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CHAPTER 8.1

Gynecologic Oncology

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(Print pagebreak 746)

Staging Laparotomy for Ovarian, Fallopian Tube, and Primary Peritoneal Cancer

Surgical Considerations

Description: Ovarian carcinoma has the highest mortality rate of all gynecologic malignancies, because it is usually discovered in advanced stages with a pelvic mass, omental caking, and ascites being common findings at presentation. Surgery is used for staging as well as therapy. Studies have demonstrated an inverse relationship between postop residual tumor mass and survival; therefore, the goals of surgery are: accurate staging and optimal tumor debulking (< 1 cm residual disease). The standard procedure consists of a meticulous exploration of the abdominopelvic cavity, abdominopelvic cytology, multiple random and targeted biopsies, **total abdominal hysterectomy (TAH), bilateral salpingo-oophorectomy (BSO), pelvic** and **paraaortic lymph node dissection, infracolic omentectomy, appendectomy,** and additional cytoreductive procedures. After access to the abdomen is obtained through a midline abdominal incision, cytologic washings of the pelvis, pericolic gutters, lesser sac, and hemidiaphragms are done. The *(Print pagebreak 747)* peritoneal cavity is carefully explored. A TAH/BSO is performed by ligating and transecting the round, infundibulopelvic, broad, cardinal, and uterosacral ligaments on both sides. The specimen is cut away from the vagina and the cuff closed. The pelvic and paraaortic lymph nodes are dissected in a manner similar to that described under **Radical Hysterectomy,** p. 776. All residual tumor is removed, using sharp dissection and/or CUSA and/or argon beam coagulator (ABC), and then an appendectomy is usually performed. The omentum is clamped, transected, and ligated along its attachment to the transverse colon. A **bowel resection** with possible **colostomy** formation may be necessary to achieve optimal cytoreductive surgery (see **Pelvic Exenteration,** p. 767). Next, the peritoneal cavity is irrigated copiously. Targeted and random biopsies of bladder, cul-de-sac of Douglas, pericolic gutters, hemidiaphragms, small bowel, large bowel, and anterior abdominal wall are performed. A peritoneal port may be placed subcutaneously for use in future intraperitoneal chemotherapy. A less extensive surgical procedure may be appropriate if a large volume of unresectable tumor is discovered. Surgery in these cases must be individualized.

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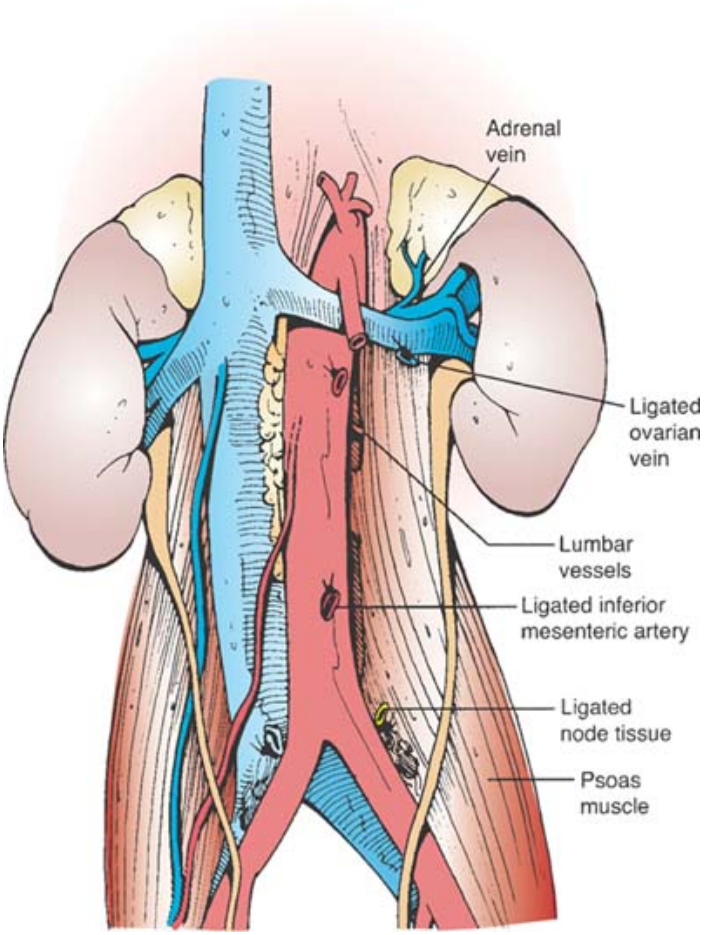

Figure 8.1-1. 1. Aortic node dissection in staging laparotomy for ovarian cancer. In this case, both right and left node dissections have occurred, leaving the kidney, renal hilum, and psoas muscle exposed. Because the dissection is infrarenal and anterior to the lumbar vessels, there is residual fatty and nodal tissue at the posterior limit of the dissection.

In some Stage I lesions, a **unilateral salpingo-oophorectomy** is sufficient therapy. The decision to use this approach depends on cell type, age, reproductive status, and extent of disease. Generally, biopsies, **a retroperitoneal lymph node dissection,** omentectomy, and appendectomy also are performed. Approximately 25% of patients undergoing cytoreductive surgery for advanced stages of ovarian carcinoma require bowel resection with either primary reanastomosis or colostomy. **A splenectomy** is not routinely done unless the spleen is involved with tumor. Some patients with unresectable disease and bowel obstruction will require a **gastrostomy tube** placement at this time.

Usual preop diagnosis: Ovarian cancer/pelvic mass

Summary of Procedures

Position	Supine
Incision	Midline or paramedian abdominal
Special instrumentation	CUSA, Vital View (suction-irrigation device combined with light source) helpful; laparoscopic biopsy forceps (laparoscope, laparoscopic instruments for evaluation of upper abdomen through lower vertical abdominal incision); Argon beam coagulator (ABC); TA, GIA, EEA stapling devices.
Unique considerations	Removal of large amounts of ascites may → fluid shifts and intravascular volume depletion intraop and postop.
Antibiotics	Cefotetan 2 g iv; further doses as indicated by large EBL, duration of surgery.
	1–4 h; 4–5 h, including splenectomy and bowel surgery for

Surgical time	more advanced stages
Closing considerations	NG tube placement by anesthesiologist (in select cases with extensive bowel involvement or bowel procedures); peritoneal or central venous access for subsequent chemotherapy
EBL	500–1000 mL; 250–500 mL for Stage I lesions; > 1000 mL for more advanced stages
Postop care	Extensive peritoneal raw surfaces → intraperitoneal fluid 3rd-spacing. Patients require good hydration to maintain intravascular volume. Central hemodynamic monitoring and ICU admission are useful in selected patients. Use SCDs and mini-dose heparin for VTE prophylaxis.
Mortality	1–2/1000
Morbidity	Postop fever: 14–19% Wound infection: < 5% Wound dehiscence: 0.3–3% PE: 1–2% Ureteral injury: < 1% Vaginal vault prolapse: Rare
Pain score	7–8

Patient Population Characteristics

Age range	All age groups; most common, 50–59 yr
Incidence	15/100,000 (26,700+ new cases/yr); 1.4% lifetime risk of ovarian cancer
Etiology	Unknown
Predisposing factors	Family Hx of ovarian carcinoma; personal or family Hx of breast cancer (BRCA gene mutations); ↑age at first pregnancy; gonadal dysgenesis; exposure to radiation; environmental factors
Associated conditions	Familial cancer syndromes (e.g., endometrial, colon, breast); Peutz-Jeghers syndrome—5% of cases develop gonadal stromal tumor; XY gonadal dysgenesis—gonadoblastomas; multiple nevoid basal cell carcinoma (Gorlin's syndrome); ataxia telangiectasia (hereditary, progressive cerebellar lack of muscular coordination associated with recurrent pulmonary infections and ocular and cutaneous telangiectasias)

(Print pagebreak 748)

Anesthetic Considerations

Preoperative

Ovarian carcinoma is usually diagnosed at a relatively late stage and, therefore, the patient may have malignant ascites and pleural effusion, and large tumor mass. Surgery is indicated for resection of localized tumor and for staging of distant and local metastases. Additional procedures, including bowel resection or lymph node dissection, may be performed at the same time.

Respiratory	Significant ascites and pleural fluid may produce respiratory compromise. The presence of dyspnea, orthopnea, tachypnea, or other chest findings need to be investigated. Underlying lung diseases, such as asthma, also may be exacerbated by the abdominal distension/ascites.

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	Tests: Consider CXR; others as indicated from H&P.
Cardiovascular	An ECHO or other studies may be requested to evaluate cardiac function. Exercise tolerance should be evaluated in every patient and any preexisting cardiac disease explored in the preop visit. Irreversible, dose-dependent cardiotoxicity may result from doxorubicin chemotherapy.
	Tests: Consider ECG, others as indicated from H&P.
Gastrointestinal	Patient should have adequate preop iv hydration if given a bowel prep overnight. Opiate use may cause ↓GI motility. May be malnourished.
Neurological	Not usually significant. Taxol and cisplatin may → peripheral neuropathy.
Hematologic	Bone marrow suppression common following chemotherapy. Carboplatin, commonly used for ovarian cancer, often induces thrombocytopenia.
	Tests: CBC
Laboratory	CBC, hepatic function, PT/PTT, T & S or T & cross
Premedication	Consider midazolam 1–2 mg iv

Intraoperative

Anesthetic technique: GETA ± epidural analgesia. Typically, a balanced anesthetic with inhalational agents and/or propofol infusion (25–200 mcg/kg/min) and narcotics. An epidural catheter may be placed for postop pain management and also may be used intraop to ↓ anesthetic requirements.

Induction	Standard induction (see p. B-2), though consider full stomach precautions if ascites present.
Maintenance	Standard maintenance (p. B-2). Continue muscle relaxation based on nerve stimulator response. Epidural 2% lidocaine with epinephrine 1:200,000 (3–5 mL/h) if catheter is placed preop. Consider NG/OG tube. Patients with combined regional/GA may require increased fluids due to vasodilation and ↓BP.
Emergence	The patient may be extubated at the conclusion of surgery, unless hemodynamically unstable and/or requiring continued vigorous fluid resuscitation. Reverse muscle relaxant with neostigmine 0.07 mg/kg and glycopyrrolate 0.01 mg/kg, and give supplemental O_2 after extubation. Consider postop ICU bed for unstable patients or those requiring invasive monitoring for fluid management.
Blood and fluid requirements	Significant blood loss possible IV: 16–18 ga × 2 NS/LR at 4–6 mL/kg/h 5% albumin 6% hetastarch Blood loss may be > 1 L. Order T & S or T & cross preop. 5% albumin or 6% hetastarch are useful for rapid volume replacement if Hct is acceptable. If large volumes of ascites are removed, significant ↓BP may develop. Third-space losses may be significant (≥10–15 mL/kg/h). Consider alternating NS and LR to avoid development of a nonanion gap hyperchloremic acidosis 2° NS. Warm fluids. Strive to maintain euvolemia based on clinical data: BP, HR, ABG, UO, EBL, and fluid shift estimates, ± CVP, etc.
Monitoring	Standard monitors (p. B-1) ± Arterial catheter ± CVP catheter Foley catheter Arterial and CVP catheters indicated for extensive surgery and/or patients with significant comorbidities (CHF, CAD, COPD, renal failure, etc).
Positioning	and pad pressure points, especially important for longer surgeries eyes Antiembolism stockings and SCDs

Complications	Hypothermia	Hypothermia likely to develop. Warm all IV fluids. Heating blanket on bed and forced-air warming blanket should be used.
	Coagulopathy	Preop malnutrition and/or significant blood loss may → coagulopathy

(Print pagebreak 749)

Postoperative

Complications	Hemorrhage VTE Ascites/pleural effusion Respiratory insufficiency	See p. B-7
	PONV	See p. B-6
Pain management	PCA Epidural	See PCA and epidural narcotic recommendations on pages C-2 and C-3. Epidural may ↓pain, PONV, and risk of VTE.

Suggested Readings

1. Copeland LJ: Epithelial ovarian cancer. In *Clinical Gynecologic Oncology.* DiSaia PJ, Creasman WT, eds. CV Mosby, St Louis: 2007; 289–350.

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5. Ozols RF, Rubin SC, Thomas G, Robboy S: Epithelial ovarian cancer. In *Principles and Practice of Gynecologic Oncology, 3rd edition.* Hoskins WJ, Perez CA, Young RC, Barakat RR, Markman B, eds: Lippincott Williams & Wilkins, Philadelphia: 2004, 981–1058.

6. Wheeless CR Jr: Staging of gynecologic oncology patients with exploratory laparotomy. In *Atlas of Pelvic Surgery,* 3rd edition. Lippincott, Williams & Wilkins, Baltimore: 1997, 380–1.

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Interval, Second-Look/Reassessment, and Secondary Cytoreductive Laparotomy for Ovarian Cancer

Surgical Considerations

Description: The clinical evaluation of an ovarian cancer patient's response to chemotherapy may be unreliable because tumor that may defy detection by noninvasive methods can be present in the abdominopelvic cavity. Historically, surgery in the form of **'second-look' laparotomy** was undertaken to determine whether a patient was surgically and pathologically free of disease, after an appropriate number of treatment cycles with platinum-based (CDDP or carboplatin) chemotherapy. However, 50% of patients with negative second-look surgeries ultimately recur, and the number of second-look surgeries has decreased significantly in favor of non-invasive evaluation including the use of tumor markers (CA-125) and imaging techniques (CT, MRI, PET). Select patients will

benefit from second-look surgery to guide further therapy. Intraabdominal assessment may be performed in conjunction with placement of an intraperitoneal port. Second-look procedures also may be done laparoscopically (see p. 626).

In patients where neoadjuvant chemotherapy was utilized or when optimal debulking could not be performed at initial surgery, an interval (after 3–6 cycles of chemotherapy) or secondary debulking laparotomy is done to achieve optimal cytoreduction. The surgery involves methodical and meticulous exploration of all of the abdomen and pelvis, multiple cytologies and biopsies, lysis of adhesions, and resection of the residual tumor, as well as the pelvic and periaortic lymph nodes (if not done at time of first surgery). Patients may also be candidates for secondary or tertiary cytoreductive surgical procedures, particularly if isolated recurrences are found in the setting of longer disease-free intervals.

Usual preop diagnosis: Ovarian carcinoma

Summary of Procedures

Position	Supine
Incision	Midline or paramedian vertical abdominal
Antibiotics	Cefotetan 2 g iv, then q 12 h × 2 doses
Surgical time	2–3 h
Closing considerations	Placement of permanent central venous or intraperitoneal access
EBL	350–700 mL
Postop care	PACU → ward
Mortality	1–2/1000
Morbidity	Postop fever: 14–19% Wound infection: < 5% Wound dehiscence: 0.3–3% PE: 1–2% Incisional hernia: 0.5–1% Ureteral injury: 0.5–1%
Pain score	7–8

Patient Population Characteristics

Age range	All ages; most common, 50–59 yr
Incidence	15/100,000; 26,700+ new cases/yr; 1.4% lifetime risk of ovarian cancer
Etiology	Risk factors include: positive family Hx; nulliparity; ↑age at first pregnancy; gonadal dysgenesis; exposure to radiation; environmental factors.
Associated conditions	Familial cancer syndromes (e.g., endometrial, colon, breast); Peutz-Jeghers syndrome (5% of cases develop gonadal stromal tumor); XY gonadal dysgenesis (gonadoblastomas); multiple, nevoid basal-cell carcinoma (Gorlin's syndrome); ataxia telangiectasia

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Anesthetic Considerations

Preoperative

Patients having a second-look laparotomy have undergone surgical resection of a tumor with lymph node biopsy, usually followed

by chemotherapy and/or radiation therapy. Depending on the type of adjunctive treatment given, the patient may come to surgery in poor physical condition from malnutrition or toxicity from chemotherapy (see Table 8.1-1). Vascular access may be difficult to obtain due to sclerosis or thrombosis of peripheral veins.

Respiratory	Pulmonary function may be impaired by several chemotherapeutic drugs, most commonly bleomycin. Patients often have a Hickman catheter or other central line already in place, which can be used for induction of anesthesia. Obtain preop CXR to assess the presence of lung injury if prior chemo given. Patients who have dyspnea at rest or with mild exertion, or who have known pulmonary fibrosis, should be evaluated by PFTs, including FVC, FEV_1, $MMEF_{25-75}$, and ABGs. Patients who have received bleomycin should not receive O_2 > 39% intraop, but arterial O_2 saturation ideally should be kept ≥ 93%. The pulmonary toxicity of bleomycin is dose-related with a much higher incidence occurring if > 200 mg/m^2. Combination chemotherapy with vincristine or cisplatin also increases pulmonary toxicity. Postop mechanical ventilation may be necessary. **Tests:** Consider CXR; others as indicated from H&P.
Cardiovascular	Cardiotoxicity is seen with several antineoplastic agents, especially daunorubicin and doxorubicin. The cardiomyopathy produced by these drugs occurs in two forms: (1) acute—ST-T wave changes and dysrhythmias, which are transient and usually not a serious problem; and (2) chronic—a dose-related toxicity manifested by CHF. Total doses of doxorubicin as low as 250 U can cause myocardial damage, but is more common at doses > 400 U. Cardiac irradiation, or combination chemotherapy with cyclophosphamide, increases the risk of cardiac toxicity. Patients who have received cardiotoxic drugs are usually followed by serial ECHOs or MUGA scans, and the results of these tests should be reviewed preop. Patients with CHF or ECG changes should have a cardiology consultation preop to optimize their medical condition. **Tests:** ECG; others as indicated from H&P.
Neurological	Peripheral neuropathies are produced by vincristine, cyclophosphamide, Taxol (paclitaxel), 5-fluorouracil and several other drugs. Vincristine can also → SIADH. Other CNS effects include N/V, Seizure, and cerebellar dysfunction. A preop neurologic exam useful for patients with evidence of neurotoxicity. Document presence of neurologic deficits preop for subsequent comparisons.
Endocrine	Corticosteroids (e.g. prednisone) are commonly used with chemotherapeutic agents, as treatment for pulmonary fibrosis and other complications of chemotherapy. The use of steroids for several weeks suppresses the endogenous secretion of the adrenal cortex, which may take up to 6 mo to recover fully. Hydrocortisone 100 mg iv, preop with an additional 2–3 subsequent doses q 8 h will provide adequate “stress dose” coverage perioperatively. The dose is tapered rapidly over 2 or 3 d postop. **Tests:** As indicated by the H&P.
Renal	Many chemotherapeutic drugs have renal toxicity; therefore, a preop set of renal function tests is mandatory. Patients with impaired renal function should be given appropriate dosages of medications (e.g., antibiotics), which depend on renal excretion. **Tests:** Renal function tests
	Vincristine produces a neurotoxicity manifested by numbness and tingling in the extremities, weakness, foot drop, loss of reflexes,

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Musculoskeletal	ataxia, and muscle pains. Muscle weakness in the arms and legs indicates that the drug should be stopped. Muscle weakness may also involve the larynx and extraocular eye muscles. Reduced amounts of NMBs should be used intraop and a nerve stimulator used to follow twitches.
Gastrointestinal	Consider hydration overnight if given a bowel prep or if there is significant N/V. **Tests:** Consider serum electrolytes, if indicated from H&P.
Hematologic	Bone marrow suppression is a very common side effect of antineoplastic drugs. The toxicity usually produces a reversible drop in leukocytes, erythrocytes, and platelets, with a nadir 10–14 d posttreatment. Patients with a total neutrophil count of < 1,000 should be kept in isolation until counts improve. A low Plt count (< 75,000) is an indication for Plt transfusion preop. Regional anesthesia in patients with thrombocytopenia needs to be considered carefully due to ↑ risk of bleeding complications. It is useful to PT/PTT preop when in doubt about the coag status of a patient. Consider preop transfusion of Plts and/or RBCs if lab values are below acceptable limits (Plt < 75,000, Hct < 25%). **Tests:** Hemogram, WBC, Plt, PT/PTT
Laboratory	LFTs if indicated by H&P.
Premedication	Consider midazolam 1–2 mg iv. Stress-dose hydrocortisone (100 mg iv) if indicated.

Table 8. 1-1. Toxicities of Selected Antineoplastic Chemotherapeutic Agents

Agent	Toxic Effects
Vincristine, vinblastine	Neuropathies, SIADH, myelosuppression
Cyclophosphamide	Prolonged neuromuscular block
Mechlorethamine	Prolonged neuromuscular block
Bleomycin	Pulmonary fibrosis
Doxorubicin, daunorubicin	Cardiotoxicity, GI upset, myelosuppression
Methotrexate	Myelosuppression, GI upset, stomatitis, pulmonary infiltrates
Fluorouracil	Myelosuppression, hepatic and GI alterations, nervous system dysfunction
Mercaptopurine	Myelosuppression
Thioguanine	Myelosuppression
Actinomycin D	Myelosuppression, GI upset, stomatitis
Mitomycin	Myelosuppression, GI upset
Cisplatin, carboplatin	Peripheral neuropathy, GI upset, electrolyte disturbances, nephrotoxicity myelosuppression
Paclitaxel	Myelosuppression, peripheral neuropathy, GI upset, arthralgia/myalgias, mucositis
Docetaxel	Myelosuppression, peripheral neuropathy, malaise, maculopapular rash, GI upset

(Print pagebreak 752)

Intraoperative

Anesthetic technique: GETA usually indicated. Combined GETA/epidural or spinal are also excellent choices. Consider surgery under regional anesthesia in patients with severe bleomycin pulmonary toxicity.

General anesthesia:

Induction	Standard induction (see p. B-2). Consider renal function and surgery duration when deciding on agents.

Maintenance		Standard maintenance: see Anesthetic Considerations for Staging Laparotomy, p. 627. An epidural may be used to reduce GA requirements (p. B-2). Consider NGT/OGT.
Emergence		Extubate when patient is responsive and neuromuscular block is fully reversed. In patients with borderline pulmonary function, extubation may be delayed until patient is in the PACU or ICU, and after ABG is checked while the patient breathes spontaneously. Consider PONV prophylaxis (see p. B-6).

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Regional anesthesia:

Epidural	2% lidocaine ± epinephrine 1:200,000 (10–20 mL) or 0.25% bupivacaine (10–20 mL) initially; then at 3–5 mL/h. Narcotics, such as morphine (2–4 mg) or hydromorphone (0.3–0.6 mg), may be given in the epidural for postop pain control.	
Blood and fluid requirements	IV: 16–18 ga × 1–2 NS/LR at 7–10 mL/kg/h Keep UO > 0.5 mL/kg/h Consider PRBC for Hct < 27%	Excessive use of NS can lead to hyperchloremic metabolic acidosis; therefore, alternating NS and LR solutions makes sense when giving large volumes of iv fluids.
	5% albumin 6% hetastarch	5% albumin or 6% hetastarch may be used as volume replacement, although no proven advantages over crystalloid solutions.
	FFP/Plt	Consider FFP and Plt if evidence of coagulopathy (↑PT, ↑PTT, ↓Plt).
Monitoring	Standard monitors (see p. B-1).	
	± Arterial line ± CVP catheter Foley catheter	Consider Arterial and CVP catheters for patients with compromised cardiac or pulmonary function or patients having extensive surgical procedures.
Positioning	and pad pressure points eyes Anti-embolism stockings and SCD	It is useful to maintain access to at least one arm for blood drawing and additional iv access.
Complications	Hypothermia	Warm fluids; keep heating pad on bed; use forced-air warmer
	Bleeding	PT; PTT, Plts periodically if large blood loss

Postoperative

Complications	Bleeding PONV (see p. B-6) Infection Respiratory insufficiency VTE (see p. B-7)	
Pain management	PCA (see p. C-3). Epidural/spinal narcotics (see p. C-2).	Surgeons may infiltrate wound edges with 0.25% bupivacaine in those patients without epidurals. Consider iv ketorolac (30 mg)
Tests	CXR ABG	As indicated by postop clinical findings.

Suggested Readings

1. Chabner BA, Ryan DP, Paz-Ares S, et al: Antineoplastic agents. In *Goodman and Gilman's: The Pharmacologic Basis of*

Therapeutics, 10th edition. Hardman JG, Limbird LE, Gilman AG, eds. McGraw Hill, New York: 2001, 1389–459.

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Radical Vulvectomy

Surgical Considerations

Description: Historically, invasive vulvar carcinoma has been treated with en bloc dissection of the inguinal-femoral region and the vulva. The surgery involves bilateral excision of lymphatic and areolar tissue in the inguinal and femoral regions, combined with removal of the entire vulva between the labia-crural folds, from the perineal body to the upper margin of mons pubis (Fig 8.1-2). A large surgical wound is created and, if 1° closure without tension is not possible, a skin or myocutaneous graft may be necessary. Deep pelvic nodes are almost never involved with metastases when the superficial and deep groin nodes are free of disease; therefore, a **pelvic lymphadenectomy** is no longer routinely performed. If presence of tumor is documented in the groin nodes, particularly in Cloquet's sentinel nodes (the most cephalad, deep inguinal nodes), a **deep pelvic lymphadenectomy** may be performed. **Postop radiation therapy,** however, is widely used instead of a pelvic lymph node dissection to minimize operative morbidity and confer a survival advantage.

A skin incision in the shape of a bull's head (Fig 8.1-2) allows access to the inguinal-femoral region. (The incision ideally should extend 2+ cm beyond the tumor margin.) The inguinal ligament and rectus fascia should be cleared bilaterally of all nodal tissues, and the fossae ovalis on both sides identified. The lateral aspect of the femoral sheath is incised along the sartorius muscle, with care being taken not to injure the femoral nerve or vessels, and the cribriform fascia is cleaned off the femoral artery. The external pudendal artery, which marks the entrance of the saphenous vein into the fossa ovalis, should be identified and ligated. The proximal and distal segments of the saphenous vein should be ligated and excised as the fibrofatty, lymph-bearing tissue of the femoral sheath is resected. Cloquet's nodes at the femoral ring beneath the inguinal ligaments on both sides should be resected and submitted for frozen-section pathology evaluation. The deep inguinal lymphatic chain is removed on both sides by opening the inguinal canal from the external inguinal ring. The vulvar incision is carried down through the labia-crural folds. The internal pudendal vessels at the posterior lateral margin of the vulvar incision are identified as they emerge from Alcock's canal, and then they are ligated and incised.

Use of electrocautery in this portion of the procedure usually tends to decrease operative blood loss. The dissection is continued along the periosteum of the symphysis at the level of the fascia of the deep muscles of the urogenital diaphragm. The bulbocavernosus, ischiocavernosus, and superficial transverse perinei muscles are removed. A circumferential vaginal incision, excluding the urethral meatus, is then performed and the vulva is removed. The incisions overlying the groin node dissections should be closed with minimal tension after placement of closed-suction *(Print pagebreak 755)* Jackson-Pratt drains. The vulvar surgical wound is closed by slightly undermining the skin of the edges of the incision and suturing them to the vaginal mucosa. A **vulvar reconstruction,** using myocutaneous flaps, also can be performed at this time (see Pelvic Exenteration, p. 767).

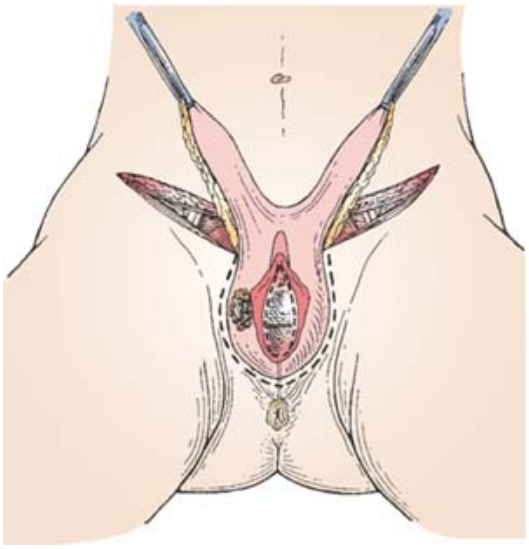

Figure 8.1-2. 2. En bloc radical vulvectomy incisions shown; bilateral inguinal lymphadenectomy is complete. (Reproduced with permission from Rock JA, Thompson JD: *TeLinde's Operative Gynecology,* 8th edition. Lippincott Williams & Wilkins, 1997.)

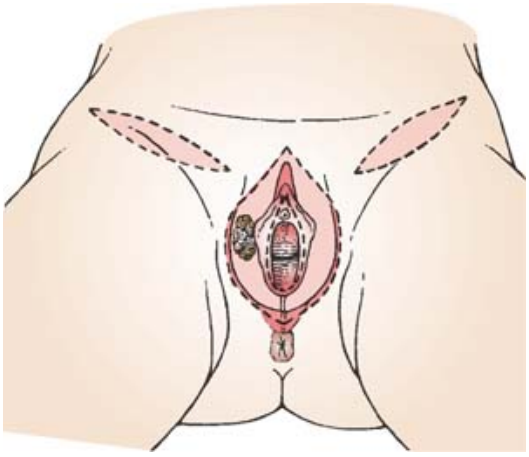

Figure 8.1-3. 3. 3-incision radical vulvectomy and bilateral inguinofemeral lympha- denectomy. (Produced with permission from Rock JA, Thompson JD: *TeLinde's Operative Gynecology,* 8th edition. Lippincott Williams & Wilkins, 1997.)

Variant procedure or approaches: In 1962, Byran and associates popularized a **3-incision technique** first described by Kehrer in 1918. This 3-incision technique, with separate vulva and groin incisions, is the most common approach (Fig 8.1-3). This operative approach has led to a significant decrease in wound infection and breakdown, apparently without increasing tumor recurrence in the inguinal dermal bridge above the symphysis pubis. Another variant is the **hemivulvectomy** (Fig 8.1-4), in which unilateral radical hemivulvectomy and groin node dissection are *(Print pagebreak 756)* performed in selected stage I, nonmidline, unifocal vulvar cancer patients. This procedure will minimize morbidity, disfigurement, and sexual dysfunction. The observation that almost no contralateral groin metastases occur in the absence of positive ipsilateral groin nodes allows the surgeon to perform only a **unilateral groin node dissection. Lymphatic mapping** and **sentinel lymph node identification** techniques are under development for the management of patients with vulvar cancer.

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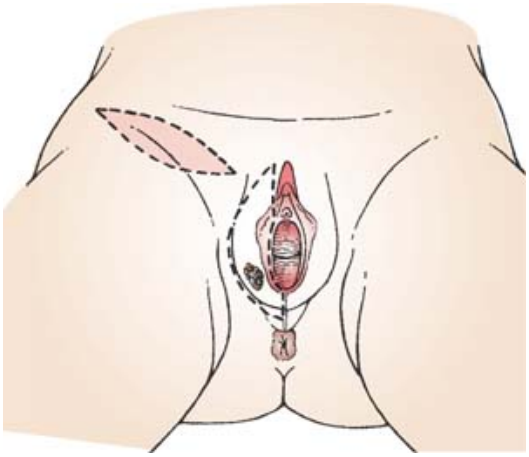

Figure 8.1-4. 4. Unilateral lymphadenectomy for a well lateralized lesion. (Produced with permission from Rock JA, Thompson JD: *TeLinde's Operative Gynecology,* 8th edition, Lippincott Williams & Wilkins, 1997.)

Usual preop diagnosis: Invasive vulvar cancer

Summary of Procedures

	En Bloc Dissection	3-Incision	Hemivulvectomy
Position	Modified dorsolithotomy in Allen universal stirrups		
Incision	Bull's head, from iliac crest to iliac crest and along labia-crural folds (Fig 8.1-2)	2 separate groin incisions from iliac crest to pubic tubercle; 1 vulvar incision (Fig 8.1-3)	1 or 2 separate groin incisions from iliac crest to pubic tubercle; vulvar incision (Fig 8.1-4)
Special instrumentation	Argon Beam Coagulator		
Unique considerations	Two-team approach to minimize surgical time. Preop bowel prep and constipating medications (e.g., Lomotil) to ↓postop bowel movements.		
Antibiotics	Cefotetan 2 g iv; then 2 g iv q 12 h × 72 h		
Surgical time	3–4 h		2–3 h
Closing considerations	Possible skin graft; vulvar and groin suction drains		
EBL	500–1000 mL		250–1000 mL
Postop care	PACU or ICU, if necessary; aggressive local wound care. VTE prophylaxis (see Appendix B). **NB:** trauma to femoral vessels at time of groin lymph node dissection increases risk of thrombophlebitis and PE.		
Mortality	1–2%		
Morbidity	Wound infection and breakdown: 40–80% Introital stenosis and dyspareunia: 50% Lymphedema of lower extremities: 25–30% Lymphocysts: 10%	15%	< 15% < 25% (if deep groin nodes not dissected) 1–2% 1–2%

	Genital prolapse: 7% Stress incontinence: 5% Thrombophlebitis: 3–5% Hernia: 1–2% PE: 1–2%		1–2%
Pain score	8	8	7

(Print pagebreak 757)

Patient Population Characteristics

Age range	Median = 70 yr
Incidence	2.5/100,000; 3–5% of female genital malignancies
Etiology	Exact etiology unknown; risk factors include vulvar dystrophies; granulomatous disease of vulva; Bowen's disease; condyloma acuminata
Associated conditions	Diabetes; obesity; HTN; arteriosclerosis; nulliparity; positive serology for syphilis; cervical malignancy; human papilloma virus infection

Anesthetic Considerations

Preoperative

Patients with vulvar carcinoma are usually elderly. Consider and evaluate coexisting medical conditions, including HTN, CAD, and diabetes. Radical vulvectomy is performed for invasive tumor that has not metastasized to distant sites.

Respiratory	The presence of lung disease and smoking Hx should be discussed with the patient preop. Consider CXR and PFTs for patients with significant respiratory disease. **Tests:** Others as indicated from H&P.
Cardiovascular	There is an increased incidence of HTN and atherosclerosis in these patients. A cardiology consultation is indicated for angina, recent MI, CHF, or heart murmurs. Review recent ECG for patients > 50. **Tests:** ECG; others as indicated from H&P.
Renal	In old age, creatinine clearance is decreased 2° ↓renal mass, but serum creatinine remains unchanged because of decreased muscle mass. **Tests:** Serum creatine; others as indicated from H&P.
Gastrointestinal	Patients should have iv hydration preop if given bowel prep overnight.
Neurological	Document a neurological exam if Hx of stroke, Sz, or other neurologic disease. Hx of peripheral neuropathy or autonomic dysfunction should be assessed in diabetic patients. **Tests:** As indicated from H&P.
Endocrine	Diabetes, obesity, and hypothyroidism are common in this patient population. **Tests:** Fasting blood sugar; thyroid function; others as indicated from H&P.
Hematologic	Chronic anemia may be present. **Tests:** Hb/Hct; Plt count
Laboratory	LFTs, if indicated.
Premedication	Consider midazolam iv 1–2 mg

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Intraoperative

Anesthetic technique: GETA or regional anesthesia, alone or in combination.

General anesthesia:

Induction	Standard induction (see p. B-2)
Maintenance	Standard maintenance (see p. B-2)
Emergence	No special considerations

(Print pagebreak 758)

Regional anesthesia:

Epidural	2% lidocaine ± epinephrine 1:200,000 (10–20 mL) or 0.5% bupivacaine (10–20 mL) are used; then at 3–5 mL/h. Narcotics such as morphine (2–4 mg) in the epidural for postop pain control.	
Spinal	Tetracaine (12 mg) or bupivacaine (12–15 mg), preservative-free morphine (0.1–0.2 mg) → T8 sensory level.	
Blood and fluid requirements	IV: 16–18 ga × 2 NS/LR at 6–8 mL/kg/h Warm iv fluids UO > 0.5 mL/kg/h	Occasionally, femoral vessels may be injured, requiring rapid blood replacement. Consider PRBCs for Hct < 21% in healthy patients and < 25–30% in patients with cardiac or pulmonary disease.
Monitoring	Standard monitors (p. B-1) ± Arterial line ± CVP line Foley catheter	Invasive monitors indicated for patients in poor condition or with cardiovascular or respiratory disease. An arterial catheter is useful for drawing labs in surgery to check Hct, coags, glucose, or ABGs.
Positioning	and pad pressure points eyes Antiembolism stockings and SCD	

Postoperative

Complications	Hypothermia Bleeding PONV	 See p. B-6
	VTE	See p. B-7
Pain management	PCA (p. C-3) Epidural or spinal narcotics (p. C-2)	Incisions may be left open to granulate in, or be covered with skin grafts. Epidural analgesia allows earlier ambulation with less sedation in elderly patients.
Tests	Tests as indicated from postop clinical findings	

Suggested Readings

1. Burke TW, Eifel P, McGuire W, Wilkinson EJ: Vulva. In *Principles and Practice of Gynecologic Oncology,* 3rd edition. Hoskins WJ, Perez CA, Young RC, eds. Lippincott Williams & Wilkins, Philadelphia: 2000, 775–810.

2. Burke TW, Levenback C, Coleman RC, et al: Surgical therapy of T1 and T2 vulvar carcinoma: further experience with radical wide excision and selective inguinal lymphadenectomy. *Gynecol Oncol* 1995; 57:215–20.

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7. Siller BS, et al: T2/3 vulva cancer: A case-controlled study of triple incision versus en bloc radical vulvectomy and inguinal lymphadenectomy. *Gynecol Oncol* 1995; 57:335.

8. Wheeless CR Jr: Radical vulvectomy with bilateral inguinal lymph node dissection. In *Atlas of Pelvic Surgery.* Williams & Wilkins, Baltimore: 1997, 405–11.

(Print pagebreak 759)

Conization of the Cervix

Surgical Considerations

Description: Conization of the cervix can be used for both diagnostic and therapeutic purposes. It is performed in cases of biopsy-proven dysplasia with unsatisfactory colposcopy (inadequate visualization of the endocervical canal) or following endocervical curettage showing dysplasia or atypical glandular epithelial cells (Fig 8.1-5). Persistent abnormal cytology associated with normal colposcopy, colposcopic suspicion of invasion, and/or cervical biopsy showing microinvasive cancer is also an indication for this procedure. The surgery consists of the annular removal of a cone-shaped wedge of tissue from the cervix with a scalpel. With the advent of the LEEP (loop electrosurgical excision procedure), most cone biopsies are done under local paracervical/intracervical block in an office setting and do not require the services of an anesthesiologist.

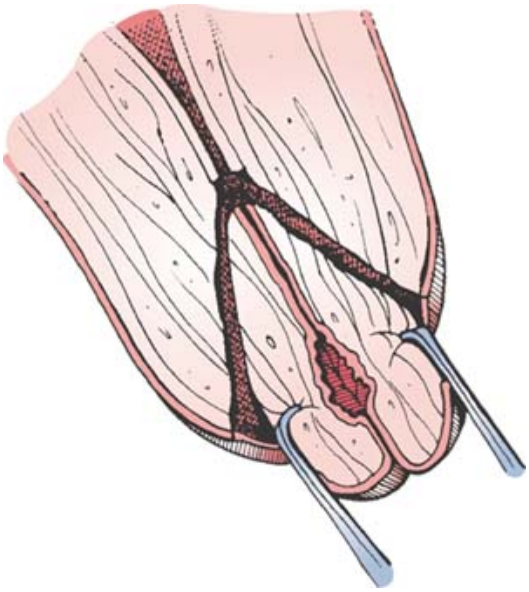

Figure 8.1-5. 5. Cut across endocervix to complete cone excision.

Variant procedure or approaches: In selected patients, a **laser** is used in place of the scalpel. This procedure can be performed under local anesthesia with less blood loss, but operative time is usually longer. The thermal effect of the laser at the cone margins, although usually minimal, may interfere with pathologic interpretation. In pregnant patients, a **shallower cone** is done to minimize complications. Approximately 1% of women with cervical carcinoma are pregnant at the time of diagnosis, and 1/1240 pregnancies

is complicated by cervical cancer. Recognition and therapy of preinvasive cervical lesions during pregnancy, therefore, are of *(Print pagebreak 760)* paramount importance. Because of the increased vascularity of the pregnant uterus and cervix, conization is usually associated with increased blood loss and morbidity.

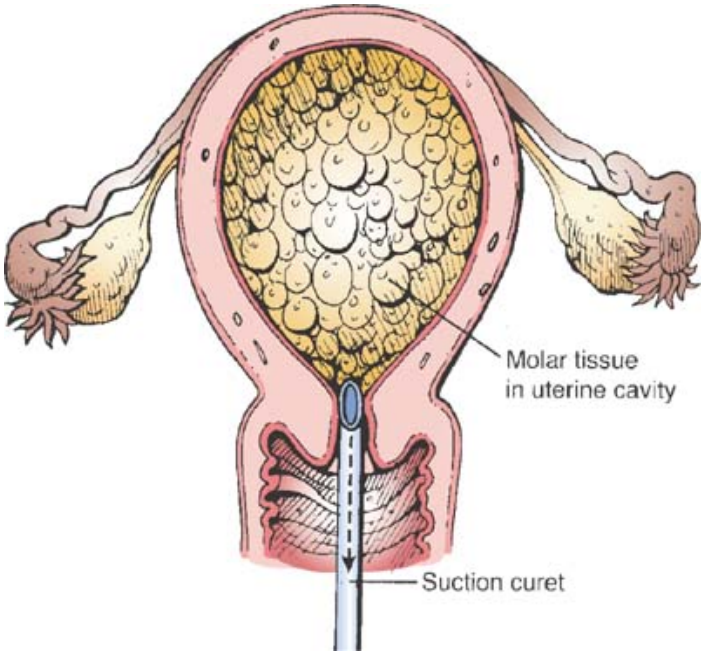

Figure 8.1-6. 6. Suction curettage of a molar pregnancy.

Usual preop diagnosis: Cervical dysplasia

Summary of Procedures

	Conization	Laser Conization	Shallow Cone In Pregnancy
Position	Lithotomy		Lithotomy; with left lateral tilt in 3rd trimester
Incision	Cervical		
Special instrumentation	Colposcope	CO_2 laser; protective eye wear; colposcope	Colposcope
Unique considerations	Infiltration of cervix with dilute vasopressin or phenylephrine solution. A 1:200,000 epinephrine solution also can be used. Vaginal pack necessary in selected patients.		Phenylephrine, vasopressin, or epinephrine should not be used during pregnancy. Liberal use of hemostatic sutures should be made.
Antibiotics	None		
Surgical time	30–60 min	30–90 min	
EBL	50–200 mL	50 mL	100–350 mL
Postop care	Monitor for postop bleeding		
Mortality	< 0.01%		10–15%
Morbidity	Hemorrhage: 5–10% Cervical incompetence: 2–3% Cervical stenosis: 2–3% Dysmenorrhea: Rare Infertility: Rare Injury to rectum and bladder: Rare		Fetal loss: 10–15% (up to 30%

	Pelvic cellulitis: Rare Uterine perforation: Rare		in 1st trimester)* Premature labor: 5–10% (controversial) Rupture of membrane: 2–5%
Pain score	3	3	3

*The naturally higher incidence of spontaneous miscarriages in the 1st trimester contributes to this figure.

Patient Population Characteristics

Age range	Reproductive and postreproductive years
Incidence	5% of Pap smears (+ for dysplasia); 10–17% of patients who undergo colposcopic exams
Etiology and predisposing factors	Smoking; human papilloma virus (HPV); herpes simplex virus (HSV); multiple sexual partners; early age of onset of coitus; multiparity; lower socioeconomic status; HIV; immunocompromised hosts

(Print pagebreak 761)

Anesthetic Considerations

Preoperative

Conization is done for diagnosis and treatment of cervical lesions. Occasionally it is necessary to perform the procedure during pregnancy, which increases the risk of bleeding complications. The effect of anesthetic agents on the fetus (especially 1st trimester) also needs to be considered when choosing anesthetic technique (see p. 835).

Respiratory	Not usually a problem, unless there is Hx of lung disease or smoking.
Cardiovascular	These patients are generally young and, therefore, less likely to have significant heart disease.
Neurological	Usually not significant, unless there is Hx of seizure disorder or other neurologic illness.
Hematologic	Consider hemogram
Laboratory	Consider pregnancy test
Premedication	Consider midazolam 1–2 mg iv (Though generally held if pregnant). Na citrate 30 mL po should be given 30 min prior to induction in all pregnant patients.

Intraoperative

Anesthetic technique: Usually a local or MAC anesthetic; occasionally, GETA or spinal. Pregnancy makes it desirable to perform the procedure under local or regional anesthesia if appropriate.

General anesthesia:

Induction	Standard induction (p. B-2). If pregnant patient, rapid-sequence induction (p. B-4) with cricoid pressure is appropriate.
Maintenance	Standard maintenance (p. B-2)
Emergence	No special issues

Regional anesthesia: Both spinal and epidural techniques are acceptable, and may be preferred for pregnant patients who cannot tolerate local anesthesia. Prehydration with 1000 mL LR before block is recommended. Treat ↓BP with ephedrine 5–10 mg iv, or

Neo-Synephrine 50–100 mcg, titrated to effect.

Blood and fluid requirements	Minimal blood loss IV: 18–20 ga × 1 NS/LR at 2–4 mL/kg/h	
Monitoring	Standard monitors (see p. B-1).	
	Fetal monitoring may be indicated for pregnancies > 16 wk	Monitor for fetal distress or onset of labor. Mg^{+} or terbutaline may be necessary to suppress a sudden onset of premature labor. Consult with obstetrician on the need for these tocolytic agents. Consider having L & D nursing staff in OR if fetal monitoring used.
Positioning	and pad pressure points eyes	***NB** peroneal nerve compression at lateral fibular head → foot drop.
	Left uterine displacement	Left uterine displacement with a wedge under mattress should be used for pregnant patients (after 20 wk).
Complications	Laser eye damage Fire Premature labor	If a laser is used, eye protection is required for the patient and all OR personnel; be alert for fire hazards when using a laser.

(Print pagebreak 762)

Postoperative

Complications	Peroneal nerve injury (2° lithotomy position)	Nerve injury manifested as foot drop and loss of sensation over dorsum of foot.
	PONV	See p. B-6.
	Premature labor Bleeding	Tocolytic agents (e.g., terbutaline, magnesium) may be needed, consult obstetrician.
Pain management	Oral analgesics	Consider acetaminophen or Vicodin.

Suggested Readings

1. Copeland LJ, Landon MB: Malignant disease in pregnancy. In *Obstetrics. Normal and Problem Pregnancies.* Gabbe SG, Niebyl JR, Simpson JL, eds. Churchill Livingstone, New York: 2002, 1255–81.

2. DiSaia PJ, Creasman WT: Cancer in pregnancy. In *Clinical Gynecologic Oncology,* DiSaia PJ, Creasman WT, eds. CV Mosby, St. Louis: 2000, 439–72.

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Obstet Gynecol 1989; 161(5):1178–85.

Anesthetic Considerations for Laser Therapy to Vulva, Vagina, Cervix

Preoperative

Laser therapy is indicated for preinvasive lesions of the vulva, vagina, or cervix. It destroys tissues by the selective application of light energy focused into a beam. Vaporized tissues tend to heal without scarring, and blood loss is minimal due to the cauterizing effect of the laser. Many gynecological laser procedures are done with local anesthesia in the clinic setting and do not require the services of an anesthesiologist.

Respiratory	Not significant, unless there is underlying lung disease.
Cardiovascular	In elderly patients, exercise tolerance should be assessed. **Tests:** ECG if > 50 yr
Hematologic	**Tests:** Hct
Laboratory	Consider pregnancy test in young women
Premedication	Consider midazolam 1–2 mg iv

(Print pagebreak 763)

Intraoperative

Anesthetic technique: Usually MAC; GETA/LMA or regional technique may be used. Sedation with propofol, midazolam, and fentanyl in small doses usually is effective.

General anesthesia:

Induction	Standard induction (see p. B-2)
Maintenance	Standard maintenance (see p. B-2). Muscle relaxation not necessary. A technique with relatively rapid emergence (e.g., propofol and/or sevoflurane/desflurane/N_2O combinations) is useful for outpatient surgery.
Emergence	Limit opiates

Regional anesthesia: Spinal or epidural anesthesia may be used with a sensory level to T10. Provide supplemental O_2 if iv sedation given.

Spinal	A T10 sensory level is desirable; bupivacaine 10–12 mg can be used. Small-diameter spinal needles (e.g., 26-ga Quincke or 25-ga Sprotte needles) minimize chance of postdural puncture headache (PDPH).	
Epidural	2% lidocaine, ± epinephrine 1:200,000 (10–15 mL), or 0.5% bupivacaine (10–15 mL) is used; redose as needed with 3–5 mL. Narcotics, such as morphine (4 mg) or hydromorphone (0.5 mg), may be given in the epidural for postop pain control.	
Blood and fluid requirements	Minimal blood loss IV: 18 ga × 1 NS/LR at 2–4 mL/kg/h	Consider prehydrating patient if using neuraxial block.
Monitoring	Standard monitors (see p. B-1).	
Positioning	and pad pressure points eyes	
Complications	Eye injury OR fires	Goggles should be worn by both patient and all OR personnel during laser use to prevent injury to eyes from light. If the patient is asleep, cover eyes with saline-soaked gauze. Whenever laser is in use, be prepared for fires: know where fire

	Aerosolization of viral particles	extinguisher is located, and watch for improper handling of lasers. Vaporization of condyloma may produce aerosolization of viral particles; therefore, appropriate ventilation is suggested to disperse smoke.

Postoperative

Complications	PONV PDPH	See p. B-6 PDPH may require epidural blood patch for treatment.
Pain management	Oral analgesics	e.g., acetaminophen 325–650 mg or Vicodin 1–2 tabs.

Suggested Readings

1. Addis IB, Hatch KD, Berek JS: Intraepithelial disease of the cervix, vagina, and vulva. In *Barek & Novak's Gynecology*. Barek JS, ed., 14th edition. Lippincott Williams & Wilkins, Philadelphia: 2007, 561–600.

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(Print pagebreak 764)

Suction Curettage for Gestational Trophoblastic Disease

Surgical Considerations

Description: Suction curettage is the most efficient method of evacuating a gestational trophoblastic neoplasm (mole). The procedure involves dilation of the cervix by instruments or by laminaria tents, followed by insertion of suction cannula of appropriate diameter into the uterine cavity. Standard negative pressures used are in the range of 30–70 mmHg. IV oxytocin—to maintain uterine contraction and minimize blood loss—is started after a moderate amount of tissue has been removed. Suction curettage is followed by gentle, sharp curettage of the uterus to ensure adequate evacuation. Paracervical injection of dilute vasopressin solution or 1% Xylocaine with 1:200,000 epinephrine may decrease operative blood loss (in cases not complicated by thyrotoxicosis or HTN).

Variant procedure or approaches: Evacuation of a mole > 16 wk gestation size is associated with a significant risk of trophoblastic embolization and cardiorespiratory embarrassment (2° pulmonary HTN/edema, cyanosis, ↓CO, ↓BP, right heart failure). Central hemodynamic monitoring with TEE or a PA catheter is useful in the management of cardiovascular changes associated with trophoblastic embolization and to prevent inadvertent fluid overload. In general, earlier diagnosis of molar pregnancies has decreased the incidence of complications such as HTN and thyroxicosis.

Usual preop diagnosis: Gestational trophoblastic disease (GTD)

Summary of Procedures

	Small Mole < 16 Weeks' Size	Large Mole > 16 Weeks' Size
Position	Lithotomy	
Incision	None	
Special instrumentation	Suction evacuation kit	
Unique considerations	If mole > 12 wk size, laparotomy setup should be readily available. Oxytocin drip. In some cases, thyrotoxicosis may be present, requiring control with β-blockers.	± central hemodynamic monitoring with TEE or PA catheter; avoid overzealous use of crystalloids and blood transfusions. Preop ABG.

Antibiotics	Cefotetan 2 g iv	
Surgical time	30–60 min	
EBL	200–400 mL	
Postop care	Outpatient (usually)	ICU admission in selected cases
Mortality	Rare	
Morbidity	Trophoblastic embolization: 2.6% Excessive bleeding: 2% Infection: < 2% Uterine perforation: < 1%	11–27% 10% 1–2% Acute pulmonary edema: 2–11%
Pain score	3	3

Patient Population Characteristics

Age range	Reproductive age group
Incidence	1/1200 deliveries in the United States
Etiology	Genetics: androgenous (all chromosomes in true moles are paternal in origin); nutritional deficiency: protein, folic acid, carotene (vitamin A)
Associated conditions	Lower socioeconomic status; Asian, Hispanic populations; hyperemesis gravidarum (2° ↑ levels of HCG); preeclampsia in 1st trimester; thyrotoxicosis (because of its analogy to TSH molecule, ↑ levels of HCG can bind TSH receptors and cause thyrotoxicosis); prior GTD (incidence ↑ to 0.6–2.0%)

(Print pagebreak 765)

Anesthetic Considerations

Preoperative

Some 80% of cases are diagnosed at 12–18 wk of development. Most patients have an unusually large uterus for the length of the pregnancy and vaginal bleeding is common. Trophoblastic disease is classified by the degree of invasiveness; **retained mole** is the most common type, and the least invasive; **invasive mole** involves the wall of the uterus; and **metastatic mole** involves more distant sites. Chemotherapy with methotrexate and actinomycin D usually is given postop for invasive or metastatic disease. (See Table 8.1-1 for toxicities of chemotherapeutic agents.)

Respiratory	Pulmonary edema may complicate preeclampsia, which occurs in 25% of patients with GTD. If respiratory distress is present, it also may be 2° embolization of tumor to lungs. Avoid overhydration → pulmonary complications in patients with large moles. **Tests:** Consider preop ABG if pulmonary function impaired, and in patients at high risk of developing trophoblastic embolization. Others as indicated by H&P.
Cardiovascular	Dehydration and/or ↓ blood volume may exist due to hyperemesis and vaginal bleeding. Adequate hydration should be given preop if patient shows Sx of hypovolemia (e.g., tachycardia, orthostatic ↓ BP, low UO). Preeclampsia also may complicate this disease and can be diagnosed by HTN, proteinuria, and edema. If the patient has preeclampsia, invasive monitoring of BP may be advisable. Also, if patient is receiving Mg^{++}therapy, a serum level should be ' d preop. Mg^{++}therapy may inhibit myocardial contractility in high doses. $Ca^{++}$is the preferred antidote for

Neurological	myocardial depression. $MgSO_4$→ uterine atony →↑blood loss. Sz prophylaxis with Mg+is indicated for women with severe preeclampsia. If Sz occurs a small dose of STP (50–100 mg) or midazolam (1–2 mg) should be given iv and respiration assisted with supplemental $O_2$by mask. The trachea should be intubated for airway protection in patients with full stomachs and in those who are difficult to ventilate by mask.
Musculoskeletal	reflexes if patient has received Mg+Reduce amount of muscle relaxant to compensate for the effects of Mg+on muscle strength.
Hematologic	Anemia may be masked by hypovolemia. Rh– patients with Rh+ partners should receive 300 mcg of Rh immune globulin (RhoGAM) within 72 h postop to ↓ possibility of Rh isoimmunization in future pregnancies. **Tests:** CBC; Plt in preeclamptics. If patient has received chemotherapy recently, HCT; complete blood count (WBC, Plt).
Endocrine	Hyperthyroidism occurs in 5% of women with hydatidiform moles and is 2° the thyroid-stimulating effects of HCG. **Tests:** Thyroid function tests should be ' d preop in women with Sx of hyperthyroidism, and managed before surgery.
Laboratory	Serum HCG level; consider thyroid function tests; LFTs; PT; PTT; Plt count; Mg+level; UA—as indicated from H&P.
Premedication	Consider midazolam 1–2 mg iv. A nonparticulate antacid (Na citrate 30 mL 0.3 M) should be given po just before induction.

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Intraoperative

Anesthetic technique: Usually GETA, although may be carried out under spinal or epidural anesthesia.

General anesthesia:

Induction	A rapid-sequence induction (p. B-4) with cricoid pressure should be used.
Maintenance	Standard maintenance (p. B-2). Control BP, if preeclamptic, with labetalol, hydralazine, or SNP. Try to keep DBP at 90–100 mmHg.
Emergence	Extubate when fully awake and protective airway reflexes have returned. Consider PONV prophylaxis. Give supplemental O_2

Regional anesthesia:

Spinal	A T8 sensory level is desirable; bupivacaine (10–12 mg) may be used.	
Epidural	Use 2% lidocaine ± epinephrine 1:200,000 (10–20 mL) or 0.25% bupivacaine (10–15 mL)	
Blood and fluid requirements	Possible large blood loss IV: 16–18 ga × 1 NS/LR at 2–4 mL/kg/h	One large-volume iv line should be placed and blood readily available. The usual causes of bleeding are uterine perforation, cervical laceration, or uterine atony.
Control of bleeding	Oxytocin (30 U/L) infusion	Oxytocin is begun about halfway through procedure at 30–60 drops/min (consult obstetrician). Large oxytocin boluses may →↓BP.
	↑% volatile anesthetic may → ↓uterine tone	Try to keep anesthetic <1 MAC to prevent uterine relaxation. Ergonovine may be given for severe bleeding. Since this drug can cause HTN, it

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	Ergonovine maleate 0.2 mg im	is contraindicated in cases of preeclampsia with elevated BP.
Monitoring	Standard monitors (p. B-1)	
	± Arterial catheter ± CVP/PA catheter Foley catheter	An arterial catheter and CVP are indicated in cases of thyrotoxicosis, preeclampsia, or significant hemorrhage. The use of vasodilators, such as SNP, is also an indication for invasive monitors.
Positioning	and pad pressure points eyes	* **NB:** peroneal nerve compression at lateral fibular head → foot drop. Lifting the legs may cause the level of spinal or epidural anesthesia to move cranially if performed too quickly after the block.
Complications	Embolization of trophoblastic material	Embolization may occur, especially if > 16 wk gestation. Significant respiratory and cardiac compromise may occur, requiring postop ventilation and PEEP, hemodynamic support, ICU.

Postoperative

Complications	Bleeding	Continue oxytocin infusion. Significant hemorrhage should be evaluated by surgeons for possible perforation, laceration, or atony.
	PONV	Consider PONV prophylaxis with odansetron 4 mg.
	HTN	BP should be monitored closely in preeclamptics. Consider ICU admission if unstable.
	↓ BP	Consider trophoblastic embolization and manage aggressively.
	Peroneal nerve injury (2° to lithotomy position)	Nerve injury manifested as foot drop and loss of sensation over dorsum of foot.
Pain management	Oral analgesics	Acetaminophen (325–650 mg po). Vicodin, or ketorolac (15–30 mg iv). Patients receiving $Mg^{+}$for preeclampsia may require less opiates for pain control. This may be 2° NMDA receptor antagonism.

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Suggested Readings

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Pelvic Exenteration

Surgical Considerations

Description: Pelvic exenteration was introduced by Brunschwig as an ultraradical surgical approach for advanced and radioresistant cervical cancer. Although advanced vaginal and vulvar carcinoma occasionally have been treated with this procedure, its most important role is in the management of centrally recurrent, surgically resectable, radioresistant cervical carcinoma. **Total pelvic exenteration** involves **en bloc resection** of all pelvic tissues, including uterus, cervix, vagina, bladder, and rectum. Involvement of the distal vagina may require resection of vulva and groin nodes. The goal of this procedure is curative with removal of all cancer tissue and reconstruction of appropriate diversions for the urine and stool, if the colon cannot be reanastomosed to the rectum. It is rare for cervical and vaginal cancer to involve the lower 5 cm of the rectum and anus. It is, therefore, often possible to mobilize the descending colon and anastomose it primarily to the distal rectum. Otherwise, an **end colostomy** is created. A continent or incontinent urinary diversion, **omental pelvic carpet** or **sling** and **gracilis myocutaneous flaps** for vaginal and perineal reconstruction are performed. A **rectus abdominis muscle flap** also can be used for vaginal reconstruction. This type of flap yields excellent aesthetic and functional results. In cases where an omental sling (shown in (Fig. 8.1-7) cannot be developed, an absorbable synthetic mesh is sutured to the pelvic peritoneum to create a pelvic lid (like a hammock) to keep the small bowel off the denuded pelvic peritoneum, thus decreasing the possibility of small-bowel obstruction. In general, an additional 2–3 h of surgical time and an additional 300 mL of EBL are expected when a vaginal reconstruction is undertaken. An exploratory laparotomy is needed prior to initiation of the exenterative procedure to exclude spread of disease outside the pelvis and/or extension to pelvic sidewalls and pelvic lymph nodes, all of which are absolute contraindications to this procedure.

Resectability is evaluated by examination of pelvic and paraaortic lymph nodes, liver, hemidiaphragms, and peritoneal surfaces of the upper abdomen and pelvic wall. Washings are obtained for cytology. Evaluation of lymph nodes is then performed and all suspicious nodes are submitted for frozen-section pathologic examination. The pararectal, paravesical, and presacral spaces are then developed. If the patient is found to be inoperable, CUSA can be used to decrease the tumor burden. Consideration also should be given to IORT, which may provide an adjunctive treatment to radical surgery in the setting of: (1) recurrent disease close to the pelvic sidewalls; and (2) *(Print pagebreak 768)* microscopically positive surgical margins or ‘close’ resection margins. If the patient is deemed operable, the space of Retzius is developed. The round ligaments are then transected close to the pelvic sidewall bilaterally; and the infundibulopelvic ligaments also are ligated and transected. The ureters are divided as close to the bladder as possible. The superior hemorrhoidal vessel is ligated and transected; and the colon is transected at the appropriate level. The anterior divisions of the internal iliac artery on both sides are ligated and divided; and the web of tissue is clamped close to the pelvic sidewall, transected, and suture-ligated. Following this, sharp dissection can be done to free up the specimen from the low attachments to the levator muscles. In larger tumors, the levator muscle is partially removed with the specimen to provide adequate margins. From a combined perineal and abdominal approach, the distal vagina, urethra, and perineum (± rectum) can be resected. The specimen is handed off the field, hemostasis is achieved, and the bladder is reconstructed with a continent urinary diversion using an ileocolonic segment, ileal loop, or transverse colon conduit. An ileal loop or other urinary conduit is performed, a colostomy or low rectal anastomosis is done, vaginal reconstruction is undertaken, and the pelvic floor is covered. (Fig. 8.1-7 and 8.1-8 show the completed exenteration.)

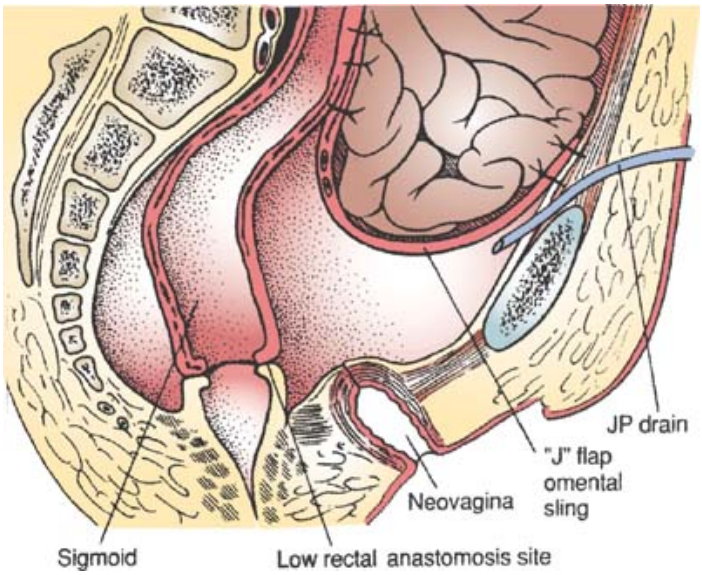

Figure 8.1-7. 7. Sagittal section of the pelvis after a total pelvic exenteration. Note that all the reproductive organs, along with their supporting structures, the rectum and the bladder, have been resected. Drains can be placed through separate stab incisions in the abdomen. The small bowel is kept away from the operative site by a pelvic lid. The urinary and fecal diversions are not diagrammed. (Reproduced with permission from Wheeless CR: *Atlas of Pelvic Surgery*. Lea & Febiger: 1988.)

Variant procedure or approaches: Anterior pelvic exenteration is technically similar to a total pelvic exenteration, except the rectum is left intact. **Posterior pelvic exenteration** involves preservation of bladder. Posterior exenteration has proved more useful in cancer of vulva or vagina than in cervical cancer. Anterior and posterior exenterations are used in selective cases because of the increased risk of an incomplete tumor resection and multiple complications and malfunctioning of the preserved organ.

Usual preop diagnosis: Recurrent cervical carcinoma following radiotherapy

Summary of Procedures

Position	Modified dorsolithotomy with Allen stirrups
Incision	Midline longitudinal, perineal
Special instrumentation	Vital View, ABC may be helpful; EEA, GIA, TA staplers; Robo-retractor or similar devices
Unique considerations	Full and thorough mechanical and antibiotic intestinal prep. NG tube placement intraop. SCD and minidose heparin intraop for VTE prophylaxis. Preop PFTs. Consider preop Greenfield IVC filter placement to avoid PE for high-risk patients. Consider intraop radiation of tumor bed and/or of resection margins. Abort case if extrapelvic metastases and/or tumor extension to pelvic sidewalls noted.
Antibiotics	Cefotetan 2 g iv preop and continue q 12 h for 3 days. Alternatively, a combination of ampicillin (1 g), gentamicin (80 mg), and metronidazole (500 mg) may be given.
Surgical time	8–12 h (2-team approach); 5–10 h (for anterior and posterior exenteration)
Closing considerations	Abdominal drains; colostomy; ureteral stents; urostomy; intraop radiation therapy. Triple-lumen central line placement. Copious irrigation of the operative sites.
EBL	1200–4000 mL
	ICU: 2–3 d. Correction of electrolyte imbalance. Extensive peritoneal raw surfaces → intraperitoneal fluid 3rd-spacing. Patients require good hydration to maintain intravascular volume. SCDs and heparin VTE prophylaxis. Consider

Postop care	concentrated albumin infusion to maintain intravascular volume. Early and aggressive use of TPN is important. Maintain Hct in the low 30s, as concentrated blood may → sludging and contribute to flap necrosis and wound breakdown. Remove ureteral stents 1–2 wk postop, when the edema at the ureterointestinal site has subsided.
Mortality	5–11%
Morbidity	Intraop hemorrhage requiring a median of 5 U PRBC Infectious: Nonspecific: 25% Flap necrosis: 20% Pelvic cellulitis: 19% Pyelonephritis: 17% Wound infection: 6% Sepsis: 3% Psychiatric: Confusion: 24% Intestinal: Ileus: 18% GI fistula: 13% Stoma breakdown: 3% Small bowel obstruction: 5% Renal: Ureteral fistulae: 14% Failure: 5% Cardiovascular: CHF: 8% Venous thrombosis: 3–7% DIC: 3% Dysrrhythmia: 3% MI: 3% Pulmonary: Pneumonia: 3% PE: 2% Neurologic: CVA: 2% Spinal cord infarction: < 2%
Pain score	7–8

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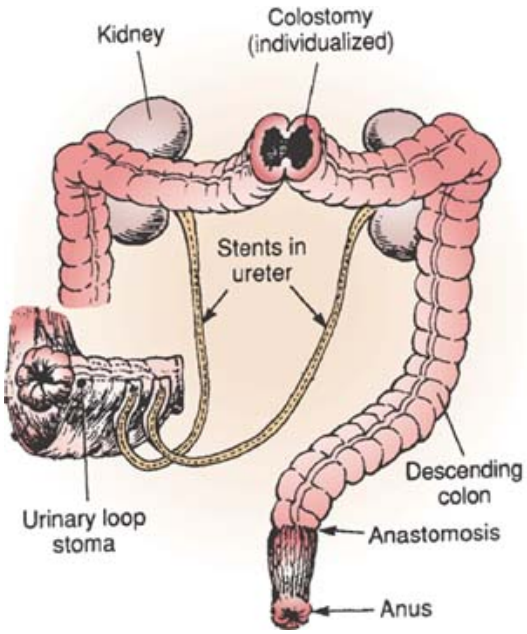

Figure 8.1-8. 8. Conceptual drawing shows the urinary and fecal diversions after a total pelvic exenteration. (Reproduced with permission from Wheeless CR: *Atlas of Pelvic Surgery.* Williams & Wilkins: 1997.)

Patient Population Characteristics

Age range	All age groups
Incidence	1.5–17% of cervical cancers treated with radiation therapy (depending on stage and cell type)
Associated conditions	Advanced or recurrent gynecologic malignancies; radiation injury

Anesthetic Considerations

Preoperative

This procedure is performed for recurrent rectal, cervical, or other gynecologic cancers and involves removal of all pelvic organs. Occasionally, the bladder or rectum is preserved, if not involved with tumor. Most patients have undergone preop radiation or chemotherapy.

Respiratory	Usually not significant unless there is Hx of smoking or lung disease. Ask about prior chemotherapy. (See Anesthetic Considerations for Second-Look/Reassessment Laparotomy for Ovarian Cancer, p. 751.) **Tests:** Consider CXR; others as indicated from H&P.
Cardiovascular	Exercise tolerance should be assessed. Underlying CAD or CHF should be medically optimized preoperatively. Any exposure to cardiotoxic chemotherapy should be investigated and may require further tests, such as an ECHO. **Tests:** Consider ECG; others as indicated from H&P.
Neurological	Any Hx of stroke, Sz, carotid artery disease, or other neurologic disease should be evaluated and documented.
Endocrine	Any endocrine disease, such as diabetes, should be optimized in consultation with the patient's primary care physician or endocrinologist. Ask about recent corticosteroid use. **Tests:** Fasting blood sugar in the diabetic; others as indicated from H&P.
Gastrointestinal	Patients should have iv hydration if given a bowel prep.
Hematologic	Many patients will be anemic from chronic disease and malnutrition. Consider preop transfusion PRBC to ↑ Hct > 30%. **Tests:** CBC, PT, PTT
Laboratory	LFTs
Premedication	Consider midazolam 1–2 mg iv. Detailed explanation about the procedure and the potential for postop events including intubation and mechanical ventilation worthwhile.

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Intraoperative

Anesthetic technique: GETA ± supplemental epidural anesthesia.

General anesthesia:

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Induction	Standard induction (p. B-2), unless otherwise indicated by patient condition. Keep in mind possibility surgery could be significantly shortened if metastatic tumor found during initial ex lap.	
Maintenance	Balanced anesthetic technique based on comorbidities, use of concomitant epidural anesthesia and likelihood of needing ICU postop. Epidural anesthetic or epidural narcotic (morphine or hydromorphone) can be given to reduce anesthetic requirements when using inhalation agents.	
Emergence	If patient is hemodynamically stable, with favorable oxygenation and pulmonary function, normothermic, and responsive at the end of surgery, extubation may be appropriate. Any patient who is unstable, hypothermic, has high-oxygen requirements, significant edema of the face or airway, or ongoing excessive fluid requirements should be admitted to ICU and remain intubated. Due to the large fluid shifts and significant complication rates, postop monitoring in the ICU is appropriate.	
Epidural	Consider epidural for intraop and/or postop use: 2% lidocaine (10–15 mL), with or without hydromorphone (0.3–0.8 mg), may be given in the epidural for postop pain control. Intraop use may ↑ hemodynamic instability in setting of ↑ bleeding and fluid shifts. Post op efficacy may be limited if patient remains intubated > 1 day.	
Ventilation	5–7 cm H_2O PEEP may help prevent atelectasis.	ABGs during surgery. Adjust ventilation to keep normocarbic. Give HCO_3 for metabolic acidosis when pH < 7.20 and treat underlying cause.
Blood and fluid requirements	Potential large blood loss IV: 14–16 ga × 2 NS/LR at 10–15 mL/kg/h Colloid solutions	Renal ultrafiltration improved by NS/LR, bowel edema ↑'d. LR useful when acidosis occurs. NS is better when giving blood products or when metabolic alkalosis is present. Rapid-infuser should be available. Strive to maintain euvolemia based on BP, HR, UO, ABG, invasive monitoring (CVP, CO, art line tracing), and estimates of ongoing EBL and fluid shifts.
	Hetastarch Consider PRBCs when Hct < 30%	Use of 6% hetastarch should be limited to 1,000 mL due to potential coagulopathy with larger volumes.
	Maintain UO of 0.5–1 mL/kg/h.	Dopamine 2–3 mcg/kg/min may be used to maintain UO.
	Ionized Ca^{++}	Measure ionized Ca^{++} and K^+ after rapid administration of blood products; replace Ca^{++} as necessary.
	FFP/Plt	Plt or FFP for coagulation abnormalities. Monitor values during case periodically.
Monitoring	Standard monitors (see p. B-1). ± Arterial line Consider CVP/PA catheter Foley catheter	Invasive hemodynamic monitoring with arterial and PA catheters usually helpful in these cases which are of very long duration, and associated with major bleeding, fluid shifts, ICU postop, and potential need for vasoactive infusions.
	± TEE	TEE allows intraop assessment of myocardial function and may be appropriate in selected patients.
Positioning	and pad pressure points eyes Antiembolism stockings and SCD	* **NB:** peroneal nerve compression at lateral fibular head → foot drop.
Complications	Hypothermia	Use forced air and fluid warmers and monitor temperature.
	VTE Coagulopathy	See Appendix B.
	Trauma to kidney	Watch for hematuria or ↓UO.

	Bleeding	Monitor hemoglobin and coagulation status periodically during long surgery. Keep adequate reserve blood products available.
	Peripheral nerve injury	Prolonged surgery, carefully pad, secure, and monitor all extremities.

(Print pagebreak 772)

Postoperative

Complications	Bleeding	Hct and coags periodically. Be prepared for continued increased fluid requirements for 24 h postop.
	Fluid overload Hypothermia	Maintain euvolemia, if significant fluid gain occurs, consider ICU postop ventilation.
	PONV	If extubated. See p. B-6.
	VTE	See p. B-7.
	Peripheral nerve injury	For prolonged surgery, carefully pad, secure, and monitor all extremities.
Pain management	Epidural or iv opiates	See p. C-2.
Tests	CBC, chemistry panel, coags, ABG	Others as indicated from postoperative course. Patient will likely need ongoing critical care/ICU management.

Suggested Readings

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Exploratory Laparotomy, Hysterectomy/BSO for Uterine Cancer

Surgical Consideration

Description: Currently, endometrial cancer is the most common gynecologic malignancy in the United States. The first step in the management of this cancer is an **exploratory laparotomy,** concurrent with a **hysterectomy.** The objective, aside from 1° therapy, is to obtain as much surgical and pathological staging data as feasible for determination of adjuvant postop therapy. Careful exploration is carried out for evidence of omental, liver, peritoneal, and adnexal metastases. Aortic and pelvic areas are palpated for metastases, and suspicious nodes are removed. In patients with low grade histology and no or minimal suspected invasion, complete lymph node dissection remains an area of controversy and treatment is generally individualized based on clinicopathologic factors. In patients with more extensive disease, a pelvic and periaortic lymph nodes dissection is performed. The lymph node sampling may be omitted in the treatment of some uterine sarcomas. A **total hysterectomy** with **BSO** is then performed in the usual manner (see discussion of TAH/BSO in Staging Laparotomy for Ovarian Cancer, p. 746).

Variant procedure or approaches: A combined **laparoscopically assisted vaginal hysterectomy and BSO,** as well as laparoscopic pelvic and paraaortic node sampling, is appropriate in selected patients and is being performed with increasing frequency. The GOG conducted a randomized prospective study evaluating exploratory laparotomy with open staging versus laparoscopic staging (GOG LAP2) to compare outcomes and safety. Although results of this large prospective study are currently pending, retrospective studies have reported similar outcomes. The benefits of this approach are shorter hospital stay and convalescence and decreased postop pain. Adhesions of variable severity may be present from prior surgery or radiation. Care should be taken to avoid possible bowel injury at time of trocar insertion. Patient needs to be in steep Trendelenburg position for duration of the procedure; and both arms should be tucked in at the patient's sides. Because argon is a heavy gas, prolonged use of the endoscopic ABC in a patient in steep Trendelenburg can → significant facial and neck subcutaneous emphysema. As with the open technique, the lymph nodes being removed are in the immediate proximity of the great pelvic vessels. The surgeon and anesthesiologist should be mindful of the potential for severe hemorrhage if these vessels are injured.

Usual preop diagnosis: Endometrial carcinoma

Summary of Procedures

	Open Technique	Laparoscopic Technique
Position	Supine	Modified dorsolithotomy in Allen stirrups
Incision	Midline longitudinal abdominal/transverse	Vertical infraumbilical and multiple small transverse incisions
Special instrumentation	None	Videolaparoscopy equipment. Endoscopic GIA staplers, endoscopic ABC, endoscopic vascular clips, and CO_2 laser
Unique considerations	None	Mechanical bowel preop; steep Trendelenburg
Antibiotics	Cefotetan 2 g iv	
Surgical time	2–4 h	2–3 h
Closing considerations	NG tube placement	Release the pneumoperitoneum completely. Closure of fascia at trocar sites ≥ 10 mm diameter
EBL	400–750 mL	100–500 mL
Postop care	Consider using SCDs and minidose heparin for DVT prophylaxis.	Begin early ambulation and feeding. Patients generally can be discharged on POD 1 or 2.
Mortality	0.1%	0.3–3%
	Hemorrhage requiring transfusion: 15% Thrombophlebitis: 7% UTI: 7%	1–2% Rare

Morbidity	Paralytic ileus: 2–5% Wound infection: 3% PE: 1–2% Pelvic infection: 1.5% Wound dehiscence: 1% Bowel injuries: < 1% Urinary tract injuries: < 1%	N/A 1.1% 0.3–3% Trocar site herniation: 0.5–2% Trocar site tumor: 1.6% (estimated)
Pain score	7	2–3

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Patient Population Characteristics

Age range	Reproductive and postreproductive ages (average = 61 yr)
Incidence	70–80/100,000
Etiology	Exposure to unopposed endogenous or exogenous estrogen; ↑ extraglandular conversion of androstenedione to estrone; sequential oral contraceptive pills; exposure to radiation (sarcomas)
Associated conditions	Obesity; diabetes; HTN; nulliparity; late menopause; early menarche; family Hx; Stein-Leventhal syndrome; chronic anovulation; ovarian and colon cancer; granulosa cell ovarian tumors; arthritis; hypothyroidism

Anesthetic Considerations

Preoperative

Endometrial cancer usually is diagnosed in postmenopausal women who present with vaginal bleeding. Exploratory laparotomy and TAH/BSO are commonly performed for removal of the primary tumor as well as staging of metastatic disease. Occasionally, preop radiation therapy may be in progress, with consequent systemic effects.

Respiratory	for Hx of lung disease or smoking. **Tests:** Others as indicated from H&P.
Cardiovascular	Hx of CAD, HTN, or CHF Sx (e.g., angina, dyspnea, or peripheral edema) should be investigated. Assess patient's exercise tolerance and current medications. Tests such as an exercise treadmill or ECHO may be indicated if patient has significant angina or CHF. **Tests:** Patients > 50 yr should have a preop ECG.
Neurological	Seldom a significant problem unless there is Hx of cerebrovascular disease, Sz, or other neurologic disease.
Endocrine	Inquire about the presence of endocrine diseases, such as diabetes and hypothyroidism, which have been associated with this tumor. If the patient has received corticosteroids within the previous 6 mo, a supplemental dose of hydrocortisone (100 mg iv q 12 h × 2 d) should be considered. **Tests:** Consider tests if indicated from H&P.
Neuromuscular	Osteoarthritis and osteoporosis common in this patient population. Ask about NSAID usage.
Hematologic	If vaginal bleeding has been profuse or of long duration, significant anemia may occur. Consider preop iron supplements if there are several days until surgery. **Tests:** CBC

Laboratory	LFTs
Premedication	Consider anxiolytic, such as midazolam 1–2 mg iv. Discuss anesthetic plan and options for postop pain management with patient.

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Intraoperative

Anesthetic technique: GETA ± epidural or spinal analgesia/anesthesia. In unusual circumstances (e.g., severe lung disease), surgery may be done under spinal or epidural anesthesia only.

General anesthesia:

Induction	Standard induction (p. B-2)
Maintenance	Standard maintenance (p. B-1).
Emergence	Reverse muscle relaxant with neostigmine (0.07 mg/kg with glycopyrrolate 0.01 mg/kg). Provide supplemental O_2 until patient is fully recovered from anesthesia. Consider PONV prophylaxis (e.g., ondansetron 4 mg iv).

Regional anesthesia:

Epidural	2% lidocaine (10–20 mL), ± epinephrine 1:200,000, or 0.25% bupivacaine (15–20 mL) is used; then at 3–5 mL/h. Narcotics, such as morphine (2–4 mg) or hydromorphone (0.3–0.6 mg), may be given in the epidural for postop pain control.	
Spinal	Tetracaine (12–14 mg) ± preservative-free morphine (0.3–0.5 mg). Sensory level T5.	
Blood and fluid requirements	IV: 16–18 ga × 1 NS/LR at 4–6 mL/kg/h Consider PRBC for Hct < 25%	Crystalloid is used for volume replacement. If anemia is present preop, it may be necessary to give PRBCs to keep Hct > 25%.
Monitoring	Standard monitors (p. B-1) Foley catheter ± Arterial line, CVP NG tube	Direct monitoring of arterial pressure is indicated in patients with CAD, severe HTN, or lung disease. Consider art line and/or CVP if significant comorbidities exist.
Positioning	and pad pressure points eyes Antiembolism stockings and SCD	
Complications	Hypothermia	Warm iv fluids; use forced-air warmer. Heating pad on OR table.
	Trauma or obstruction of ureter	Watch for hematuria or ↓ UO.

Postoperative

Complications	PONV	See p. B-6
	VTE	See p. B-7
	Hypothermia	
	Bleeding	
Pain management	PCA (p. C-3) Epidural/spinal narcotics (p. C-2)	Ketorolac (30 mg im/iv) is useful for breakthrough pain. A multimodal approach—including local anesthetics, NSAIDs or acetaminophen, or even low-dose (0.1–0.2 mg/kg/h) ketamine—in the OR may provide analgesia and ↓ PONV.

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Radical Hysterectomy

Surgical Considerations

Description: Radical hysterectomy is the preferred mode of therapy for young women with Stage IA, IB, or nonbulky IIA cervical carcinoma, who want to preserve ovarian function. It is also appropriate with Stage II endometrial and Stage I vaginal carcinoma. The operation involves the removal of the uterus, along with the upper vagina and all the parametrial tissues to the pelvic sidewall. A pelvic and paraaortic **lymph node dissection** usually is performed at the beginning of the procedure. Suspicious nodes are submitted for pathological frozen-section evaluation. The paravesical and pararectal spaces are then developed, with the ‘web’ of tissue between these two spaces being palpated carefully (Fig. 8.1-9). If parametrial tumor extension is noted and/or the lymph nodes are positive on frozen section, the hysterectomy may be aborted. The radical hysterectomy is performed after the pararectal and paravesical spaces have been developed. The uterine arteries are divided at their origin from the anterior division of the internal iliac artery. The ureters are dissected free of the parametrial tissues, which are then transected close to the pelvic sidewall. Next, the rectovaginal space is developed (Fig. 8.1-10). The uterosacral ligaments are transected between their uterine and sacral attachments. The upper third of the vagina is cross-clamped and divided in such a manner as to provide a 3 cm margin, and the specimen is delivered en bloc. Note that, during this procedure, the ureters and bladder are dissected free and left intact.

In reproductive-age women, who may require postop radiotherapy, ovarian function is preserved by performing an **oophoropexy.** This is accomplished by severing the uteroovarian ligament and mobilizing the ovarian vessels as they course through the infundibulopelvic ligament. The ovaries are then sutured outside the radiation therapy field and marked with metal clips for future identification.

Variant procedure or approaches: Stallworthy, Dolstad, Novak, Rutledge, Wertheim, and other surgeons have proposed several modifications in an effort to reduce the incidence of ureteral and bladder fistulae. These approaches include preservation of blood supply to the terminal 2 cm of the pelvic ureter by widely displacing ureters (not dissecting them from their fascial beds) and limiting parametrial dissection to the proximal 1/3 or 1/2.

Usual preop diagnosis: Stage IA, IB, or nonbulky IIA cervical carcinoma; Stage II endometrial or Stage I vaginal carcinoma (less common)

Summary of Procedures

Position	Supine/modified lithotomy
Incision	Midline longitudinal or low transverse abdominal (Maylard/Cherney)
Special instrumentation	ABC, Vital View (suction, irrigation, and light source combined in 1 instrument) helpful
Unique considerations	Abort case if positive paraaortic lymph nodes found on frozen section, or if obvious parametrial involvement noted. Consider intraop radiation therapy (investigational), if patient is inoperable.
Antibiotics	Cefotetan 2 g iv; then q 12 h × 2 doses
Surgical time	3–6 h
Closing considerations	Vaginal and abdominal drains; NG tube placement; suprapubic bladder catheter placement; oophoropexy; copious irrigation
EBL	500–1500 mL
Postop care	Transient ileus very common. Advance diet slowly. Transient bladder dysfunction very common; therefore, continued bladder drainage for 1+ wk may be necessary. Consider using SCDs and minidose heparin for DVT prophylaxis.
Mortality	0.3–2.0%
Morbidity	Paralytic ileus: 3–11% Pelvic lymphocyst: 6.4% Intraop hemorrhage: 5.6% Thrombophlebitis: 5% Pneumonia: 1.5–4% Wound infection: 3.5% Vesical injury: 2–3.5% Pelvic infection: 2.2% PE: 2.2% Vesical fistulae: 1.8% Small bowel obstruction: 1.5% Ureteral fistulae: 1.1% Ureteral injury: 1.1% Wound dehiscence: 1% Postop lymphedema: < 1% Rectal injury: < 1% Pelvic urinoma: Rare
Pain score	8

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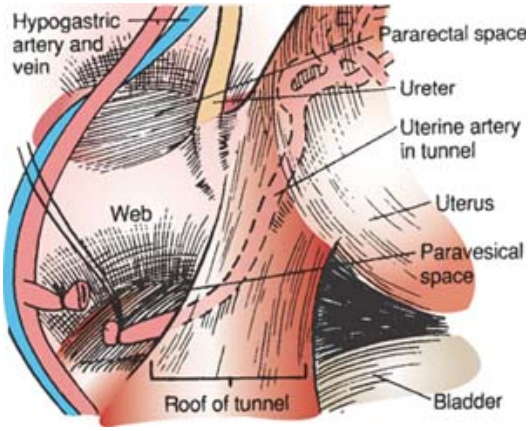

Figure 8.1-9. 9. View of parametrial area, showing positions of ureter and uterine artery to web, hypergastric vessels, paravesical, and pararectal spaces. (Reproduced with permission from Wheeless CR: *Atlas of Pelvic Surgery.* Williams & Wilkins: 1997.)

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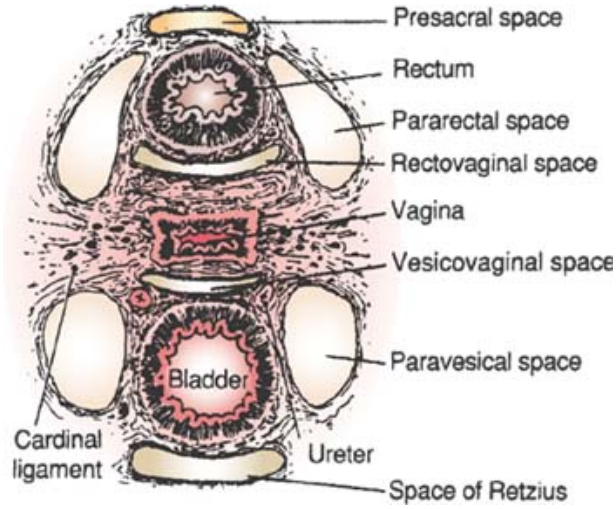

Figure 8.1-10. 10. Schematic diagram of a cut in the anteroposterior plane with positions of all spaces in relation to pelvic organs. (Reproduced with permission from Wheeless CR: *Atlas of Pelvic Surgery.* Williams & Wilkins, 1997.)

Patient Population Characteristics

Age range	Reproductive and postreproductive years
Incidence	10/100,000
Etiology	Human papilloma virus (HPV), subtypes 16, 18 (most common), and others
Associated conditions	Smoking; venereal warts; genital herpes; multiple sexual partners; early-age onset of coitus; multiparity; lower socioeconomic status; HIV infection

Anesthetic Considerations

Preoperative

This surgery usually is performed for cervical carcinoma in young women who wish to preserve ovarian function, and whose tumor has not spread beyond local invasion. Lymph nodes are removed to confer a therapeutic advantage and to plan postop adjuvant

therapy, if any.

Respiratory	These tumors have been associated with cigarette smoking.	for preexisting lung disease.
Cardiovascular	**Tests:** As indicated from H&P Patients > 50 yr need a preop ECG.	
Hematologic	**Tests:** As indicated fro m H&P NSAID usage in the previous week.	
Laboratory	**Tests:** Hemogram Renal panel if age ≥ 65 yr, HTN, renal disease, DM	
Premedication	Consider midazolam 1–2 mg iv	

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Intraoperative

Anesthetic technique: GETA ± epidural or spinal analgesia for postop pain control.

Induction	Standard induction (p. B-2)	
Maintenance	Standard maintenance (p. B-2)	
Emergence	No special considerations	
Blood and fluid requirements	500–1500 mL IV: 16–18 ga × 1–2 NS/LR at 6–8 mL/kg/h Maintain UO > 0.5 mL/kg/h Warm iv fluids	Good iv access is necessary to deal with potential for bleeding. A lymph node dissection will ↑ 3rd space losses and should be accounted for in fluid management. Fluid requirements generally are increased by a functioning epidural catheter 2° vasodilation. Maintain euvolemia based on HR, BP, UO, invasive monitoring, ABG, and estimates of ongoing blood loss and fluid shifts.
Monitoring	Standard monitors (p. B-1) Foley catheter ± CVP catheter ± Arterial catheter	Invasive monitoring is indicated for patients with underlying cardiopulmonary disease, advanced age, or in cases of large anticipated or unanticipated blood loss.
Positioning	and pad pressure points eyes Antiembolism stockings and SCD	
Complications	Injury to ureters Hypothermia	Watch for hematuria or ↓ UO. Warm iv fluids; use forced-air warmer.

Postoperative

Complications	Atelectasis Hypothermia Bleeding	Give supplemental O_2postop. Encourage use of incentive spirometer.
	VTE	See p. B-6
	PONV	See p. B-7
Pain management	PCA (p. C-3) Epidural or spinal narcotics (p. C-2)	Consider ketorolac 15–30 mg im/iv q 8 h for breakthrough pain.

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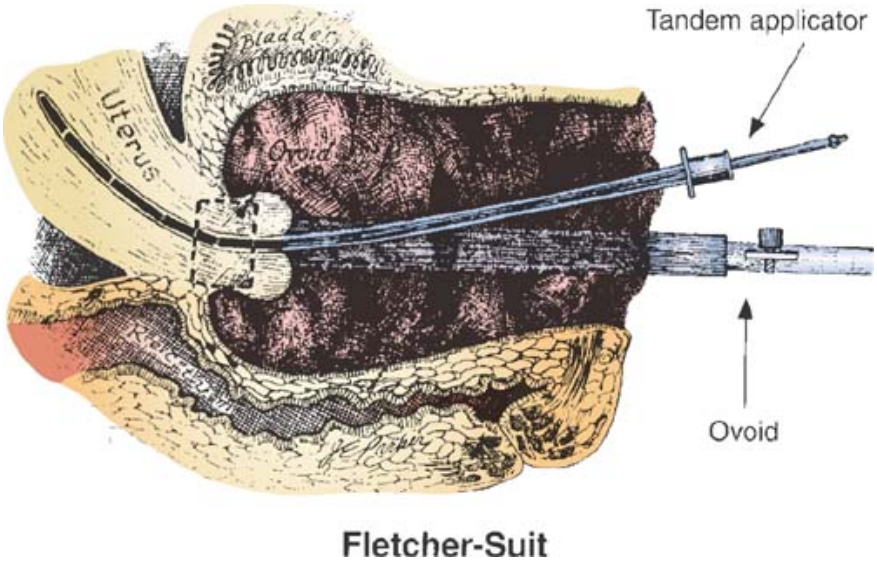

Figure 8.1-11. 11. 'Fletcher-Suit.' The tandem and ovoid applicators are packed into the vagina, leaving the maximum distance between the bladder and radium sources. (Reproduced with permission from Wheeless CR: *Atlas of Pelvic Surgery.* Williams & Wilkins, 1997.)

Interstitial Perineal Implants

Surgical Considerations

Description: Radiotherapy
is the treatment of choice for International Federation of Gynecology and Obstetrics (FIGO) Stage IIB-IVA carcinoma of the cervix; Stage I, II, III, and IVA vaginal cancers; selected vulvar cancers; and pelvic recurrences of gynecologic cancers. Often, **external-beam therapy** is combined with **brachytherapy,** either in the form of **intracavitary insertion** or as an **interstitial perineal template implant.** Intracavitary radiotherapy utilizes devices such as **Fletcher-Suit** tandem and ovoid applicators (Fig. 8.1-11) or cylinders that are fitted into the vagina and provide a therapeutic boost to the vaginal apex region after external beam irradiation. In general, these devices do not require a laparotomy or laparoscopy for guidance. For selected patients with distorted anatomy and/or bulky tumors, interstitial implants provide superior dose distribution and better local tumor control. The two most widely used systems are the **Martinez Universal Perineal Interstitial Template (MUPIT)** and the **Syed-Neblett applicator.** These systems have similar efficacy and both are performed in the OR with the patient under local or GA. A **laparotomy** is frequently performed at the time of interstitial implant placement to accurately guide the needles into their target tissues and to avoid radiation injury to bowel and/or other pelvic organs not involved with tumor. To minimize postop patient discomfort, some centers use **laparoscopy** instead of laparotomy for needle guidance. A two-team approach is used: a gynecologic oncology team performs the laparotomy or laparoscopy and guides the needles from above; a radiation oncology team inserts the implants from below. The implants are afterloaded with the appropriate radiation sources when the patient has returned to her shielded room. If a hysterectomy has been done previously, an omental pelvic carpet, or a pelvic lid made of delayed, absorbable mesh, is performed to provide additional space between the radiation source and bowel.

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Usual preop diagnosis: Cervical, vaginal, vulvar carcinomas; pelvic recurrence of gynecologic malignancies

Summary of Procedures

	Laparotomy-Guided	Laparoscopy-Guided
Position	Modified dorsolithotomy; Allen stirrups	
Incision	Midline longitudinal abdominal	Vertical infraumbilical and multiple small transverse incisions at the pubic hairline
Special instrumentation	Syed-Neblett or MUPIT systems, or modifications thereof	+ videolaparoscopy equipment, preferably with a 3-chip camera
Unique considerations	MRI and/or CT scans + information from physical exam are used to preplan implant with a computer dosimetry program. Patients require thorough preop mechanical and antibiotic bowel prep. Preop epidural placement or postop PCA (see p. C-3) may prove helpful for pain control. Foley catheter needs to be inserted through an opening at the top of the clear plastic template prior to implant positioning.	+ Adhesions of variable severity may be present from prior surgery or radiation. Care should be taken to avoid possible bowel injury at time of trocar insertion. Patient needs to be in steep Trendelenburg position for duration of procedure.
Antibiotics	Cefotetan 2 g iv; then q 12 h × 3 doses	
Surgical time	1.5–3 h	
EBL	150–350 mL	Minimal
Closing considerations	Suture template to perineum. Perform rectal exam and adjust any needles that are too close to, or have protruded through, the rectal mucosa. Pack any space between template and perineum with Vaseline gauze. Obtain A-P and lateral orthogonal localization films with the patient in the supine bed-rest position. Insert Hypaque dye into Foley catheter balloon before localization films. Consider insertion of a large Foley into the rectum, and attach to a drainage bag. Consider NG tube placement.	+ Release the pneumoperitoneum completely. Consider insertion of 1 L heparinized LR to cause the bowel to float and remain mobile, thus minimizing the risk of radiation injury.
Postop care	Patient is confined to bed while interstitial implants are in place. SCDs and minidose heparin for DVT prophylaxis. Vigorous use of incentive spirometry. Consider constipating medications (e.g., Lomotil). Patient must be placed in a shielded room. Visitors and medical personnel should interact with patient from behind a lead shield until radiation sources have been removed.	
Mortality	0.1–0.3%	
Morbidity	Hemorrhagic proctitis with diarrhea and tenesmus: 7–18% Radiation cystitis: 7–10% Cervical necrosis: 5–6% Rectovaginal fistula: < 5% Vesicovaginal fistula: < 5% Vaginal vault necrosis: 3–5%	

	Rectal fibrosis: 2–5% Pelvic infection: 2–3%	
Pain score	8–9	8–9

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Patient Population Characteristics

Age range	Reproductive and postreproductive yr; childhood—rare
Etiology	Cervical, vaginal, or vulvar carcinomas; pelvic recurrence of gynecologic malignancies

(Print pagebreak 782)

Anesthetic Considerations

Preoperative

Radiation implants are used for palliation or cure in cervical, endometrial, and ovarian cancer. The implants concentrate the radiation close to the site of the tumor and may be supplemented by external beam radiation. The unusual tolerance of the uterus and vagina to radiation permits large doses to be given, and accounts for the success in treating cervical lesions. The sigmoid, rectum, and large bowel are much more sensitive to radiation injury, limiting the dose of radiation that may be given to the pelvis.

Respiratory	Usually not significant unless underlying lung disease is present.
Cardiovascular	Many patients with pelvic tumors are elderly and prone to cardiovascular disease. **Tests:** ECG if age ≥ 50; others as indicated from H&P.
Hematologic	**Tests:** CBC, consider PT/PTT if at risk for coagulopathy
Laboratory	Renal panel
Premedication	Consider midazolam 1–2 mg iv

Intraoperative

Anesthetic technique: Regional or GA, depending on site involved. A postop epidural is useful for pain management.

Induction	Standard induction (see p. B-2).
Maintenance	Standard maintenance (see p. B-2).
Emergence	Consider PONV prophylaxis (see p. B-6)
Blood and fluid requirements	Small blood loss IV: 18–20 ga × 1 NS/LR at 2–4 mL/kg/h
Monitoring	Standard monitors (see p. B-1).
Positioning	May be necessary to keep patient motionless during implant insertion. and pad pressure points. eyes. Antiembolism stockings and SCD.

Postoperative

Pain management	Epidural narcotics (see p. C-2). PCA (see p. C-3).	Consider ketorolac 15–30 mg im/iv q 6 h for breakthrough pain. Implants are associated with significant discomfort.

Suggested Readings

1. DiSaia PJ: Radiation therapy in gynecology. In *Obstetrics and Gynecology,* 8th edition. Scott JR, DiSaia PJ, Hammond CB, Spellacy WN, eds. Lippincott-Raven, Philadelphia: 1999, 909–26.

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Laparoscopic Surgery in Gynecologic Oncology

Surgical Considerations

Description: With the advent of minimally invasive laparoscopic techniques and instrumentation, the role of laparoscopic procedures in gynecologic cancer treatment continues to be actively defined. The potential advantages of a laparoscopic approach include a shorter hospital stay, better pain control, faster recovery time, ↓ morbidity, and cosmetically appealing smaller incision. There is an acceptable complication rate; however, questions with regard to safety of use in malignant diseases, → operative time, and cost remain to be studied. The authors believe that there is a role for laparoscopy in select situations, such as:

- Second-look evaluation for ovarian cancer;
- Assessment of adnexal masses and diagnosis of ovarian cancer;
- Laparoscopic lymphadenectomy with laparoscopically assisted vaginal hysterectomy or laparoscopic hysterectomy in staging of endometrial cancer;
- Laparoscopically assisted radical vaginal hysterectomy or laparoscopic radical hysterectomy with lymphadenectomy in early-stage cervical cancer; and
- Laparoscopically assisted application of interstitial brachytherapy implants.

Details of each of these procedures are beyond the scope of this section; however, common principles of laparoscopic techniques (e.g., adhesiolysis, biopsies, oophorectomy, omentectomy) apply (see discussion in Laparoscopic Procedures for Gynecologic Surgery, p. 854). The patient is placed in the dorsal lithotomy position, with the buttocks extended over the edge of the table to allow for instrument manipulation, and may need to be placed in steep Trendelenburg position during surgery. Various techniques are used for entry into the abdominal cavity, but the open laparoscopic technique is favored by many and may ↓ risk of vascular or visceral injuries. Other incision-related complications include dehiscence and hernia.

Usual preop diagnosis: Ovarian tumor and other gynecological cancers/tumors

Summary of Procedures

Position	Dorsal lithotomy; legs in Allen universal stirrups; steep Trendelenburg
Incisions	Intraumbilical; bilateral suprapubic; midline suprapubic
Special instrumentation	CO_2 laser; bipolar Kleppinger forceps; suction irrigator; may require Harmonic Scalpel; various laparoscopic stapling instruments
Unique considerations	Extended operative time and period of abdominal insufflation for radical procedures. Possible rapid need for laparotomy. Extensive use of electrocautery, ABC, CO_2 laser
Antibiotics	Cefazolin 1 g or cefotetan 2 g iv
Surgical time	1.5–5 h
Closing considerations	Quicker than with laparotomy; but fascia of all 10- to 12-mm ports need to be closed. Five mm trocar sites can be closed in a subcuticular fashion.
EBL	50–1500 mL, depending on extent of procedure
Postop care	Clear liquid diet; ambulate POD 1
Mortality	4.4/100,000
Morbidity	Overall complication rate: 0.2–10.3% Conversion to laparotomy: 2.1–7% Port-site metastasis: < 1% Subcutaneous emphysema: 0.3–2% Pneumomediastinum: 0.26% Brachial plexus neuropathy: 0.16% Incisional hernia: 0.06–1% Visceral injury: 0.06–0.5% Major vascular injury: 0.04–0.08% Bladder/ureteral injury: 0.02–1.7% Gas embolism: 0.0014% Wound infection: Uncommon
Pain score	3–4

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Patient Population Characteristics

Age range	Reproductive and postreproductive yr
Incidence	Depends on primary disease
Etiology	Numerous, depending on primary disease (see appropriate sections earlier in this chapter).
Associated conditions	See specific procedures in this chapter.

Anesthetic Considerations

See Anesthetic Considerations for Laparoscopic Hysterectomy, p. 854.

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