with the flexibility of continuous epidural anesthesia. Apply monitors, administer fluid, and position patient as for spinal or epidural. The most common technique is the needle-through-needle. After the epidural space is located with a standard 17 ga Tuohy needle, insert a 4" 26- to 27-ga pencil-point spinal needle through it to administer 0.6 mL of spinal bupivacaine (0.75%) ± fentanyl 10 mcg and morphine sulfate 0.1–0.2 mg. Secure the epidural catheter and use if needed (a test dose is advisable).

General anesthesia:

Induction

Standard induction (see [p. B-2](#)).

Maintenance

Standard maintenance (see [p. B-2](#)) used commonly, although frequently done by mask with O₂/N₂O + volatile anesthetic and spontaneous ventilation. May also use propofol infusion (50–200 mcg/kg/min), with N₂O, without volatile anesthetic. A small amount of opiate may be used.

Emergence

Be ready with suction in the event of vomiting on emergence.

Blood and fluid requirements

Minimal blood loss
IV: 18 ga × 1 (unless hypovolemic)
NS/LR at 2 mL/kg/h

Usual replacement of maintenance fluids and overnight deficit with crystalloid to restore euvoolemia. Blood replacement rarely indicated.

Control of blood loss

Oxytocin (Pitocin) 20–30 U/L iv
Methylergonovine maleate (0.2 mg) im

Oxytocin causes uterine contraction, with a consequent decrease in blood loss. Rapid iv bolus may lead to hypotension. 20–30 U Oxytocin is usually diluted in 1 L of crystalloid and then infused. Methylergonovine maleate also causes uterine contraction and is usually given im. Side effects include HTN, myocardial ischemia and dysrhythmias, especially if given iv.

Monitoring

Standard monitors ([p. B-1](#))

Positioning

hip, leg, hand position
and pad pressure points
eyes
Shoulder abducted < 90°

Vagal stimulation

Bradycardia

Lithotomy position may worsen pulmonary function. Rarely, hemodynamic changes can occur on elevation of the legs into the stirrups, as this increases venous return to the heart. Problems with hypotension on lowering legs postop are more common.

When the cervix is grasped and dilated, the patient may have excessive vagal stimulation, which can be treated by prompt cessation of stimulation and with atropine (0.4 mg iv), if indicated.

Common peroneal nerve palsy (e.g., foot drop) is possible if pressure on the nerve over the fibula is not prevented by adequate padding or positioning. Hyperflexion of the hip joint can cause femoral and lateral femoral cutaneous nerve palsy. Obturator and saphenous nerve injury are also complications of the lithotomy position.

Take care to ensure safety of patient's fingers when manipulating foot of the bed. Avoid finger injury by placing patient's arms on arm boards or by wrapping her hands.

Complications

Nerve injury

Finger trauma

Postoperative

PONV (see [p. B-6](#))

Complications

Uterine perforation with severe abdominal pain (rare)

Severe postop bleeding may be caused by uterine atony, retained POCs, uterine perforation, or cervical injury.

Pain management

Oral pain medications may be satisfactory. With extreme pain consider uterine perforation.

IV opiates

Tests

Hb/Hct, if hemorrhage

Suggested Readings

1. Courtney, MA: Neurologic sequelae of childbirth and regional anesthesia. In *Manual of Obstetric Anesthesia*. Churchill Livingstone, New York: 1992.
2. Grimes DA: Management of abortion. In *TeLinde's Operative Gynecology*, 9th edition. Rock JA, Jones HW, eds. Lippincott Williams & Wilkins, Philadelphia: 2003, 483–506.
3. Hakim-Elahi E: Complications of first-trimester abortion: a report of 170,000 cases. *Obstet Gynecol* 1990; 76(1):129–35.
4. Nakata DA, Stoelting RK: Positioning. In *Patient Safety in Anesthetic Practice*. Morell RC, Eichhorn JH, eds. Churchill Livingstone, New York: 1997, 293–318.
5. Stovall TG: Early pregnancy loss and ectopic pregnancy: In *Berek & Novak's Gynecology*, 14th edition. Berek JS, ed. Lippincott Williams & Wilkins, Philadelphia, 2007, 601–36.

Hysteroscopy

Surgical Considerations

Description: Hysteroscopy is a procedure in which the endometrial cavity can be examined, allowing for direct visualization of lesions. The procedure is used primarily to investigate abnormal uterine bleeding, often caused by intra-uterine submucous myoma and polyps. After the diagnosis, these lesions can be removed through the operative hysteroscope using a variety of techniques.

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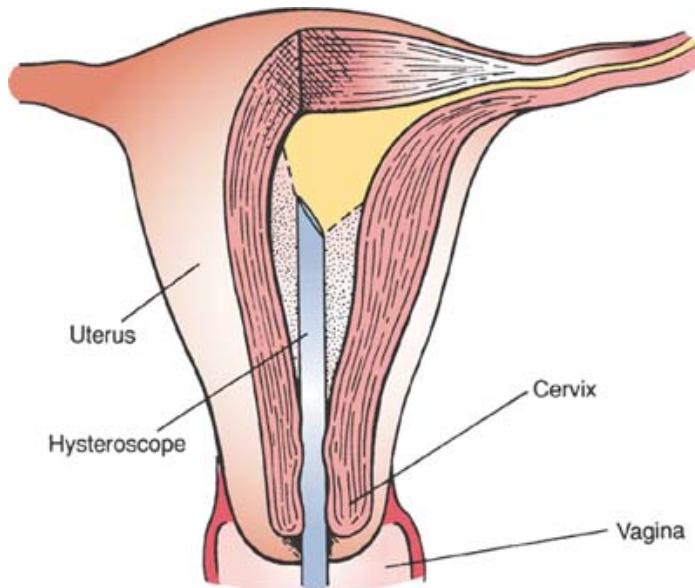


Figure 8.2-3. 3. Hysteroscopy. (Reproduced with permission from Baggish MS, Barbot S, Valle RF: *Diagnostic & Operative Hysteroscopy*. Year Book Medical Pub, 1989.)

Variant procedure or approaches: Diagnostic hysteroscopies can be performed under both GA and local anesthesia with iv sedation, whereas operative hysteroscopies are usually performed under GA. An examination under anesthesia is performed, followed by the insertion of open speculum and the attachment of a tenaculum to the cervix. The cervical canal is dilated until the hysteroscope can be introduced with its sheath ([Fig. 8.2-3](#)). A distention medium—usually a low-viscosity fluid—is then used to provide visualization of the uterine cavity. In the past, other media, such as CO₂ gas and Hyskon, were used frequently to distend the uterus; however, these have been replaced by low-viscosity fluids, due to the ease of its use and safety concerns about Hyskon. It has been recommended that no more than 300 mL of this solution be infused, to avoid these potentially serious complications. The most commonly used low-viscosity fluids are NS, sorbitol 3%/mannitol 0.5%, and mannitol 5% solutions. NS is most commonly used for diagnostic hysteroscopies, while the other nonconductive fluids are used for operative hysteroscopies. Certain bipolar operative hysteroscopies also allow the use of NS.

The distension medium is delivered to the hysteroscope by means of gravity or by a pump. Most systems use gravity, whereby the fluid is delivered via a wide-bore tubing and the maximum intrauterine pressure (IUP) is determined by the height of the fluid container above the uterus. The maximum IUP is thus limited by gravity, making this system relatively safe. The lowest IUP necessary to provide adequate visualization should be used to decrease the rate of absorption of the distention medium. A video camera is usually attached to the hysteroscope to allow for easier visualization. During operative cases, an accompanying laparoscope is sometimes introduced from the abdomen to evaluate the progress of the hysteroscopy and to safeguard against uterine perforation and potential bowel injury.

Usual preop diagnosis: Abnormal uterine bleeding; infertility; recurrent pregnancy loss

Summary of Procedures

Position

Dorsal lithotomy (Allen stirrups)



Incision	None
Special instrumentation	Fluid pump; laser; electrocautery equipment
Unique considerations	Accelerated fluid absorption with prolonged procedures or with resections may → pulmonary edema. Laparoscopy may accompany this procedure.
Surgical time	15 min to 2 h
Antibiotics	Cefazolin 1 g iv
EBL	0–100 mL
Postop care	Excessive postop bleeding can be controlled by using a 5 mL Foley balloon catheter in the uterus for several h.
Mortality	Minimal
Morbidity	Pleural effusion can be seen with use of low-viscosity medium.
Pain score	3–5

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Patient Population Characteristics

Age range	20–80 yr
Incidence	> 1/50
Etiology	Unexplained uterine bleeding; infertility
Associated conditions	Obesity

W Anesthetic Considerations

Preoperative

Hysteroscopy may be performed for diagnostics or treatment of intrauterine pathology.

Cardiovascular

As patient may be undergoing hysteroscopy for uterine bleeding, consider hypovolemia and anemia. BP, HR and Orthostatic VS.
Tests: As indicated from H&P.

Laboratory

Hb/Hct if bleeding Hx. Other tests as indicated from H&P; consider pregnancy testing.

Premedication

Consider midazolam 1–2 mg iv.

Intraoperative

Anesthetic technique: Local, regional, or GA may be used. In the younger patient population, spinal anesthesia may be less desirable because of increased incidence of postdural puncture headache (PDPH). If spinal anesthesia is indicated, pencil point spinal needles (e.g., Sprotte or Whitacre) should be used to decrease the incidence of PDPH.

Local anesthesia: Some procedures may be done under local, usually with supplemental iv sedation, especially if they are diagnostic. Paracervical block has the potential for an inadvertent intravenous administration, with consequent toxic reaction.

Regional anesthesia: A T10 sensory level is sufficient to provide anesthesia for these procedures.

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Spinal 0.75% bupivacaine 7.5–10 mg in 8.25% dextrose. (See [Anesthetic Considerations for Cesarean Section, p. 819](#).)

Epidural

1.5–2.0% lidocaine with epinephrine 5 mcg/mL, 15–20 mL; redose with 3–5 mL as needed. Supplemental iv sedation. (See [Anesthetic Considerations for Cesarean Section, p. 819](#).)

CSE

Combined spinal/epidural (CSE): An alternative technique combining the rapid onset and density of spinal anesthesia with the flexibility of continuous epidural anesthesia. Apply monitors, administer fluid, and position patient as for spinal or epidural. The most common technique is the needle-through-needle. After the epidural space is located with a standard 17-ga Tuohy needle, insert a 4" 26- to 27-ga pencil-point spinal needle through it to administer 7.5–10 mg of spinal bupivacaine (0.75%) ± fentanyl 10 mcg and morphine sulfate 0.1–0.2 mg. Secure the epidural catheter and use if needed (a test dose is advisable).

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General anesthesia:

Induction

Standard induction (see [p. B-2](#)). LMA if appropriate

Maintenance

Standard maintenance (see [p. B-2](#)).

Emergence

Standard emergence

Minimal blood loss

Blood and fluid requirements

IV: 18–20 ga × 1 (unless hypovolemic)

NS/LR at 2–4 mL/kg/h

Positioning

hip, leg, and hand positions
and pad pressure points
eyes
Shoulder abduction < 90°

Lithotomy position can be deleterious to pulmonary function, as it may impair respiratory mechanics. Rarely, hemodynamic changes occur on elevation of legs into the stirrups, as this increases venous return to the heart. Problems with hypotension on lowering legs postop are common. Common peroneal nerve palsy is possible if pressure on the nerve over the fibula is not prevented by adequate padding or positioning. Hyperflexion of hip joint can cause femoral and lateral femoral cutaneous nerve palsy. Obturator and saphenous nerve injury are also complications of the lithotomy position.

Monitoring

Standard monitors (see [p. B-1](#)).

Surgical stimulation

When cervix is grasped and dilated, patient may have excessive vagal nerve stimulation.

Rx: prompt cessation of stimulation by surgeons and treatment with atropine, if indicated.

Complications

Pulmonary and cerebral edema
(2° hypotonic fluid overload)
Coagulopathy
Air embolism
Anaphylactoid reactions

Air embolism can occur with the use of gas distention media: thus, most institutions currently use low-viscosity fluids for distension. Low-viscosity media can be grouped, based on their tonicity and electrolyte content: (1) hypotonic, electrolyte-free media that may cause hypotonic fluid overload; and (2) isotonic, electrolyte-containing media that may cause isotonic fluid overload. It is important to monitor the volume of fluid used during the procedure. It is not uncommon to use 10–20 L of distention fluid during an operative hysteroscopy. Monitor for fluid balance. Adjust iv fluid to

Finger injury (2° positioning)

maintain euvoolemia.

When manipulating the foot of the bed, avoid finger injury by placing patient's arms on arm boards or by wrapping her hands.

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Postoperative

Complications

PONV (see [p. B-6](#))

Fluid overload/pulmonary edema from excessive fluid absorption

Pain management

Small dose of titrated opiate

Patients usually tolerate oral pain medications.

Tests

Consider CXR and ABG.
Serum electrolytes

For patient with respiratory compromise

Suggested Readings

1. Baggish MS: Operative hysteroscopy. In *TeLinde's Operative Gynecology*, 9th edition. Rock JA, Jones HW, eds. Lippincott Williams & Wilkins, Philadelphia: 2003, 483–506.
2. Cooper JM, Brady RM: Intraoperative and early postoperative complications of operative hysteroscopy. *Obstet Gynecol Clin North Am* 2000; 27(2):247–66.
3. Nakata DA, Stoelting RK: Positioning. In *Patient Safety in Anesthetic Practice*. Morell RC, Eichhorn JH, eds. Churchill Livingstone, New York: 1997, 293–318.
4. Stovall TG: Hysteroscopy. In *Berek & Novak's Gynecology*, 14th edition. Berek JS, ed. Lippincott Williams & Wilkins, Philadelphia, 2007, 601–36.

Pelvic Laparotomy

Surgical Considerations

Description: Laparotomy and its variants are all common gynecological procedures. Laparotomy is most frequently performed via a Pfannenstiel's incision, which permits good pelvic exposure. A vertical incision is used in oncological surgery or in the presence of a large uterus. A knife or Bovie is used to cut through the skin and underlying tissue until the rectus fascia is reached. The fascia is nicked, and then sharply incised bilaterally 2–4" with scissors or electrocautery (Bovie). The rectus muscle is separated sharply in the midline down to the pubis and the peritoneum is entered. The peritoneal incision is then extended vertically or transversely. The pelvis and entire abdominal cavity are explored first by palpation. Then the bowels usually are packed in a cephalad direction with surgical laparotomy sponges (laps) to prevent them from falling back into the pelvis. Good muscle relaxation is important during this stage to ensure optimal packing. A self-retaining retractor frequently is used to keep the laps in place and to enhance exposure. After the desired operation has been performed, the retractor and packs are removed. During the peritoneal closure, abdominal muscle relaxation is again critical to minimize tension on this layer and risk of bowel injury with the needle. The rectus fascia, the subcutaneous tissue, and the skin are closed in succession.

Variant procedures: Myomectomies are performed to remove myomata that are causing pain, abnormal bleeding, or infertility. Myomata are heavily vascularized at the base, and the surgeon has several ways to minimize this bleeding. A clamp can be placed across the uterine vasculature to minimize blood flow to the uterus. A common (Print pagebreak 796) alternative is the use of a vasoconstrictor, such as diluted epinephrine (1:200,000) or vasopressin solution (1–5 U/10 mL NS). The solution (2–10 mL) is injected around the myoma prior to incising the uterus, which invariably →↑HR (epi) or ↓HR (vasopressin) and →BP. Gonadotropin releasing hormone (Gn-RH) agonists may be used for a few months prior to the operation to render the patient

hypoestrogenic and, thus, decrease the vascularity of the myomata. After the myomata have been removed, the uterine defects are closed with several layers of suture, and the uterine serosa is closed.

Ovarian cystectomies are performed to alleviate related pain and to diagnose the identity of asymptomatic cysts. Small, single-functional ovarian cysts are found at different stages in a woman's menstrual cycle. At times, these cysts can increase in size and quantity, which may cause severe pain. The ovary also can contain various nonfunctional cysts (e.g., tumors) which have to be removed, even if asymptomatic, to exclude malignancy. After the pelvic structures are well visualized, the cystic ovary is stabilized with instruments or surgical laps. Sharp or blunt dissection is used to shell out the cyst intact. If there is any suspicion about the nature of the cyst, an intraop frozen section is obtained. The ovary is then reapproximated and the abdomen closed. If the cyst is large and little healthy ovarian stroma remains, an **oophorectomy** is performed.

Ectopic pregnancies are usually medical emergencies. Increasingly, **laparoscopy** is being used to treat this condition (see [p. 849](#)), although laparotomies for ectopic pregnancies are still widely performed. The abdomen is entered, and the pregnancy located quickly. An attempt is made to control the bleeding with the surgeon's hand, a clamp, or suture. Frequently, large amounts of blood in the pelvis are suctioned and the ectopic pregnancy is removed via a **partial tubal resection, salpingostomy, or salpingectomy**; then the abdomen is closed. A **D&C** is often performed at the end to prevent late bleeding from the pregnancy-induced endometrial proliferation (see [p. 786](#)).

In **abdominal colpopexy** (fixation of vagina), the patient is placed in the lithotomy position, usually with Allen stirrups, to perform an examination under anesthesia, as well as to insert a vaginal pack needed to identify the vaginal apex. A urethral catheter is inserted prior to staging the laparotomy. A rectus fascia graft is obtained during the opening of the abdomen (a synthetic graft can be used instead). The bowel is packed and the defect is examined from the abdominal perspective. Frequently there is an accompanying enterocele which must be closed initially (see **Moschowitz procedure**, later). The peritoneum over the vaginal apex is then entered and the neighboring rectum and bladder are dissected a distance away from the vaginal apex. The peritoneum over the sacrum is incised and the cephalad end of the graft is sutured to the anterior sacral ligament of the third vertebrae. Severe bleeding can occur if there is injury to the middle sacral artery. The caudal end of the graft is attached to the vaginal apex, with the surgeon frequently using a vaginal hand to place these last sutures. The peritoneum and abdomen are closed, and the patient's legs are elevated to the dorsal lithotomy position for a high-posterior **colporrhaphy** (repair of vagina).

The **Moschowitz procedure** is used to reduce enteroceles via an abdominal approach. The abdomen is entered in the usual fashion, the uterus held up with a traction suture, the bowel packed, and the patient placed in the Trendelenburg position. Multiple concentric purse-string sutures are used to close the defect in the pouch of Douglas and the abdomen is closed.

The **presacral neurectomy** is an operation performed for women with severe chronic midline pelvic pain. Usually the patient has a history of prior surgeries to diagnose and treat the problem. A laparotomy is initially performed with packing of the bowels. The rectosigmoid is brought over to the left to make a vertical, posterior, parietal, peritoneal incision over the sacral area. The anatomy is examined closely and the presacral nerves are obliterated or excised; then the peritoneum and abdomen are closed. Severe bleeding can be seen intraop from the hemorrhoidal and sacral veins, but usually can be controlled with pressure.

Usual preop diagnosis: Myomata (pelvic pain, hypermenorrhea, infertility); ovarian cysts and pelvic pain with undiagnosed ovarian mass; ectopic pregnancy; vaginal vault prolapse; enterocele; presacral neurectomy (chronic pelvic pain)

Summary of Procedures

Position	Supine or lithotomy
Incision	Pfannenstiel's or low midline abdominal
Unique considerations	Muscle relaxation is important during bowel packing and abdominal closure. Vasoconstrictor substances for controlling myomata bleeding (1:200,000 epinephrine and 1–5 U vasopressin/10 mL NS) are often used and can alter BP and HR.
Antibiotics	1–2 g iv cefoxitin or cefotetan
Surgical time	45 min–4 h Abdominal colpopexy: 4–5 h
EBL	150–1000 mL (maximum related to procedure)
Postop care	PACU
Mortality	Minimal



Morbidity

Gastric dilatation: 3%
Thrombophlebitis: 3%
PE: 2%
Ureteral stenosis: 1%
8

Pain score

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Patient Population Characteristics

	Myomectomy	Ovarian Cystectomy, Oophorectomy	Ectopic Pregnancy	Abdominal Colpopexy, Moschowitz	Presacral Neurectomy
Age range	20–45 yr	20–85 yr	15–45 yr	40–80 yr	20–50 yr
Incidence	> 1/5 females		1/100 females	1/500 females	
Etiology	Congenital	Endometriosis Anovulation Adenoma	Preexisting tubal disease	Multiparous Obesity Chronic cough	Endometriosis
Associated conditions	Menorrhagia	Endometriosis	Pelvic adhesions	Pelvic relaxation	Endometriosis

■ Anesthetic Considerations

See [Anesthetic Considerations following Infertility Operations, p. 800.](#)

Suggested Readings

1. Berek JS, ed: *Berek & Novak's Gynecology*. Lippincott Williams & Wilkins, Philadelphia, 2007.
2. Rock JA, Jones HW, eds: *TeLinde's Operative Gynecology*. 14th edition. Lippincott Williams & Wilkins, Philadelphia: 2003.

Transvaginal Oocyte Retrieval (TVOR)

■ Surgical Considerations

Description: **Transvaginal oocyte retrieval (TVOR)** is performed on patients who have undergone ovarian stimulation using ovulation-inducing agents. This procedure is performed 35–36 h after the patient has been injected with human chorionic gonadotropin (HCG) to induce oocyte maturation. It is very important for the success of the procedure that retrieval be performed within this time period. If a retrieval is performed too late, ovulation will have occurred and oocyte retrieval will no longer be possible.

In the procedure room, the patient is placed in the dorsal lithotomy position, and moderate to heavy iv sedation is started at this time. A sterile speculum is inserted into the vagina and a vaginal prep is performed. After the prep, the speculum is removed and an ultrasound probe with a 16-ga needle on a needle guide is placed into the patient's vagina. One of the ovaries is identified and entered by inserting the needle through the vaginal fornix. Patients may (Print pagebreak 798) experience a combination of pain and pressure at this point of the procedure. After the needle is in the ovary, the surgeon will then proceed with sequential aspiration of the ovarian follicles. It is important that the patient remain relaxed and motionless during this part of the procedure, as movement may prevent aspiration of oocytes and increase the risk of injury to the surrounding organs and vessels. After retrieval is completed in the first ovary, the needle is withdrawn; the other ovary is identified, and a second puncture is made through the vaginal fornix. Depending on the number of follicles present, the entire procedure may last anywhere from 10–30 min. After all of the follicles have been aspirated, the needle and ultrasound probe are removed from the vagina. A sterile speculum is then reintroduced into the

vagina and the vaginal wall and cervix are inspected for hemostasis. It is possible that a few minutes of applied pressure using sterile gauze are needed to obtain adequate hemostasis. Subsequently, the patient is taken to the recovery room and discharged to home after a recovery period of 30–60 min.

Summary of Procedures

Position	Dorsal lithotomy
Incision	Vaginal punctures (usually 2)
Special instrumentation	Ultrasound probe with needle guide, 16- to 17-ga needle
Unique considerations	Requires complete relaxation/sedation to prevent injury and loss of oocyte during follicle aspiration.
Antibiotics	Cefotetan or cefazolin 1 g iv prior to procedure
Procedure time	Setup: 5–10 min Procedure: 10–30 min (depending on # of follicles)
Postop care	PACU→ Home
Morbidity	Bleeding: rare infection: rare
Pain Score	1–3 (abdominal cramping)

Patient Population Characteristics

Age Range	18–50 yr (rare after age 43)
Incidence	It is estimated that at least 14% of American couples of reproductive age who desire pregnancy are unable to conceive within 1 yr.
Etiology	A male factor is responsible for 35%; pelvic factor, 25%; ovulatory factor, 20%; cervical factor, 10%; and 10% are unexplained.
Associated conditions	Thyroid disorders; polycystic ovarian syndrome; endometriosis; depression

Anesthetic Considerations

Preoperative

This is generally a healthy patient population. Little is required beyond routine tests, unless otherwise indicated.

Laboratory

Tests as indicated from H&P

Premedication

Consider midazolam 1–2 mg iv

Intraoperative

Anesthetic technique: Moderate to heavy iv sedation or, rarely, local or regional anesthesia and GA have been used. Intravenous sedation (hypnotic agent, ± benzodiazepine, ± a narcotic analgesic), however, is the most commonly (*Print pagebreak 799*) used and the safest technique for IVF. The most stimulating parts of the procedure occur when the vaginal fornix is pierced on each side and when the ovarian follicles are entered for aspiration of the eggs.

MAC

Propofol infusion (25–200 mcg/kg/min), ± midazolam (1–2 mg iv) and ± fentanyl titrated to achieve the desired combination of moderate to heavy sedation and analgesia (see [p. B-3](#)).



Blood and fluid requirements

Monitoring

Positioning

Minimal blood loss
IV: 18–20 ga × 1
Standard monitors ([p. B-1](#))
hip, leg, and hand positions
and pad pressure points

Postoperative

Complications

PONV ([p. B-6](#))
Bleeding: rare

PONV rare with propofol based-TIVA.
Minimal post op pain → limit intraop opiates.
Oral analgesics are usually sufficient or small doses fentanyl (25–50 mcg iv).

Pain management

Pain: usually minimal

Suggested Readings

1. Burney RO, Schust DJ, Yao MW: Infertility: In *Berek & Novak's Gynecology*, 14th edition. Berek JS, ed. Lippincott Williams & Wilkins, Philadelphia, 2007, 1185–276.
2. Hadimioglu N, Titiz TA, Dosemeci L, Erman M: Comparison of various sedation regimens for transvaginal oocyte retrieval. *Fertility and Sterility* 2002; 78(3):648–9.
3. Meniru GI: *Cambridge Guide to Infertility Management and Assisted Reproduction*. Cambridge University Press, Cambridge: 2001, 130–1.

Infertility Operations/Assisted Reproductive Technologies

Surgical Considerations

Description: These operations all deal with reproductive problems. The general trend is to avoid laparotomies and to perform operations using outpatient laparoscopy and hysteroscopy techniques whenever possible.

Fimbrioplasty is used to repair distal fallopian tubal occlusion—a common cause for infertility—which is usually a consequence of pelvic inflammatory disease (PID). The operation may be performed by **pelvic laparotomy** or **laparoscopy** (see [p. 795](#)). If done by laparotomy, a urethral catheter is inserted to empty the bladder, followed by the insertion of a transcervical uterine catheter for chromoperturbation (dye injection). The abdomen is opened and the pelvic structures are exposed. During the operation, microsurgical techniques are followed closely to minimize trauma. Meticulous hemostasis is important. A wound protector is often used instead of self-retaining retractors. The peritoneum and pelvic structures are kept moist with intermittent irrigation. Salpingolysis and ovariolysis may be performed microsurgically. After the adnexae have been freed, they are elevated by loosely packing the pouch of Douglas with insulated pads (plastic sheathed covered laps). Chromoperturbation is then performed and, if occlusion is present, a new stoma is created using microsurgical instruments and sutures. The abdomen is then closed.

Tubal reanastomosis, performed to restore fertility, is very similar to fimbrioplasty, with microsurgical techniques followed diligently. After the tubal segments have been freed slightly from their underlying mesosalpinx, the occluded ends are cut and chromoperturbation is performed to ensure patency. After patency has been established, (*Print pagebreak 800*) anastomosis is performed in two layers. The mesosalpinx is reapproximated to the tubal serosa and the abdomen closed.

The uterus is embryologically formed by the fusion of two paramesonephric tubes. At times, the fusion is incomplete and a septated uterus or bicornuate uterus is formed. The malformed uterus is associated with an increased risk for miscarriages and preterm labor. **Metroplasty** is used to correct this condition. The **Strassmann procedure** (extremely rare) for bicornuate uteri uses a standard pelvic laparotomy. Following uterine exposure, an incision is made on the medial side of each hemicorpus and carried down until the uterine cavity is entered. The edges are reapproximated to form a single uterus. Septated uteri are usually repaired via a hysteroscopic approach (see [Hysteroscopy, p. 791](#)) with scissors or laser.

Proximal tubal cannulation is a procedure in which proximal tubal occlusion can be repaired through either fluoroscopic or

hysteroscopic approach. The hysteroscopic approach, usually performed under GA, allows the surgeon to insert a small cannula to restore tube patency. This procedure is often done with laparoscopy to follow the progress of the cannulation and to visualize the chromoperturbation (see [Hysteroscopy, p. 791](#), and [Laparoscopy, p. 846](#)).

Gamete intrafallopian transfer (GIFT), zygote intrafallopian transfer (ZIFT), and tubal embryo transfer (TET) are methods of **advanced reproductive technology (ART)**, but are **seldom used**. Couples who have undergone extensive infertility workups and treatment without success may become candidates for GIFT, ZIFT, or TET procedures. Ovarian follicles are stimulated to grow with the help of gonadotropins. These follicles are then punctured with a needle transvaginally to 'harvest' the eggs. These eggs can be mixed with semen and placed directly into the distal end of the fallopian tube (GIFT) using laparoscopic techniques and a small tubal catheter (see [Laparoscopy, p. 846](#)). In the ZIFT and TET procedures, the semen and eggs are allowed to incubate 1–2 days in vitro; embryos form and are transferred to the fallopian tubes in a manner similar to the GIFT procedure. Most patients undergoing ART procedures utilize conventional in vitro fertilization (IVF) and do not need laparoscopy.

Usual preop diagnosis: Infertility; history of multiple spontaneous abortion and preterm labor

Summary of Procedures

(For summaries of specific procedures, see [Laparoscopy, p. 846](#); [Hysteroscopy, p. 791](#); or [Pelvic Laparotomy, p 795](#).)

Patient Population Characteristics

Age range	18–50 yr
Incidence	1/20 women
Etiology	PID; endometriosis; idiopathic
Associated conditions	Obesity

Anesthetic Considerations

(Procedures covered: pelvic laparotomy for myomectomy; ovarian cystectomy; oophorectomy; ectopic pregnancy removal; abdominal colpopexy; Moschowitz enterocoele repair; presacral neurectomy; infertility operations)

Preoperative

This is generally a healthy patient population; however, this procedure can be performed for a wide variety of pathologic conditions.

Cardiovascular

Patients undergoing myomectomy and, especially, ectopic pregnancy removal, may have had a significant amount of preop bleeding; therefore, assess for hypovolemia. Preexisting comorbidities and preop status will vary considerably. Assess as appropriate.

Tests: As indicated from H&P.

Hb/Hct. Patients with ectopic pregnancy may have urine/serum pregnancy tests, as well as pelvic ultrasound.

Patients with ruptured ectopic pregnancies may come to the OR urgently, and should be treated as for full stomach. This includes premedication with a nonparticulate antacid, Na citrate 30 mL po, metoclopramide 10 mg iv, and ranitidine 50 mg iv.

Laboratory

Premedication

(Print pagebreak 801)

Intraoperative

Anesthetic technique: GETA is indicated for patients undergoing laparoscopic surgery and in patients presenting for emergency surgery. Regional anesthesia is best avoided in hemodynamically unstable patients (i.e., ectopic pregnancies), and for laparoscopy where breathing difficulty may develop 2° to pneumoperitoneum and Trendelenburg position. Regional anesthesia may be suitable for simple laparotomies. In the younger patient population, spinal anesthesia is less desirable because of an increased incidence of postdural puncture headache (PDPH). If spinal anesthesia is indicated, a pencil-point needle (e.g., Whitacre, Sprotte) should be used in order to decrease the incidence of PDPH.

General anesthesia:

Induction

Standard induction (see [p. B-2](#)) In a patient with a ruptured ectopic pregnancy, bleeding and hemodynamic instability, consider ketamine 1–2 mg/kg or etomidate 0.1–0.4 mg/kg. These patients are generally considered unfasted and would require rapid-sequence induction (see [p. B-4](#)). Use OGT/NGT to decompress stomach after induction for laparoscopic surgery
Standard maintenance (see [p. B-2](#)). Consider PONV prophylaxis.
Standard emergence

Maintenance

Emergency

Regional anesthesia: A T4-6 sensory level is recommended for pelvic/lower abdominal surgery.

Spinal

0.75% bupivacaine 12–14 mg in 8.25% dextrose. (See [Anesthetic Considerations for Cesarean Section, p. 819](#).)

Epidural

1.5–2.0% lidocaine with epinephrine 5 mcg/mL, 15–20 mL; redose with 3–5 mL as needed. Supplemental iv sedation. (See [Anesthetic Considerations for Cesarean Section, p. 819](#).)

CSE

Combined spinal/epidural (CSE): An alternative technique combining the rapid onset and density of spinal anesthesia with the flexibility of continuous epidural anesthesia. Apply monitors, administer fluid, and position patient as for spinal or epidural. The most common technique is the needle-through-needle. After the epidural space is located with a standard 17-ga Tuohy needle, insert a 4" 26- to 27-ga pencil-point spinal needle through it to administer 12–14 mL of spinal bupivacaine (0.75%) ± fentanyl 10 mcg and morphine sulfate 0.1–0.2 mg. Secure the epidural catheter and use if needed (a test dose is advisable).

Blood loss will vary by procedure. Generally limited unless ruptured ectopic pregnancy or vascular complication of laparoscopy.

IV: 16–18 ga × 1–2

NS/LR at 4–7 mL/kg/h

Maintain euvoolemia, UO ≥0.5 cc/kg/h

Epinephrine
Vasopressin

During myomectomies, surgeons may inject vasopressors into the area surrounding myomata prior to excision. This can cause HTN and cardiac and either brady- or tachydysrhythmia.

Standard monitors (see [p. B-1](#))

±Foley catheter

± Arterial catheter

Patients with ectopic pregnancies may need intra-arterial monitoring if major hemorrhage occurs.

Control of blood loss

Monitoring

Positioning

Monitoring

and pad pressure points
eyes

During abdominal colpopexy, patient is placed intermittently in both the lithotomy and supine positions. (See [p. 789](#) for concerns regarding the lithotomy position.)

Pneumoperitoneum
↑PaCO₂ ↓PaO₂
ETT migration

Pneumoperitoneum with CO₂ and steep Trendelenburg position cause cephalad displacement of diaphragm with ↓FRC, ↓ pulmonary compliance, and ↑airway closure/atelectasis. Hypercarbia and hypoxia, due to respiratory compromise, can result unless ventilation is controlled during GA. Check for endobronchial

Complications

Pneumothorax	migration of ETT upon assumption of Trendelenburg position.
↓BP	Pneumothorax due to retroperitoneal dissection of insufflated gas into the mediastinum can cause hypoxemia, ↑ airway pressure, subcutaneous emphysema, and ↓BP. ↓BP can result from ↓venous return caused by pneumoperitoneum.
Hemorrhage	Hemorrhage can result from blood vessel injury or rapid reversal of head-down position.
Dysrhythmias	
Peripheral nerve injury	
Venous CO ₂ embolism	Unintended intravascular injection of CO ₂ gas can →↓BP and dysrhythmias.

(Print pagebreak 802)

Postoperative

Complications

Pain Management Tests

PONV (see [p. B-6](#))

Anemia

Shoulder pain

PCA (see [p. C-3](#))

Hb/Hct if hemorrhage occurs.

Anesthetic Considerations for Assisted Reproductive Technologies (ART)

Preoperative

This is generally a fit, healthy patient population. Little is required beyond routine tests, unless otherwise indicated.

Laboratory Premedication

Tests as indicated from H&P.

Standard premedication (see [p. B-1](#)).

Intraoperative

Anesthetic technique: Conscious sedation, local anesthesia, regional (e.g., spinal and epidural) and GA all have been employed for ART. The standard in vitro fertilization (IVF) technique consists of transvaginal egg retrieval (Print pagebreak 803) and embryo transfer (not laparoscopic technique), and one study suggests higher pregnancy and delivery rates if conscious sedation or epidural anesthesia is used as opposed to GA. Laparoscopy is only performed for GIFT, ZIFT, or TET, but not for in vitro fertilization. For TVOR, use moderate → heavy iv sedation. For laparoscopic procedures, breathing difficulty can develop due to pneumoperitoneum and Trendelenburg position. Therefore, GETA with controlled ventilation is most commonly used. If GA is used, isoflurane-N₂O vs propofol-N₂O is controversial. No difference in pregnancy rates with the use of isoflurane, propofol, N₂O, or midazolam has been demonstrated.

Induction

Standard induction (see [p. B-2](#)). Avoidance of succinylcholine may decrease postop myalgia.

Maintenance

Standard maintenance (see [p. B-2](#)). N₂O does not appear to adversely affect success of fertilization.

Emergence

No special considerations

Blood and fluid requirements

Minimal blood loss

IV: 18 ga × 1

NS/LR at 2 mL/kg/h

Blood loss minimal, unless trauma to vasculature. Rarely, trauma to blood vessels or organs following laparoscopy may necessitate laparotomy.

Monitoring

Standard monitors ([p. B-1](#))

Positioning

and pad pressure points
eyes

Ventilatory

Pneumoperitoneum with CO₂ and steep Trendelenburg position cause cephalad displacement of diaphragm with ↓FRC, ↓ pulmonary compliance, and ↑airway closure/atelectasis. Hypercarbia and hypoxia, due to respiratory compromise, can result unless ventilation is controlled during GA. Check for endobronchial migration of ETT upon assumption of Trendelenburg position.

Pneumothorax due to retroperitoneal dissection of insufflated gas into the mediastinum can cause hypoxemia, ↑ airway pressure, subcutaneous emphysema and ↓BP.

↓BP may result from ↓venous return 2° pneumoperitoneum.

Hemorrhage may result from blood vessel injury or rapid reversal of head-down position.

Unintended intravascular injection of CO₂ gas → ↓BP and dysrhythmias.

Use of Trendelenburg position incurs risk of nerve injury. Hyperextension of arm may result in brachial plexus injury, and careful padding of vulnerable points is necessary.

Complications

Pneumothorax

Cardiovascular

Hemorrhage

Venous CO₂ embolism
Dysrhythmias

Nerve injury
Bowel injury

Postoperative

Complications

Shoulder pain

Pain management

Oral analgesics are usually sufficient.

Postop pain may be referred to the shoulder, due to irritation of diaphragm by residual pneumoperitoneum or bleeding.

(Print pagebreak 804)

Suggested Readings

1. Beilin Y, Bodian C, Eisenkraft J, et al: The use of propofol, nitrous oxide, or isoflurane does not affect the reproductive success rate following gamete intrafallopian transfer (GIFT). *Anesthesiology* 1999; 90:36–41.
2. Burney RO, Schust DJ, Yao MW: Infertility: In *Berek & Novak's Gynecology*, 14th edition. Berek JS, ed. Lippincott Williams & Wilkins, Philadelphia, 2007, 1185–276.
3. Gonen O, Shulman A, Ghetler Y, Shapiro A, Judekin R, Beyth Y, Ben-Nun I. The impact of different types of anesthesia on *in vitro* fertilization-embryo transfer treatment outcome. *J Assist Reprod Genet* 1995; 12(10): 678–82.
4. Meniru GI: *Cambridge Guide to Infertility Management and Assisted Reproduction*. Cambridge University Press, Cambridge: 2001, 130–1.
5. Rock JA, Jones HW, eds: *TeLinde's Operative Gynecology*, 8th edition. Lippincott-Raven, Philadelphia: 2003.
6. Tanbo T: Assisted fertilization in infertile women with patent tubes: a comparison of *in vitro* fertilization, gamete intra-fallopian

transfer and tubal embryo stage transfer. *Hum Reprod* 1990; 5:266–70.

Hysterectomy—Vaginal or Total Abdominal

Surgical Considerations

Description: After cesarean section (C-section), **hysterectomy** is the most commonly performed operation in the United States (650,000/year). Two approaches are possible: vaginal and abdominal. The **vaginal approach**, performed with the patient in a dorsal lithotomy position, is preferred, because it offers significantly less morbidity and mortality. Its use is limited by situations in which pelvic bony architecture, uterine size, pelvic adhesions, or the presence of gynecological cancers requires an **abdominal approach**. The approach may be changed in the OR, where a pelvic examination under anesthesia will determine the true uterine size, degree of prolapse, and the presence of pelvic pathology. A laparoscopy may be performed at the outset of surgery to evaluate the pelvis and free up adhesions that would have made a vaginal approach initially unsafe. In patients ≥ 45 years, **bilateral salpingo-oophorectomy** (BSO) is often performed in addition to the hysterectomy to provide ovarian cancer prophylaxis. Pelvic relaxation syndrome is the most frequent preop diagnosis in patients having a vaginal hysterectomy. Pelvic relaxation includes one or more of the following: prolapse of the uterus; intestine into the pouch of Douglas (enterocele); bladder into the anterior vaginal wall (cystocele); urethra into the anterior vaginal wall (urethrocele); and rectum into the posterior vaginal wall (rectocele). In these cases, the hysterectomy is often accompanied by an anterior/posterior colporrhaphy, bladder neck suspension, and perineoplasty.

Variant approaches: **Abdominal hysterectomy** is performed through a Pfannenstiel's or midline incision, depending on the uterine size and the need to perform a lymph node dissection for cancer. A Pfannenstiel's incision often can be improved with two types of muscle-splitting steps: the **Maylard**, in which the rectus muscles are cut, or a **Cherney rectus muscle detachment** performed at the pubic insertion. After entering the abdomen, a self-retaining retractor is placed and the round, ovarian, and broad ligaments are clamped, cut, and tied, in that order. The uterine vessels are identified and ligated, followed by the creation of a bladder flap and, finally, the cutting and ligation of the uterosacral and cardinal ligaments. The vagina is entered and the cervix removed. Then the vaginal cuff is closed in a way to incorporate the uterosacral ligaments for support. The visceral peritoneum is reapproximated, the retractor removed, and the abdominal layers closed.

In a **vaginal hysterectomy**, the cervix is retracted, a paracervical incision is made, and the anterior and posterior cul de sacs are entered ([Fig. 8.2-4](#)). The uterosacral and cardinal ligaments and the uterine vessels are cut and ligated. With steady downward traction, the broad ligament is ligated in a step-wise manner until either the ovarian or infundibulopelvic ligament is reached, and one of the two is ligated, depending on whether the ovaries are to be removed or not. After the uterus has been removed, the peritoneum is reapproximated, followed by the closing of the vaginal cuff, which often includes the uterosacral and cardinal ligaments for support. A vaginal pack often is left in place. Frequently, laparoscopy is being combined with vaginal hysterectomy to evaluate the pelvis for unrecognized disease and to ensure prophylactic adnexectomy in women ages ≥ 40 –45 yr.

Usual preop diagnosis: Uterine myoma; pelvic relaxation syndrome; pelvic pain 2° endometriosis or adhesions; uncontrolled uterine bleeding/dysmenorrhea; endometrial hyperplasia; gynecological cancers

(Print pagebreak 805)

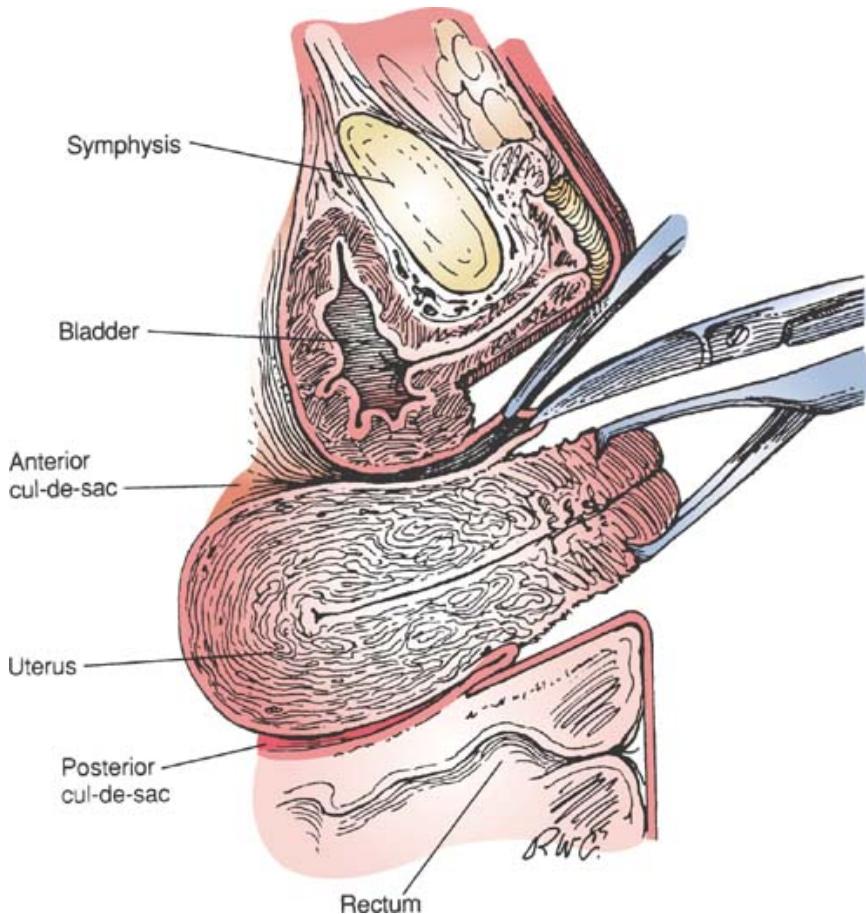


Figure 8.2-4. 4. Surgical anatomy for vaginal hysterectomy. (Reproduced with permission from Rock JA, Thompson JD, eds: *TeLinde's Operative Gynecology*, 8th edition. Lippincott Williams & Wilkins, 1997.)

Summary of Procedures

	Abdominal Approach	Vaginal Approach
Position	Supine	Lithotomy. Following induction, position patient so that the perineum is at the end of operating table to ensure optimum surgical exposure.
Incision	Pfannenstiel's or low midline. The Pfannenstiel's incision can be extended with a Maylard muscle-splitting procedure or a Cherney rectus muscle detachment at pubic insertion.	Pericervical vaginal
Special instrumentation	None	Stirrups
Unique considerations	None	To prevent peroneal nerve injury, the area of leg leaning against stirrup should be well cushioned. Often, vasoconstriction agents (1:200,000 epinephrine and vasopressin) are used to cut down perioperative vaginal cuff bleeding.
Antibiotics	1–2 g cefoxitin or cefotetan + clindamycin 600 mg iv	
Surgical time	1–2 h	45 min–1.5 h
EBL	200–300 mL	100–200 mL
Postop care	PACU Overall (10,000 patients): 14.6	20

Mortality	< 25 yr: 8.9	0
	25–34 yr: 4.7	0.9
	35–44 yr: 3.8	0.5
	45–54 yr: 6.5	2.7
	55–64 yr: 41.3	1.9
	65–74 yr: 93.0	18.3
	> 75 yr: 255.8	56.8
	Infection:	
Morbidity	Unexplained fever: 10–20%	5–8%
	Pelvic infection: 3.2–10%	3.9–10%
	Wound infection: 4–8%	—
	Urinary tract: 1.1–5%	1.7–5%
	Femoral nerve injury: 11.6%	—
	Hemorrhage:	
	Intraop: 1–2%	0.7–2–5%
	Requiring transfusion: 2–12%	2–8.3%
Pain score	Unintended major procedures: 1.7%	5.1%
	Injury:	
	Bladder: 1–2%	0.5–1.5%
	Bowel: 0.1–0.5%	0.1–0.8%
	Ureter: 0.1–0.5%	0.05–0.1%
	Vesicovaginal fistula: 0.1–0.2%	
	Thromboembolic events: 0.4–1.3%	0.62–1.7%
	5–8	4–6

(Print pagebreak 806)

Patient Population Characteristics

Age range	30–80 yr
Incidence	> 1/5 females; 650,000/yr in the United States.
Etiology	Uterine myomata; endometriosis; uterine prolapse; uterine cancer
Associated conditions	Stress urinary incontinence; obesity

Anesthetic Considerations

Preoperative

Although many patients presenting for this procedure are otherwise healthy, others may have metastatic cancer.

Respiratory

CXR may be indicated to r/o pleural effusion or other lung pathology in cancer patients. Additionally, ABG, ± PFTs, may be indicated preop in patients with significant pulmonary involvement.

Tests: As indicated from H&P.

Cardiovascular

Patient may have blood loss from the primary problem. Bowel prep may cause dehydration and electrolyte abnormalities.

Hematologic

Tests: As indicated from H&P.

Laboratory

Hb/Hct. Patients with Hx of easy bruising or bleeding should have coagulation parameters evaluated (PT, PTT, Plt).

Premedication

Other tests as indicated from H&P.

Consider midazolam 1–2 mg iv

(Print pagebreak 807)

Intraoperative

Anesthetic technique: GA is commonly used; however, spinal, epidural, or combined spinal–epidural (CSE) anesthesia is appropriate for adequately hydrated patients who are undergoing simple hysterectomy through a Pfannenstiel's incision or vaginal hysterectomy. In the younger patient population, spinal anesthesia may be less desirable because of the increased incidence of postdural puncture headache (PDPH) in using this technique. If spinal anesthetic is indicated, a pencil-point needle (e.g., Sprotte or Whitacre) should be used to decrease the incidence of PDPH.

General anesthesia:

Induction

Standard induction (see [p. B-2](#)).

Maintenance

Standard maintenance (see [p. B-2](#)). Muscle relaxation is necessary if the procedure is performed abdominally. These patients have a high incidence of PONV; consider prophylaxis (see [p. B-6](#)).

Emergence

Standard emergence

Regional anesthesia: A T4-6 sensory level is sufficient to provide anesthesia for procedures on the uterus.

Spinal

0.75% bupivacaine 10–15 mg in 8.25% dextrose. (See [Anesthetic Considerations for Cesarean Section, p. 819](#)) Supplement with iv sedation.

Epidural

1.5–2.0% lidocaine with epinephrine 5 mcg/mL, 15–20 mL; supplement with 3–5 mL as needed. Supplemental iv sedation. (See [Anesthetic Considerations for Cesarean Section, p. 819](#).) Supplement with iv sedation.

Combined spinal/epidural (CSE): An alternative technique combining the rapid onset and density of spinal anesthesia with the flexibility of continuous epidural anesthesia. Apply monitors, administer fluid, and position patient as for spinal or epidural. The most common technique is the needle-through-needle. After the epidural space is located with a standard 17-ga Tuohy needle, insert a 4" 26- to 27-ga pencil-point spinal needle through it to administer 0.6 mL of spinal bupivacaine (0.75%) ± fentanyl 10 mcg and morphine sulfate 0.1–0.2 mg. Secure the epidural catheter and use if needed (a test dose is advisable).

Consider ↑blood loss in cancer patients, prior XRT, prior abdominal surgery

IV: 18 ga × 1–2

Warm fluids

Type & screen/cross patients at ↑risk of bleeding

Vaginal hysterectomy: Moderate blood loss

NS/LR at 4–5 mL/kg/h

Abdominal hysterectomy: Moderate-to-heavy blood loss

NS/LR at 6–10 mL/kg/h

Vaginal hysterectomy: Standard monitors

(see [p. B-1](#))

± Foley catheter

Abdominal hysterectomy: Standard monitors (see [p. B-1](#))

Foley catheter

± Arterial line

± CVP line

and pad pressure points.

Shoulder abduction < 90°

Consider in patients with anticipated ↑ blood loss or major medical comorbidities.

The lithotomy position has several considerations for safety. (See [p. 789](#) for details.)

Vaginal hysterectomy: Cervical stimulation

Epinephrine/vasopressin injection

Abdominal hysterectomy:

Vagal stimulation and ↓↓HR may occur with cervical /peritoneal manipulation. Surgeon may inject epinephrine or

Monitoring

Positioning

Complications



Blood loss
Epinephrine/vasopressin injection

vasopressin to decrease local bleeding →
HTN and brady or tachydysrhythmias.

(Print pagebreak 808)

Postoperative

Complications

PONV (see [p. B-6](#))

VTE (see [p. B-7](#))

Anemia

Epidural opiates ([p. C-2](#))

PCA ([p. C-3](#))

Pain management

If catheter to be used postop.

Tests

Hct

CXR (if CVP catheter placed intraop)

CXR to evaluate central line placement and rule out pneumothorax.

Suggested Readings

1. Carley ME, McIntire D, Carley JM, Schaffer J: Incidence, risk factors and morbidity of unintended bladder or ureter injury during hysterectomy. *Int Urogynecol J Pelvic Floor Dysfunct* 2002; 13(1): 18–21.
2. Clough TF: Perioperative morbidity of hysterectomy for benign gynaecological disease. *J Obstet Gynaecol* 2001; 21(5):504–6.
3. Davies A, Hart R, Magos A, Hadad E, Morris R: Hysterectomy: surgical route and complications. *Eur J Obstet Gynecol Reprod Biol* 2002; 104(2):148–51.
4. Jones HW: Hysterectomy. In *TeLinde's Operative Gynecology*, 9th edition. Rock JA, Jones HW, eds. Lippincott Williams & Wilkins, Philadelphia: 2003, 799–828.
5. Stovall TG: Hysterectomy. In *Berek & Novak's Gynecology*, 14th edition. Berek JS, ed. Lippincott Williams & Wilkins, Philadelphia, 2007, 601–36.

Anterior and Posterior Colporrhaphy, Enterocèle Repair, Vaginal Sacrospinous Suspension

Surgical Considerations

Description: Cystocele ([Fig. 8.2-5A](#)) and rectocele ([Fig. 8.2-5B](#)) are prolapses (relaxations) of the anterior and posterior vaginal wall, respectively. They occur 2° multiparity and congenital weakening of pelvic tissue. The term *pelvic relaxation syndrome* includes the often coexisting anatomical ‘relaxations’ (e.g., enterocèle [[Fig. 8.2-5C](#)] and uterine (Print pagebreak 809) prolapse). Cystoceles are often symptomatic due to bladder protrusion past the introitus during straining. Often this relaxation will allow the bladder neck to lose its important anatomical relationship to the urethra and the rest of the bladder. The result can be bothersome stress urinary incontinence for the patient (see [Operations for Stress Urinary Incontinence, p. 812](#)). The rectocele often is experienced as a vaginal bulge during straining, and tends to cause incomplete evacuation of stool. The goal of the colporrhaphy is to restore the original anatomy. Due to the frequent (Print pagebreak 810) coexisting relaxations, a posterior colporrhaphy (vaginal repair), enterocèle repair, and vaginal hysterectomy are frequently performed at the same time.

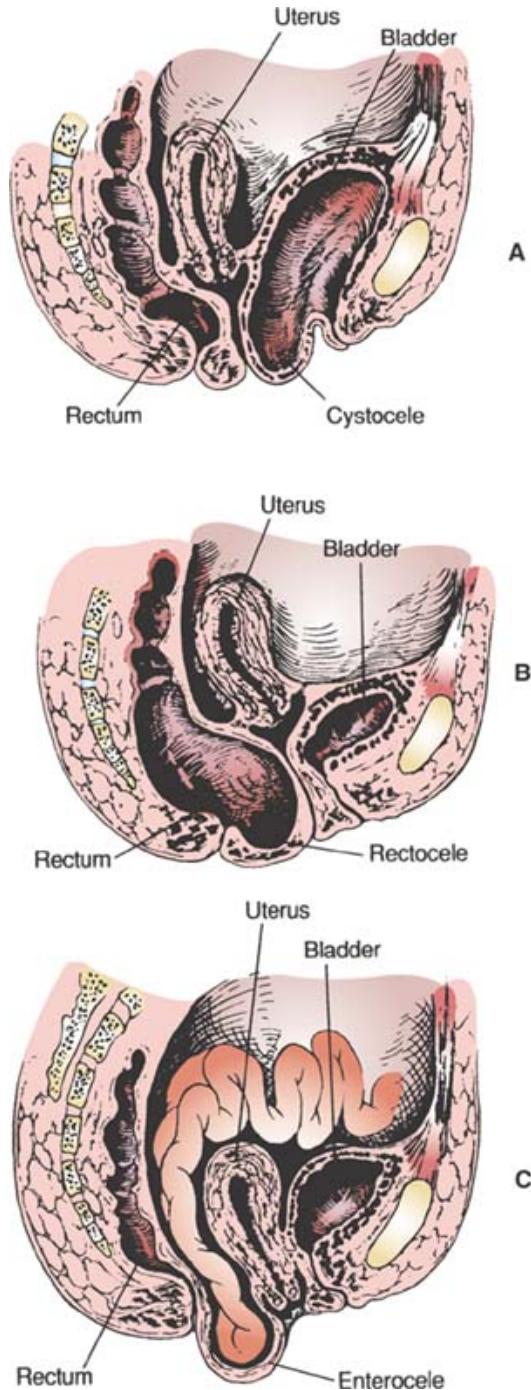


Figure 8.2-5. 5. (A) Anatomy of cystocele. (B) Anatomy of rectocele. (C) Anatomy of enterocele. (Reproduced with permission from Pernoll ML, ed: *Current Obstetrics and Gynecological Diagnosis and Treatment*. Appleton & Lange: 1991.)

In an **anterior colporrhaphy**, the patient is placed in a high-dorsal lithotomy position with the perineum at the end of the operating table for surgical access. The bladder is emptied and a weighted speculum is inserted into the vagina. A **vaginal hysterectomy** is performed at this point, if indicated (see [Vaginal Hysterectomy, p. 804](#)). The extent of the urethrocystocele is determined manually and the vaginal mucosa is grasped at its cephalic border with two clamps. From this point to the external urethral meatus, the mucosa is undermined with a vasoconstrictive solution (epinephrine 5–10 mL, 1:200,000), phenylephrine (1:200,000), or vasopressin (1–5 U/10 mL NS). This decreases blood loss significantly and helps to determine the depth of the vaginal mucosa. The mucosa is cut over this undermined area and, with the help of sharp and blunt dissection; the mucosa is dissected laterally from its underlying fascia. A series of fascial plication sutures are placed to reduce the cystourethrocele. The redundant mucosa is excised and the edges are reapproximated. A suprapubic catheter is most often inserted at the end to prevent bladder overdistention.

Paravaginal repair is another procedure for repair of cystocele, and can be performed via the abdomen or the vagina. The space between the bladder and pubic bone is entered, and the bladder is dissected off the pelvic sidewall, taking care to avoid injury to the obturator nerve and vessels. The arcus tendineus fascia pelvis is visualized, running from the inferior margin of the pubic symphysis

posteriorly to the ischial spine. The surgeon places a hand in the vagina to elevate the lateral vaginal sulcus to the arcus tendineus fascia. Multiple fine sutures are placed to secure the paravaginal tissues to the arcus tendineus fascia pelvis. The same is done for the opposite pelvic sidewall if bilateral defects are present.

If necessary, a **posterior colporrhaphy** may be performed. A small portion of perineum posterior to the introitus is removed initially. The vaginal mucosa over the rectocele is undermined with vasoconstrictor fluid prior to incision, followed by dissection of the overlying mucosa in a manner nearly identical to anterior colporrhaphy. One or several layers of stitches are placed to plicate the pararectal fascia, allowing for reduction of the rectocele. Redundant mucosa is excised and the edges are reapproximated. A vaginal pack is usually placed to minimize bleeding.

An **enterocele** often is first noticed during a posterior colporrhaphy procedure, and is repaired prior to finishing the posterior repair. The enterocele is well-identified and dissected away from the surrounding tissue. Two or more parallel purse-string stitches are used to close the enterocele. The enterocele tissue distal to the purse-string closure is excised. To reduce the enterocele in an optimal fashion, intraabdominal pressure has to be at a minimum.

Variant procedure or approaches: **Vaginal sacrospinous suspension** with the Miya hook is an elegant alternative to the abdominal colpopexy procedure for women with severe uterine and/or vaginal vault prolapse. The patient is placed in a dorsal lithotomy position, and an examination under anesthesia is performed. A vasoconstrictive solution is injected (usually 1:200,000 epinephrine 3–5 mL) in the posterior vaginal wall. A vertical incision is made and the mucosa is bluntly dissected off the rectum in an anterolateral direction. An enterocele, if found, is repaired at this time. The pararectal tissue is then bluntly pierced to enter the pararectal space. The anatomy surrounding the sacrospinous ligament is well palpated and, with the help of the special Miya hook, a large suture is placed into the sacrospinous ligament. The other end of the suture is placed at the apex of the vagina, which, after tying, is pulled in a lateral cephalad direction. The mucosa is finally closed.

Uterosacral ligament suspension, or high McCall's culdoplasty, is an alternate procedure for vaginal apex support. After the uterus is removed by a vaginal hysterectomy, the uterosacral ligaments are identified. Two separate permanent sutures are placed along the uterosacral ligament as far cephalad (toward the sacrum) as possible. The same is done on the opposite side. A cystoscopy is then carried out with all four stitches placed on tension in order to r/o ureteral obstruction due to ligation or kinking of the ureters. The stitches are replaced if obstruction is observed. After ureteral patency has been confirmed, these stitches are sutured to the fibromuscular layer of the vaginal cuff and tied, to bring the apex as cephalad as possible. The vaginal cuff is closed with absorbable sutures.

The **Le Fort procedure** is now a rare operation and is performed in very elderly women with complete prolapse of the uterus and/or vagina who do not desire to remain sexually active. With the patient in a dorsal lithotomy position, a rectangular strip from the anterior and posterior vaginal wall is removed initially, followed by closure of the margins each to the other. The result is a near-complete closure of the vagina.

Usual preop diagnosis: Symptomatic cystocele; symptomatic uterine prolapse; enterocele; rectocele causing severe constipation; dyspareunia

(Print pagebreak 811)

Summary of Procedures

Position	Dorsal lithotomy
Incision	Vaginal mucosal; peritoneum for enterocele repair To prevent peroneal nerve injury, the area of the leg leaning against the stirrup should be well cushioned. Putting the legs in a high position increases venous return to the heart. Infiltration with epinephrine and vasopressin often is used to reduce intraop bleeding. This causes changes in CO, HR, and BP. Low intraabdominal pressure (good muscle relaxation) is needed during the enterocele reduction.
Unique considerations	Cefoxitin or cefotetan 1–2 gm iv 45 min (anterior colporrhaphy) 30 min (posterior colporrhaphy/enterocele repair) 45 min (uterosacral ligament suspension) 1 h (paravaginal repair)
Antibiotics	
Surgical time	

Closing considerations

EBL

Postop care

Mortality

Suprapubic catheter (anterior colporrhaphy); vaginal pack (enterocele repair)

20–500 mL

PACU

1%

Anterior colporrhaphy

Delayed voiding 1–7 d: 30%

Foul vaginal discharge: 14%

Bacteriuria: 13%

Pyrexia (>100.4°F): 11%

Atelectasis: 3%

Delayed voiding > 7 d: 0.6%

Need for blood transfusion: 0.6%

Urethrovaginal fistula: 0.4%

Acute gastric dilatation: 0.2

%

Uterosacral ligament suspension

Ureteral obstruction

Perirectal abscess due to stitch in rectum

Morbidity

Vaginal sacrospinous suspension (Miya hook)

Bleeding in gluteal and pudendal vessels

Pararectal burning pain = 2 mo

Sciatic pain (indicating misplaced sutures, which must be removed)

Peritoneal tear (during Miya hook insertion)

Paravaginal repair

Obturator vessel laceration

Obturator nerve injury

Ureteral obstruction

Bladder laceration

5–8

Pain score

Patient Population Characteristics

Age range

40–80 yr

Incidence

> 1/5 women

Etiology

Multiparous state; obesity; chronic cough; previous pelvic surgery

Associated conditions

Pelvic relaxation syndrome

Anesthetic Considerations

See [Anesthetic Considerations following Operations for Stress Urinary Incontinence, p. 814](#).

Suggested Readings

1. Richter HE, Varner RE: Pelvic organ prolapse. In *Berek & Novak's Gynecology*, 14th edition. Berek JS, ed. Lippincott Williams & Wilkins, Philadelphia, 2007, 601–36.

(Print pagebreak 812)

2. Zimmerman CS, Shull B, Grody MHT, et al: Surgery for correction of defects in pelvic support and pelvic fistulas. In *TeLinde's*

Operative Gynecology, 9th edition. Rock JA, Jones HW, eds. Lippincott Williams & Wilkins, Philadelphia: 2003, 925–1160.

Operations for Stress Urinary Incontinence

Surgical Considerations

Description: Stress urinary incontinence is a common condition affecting mostly older and multiparous women. It is a disorder of the musculofascial support to the bladder neck and pelvic floor. These patients usually have extensive preop workup to exclude urge incontinence and many have been treated with pelvic floor exercises (Kegel) prior to surgery. Two surgical approaches exist: **abdominal suspension** procedures and **suspension by the vaginal route**. Ongoing controversy exists concerning which approach is best. Patient positioning is crucial for all vaginal surgery.

Vaginal approaches: The **Kelly urethral plication** often has been used as the primary surgical treatment, especially when other vaginal surgery is to be performed. The patient initially is placed in a high-dorsal lithotomy position with the perineum at the end of the operating table for surgical exposure. The bladder is emptied and a weighted speculum is inserted into the vagina. The extent of the cystourethrocele is determined and the vaginal mucosa is grasped at its cephalic border with two clamps. From this point to the external urethral meatus, the mucosa usually is undermined with 5–10 mL of a vasoconstrictive solution (epinephrine 1:200,000, phenylephrine 1:200,000, or vasopressin 1–5 U/10 mL NS). This decreases blood loss significantly and helps to determine the depth of the mucosa. With the help of sharp and blunt dissection, the mucosa is freed laterally from its underlying adherent fascia. A series of vertical mattress sutures are placed in the mobilized paraurethral and paravesicle fascia to reduce the cystourethrocele and elevate the posterior urethra to a high-retropubic position. The redundant mucosa is excised and the edges are reapproximated. A suprapubic catheter is often inserted at the end of the surgery to prevent bladder overdistention.

Two anterior vesicle neck suspension techniques—Stamey and modified Pereyra—are very similar procedures wherein the vaginal mucosa is incised and dissected off the underlying paraurethral fascia, much the same way as in the Kelly plication. Instead of using a layer of mattress sutures, both suspension methods use two lateral sutures that suspend the vesicle neck on each side (see [Fig. 9-21, p. 899](#)). The ends of the sutures are tied over the rectus fascia to provide support. The Stamey method uses a small Dacron cuff to prevent the suture from tearing through the paravesicle fascia, while in the modified Pereyra method, the posterior loop is attached firmly to the pubourethral ligament. One or two small suprapubic abdominal incisions must be made to allow for the tying of the sutures. Specialized long needles are used to help the placement of these sutures, and a cystoscope often is used to verify their placement. Perforation of the bladder is a common complication found upon cystoscopy. Finally, a suprapubic catheter is placed at the end of the operation.

Abdominal approaches: The **Marshall-Marchetti-Krantz (M-M-K)** and **Burch** (urethropexy) are probably the most common abdominal suspension procedures. The patient is placed in the frog-leg position with a urethral catheter in place. A Pfannenstiel's incision is used to enter the space of Retzius, which lies between the parietal peritoneum and the rectus fascia under the pubic bone. Blunt dissection is used to open and extend this space. The surgeon then inserts two fingers into the vagina to raise the anterior vagina and bladder neck. This enables the surgeon to place two or more sutures in the tissue just lateral to the urethra and attach them to Cooper's ligament (Burch) or to the periosteum of the posterior pelvic bone (M-M-K).

The **urethral sling procedure** was once reserved for women with low urethral pressure and/or for whom other incontinence operations had failed. It is now also used as primary treatment for stress urinary incontinence. The goal of the sling procedure is to produce extrinsic compression of the urethrovesical junction with the help of a strip anchored to the rectus fascia or pubic bone (see [Fig. 9-21, p. 899](#)). With the patient in the dorsal lithotomy position, a urethral catheter is placed and the vaginal mucosa incised and dissected off the underlying paravesicle and paraurethral fascia, similar to the Kelly plication. The retropubic space is entered through a Pfannenstiel's incision and a strip of rectus fascia, is obtained. The strip is then brought through the vagina, around the urethra, and back to the (*Print pagebreak 813*) abdomen, where it is fastened to the rectus fascia, creating a sling under the urethra at the junction of the bladder neck. The vaginal and abdominal incisions are closed, and a suprapubic catheter is placed. If donor fascia lata or synthetic material is used, a small (~ 2") horizontal incision is made above the pubic bone for attachment of the sling.

Tension-free vaginal tape (TVT) is a new ‘sling’ type procedure for treatment of stress urinary incontinence. A Prolene mesh sling is used to support the urethra, although it is not attached to the fascia. The Prolene is woven in such a way that the sling cannot slide out over time. Fibroblasts grow into the sling to anchor it throughout the endopelvic fascia and around the dependent surface of the urethra. Placement of the sling material is through a vaginal incision similar to that of the Kelly plication. The TVT curved needle is introduced from the vagina through the space of Retzius on each side of the urethra, and is brought out to the abdomen above the pubic bone. The sling mesh is attached to the ends of each needle; thus, when both needles are pulled through the abdominal sites, the mesh will rest under the urethra. A cystoscopy is done before pulling the mesh through to verify that neither needle is in the

bladder or the urethra. The mesh is then adjusted so that the urethra is resting on the sling, under no tension.

Usual preop diagnosis: Stress urinary incontinence; intrinsic sphincter deficiency

Summary of Procedures

	Kelly Plication	M-M-K/Burch	Urethral Sling
Position	Dorsal lithotomy	Frog-leg	
Incision	Vaginal mucosa Cushion area of leg against stirrup to prevent peroneal injury. Epinephrine (1:200,000) or vasopressin are often infiltrated to reduce intraop bleeding for vaginal approaches. Injections may cause ↑BP and tachydysrhythmias (epi) or bradydysrhythmias (vasopressin). The urethral catheter is frequently removed and reinserted during surgery.	Pfannenstiel's	Vaginal
Unique considerations			
Antibiotics	Cefoxitin 1–2 g iv		
Surgical time	1 h		
Closing considerations	Suprapubic catheter		
EBL	50 mL	100–200 mL	50–100 mL
Postop care	Inpatient		± outpatient
Mortality	Minimal		
Morbidity	Detrusor instability: Rare (due to vaginal approach) Enterocoele: Rare Incisional hernia: Rare Osteitis pubis: Rare Voiding difficulties: Rare Wound infection: Rare	14% 15% 0.09% 2% 8.7%	N/A Rare 40% Rare Prolonged catheter time: > 50% Outlet obstruction: 10–20% Urethral perforation: 7% Bladder perforation: 1%
Pain score	4–6	6–8	4–6

(Print pagebreak 814)

Patient Population Characteristics

Age range	40–80 yr
Incidence	>1/5 women
Etiology	Multiparous state; obesity; chronic cough
Associated conditions	Other components of pelvic relaxation syndrome (rectocele, uterine prolapse, enterocoele)

Anesthetic Considerations

(Procedures covered: anterior and posterior colporrhaphy; enterocele repair; vaginal sacrospinous suspension; operations for stress urinary incontinence)

 **Preoperative**

This is usually an older patient population, past child-bearing age. Assess for medical comorbidities.

Laboratory

Hb/Hct, as indicated from H&P.

Premedication

Consider midazolam 1–2 mg iv

 **Intraoperative**

Anesthetic technique: Regional or GA may be used.

Regional anesthesia: A T10 sensory level is sufficient to provide anesthesia for procedures using a perineal approach, but a T4 level is recommended for abdominal/combined approaches.

Spinal

0.75% bupivacaine 10–15 mg in 8.25% dextrose. (See [Anesthetic Considerations for Cesarean Section, p. 819](#).)

Epidural

1.5–2.0% lidocaine with epinephrine 5 mcg/mL, 15–20 mL; supplement with 3–5 mL as needed. Supplemental iv sedation. (See [Anesthetic Considerations for Cesarean Section, p. 819](#).) Spinal may provide better perineal block.

CSE

Combined spinal/epidural (CSE): An alternative technique combining the rapid onset and density of spinal anesthesia with the flexibility of continuous epidural anesthesia. Apply monitors, administer fluid, and position patient as for spinal or epidural. The most common technique is the needle-through-needle. After the epidural space is located with a standard 17-ga Tuohy needle, insert a 4" 26- to 27-ga pencil-point spinal needle through it to administer 0.6 mL of spinal bupivacaine (0.75%) ± fentanyl 10 mcg and morphine sulfate 0.1–0.2 mg. Secure the epidural catheter and use if needed (a test dose is advisable).

General anesthesia:

Induction

Standard induction (see [p. B-2](#)).

Maintenance

Standard maintenance (see [p. B-2](#)).

Emergence

No special considerations

Blood and fluid requirements

Normally minimal blood loss

IV: 18–20 ga × 1

NS/LR at 2–4 mL/kg/h

Control of blood loss

Epinephrine, vasopressin, phenylephrine used by surgeons.

Surgeons may inject vasopressors into the submucosa to minimize blood loss, which may cause ↑ BP and tachydysrhythmias (epi) or bradydysrhythmias (phenylephrine/vasopressin).

Monitoring

Standard monitors ([p. B-1](#))

Although bladder catheterization prior to incision is normal, the catheter is not left in place throughout surgery in those patients undergoing anterior and posterior colporrhaphy, enterocele repair, and Kelly urethral plication. Suprapubic bladder catheters are placed toward the end of surgery in these procedures, as well as in the Stamey, Pereyra, and urethral sling

Positioning

and pad pressure points
eyes

procedures.
See [p. 789](#) for concerns regarding the lithotomy position.

(Print pagebreak 815)

Postoperative

Complications

PONV (see [p. B-6](#))

Pain management

IV opiates, ketorolac

Tests

Usually rapid conversion to po pain medications

None indicated

Suggested Readings

1. Nygaard I, Menefee SA, Wall LL: Lower urinary tract disorders. In *Berek & Novak's Gynecology*, 14th edition. Berek JS, ed. Lippincott Williams & Wilkins, Philadelphia, 2007, 601–36.
2. Pereyra AJ, et al: Pubourethral supports in perspective: modified Pereyra procedure for urinary incontinence. *Obstet Gynecol* 1982; 59(5):643–8.
3. Richter HE, Varner RE: Pelvic organ prolapse. In: *Berek & Novak's Gynecology*, 14th edition. Berek JS, ed. Lippincott Williams & Wilkins, Philadelphia, 2007, 601–36.
4. Ross BK, Chaduck HS, Mancuso JS, Benedetti C: Sprotte needle for obstetric anesthesia: Decreased incidence of post dural puncture headache. *Reg Anesth* 1992; 17:29–33.
5. Wall LL: Urinary stress incontinence. In *TeLinde's Operative Gynecology*, 9th edition. Rock JA, Jones HW, eds. Lippincott Williams & Wilkins, Philadelphia: 2003, 1033–80.