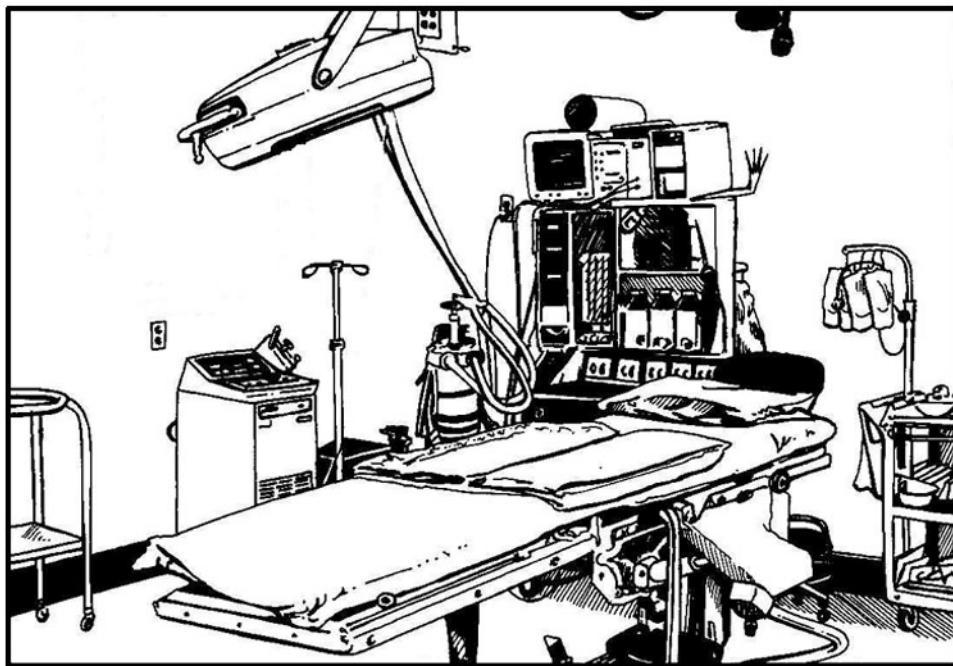


CDC B4N151

Surgical Service Journeyman, Part II

Volume 3. Surgical Specialties



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THIS VOLUME of CDC B 4N151, *Surgical Service Journeyman*, provides you with the basic knowledge of the surgical specialties. Much of your daily work activities will be spent assisting the surgeon during the procedures outlined in this volume, so this knowledge will be useful to you now and throughout your Air Force career.

Unit 1 of this volume covers general surgery. Unit 2 covers obstetrics and gynecology. Unit 3 covers orthopedics. Unit 4 covers urology. Unit 5 covers ophthalmology, otolaryngology, and oral surgery. Unit 6 covers plastic and neurosurgery. Unit 7 covers cardiovascular and thoracic surgery.

All units cover common preoperative preparations, skin preparations, instrumentation, and surgical procedures.

A glossary of terms used in this course is included at the end of this volume.

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This volume is valued at 27 hours and 9 points.

NOTE:

In this volume, the subject matter is divided into self-contained units. A unit menu begins each unit, identifying the lesson headings and numbers. After reading the unit menu page and unit introduction, study the section, answer the self-test questions, and compare your answers with those given at the end of the unit. Then do the Unit Review Exercises (URE).

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Unit 1. General Surgery

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SOME OF THE MOST COMMON OPERATIVE PROCEDURES performed in Air Force operating rooms are general surgery procedures. These procedures are performed on many areas of the body and they can involve several of the body systems. The abdominal cavity and digestive system are the most prominent systems involved. In addition, abnormal conditions of the breast, rectum, and numerous superficial skin areas also require the attention of the general surgeon. This section does not attempt to cover all general surgical procedures, only to sample some of the more common ones.

We start by discussing basic procedural considerations. Then we look at the different incisional sites associated with abdominal surgery. Finally, we cover a few of the common operations associated with general surgery.

1–1. Fundamentals of General Surgery

In Career Development Course (CDC) 4N151A, we discussed preoperative nursing care of the patient. Principles relating to prepping, anesthesia, draping, and many of the sequences of the operation are those with which you are already familiar. In this unit, we look at considerations related specifically to general surgery.

401. Common preoperative and intraoperative practices

Every surgical procedure performed in the operating room will require some type of preoperative and intraoperative practice. This lesson will introduce you to some of the more common practices that you may need to apply before or during a surgical procedure.

Preoperative preparations

Frequently, the operation the surgeon performs depends on the tissue biopsy and frozen section report at the time of the operation. Operability of malignant lesions sometimes can only be determined after a thorough exploration of the affected area. Depending on the diagnosis obtained after the procedure begins, the circulating nurse must be ready with two draping and instrument setups. To eliminate excessive waiting time for the staff and patient, anticipated supplies and equipment must be readily available.

It is very important that the fluid and electrolyte balance are maintained before, during, and after surgery. A Foley catheter may be inserted (fig. 1–1), either preoperatively or after induction, to keep the bladder empty. A catheter also helps the anesthesia provider to monitor urine output and renal function. Keeping the bladder empty gives the surgeon more room to operate in the lower abdomen, and reduces the risk of accidentally damaging the bladder.

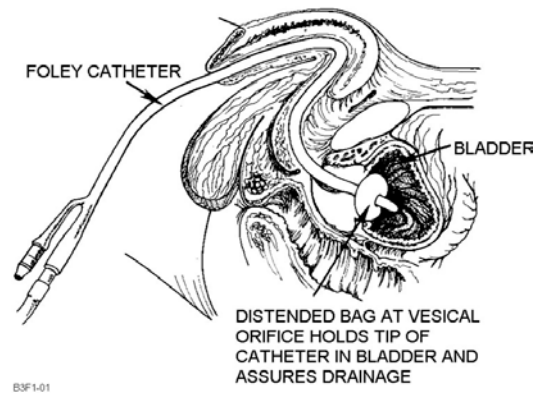


Figure 1-1. Foley catheter placement.

As in all operative procedures, use caution in positioning the patient to ensure the surgeon can gain maximum exposure without obstructing the circulatory, respiratory, or nervous system. We do not want the patient to return to surgery to correct a problem caused by negligence of the operating room team!

Intraoperative practices

It's important to remember that once the abdominal cavity is entered, *all 4 × 8 radiopaque sponges should be immediately removed from the operative site*. They should only be used folded and secured on a sponge stick. Moist laparotomy (lap) sponges should be used in the abdominal cavity. You should ensure that suction is available and ready for use before the peritoneum is entered—in case the abdomen is filled with an excessive amount of fluid.

The alimentary canal is home for many microorganisms capable of producing infection if allowed to be exposed to other body tissues. For this reason, the general surgeon must use extra care when operating on this system. Every effort is made to prevent gastrointestinal contents from leaking into the peritoneal cavity. The surgeon may use moist lap sponges as “packs” to wall-off and isolate the operative area to prevent contamination of other structures and areas in the peritoneal cavity.

Irrigating solutions should be warm (preferably body temperature). Generally, normal saline is used for moistening laps and irrigation. Sterile distilled water is occasionally used in cases of suspected malignancy because of its hypotonic properties—but this is very rare. *All solutions on the sterile field must be clearly labeled to avoid any error in administration*. The surgeon may want to irrigate the wound prior to closure to remove any debris and blood clots. Keep close track of how much irrigation you give to the surgeon, and report it to the anesthesia provider, either when asked or near the end of the procedure, to help monitor blood loss.

Retention sutures may be used to reinforce large abdominal incisions. Assorted drains, tubes, drainage bags, and wound-suction apparatus should be on hand. The surgeon may insert a drain through the incision or stab wound in the adjacent abdominal wall prior to closing the incision.

If it is sometimes difficult to make distinctions about the anatomical limits of this specialty, remember that the extent of the disease process may dictate these limits. For instance, if a general surgeon explores the abdominal cavity to correct an intestinal obstruction, and finds the cause is a mass that is adhered to a fallopian tube and ovary, the general surgeon may elect to bring in an obstetric and gynecological (OB/GYN) surgeon for consultation. However, the general surgeon is not obligated to consult; the general surgeon is capable of and permitted to remove the mass. If the surgeon does elect to consult, the assistance may be in the form of advice or actually physically assisting during the surgical procedure.

402. Abdominal incisions

There are many different types of incisions that can be made when a surgeon needs to operate on a patient's abdomen. The exact position of the incision is determined before the surgeon starts the operation. When exposing the abdominal cavity, first the skin and subcutaneous tissue are incised and blood vessels ligated. Next the anterior fascia is incised and each muscle layer is divided and/or separated with bleeding vessels ligated. Next, the posterior fascia and peritoneum are incised; thus exposing the contents of the abdominal cavity. The surgeon tries to choose an incision that will provide maximum exposure, minimum trauma to the tissue, maximum postoperative wound strength, and the least postoperative discomfort and scarring.

There are two main factors that are considered when determining the incision type—location and direction. Incisions may be horizontal, vertical, or oblique in different areas of the torso. The following types of incisions are applicable to abdominal or pelvic operations.

Median (midline)

Figure 1-2 depicts a midline incision, the simplest abdominal incision used by general surgeons. It can be upper abdominal, lower abdominal, or a combination of both, going around the umbilicus. An upper midline incision begins in the epigastrium at the level of the xiphoid process downward to the level of the umbilicus. This incision provides excellent exposure of the upper abdomen and is quickly executed, but it is not a strong incision and may disrupt. An example of its use is for a gastrectomy. A lower midline incision begins at the umbilicus and extends downward to the suprapubic region. This incision provides exposure of pelvic organs and rapid entry, but lacks the strength of a paramedian incision. An example of its use is for an intestinal resection.

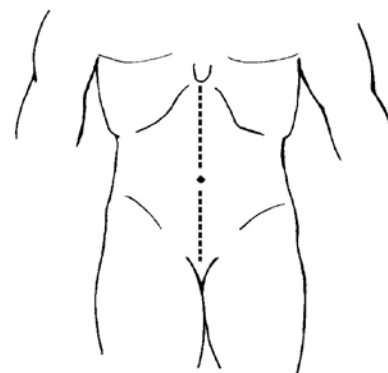


Figure 1-2. Abdominal incision—median (midline).

Paramedian

The paramedian incision (fig. 1-3) is a vertical incision approximately two inches to the right or left of the midline, in the upper or lower abdomen. This incision allows excellent exposure, limits trauma, avoids nerve damage, is easily extended, and gives a firm closure. A paramedian incision in the right upper quadrant could be used for operations on the biliary tract; an incision in the left upper quadrant for a hiatal hernia repair; an incision in the right lower quadrant for a small bowel resection; and, an incision in the left lower quadrant for a sigmoid colon resection.

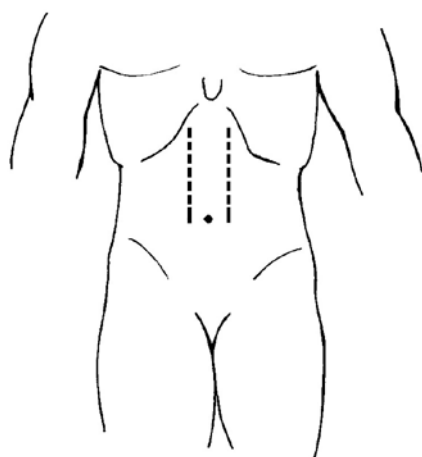


Figure 1-3. Abdominal incision—paramedian.

Subcostal

The subcostal incision, shown in figure 1-4, begins in the epigastrium, and extends laterally and

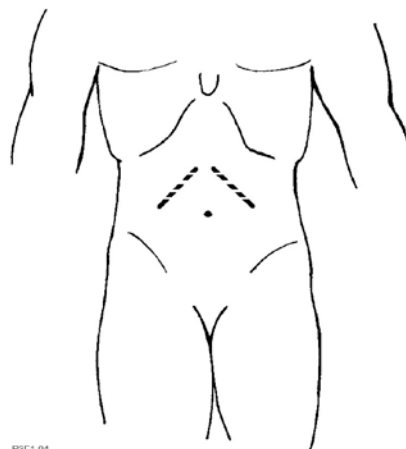


Figure 1-4. Abdominal incision—subcostal.

obliquely just below the lower costal margin. This incision offers limited exposure but cosmetically provides good results since it follows skin lines. Nerve damage is limited because only one or two nerves are cut. It is a strong incision postoperatively, but a

painful one because the rectus muscles are severed. Examples of its use are for a cholecystectomy on the right side and a splenectomy on the left side.

Inguinal

The inguinal incision (fig. 1-5) extends from pubic tubercle to the anterior crest of the ilium, slightly above and parallel to the left or right inguinal crease. This incision gives access to the inguinal canal and cord structures, and does not enter the abdomen. An example of its use is to repair an inguinal hernia.

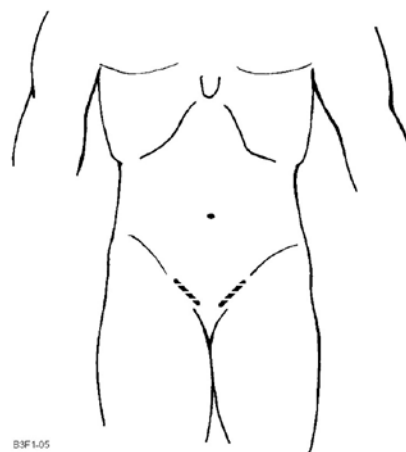


Figure 1-5. Abdominal incision—inguinal.

McBurney's

The McBurney's incision, shown in figure 1-6, extends obliquely from just below the umbilicus through McBurney's point upwards towards the right flank. This incision is called a *muscle splitting incision* because the muscle fibers are split manually, not cut. This incision is quickly executed and easy to close and allows a firm wound closure. However, it gives poor exposure and is difficult to extend. The McBurney's incision is almost exclusively used for an appendectomy.

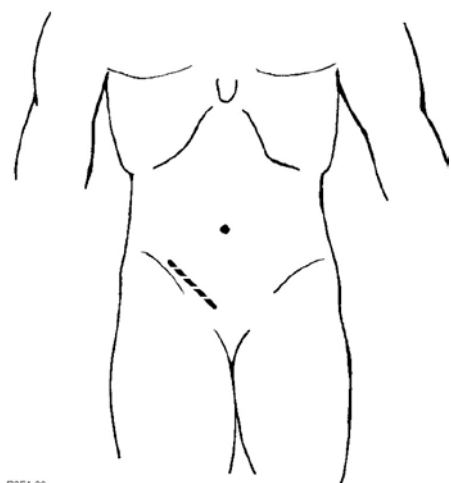


Figure 1-6. Abdominal incision—McBurney's.

muscle splitting incision because the muscle fibers are split manually, not cut. This incision is quickly executed and easy to close and allows a firm wound closure. However, it gives poor exposure and is difficult to extend. The McBurney's incision is almost exclusively used for an appendectomy.

Pfannenstiel's

The Pfannenstiel's incision (fig. 1-7) is a curved transverse incision across the lower abdomen within the hairline of the pubis. This incision provides good exposure and a strong closure for pelvic procedures; OB-GYN surgeons primarily use it. An example of its use is for an abdominal hysterectomy or cesarean section (C-Section).

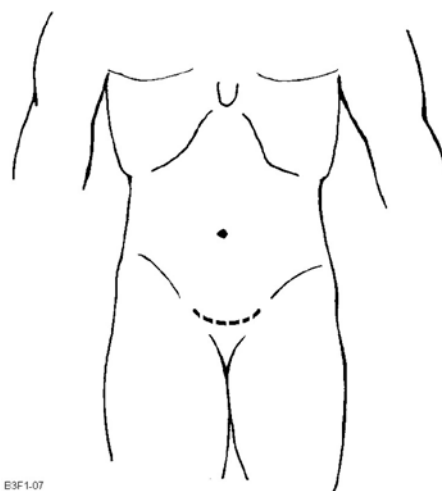


Figure 1-7. Abdominal incision—Pfannenstiel.

Thoraco-abdominal

The thoraco-abdominal incision, shown in figure 1-8, begins at a point midway between the xiphoid and umbilicus, extends across the abdomen to the seventh or eighth costal interspace, and goes along the interspace into the thorax. The rectus and oblique and intercostal muscles are divided in the line of incision down to the peritoneum and pleura. This converts the peritoneal and pleural cavity into one main cavity, allowing for excellent exposure of the upper stomach and lower end of the esophagus. An example of its use is for a hiatal hernia repair.

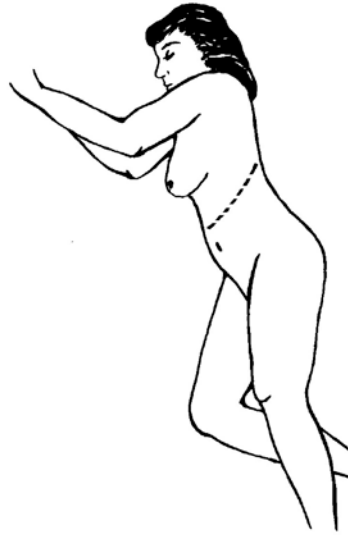


Figure 1-8. Abdominal incision—thoraco-abdominal.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

401. Common preoperative and intraoperative practices

1. What preoperative preparations must be taken by the circulating nurse during exploration of suspect malignant lesions to eliminate excessive waiting time for the staff?
2. List the purposes for inserting a Foley catheter.
3. Once the general surgeon enters the abdominal cavity, what should be done with all radiopaque sponges?
4. What measures can the surgeon take to prevent possible infection during operative techniques involving the alimentary canal?
5. What fluid is *routinely* used for moistening laps and irrigation?
6. Why are sterile distilled water used in cases of suspected malignancy instead of the usual irrigation fluid?
7. Why must you keep track of the amount of irrigation fluid given to the surgeon?

8. If a general surgeon discovers a mass that is adhered to a fallopian tube and ovary, what action may he or she take?

402. Abdominal incisions

1. List three steps the surgeon takes for an incision to expose the abdominal cavity.
2. What criteria does the surgeon use in choosing an incision?
3. What two major factors are considered when selecting the type of incisions?
4. Match each abdominal incision in column B with its description in column A. Items in column B may be used once.

Column A

- ____ (1) Is called a muscle splitting incision.
- ____ (2) Is made about 2 to 3 inches left or right of midline.
- ____ (3) Provides a strong closure for abdominal hysterectomy.
- ____ (4) Converts the peritoneal and pleural cavity into one main cavity.
- ____ (5) Begins in the epigastrium and extends laterally and obliquely.
- ____ (6) Is the general surgeon's simplest method of rapid pelvic exposure.
- ____ (7) Extends from the pubic tubercle to the anterior crest of the ilium.

Column B

- a. Subcostal.
- b. Thoracoabdominal.
- c. McBurney.
- d. Midline (median).
- e. Pfannenstiel.
- f. Inguinal.
- g. Paramedian.

1-2. Commonly Performed General Surgical Procedures

As stated previously, the field of general surgery encompasses many areas. In this section we look at the most common general surgical procedures performed in a number of Air Force medical facilities. The information given is only a basic guideline. Procedures may vary at your clinic, hospital, or deployed locations.

403. Major and general surgery procedures

In this lesson we cover a laparotomy, resection of the right half of the colon, removal of the gall bladder, and a pyloromyotomy. These are some of the more common major abdominal procedures performed in general surgery.

Abdominal laparotomy

An abdominal laparotomy is an opening made through the abdominal wall into the peritoneal cavity. If the laparotomy is performed for diagnostic reasons, then it is an exploratory laparotomy. If the diagnosis made during the exploratory laparotomy leads to further surgery, such as repair or removal of traumatized tissue or removal of an organ to cure a disease process, the operation is further described by the procedure performed. For example, if a motorcycle accident victim is operated on to determine the cause of internal bleeding, and during the exploratory laparotomy the surgeon reveals bleeding from the spleen requiring the spleen to be removed, the operation is called an "exploratory laparotomy with splenectomy."

Patient preparation

The patient is placed in the supine position with the arms at the side or extended on arm boards. The surgeon may request that a urinary catheter be inserted after the patient is anesthetized. The electrosurgical ground pad is placed on the anterior thigh in preparing for an abdominal laparotomy.

Skin preparation

The patient is shaved/clipped preoperatively from the nipple line to mid-thigh, bedside to bedside. After the incisional site is determined, begin the cleansing skin prep at this point, working outward. Prep from the nipples to the mid-thighs, and bedside to bedside. On female patients, the vaginal area may be indicated.

Draping

The patient is draped by using four hand towels, a base or foundation sheet (optional), and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following items:

- Blades.
- Sponges.
- Basin set.
- Suture material.
- Needle count pad.
- Major instrument set.
- Suction tubing and tip.
- Hemoclips and appliers.
- Electrosurgical handpiece.
- Self-retaining retractor (Balfour).
- Long instrument set (have available).

Procedure

After the patient is draped and the sterile field is established, the suction tubing and electrosurgical handpiece is secured to the field and tested. Two dry sponges are placed on each side of the incisional site to provide traction for making the skin incision. The skin incision is made using a number 10 (or 20) knife blade. This knife blade will be referred to as the “skin knife” and may be specifically designated only for use to further extend the skin incision or cut an area containing “dirty” tissue, such as the appendix. This depends on the surgeon’s preferences and local policies; some believe the skin knife carries bacteria from the skin into deeper layers of the body.

The skin incision exposes subcutaneous tissue that is incised with a “deep knife” or electrocautery handpiece. Blood vessels may be cauterized or clamped with Crile hemostats and ligated with absorbable suture. The fascia is incised next and the underlying muscles are retracted or transected. Before the peritoneum is entered, soiled sponges should be replaced with clean, saline-moistened ones. This should be done continuously throughout the operative procedure. If 4×8 radio-paque sponges were used prior to opening the peritoneum, they must be removed from the field immediately. The peritoneum is grasped with hemostats and exposed. The surgeon then nicks the peritoneum with the deep knife. A Metzenbaum scissor is then used to complete the peritoneal incision.

With the abdomen exposed (fig. 1–9), the surgeon may explore the area. Unsuspected disease processes in other areas are sometimes discovered by this means, and it is of value to know as much as possible about the intra-abdominal organs. Old abdominal adhesions may prevent a thorough exploration because they can prevent the surgeon’s hand from reaching all of the recesses of the abdominal cavity. Wound edges are protected with



Figure 1–9. Abdominal cavity exposed.

moistened sponges and retracted using a self-retaining retractor (i.e., Balfour), Deavers, and/or large Richardson retractors. The area of disease is located and the surgery is performed. The wound and/or peritoneal cavity may be irrigated with warm saline solution prior to closure of the abdomen. Drains may be inserted, often through stab wound incisions. All sponges and instruments are removed from the abdomen. The peritoneal edges are approximated using two tissue forceps or clamps. The peritoneum is closed with a continuous absorbable suture, swaged to a taper needle. The fascia is closed next. Since the fascia is the strongest layer of the abdominal wall and the integrity of the closure depends on its strength, interrupted sutures are normally used. This suture has a tapered or cutting needle, depending on the surgeon's preference. Retraction is necessary as the various layers are closed. The subcutaneous layer is closed next with interrupted absorbable sutures using fine tapered needles. Finally, the skin edges are grasped with Adson forceps and approximated with nonabsorbable interrupted silk or nylon on a cutting needle. Skin staples or clips may also be used. For infected procedures, the skin and subcutaneous tissues may be left open and drained. A dressing is placed over the wound, the drapes are removed, and tape is applied to the dressing.

Right hemicolectomy with anastomosis

A right hemicolectomy is the resection of the right half of the colon—including a portion of the transverse colon, ascending colon, and the cecum—and a segment of the terminal ileum and mesentery. An anastomosis is performed between the ileum and the transverse colon. This procedure is indicated when the diagnosis shows evidence of malignant lesions or inflammatory lesions involving the ileum, cecum, or ascending colon.

Patient preparation

The patient is placed in the supine position with the arms at the side or extended on arm boards. The surgeon may request that a urinary catheter be inserted. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the nipple line to mid-thigh, bedside to bedside. The cleansing skin prep begins at the incision site (right paramedian or midline) extending from the nipples to the mid-thighs, and bedside to bedside.

Draping

The patient is draped for a typical laparotomy.

Instrumentation

The basic instrumentation and supplies include the following objects:

- Blades.
- Sponges.
- Kitners.
- Basin set.
- Suture material.
- Needle counter pad.
- Long instrument set.
- Major instrument set.
- Suction tubing and tip.
- Automatic stapling devices.
- Gastrointestinal instruments.
- Harrington Deaver retractors, electrosurgical handpiece, hemoclips and appliers.

An additional set-up of instruments and supplies is needed for wound closure:

- Gowns.
- Gloves.
- Sponges.
- Suture material.

- Laparotomy sheet.
- Needle counter pad.
- Minor instrument set.
- Suction tubing and tip.
- Electrosurgical handpiece.

Procedure

To begin the procedure, a right paramedian or midline incision is made. The bowel is explored and the diseased portion is identified and isolated. The bowel is then freed from the mesentery by carefully double-clamping, cutting, and tying with silk sutures or a ligate and dividing stapler (LDS). After the bowel is isolated, the bowel is cross clamped and cut using gastro-intestinal anastomosis (GIA) staplers both proximally and distally to the diseased area (fig. 1-10). Once the specimen has been removed, the surgeon determines whether the patient requires a colostomy or anastomosis (anastomosis preferred). If the surgeon decides on an anastomosis, several different types can be done. For our example procedure, we discuss a functional end-to-end anastomosis using a TA-55 and GIA stapler.

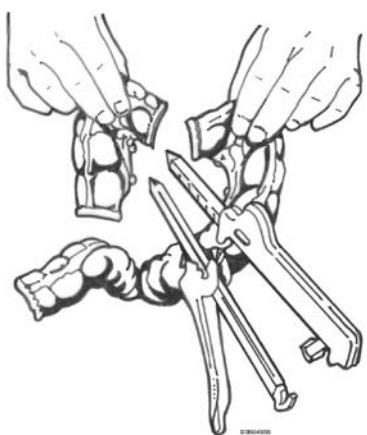


Figure 1-10.
Hemicolectomy—dissecting the bowel.



Figure 1-11.
Hemicolectomy—excising the antimesenteric corners.

As shown in figure 1-11, the surgeon aligns the proximal and distal bowel staple lines and excises the antimesenteric corners of the staple line. The surgeon then places one prong of the GIA into each bowel lumen (fig. 1-12), closes the stapler, and “fires” (fig. 1-13) the stapler. The GIA staples join the bowel walls and cut an internal lumen simultaneously.

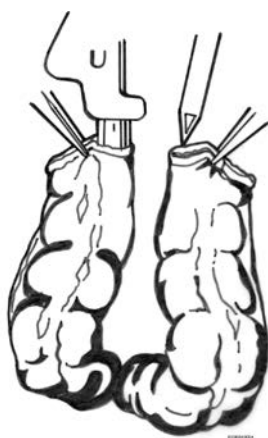


Figure 1-12.
Hemicolectomy—approximating the antimesenteric borders.

Next, the surgeon requires a TA-55 stapler to close the opening left after removing the GIA stapler prongs (fig. 1-14). After completing the anastomosis, the surgeon inspects for adequate hemostasis, irrigates the wound, and prepares for closure.

If the surgeon decides to do a colostomy, a temporary (Loop) colostomy or a permanent (terminal) colostomy may be performed—depending on the diagnosis and condition of the surrounding tissue. If this procedure is done as a temporary colostomy, then the surgical patient will need another procedure later for the anastomosis to be done.

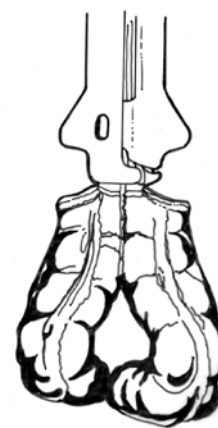


Figure 1-13.
Hemicolectomy—anastomosing the bowel.

Because this procedure involves fecal material, the sterile field is usually re-established after the anastomosis is complete. The scrub should remove all sponges, instruments, and supplies from the contaminated field. The circulator removes each team member's gown and gloves and distributes new ones. The scrub dons a new gown and gloves and proceeds to re-gown and

glove the other team members. A sterile laparotomy drape is placed over the patient, and a new suction set up and electro-surgical handpiece is secured. Fresh lap sponges are placed on the field, and the wound is closed in routine fashion using this closure setup.

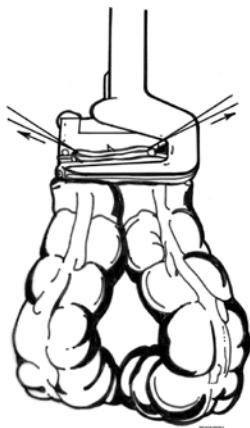


Figure 1-14. Hemicolectomy—closing the common opening.

“Open” cholecystectomy with cholangiogram

A cholecystectomy is the surgical removal of the gallbladder. This procedure is performed for cholecystitis (acute or chronic inflammation), cholelithiasis (stones), carcinoma, or polyps. During the procedure, the surgeon may do a cholangiogram, which is injecting radiopaque solution into the common bile duct. Then an x-ray is taken to determine if there is a stone or stricture that may be obstructing the flow of bile into the duodenum. Most cholecystectomies today are performed via laparoscopy—discussed later in this unit—but extremely large stones (stones in a bile duct) or other problems may require the traditional “open” cholecystectomy discussed here. The instruments and supplies for an open cholecystectomy should be pulled and available whenever a laparoscopic cholecystectomy is scheduled, as every “lap-chole” can potentially revert to an open procedure.

Patient preparation

The patient is placed in the supine position with the arms at the side or extended on arm boards. A small pad or rolled sheet is placed under the right upper flank, which helps facilitate interpretation of the cholangiogram. Once the patient is properly positioned, a scout film may be taken to ensure correct placement of the x-ray cassette. The electro-surgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the nipple line to the pubic area, bedside to bedside. The cleansing skin prep begins at the incision (either right subcostal, midline, or right paramedian) and extends from the nipple line to the pubic area, bedside to bedside.

Draping

The patient is draped similarly to a typical laparotomy.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- 30 cubic centimeter (cc) syringe.
- 20cc syringe.
- Suture material.
- Cholangiocatheters.
- Needle counter pad.
- Long instrument set.
- Major instrument set.
- Suction tip and tubing.
- Hemoclips and appliers.
- Electrosurgical handpiece.
- Injectable 9% NaCl—500cc.
- Catheter adapter (have available).
- Culture tube (aerobic and anaerobic).
- Conray, Hypaque, or other contrast media.
- Common bile duct exploration instruments.
- 3-way stopcock w/extension tubing (have available).

Procedure

Through a right paramedian, right subcostal, or midline incision, the abdominal cavity is opened. The abdominal cavity is explored and the common bile duct is carefully examined for the presence of stones. If stones are felt, the surgeon may do a common bile duct exploration in conjunction with the cholecystectomy. The gallbladder is examined for evidence of stones. If the gallbladder is extremely tense and distended, aspiration of its contents, using a gallbladder trocar attached to the suction, may be carried out to provide additional exposure. Once all of this is accomplished, the gallbladder is then grasped with a Pean clamp to draw the organ up into the wound and provide better exposure of the cystic duct and artery and the common duct area, as illustrated in figure 1–15. Using a combination of sharp (Metzenbaum scissors) and blunt (kitners) dissection, and a pair of DeBakey forceps, the thin peritoneal layer is removed from the cystic duct and artery, and from the common bile duct. After complete visualization and exposure of the branches, the cystic artery is clamped (using right-angle clamps) and ligated with silk suture (on a passer) or hemoclips.

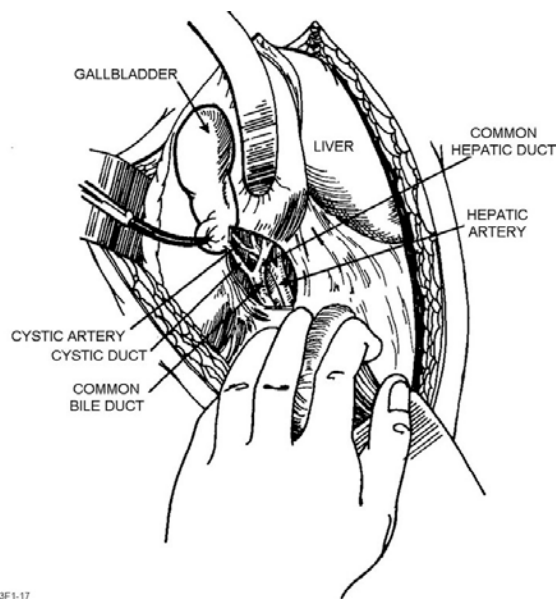


Figure 1–15. Cholecystectomy—grasping the gallbladder.

At this point, the surgeon may elect to do a cholangiogram. It is very important that the scrub have all of the necessary supplies (catheter for insertion into the duct, radiopaque contrast media, and a 30cc syringe) ready so there will be no delay in doing the cholangiogram. The most important item to have prepared is the radiopaque contrast media; ensure it is mixed to the proper dilution according to the surgeon's preference. It is also very important to remove all of the air bubbles from the syringe and

catheter containing the contrast media, because air bubbles may appear to be stones on the x-ray. (The air bubbles can be removed by gently tapping the syringe until the bubble rises to the top, then pushing the plunger in until the bubble is gone.) The surgeon threads the tip of the catheter through an incision in the common duct. He or she may place a silk retention suture around the catheter to hold it in place. The catheter is then tested for leakage using saline. If no leakage is found, a towel is placed over the wound to protect it from contamination by the overhead x-ray machine. The surgeon remains at the field to inject the contrast media; all other members of the operative team stand behind lead x-ray shields brought into the room by the circulator. The x-ray films are taken. Once the surgeon is sure there are no stones in the duct, the catheter is removed, and the cystic duct is clamped and ligated.

The gallbladder is freed from the liver and removed. The specimen is passed off the field; the surgeon may request that the circulating nurse cut it open to verify the presence of stones. A culture of the bile may also be taken at this point. If there is oozing at the operative site, the surgeon may insert a Penrose or other type drain. Figure 1-16 shows drain placement exiting the abdomen through a stab wound near the original abdominal incision. The wound is irrigated with warm saline solution, hemostasis is achieved, and the abdomen is closed in the routine fashion.

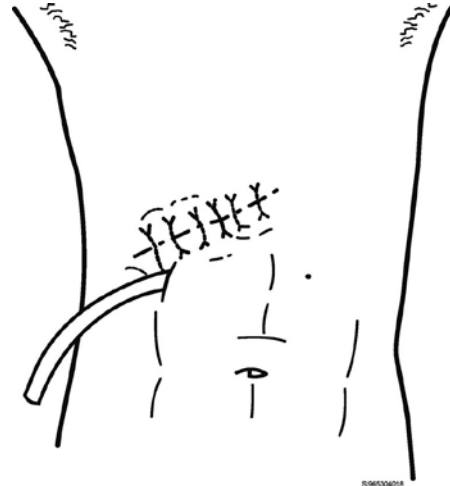


Figure 1-16. Incisional site closed with drain exiting via stab wound.

Mastectomy

Mastectomy is the surgical removal of the breast. There are several different types of mastectomies that can be performed: partial (lumpectomy), subcutaneous, simple, and modified radical. We are going to discuss the procedures pertaining to a simple mastectomy, which is the surgical removal of the entire breast without lymph node dissection. After radical or modified radical mastectomy, skin grafts may be required if primary closure of the skin flaps create unacceptable tension.

Patient preparation

The patient is placed in the supine position with the arms extended on arm boards. A folded sheet or small sandbag is placed under the shoulder on the affected side. The electrical ground pad is placed on the anterior thigh.

Skin preparation

The skin preparation is the same as it would be for a breast biopsy. If there is a possibility of the surgeon doing a skin graft, one thigh must be prepped and draped along with the main operative site.

Draping

The patient's arm on the affected side is placed in a stockinette and a drape sheet is placed underneath the axilla. The operative site is then draped with four hand towels. Finally, the arm is placed through the fenestration of the laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the items in the following table:

- | | |
|--|---|
| • Minor instrument set. | • Suture material. |
| • Extra curved Crile clamps and large towel clips. | • Needle counter pad. |
| • Hemoclips and appliers. | • Suction tubing and tip. |
| • Large rake retractors. | • Electrosurgical handpiece. |
| • Basin set. | • Dermatome and supplies for skin graft (have available). |

- Blades.
- Sponges.
- Closed wound drainage unit (Hemovac or Jackson Pratt).

Procedure

The simple mastectomy begins with the surgeon making a transverse, elliptical incision on the infero-lateral aspect of the breast, including the nipple (fig. 1-17). Using the cautery, the surgeon deepens the incision. He or she then elevates the skin flaps and dissects the

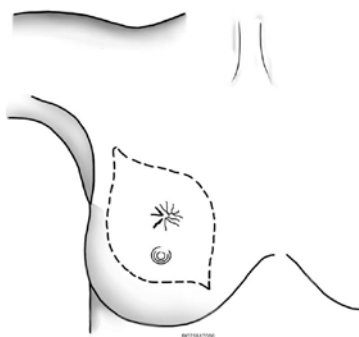


Figure 1-17.
Mastectomy—incisional site.

breast tissue from the underlying pectoral fascia (fig. 1-18). The breast is mobilized and removed. The wound is irrigated with warm saline and observed for small bleeders. Before the wound is closed, the surgeon may place a Penrose drain, Jackson-Pratt or Hemovac tube in the wound. The drainage tube is extended out of the skin flap through a stab wound made with the trocar. The drain is anchored to the skin with a suture

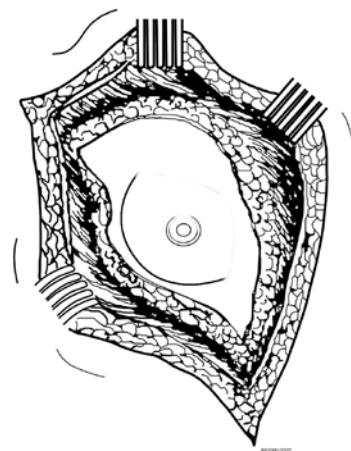


Figure 1-18.
Mastectomy—dissected tissue.

or staple, and the wound is closed, as depicted in figure 1-19.

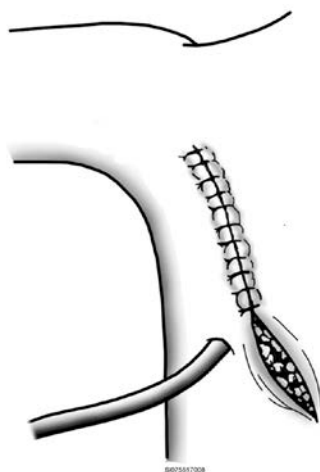


Figure 1-19. Mastectomy—closure of incision.

Ramstedt-Fredet pyloromyotomy

The Ramstedt-Fredet pyloromyotomy is done for pyloric stenosis. This congenital condition usually becomes evident in infants two to six weeks of age. One of the first symptoms is projectile vomiting, free of bile, caused by pyloric muscular hypertrophy creating a stomach obstruction. The pyloromyotomy divides the pyloric muscle leaving the mucosa intact and relieving the condition.

Patient preparation

Before the patient is brought into the operating room, the room temperature should be adjusted to approximately 80 to 85°F for infants less than 25 pounds (check local policy). A warming blanket should also be placed on the operating room table. The patient is placed in the supine position, and after anesthesia induction, the extremities are gently restrained using soft, well-padded devices. The pediatric electrosurgical ground pad is placed on the buttocks.

Skin preparation

Using warm prep solution, begin the prep over the right upper abdomen, extending downward from the axilla to the pubic symphysis, bedside to bedside.

Draping

The patient is draped using hand towels and a pediatric or infant laparotomy sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Kitners.
- Sponges.
- Basin set.
- Suture material.
- Pyloric spreader.
- Pediatric major set.
- Needle counter pad.
- Suction tubing and tip.
- Electrosurgical handpiece (with needle tip).

Procedure

The abdomen is entered through a right transverse, oblique, or upper paramedian incision. After the pylorus is identified and exposed, the surgeon will make an incision into the pylorus over the extent of the hypertrophic muscle. Then he or she will use a pyloric spreader to separate the circular muscle fibers to the depth of the submucosa; thus releasing the stricture. The wound is irrigated using warm saline and closed in the routine fashion, using sutures appropriate for the patient's size.

404. Minor and general surgery procedures

All surgeries we previously discussed are considered major general surgical procedures due to the amount of tissue exposure required or instrumentation needed. In this unit, we will discuss some of the more common minor procedures that are performed in Air Force operating rooms.

Hernia repairs (open method)

A hernia is a protrusion of an organ or tissue through a defect in the layers of the abdominal wall. Hernias may be congenital or acquired and are classified according to their location. *Inguinal hernias* are either direct or indirect. The herniated tissue protrudes into the inguinal canal, but not into the spermatic cord on direct hernias. This type of hernia is the most difficult to repair and occurs mostly in males. It is usually acquired through heavy lifting or straining. With indirect hernias, the herniated tissue protrudes through a congenital defect in the internal ring and passes down the inguinal canal. This type of hernia may be found in the scrotum. *Femoral* hernias protrude from the groin through the femoral canal and most frequently occur in females. *Umbilical* hernias are seen most frequently in children and occur when there is a protrusion of peritoneum through the umbilical ring. Occasionally abdominal incisions do not heal properly due to a weakening in the abdominal wall caused by postoperative hematomas, infection, or undue strain. This results in an *incisional (ventral)* hernia. A *hiatal* hernia occurs when a portion of the stomach protrudes through the hiatus of the diaphragm. This defect causes the esophagus and upper stomach to slide up into the thoracic cavity when intra-abdominal pressure exceeds pressure in the chest. The operative approach for repair may be via the chest or abdomen. The last type of hernia is the *epigastric* hernia. This type of hernia occurs when there is a protrusion of fat through defects between the xiphoid process and umbilicus.

All of these hernias are either reducible or irreducible. That means if the contents of the hernia sac can be returned to the normal cavity by manipulation, the hernia is reducible. If the contents are trapped and cannot be reduced, the hernia is irreducible or incarcerated. The biggest danger of an incarcerated hernia is it may become strangulated. The blood supply of the trapped contents is cut off and will begin to necrose, making resection of the necrosed contents necessary in addition to the hernia repair.

Like a cholecystectomy, a hernia repair (or *herniorrhaphy*) can be performed either laparoscopically or by using the open method. In this lesson, we discuss only an open approach to repair of inguinal hernias.

Patient preparation

The patient is placed in the supine position with the arm on the affected side extended on an arm board. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped from nipple line to mid-thigh, bedside to bedside. The cleansing skin prep begins at the incisional site and extends from the nipple line to mid-thigh, bedside to bedside, including the external genitalia.

Draping

The patient is draped as in a typical laparotomy.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Kitners.
- Basin set.
- Penrose drain.
- Suture material.
- Needle counter pad.
- Minor instrument set.
- Suction tubing and tip.
- Electrosurgical handpiece.

Procedure

The surgeon begins the procedure by making an inguinal incision over the affected area using as landmarks two bony prominences—the anterior superior spine of the ilium—above and laterally—and the spine of the pubic bone—below and medially—as shown in figure 1-20. Once the Scarpa's fascia has been reached, the surgeon places two small Richardson retractors and continues the incision through the Scarpa's external and internal oblique muscle, to expose the spermatic cord (fig. 1-21). When the cord has been identified, the surgeon uses both blunt and sharp

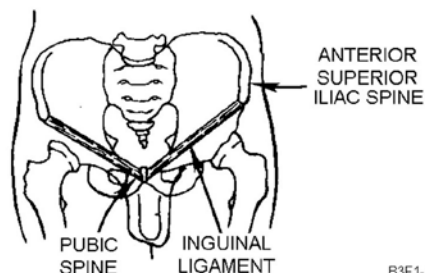


Figure 1-20. Inguinal hernia—landmarks.

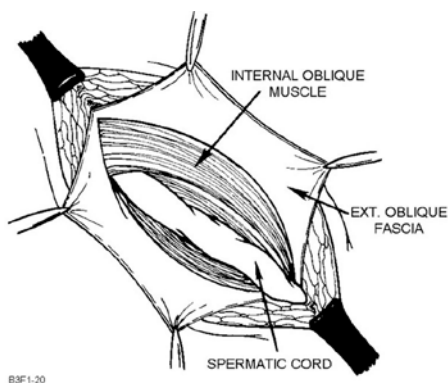


Figure 1-21. Inguinal hernia—exposing the spermatic cord.

dissection to separate it from the surrounding tissue, taking time to locate and isolate the ilioinguinal nerve. The scrub then passes the surgeon a moistened Penrose drain attached to a Kelly clamp to wrap around the cord for retraction (fig. 1-22). Dissection is continued until the hernia is located.

If the surgeon finds a direct hernia, the surgeon will reduce

it by placing interrupted silk sutures in the transversalis fascia, as shown in figure 1-23.

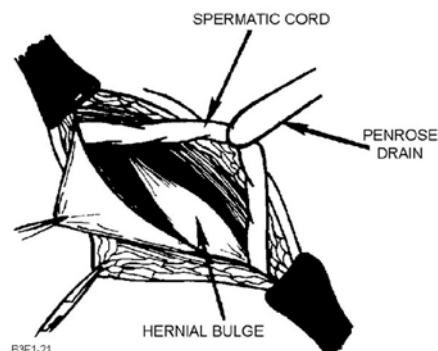


Figure 1-22. Inguinal hernia—retracting the spermatic cord.

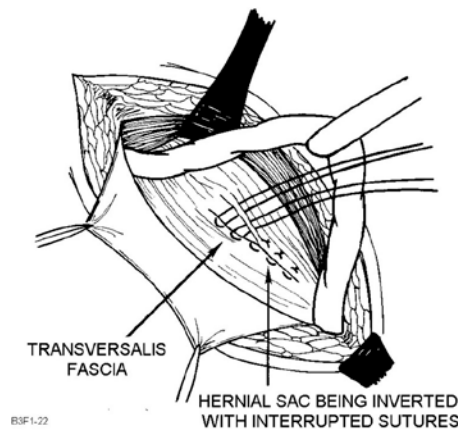


Figure 1-23. Inguinal hernia—reducing the hernia.

If the hernia is indirect, the surgeon will dissect the sac away from the spermatic cord. Its dissection must be complete to its neck, flush with the peritoneal plane to prevent recurrence. If you look at figure 1-24 you can see how the sac is opened and all abdominal contents—including omentum—are pushed back into the abdomen with a Kitner or finger. The sac is closed with a suture placed close to the abdominal wall and then excised. The dissected hernia sac is then passed off the field and submitted as a specimen. The wound is irrigated with warm saline, and closed in individual layers. In some situations, the fascia may be very weak and require reinforcement. A prosthetic material—such as Prolene, Mersilene or Marlex mesh—provides additional support to the fascia. The other layers are closed in routine fashion.

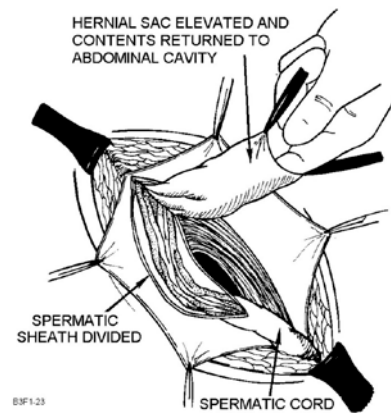


Figure 1-24. Inguinal hernia—freeing the hernia sac.

Breast biopsy

A breast biopsy is the removal of breast tissue for pathological examination. This procedure is usually done to diagnose a suspected malignancy detected by a mammogram study, palpation, or skin changes such as nipple discharge or dimpling.

It is important to understand that there are three basic types of breast biopsies. For an *incisional biopsy*, only a portion of the breast mass is excised and sent for pathologic examination. An *excisional biopsy* is the removal of the entire breast mass. The third type of biopsy is a *needle biopsy*. A needle biopsy is a form of an incisional biopsy because only a portion of the breast mass is removed. This is accomplished by using a Vim-Silverman or disposable cutting needle. The needle is inserted into the mass, and the needle lumen traps a core (or plug) of tissue. The needle is withdrawn with the specimen attached. The specimen is removed from the needle and sent to pathology for examination.

If the surgeon is confident that the breast mass is benign, the biopsy is scheduled without a frozen section. However, if there is a strong possibility that the mass is malignant, the procedure is scheduled as a “breast biopsy with frozen section.” If the pathological report from the frozen section comes back malignant, the surgeon waits on the result of the permanent section to confirm the malignancy. This eliminates the possibility of a patient undergoing an unnecessary mastectomy in case the frozen section was misread as being malignant.

The surgeon may be guided to the specific tissue requiring the biopsy by a procedure known as *needle localization*. This procedure, usually performed in the radiology department, involves using x-ray to place a thin (22 or 25 gauge) needle directly into the mass. The patient is then transported to the

operating room, and the surgeon uses the needle as a guide to the biopsy area. It is critical that patient and all medical personnel involved in the procedure know not to touch or otherwise disturb the needle once it is in place. Disturbing the placement of the needle may result in the wrong tissue being biopsied, and consequently, an incorrect diagnosis.

Patient preparation

The patient is placed in the supine position with the arm on the affected side placed on an arm board and the other arm tucked at the patient's side or on an arm board. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient is shaved/clipped from the neckline to waist and under the axilla on the affected side. Remember to use gentle strokes to avoid the chance of spreading cancerous cells to other areas of the breast. The cleansing skin prep begins gently at the lesion and extends outwards from the neckline to the waist, around the shoulder, and under the axilla on the affected side.

Draping

The patient is draped using four hand towels, a foot sheet, and a pediatric laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Suture material.
- Needle counter pad.
- Electrosurgical handpiece.
- Basic/Minor instrument set.

Procedure

The surgeon makes an incision over the lesion and continues cautiously until the mass is reached. For central lesions, a circumalveolar incision may be used. Small rake retractors are placed for retraction. Once the mass is partially mobilized, the surgeon will grasp it using an Allis or Kocher clamp, and dissect it free. The specimen is then prepared for routine pathological or frozen section examination. The wound is examined for small bleeders, a drain may be inserted (rarely), and the wound is closed in the routine fashion.

Hemorrhoidectomy

A hemorrhoidectomy is the surgical excision and ligation of distended veins of the anus and rectum. Hemorrhoids are classified as *external* or *internal*. External hemorrhoids occur outside, or below the external sphincter, are covered with skin, and cause pruritus and pain. *Internal* hemorrhoids occur inside, or above the internal sphincter, are covered with columnar mucosa, and may become thrombosed and bleed. Some patients suffer from both types of hemorrhoids.

Patient preparation

The patient is placed in either the lithotomy or Kraske position. The buttocks are retracted by using two long pieces of 3- or 4-inch wide cloth adhesive tape. The circulator cuts a lengthwise slit in one end, and places one piece of tape on each buttock, using the slit to create a "Y" shape. Tension is applied to spread the buttocks as the other end of the tape is fastened to a rigid structure, usually to the stirrups for the lithotomy position, and to the underside of the operating room table for the Kraske position. The electrosurgical ground pad is placed on the posterior thigh.

Skin preparation

The patient is shaved/clipped according to the surgeon's preference. The cleansing skin prep is also done according to the surgeon's preference, usually encompassing the area located between the margins of the tape.

Draping

For the lithotomy position, the patient is draped using four hand towels and a lithotomy sheet; for the Kraske position, four hand towels and a laparotomy drape sheet are used.

Instrumentation

The basic instrumentation and supplies include the following:

- Basin set.
- Blades.
- Sponges.
- Suture material.
- Lubricant (K-Y).
- Needle counter pad.
- Rectal instrument set.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Sigmoidoscope (have available).
- Hemostatic agent (Gelfoam or Surgicel).

Procedure

This procedure begins with the surgeon gradually dilating, and then examining the rectum using a rectal dilator or similar shaped instrument. After the rectum is dilated, a rectal speculum is inserted. As shown in figure 1-25, the surgeon then grasps the hemorrhoids with an Allis, Kocher, or Pennington clamp. A clamp (Kelly or Péan) is placed above the proposed incision and across the base.



Figure 1-26. Hemorrhoidectomy—suture placement.

After all the hemorrhoids are excised, the surgeon examines the wound for small bleeders and places petrolatum (Vaseline) gauze packing in the anal canal.

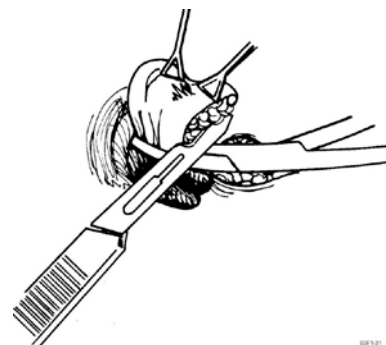


Figure 1-25. Hemorrhoidectomy—excising the hemorrhoid.



Figure 1-27. Hemorrhoidectomy—tying the suture.

405. Endoscopic and general laser surgery procedures

Up until now we have only discussed procedures that can be performed by making surgical incisions. However, many procedures can be performed by using endoscopic or laparoscopic video equipment and laser. This lesson will cover a few of the more common procedures that are performed.

Colonoscopy/sigmoidoscopy

Colonoscopy is endoscopic visualization of the mucosa of the lumen of the colon; *sigmoidoscopy* is endoscopic visualization of the anal canal, rectum, and sigmoid colon. These procedures are important diagnostic tools and may be used for biopsy of lesions and removal of polyps from the large intestine. They are often performed in a clinic or ambulatory surgery unit, but are done in the operating room when heavy sedation or general anesthesia is required, when the patient is considered at high-risk of developing complications, or in conjunction with other surgical procedures.

Patient preparation

The patient may be placed in the modified lateral/Sim's, Kraske, or lithotomy position. The electrical ground pad is placed according to the position of the patient.

Skin preparation

There is no skin preparation. However, the patient is often required to receive a liquid diet for two days prior to surgery and receive laxatives. Enemas are administered at various times preoperatively to ensure the colon is clear before the surgery.

Draping

If the surgeon desires, the patient is draped using four hand towels and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Lubricant.
- Suction tubing.
- Small round basin.
- Electrosurgical unit.
- Fiberoptic light cords.
- Fiberoptic light source.
- Rigid or flexible sigmoidoscopy set or colonoscopy set.

Procedure

The scope is well-lubricated before it is inserted into the patient's rectum. It is advanced slowly under direct visualization until the area desired is reached or until patient discomfort, resistance, or inability to see the lumen is reached. Various accessory instruments may be employed (biopsy forceps, irrigating tubes, cytology brush) at this point. Examination is continued on withdrawal of the scope. Following the procedure, the patient is observed to ensure there is no postoperative bleeding or signs of perforation.

Esophagoscopy

Esophagoscopy is endoscopic visualization of the esophagus and the cardia of the stomach. This procedure is done primarily for diagnostic purposes. Examples include removing tissue or secretions for study such as for identification of cancer, to diagnose esophagitis or hiatal hernia visually, or to clarify or confirm a radiology finding. Esophagoscopy may also be used for therapeutic procedures such as dilating a stricture by insertion of an esophageal bougie, ablation of lesions via electrosurgery or laser, or removing a foreign body using forceps or graspers.

Two different methods may be used: indirect or direct. The indirect method involves inserting some type of guiding device, such as a bougie dilator, then inserting the scope over the guide. It may be indicated for children less than 12 months, patients in which it may be difficult to locate the

esophageal lumen and patients with esophageal tumors or strictures. The direct method is simply directly inserting the scope.

Patient preparation

The patient is placed in the supine position with the shoulders level with or just beyond the point at which the table breaks to allow lowering of the head. The patient's head is held by an assistant and raised and lowered to allow manipulation of the esophagoscope.

Skin preparation

There is no skin preparation.

Draping

The patient's head is draped using a hand towel and towel clip, and a drape sheet is placed over the patient's body.

Instrumentation

The basic instrumentation and supplies include the following:

- Lubricant.
- Suction tubing.
- Small round basin.
- Fiberoptic light cord.
- Fiberoptic light source.
- Bougies (have available).
- Esophagoscope instrument tray.
- Aspirating tubes, e.g., Lukens (have available).

Procedure

For the *indirect* method, a bougie or dilator is passed into the mouth through the cricopharyngeal lumen to act as a guide for the esophagoscope. The esophagoscope is inserted over the dilator until the lumen is visible. When the lumen is visible, the dilator is removed and the procedure is carried out. For the *direct* method, the esophagoscope is passed directly into the mouth; and the tongue, epiglottis laryngeal inlet, and cricopharyngeal lumen are identified. The scope is passed to the right side of the tongue with the patient's head turned slightly to the left.

When the esophagoscope has passed all of the inferior constrictors, the entire esophagus, including the esophagogastric junction and proximal stomach, is examined. Specimens may be obtained, if necessary. The scope is then carefully removed.

Laparoscopic procedures

As previously mentioned some general surgical procedures may be performed using a laparoscope rather than by "opening the patient" with a major incision. These techniques of *minimal access surgery* are beneficial to the patient because they generally result in less postoperative pain, a shorter hospital stay, a shorter recovery time, and smaller (though more numerous) scars. Laparoscopic procedures can be performed on adult or pediatric patients.

The three most common procedures performed via laparoscopy are *cholecystectomy*, *appendectomy*, and *herniorrhaphy*; as instrumentation and techniques improve, this approach is being used for other procedures. Because each specific operation uses specialized instrumentation, details of these procedures are beyond the scope of this text. In this lesson, we will cover only the basic preparations and set-up for a typical operative laparoscopy.

One important fact must be kept in mind for any laparoscopic procedure—every laparoscopic procedure can potentially revert to an "open" procedure. The patient should always be informed of this preoperatively, an "open" set-up should be pulled and immediately available and physical preparation (position, skin prep, etc.) of the patient should allow for this occurrence.

Patient preparation

Patient preparation is the same as for the “open” procedures discussed previously. The patient is generally placed in the supine position with the arms either extended on arm boards or tucked at the sides.

Skin preparation

Shave preps are rarely necessary. The cleansing skin prep is usually from nipple-line to pubis, and from bedside to bedside.

Draping

Standard laparotomy draping is usually sufficient; some surgeons prefer to use a drape with a larger fenestration than a standard laparotomy sheet. Specialized laparoscopic drape packages are also sometimes used.

Instrumentation & equipment

The basic instrumentation and supplies include the following:

- Basin set.
- Suction tubing.
- Video monitor.
- Suture/Band-Aids.
- #15 or #11 blades.
- Fiberoptic light cord.
- Camera control unit.
- Fiberoptic light source.
- Video recorder (if desired).
- Electrosurgery instruments and cord(s).
- Operative laparoscopy instrument set.
- Camera (if not built-in to the scope) and cord.
- Insufflation device (generally a high-flow type).
- Insufflating needle and sterile insufflating tubing.
- Sheaths and trocars of various sizes (at least 3 of each available).
- Surgeon's choice of laparoscope (diameter and view angle varies).
- Individually packaged operative forceps, scissors, punches, suction cannula, etc.
- Adaptors/convertors to allow smaller diameter instruments to be used in large sheaths.

NOTE: Some facilities have specific sets for each type of procedure to include specialized laparoscopic pediatric instrumentation.

Procedure

As stated previously, the exact procedure depends on the specific operation being performed. A basic laparoscopy is described in the following paragraphs. After the patient is prepped and draped, all tubes and cords are attached to the drapes, and the appropriate end of each is passed to the circulator for connection to the respective apparatus. The surgeon makes a small skin incision, generally immediately under the umbilicus, and inserts the insufflation needle/cannula into the abdominal (fig. 1-28); cavity. A syringe may be used to determine abdominal placement, then the cannula is connected to the insufflation tubing and the abdominal cavity is filled with carbon dioxide to establish *pneumoperitoneum*. When the intra-abdominal pressure reaches the surgeon's specified level (generally 8–12 mm Hg), the insufflation cannula is removed and the sheath/trocar unit for the laparoscope is inserted in its place. The trocar is removed and the scope is inserted into the sheath, then into the abdomen. The insufflation tubing is connected to a port on the sheath to maintain pneumoperitoneum, and the light cord and camera is connected to the scope. The abdominal cavity should now be visible on the monitor.

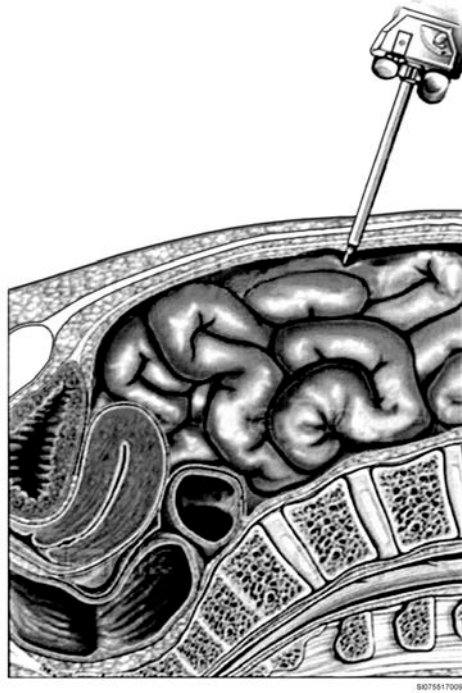


Figure 1-28. Insufflation cannula placement.

Before beginning the actual operative part of the procedure, the surgeon uses the scope to perform an examination of the abdomen, paying particular attention to structures susceptible to damage during insertion of the instrumentation. The surgeon visually confirms the preoperative diagnosis, if possible, and looks for evidence of other injuries or disease.

To perform the procedure, additional sheaths are inserted into various areas of the abdomen in similar fashion to the first (fig. 1-29). A small incision is made through the skin, and then the trocar/sheath unit is introduced into the abdominal cavity. Whenever an additional sheath is inserted, it is done under direct visualization. The surgeon uses the scope to watch exactly where and how the sheath enters the abdominal cavity, checking for inadvertent tissue damage during placement. Depending on the operation, numerous additional sheaths may be inserted to accommodate the various instruments required. The specific instruments inserted into the sheaths and used to perform the operation depend on the procedure being performed.



Figure 1-29. Additional cannula placement.

At completion of the procedure, the instruments and sheaths are removed; the carbon dioxide is released from the abdomen before the last sheath is removed. The stab incisions are closed; some surgeons place a stitch in the fascia, some simply close the skin. Dressing also depends on the surgeon, some use sponges; others use adhesive dressing strips (Band-Aids).

Laparoscopic Nissen fundoplication

A Nissen fundoplication is the wrapping of the stomach around the esophagus at the gastroesophageal junction. This procedure is used for patients with severe gastroesophageal or acid reflux.

Patient preparation

The patient is placed in the supine position with the thighs abducted and slightly flexed. The arms are positioned at the side or extended on arm boards. The surgeon may request that a urinary catheter be inserted. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

Shave preps are rarely necessary, but if the surgeon desires, the patient is shaved/clipped preoperatively from the nipple line to pubis. The cleansing skin prep is usually from nipple-line to pubis, and bedside to bedside.

Draping

Standard laparotomy draping is usually sufficient; some surgeons prefer to use a drape with a larger fenestration than a standard laparotomy sheet. The surgeon may drape the legs separately. Specialized laparoscopic drape packages are also sometimes used.

Instrumentation

The basic instrumentation and supplies include the following:

- Basin set.
- Sponges.
- Blades: #12 or 15.
- Needle counter pad.
- Coagulation hook.
- Two 5mm trocars.
- Fiberoptic light cord
- Three 10mm trocars.
- Maloney or Bougie dilators.
- Laparoscopic hemoclips/applier.
- Operative laparoscopy instrument set.
- Electrosurgical instruments and cord.
- Suture material (Laparoscopic Suture).
- Camera (if not built-in to the scope) and cord.
- Insufflation device (generally a high-flow type).
- Insufflating needle and sterile insufflating tubing.
- Surgeon's choice of laparoscope (diameter and view angle varies).
- Video system set-up with fiberoptic light source, camera control unit and monitor.

Procedure

To begin the procedure a small incision is made approximately five cm above the umbilicus and an insufflation needle is inserted through the incision into the abdominal wall to establish pneumoperitoneum. When the intra-abdominal pressure reaches the surgeon's specified level, about 15 mm Hg, the insufflation cannula is removed and a sheath/trocar unit is inserted in its place. The trocar is removed and a 30 degree laparoscope is inserted into the sheath to visualize the abdomen. The insufflation tubing is connected to a port on the sheath to maintain pneumoperitoneum, and a light cord and camera are connected to the scope. The surgeon performs a routine visualization of the abdomen and makes small incisions where additional trocars will be inserted. Five trocars are typically used during this procedure. They are placed in the following five areas: above the umbilicus in midline, in the right and left subcostal, between the umbilical and left subcostal, and under the xyphoid process.

Once the additional trocars have been placed, the assistant retracts the left lobe of the liver to expose the esophageal hiatus. The surgeon opens the omentum and identifies the hiatus. Once identified, the

surgeon makes an incision into the peritoneum and severs the phrenogastric ligament. The stomach is grasped with grasping forceps and retracted upward and laterally. The posterior vagus nerve is identified and the retroesophageal areas are dissected. The stomach is grasped to expose the gastrosplenic ligament and the vessels are isolated and coagulated with a coagulation hook and clipped. The fundus is grasped and passed behind the esophagus (fig. 1-30). Anesthesia will pass a Maloney or Bougie dilator to check for torsion. Interrupted 2-0 silk sutures are placed through the stomach, anterior wall of the esophagus, and the gastric wrap (fig. 1-31). The dilator is removed and replaced with a nasogastric tube. The surgeon checks for hemostasis, irrigates, removes trocars and instruments, and the incisions are closed.

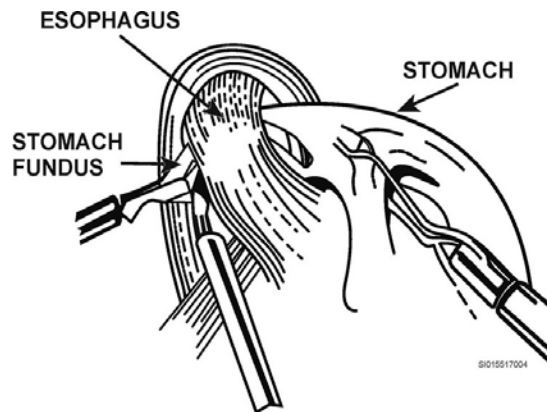


Figure 1-30. Nissen-stomach passed behind the esophagus.

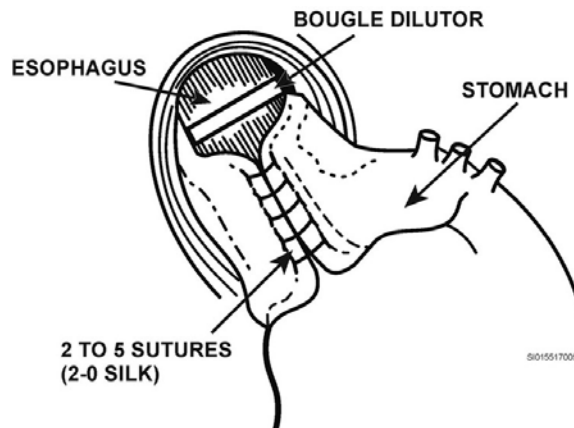


Figure 1-31. Nissen fundoplication suturing.

General surgery laser procedures

As we discussed in previous units, lasers can be used on any number of surgical procedures. When used in general surgery, surgeons employ the various laser wavelengths and laser delivery systems to cut, coagulate, vaporize, and remove tissue. In most “laser surgeries,” they actually use genuine laser devices in place of conventional surgical tools—scalpels, or electrosurgical units—to perform procedures. With the use of lasers, properly trained surgeons can accomplish tasks that are more complex, all the while reducing blood loss, decreasing postoperative discomfort, decreasing the chances of infection to the wound, reducing the spread of some cancers, minimizing the extent of surgery, and achieving better outcomes in wound healing.

Lasers are also extremely useful in both open and laparoscopic procedures. Common surgical uses include breast surgery, removal of the gallbladder, hernia repair, bowel resection, hemorrhoidectomy, solid organ surgery, and treatment of pilonidal cyst.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

403. Major and general surgery procedures

1. Define exploratory laparotomy.
2. Where is the electrosurgical ground pad placed in preparation for an abdominal laparotomy?
3. Which instruments are required for abdominal laparotomy setup?
4. At which stage of the operative procedure are the suction tubing and electrosurgical handpiece tested?
5. Why is the “skin knife” reserved for cutting only “dirty” tissue areas after being used to make the initial cut?
6. What instrument is referred to as the “deep knife”?
7. Once the surgeon nicks the peritoneum with the “deep knife,” what instrument completes the incision?
8. What structures may prevent a thorough exploration of the abdominal cavity?
9. List three retractors used for retracting abdominal wound edges.
10. Why are *interrupted sutures* normally used to close the abdominal wall?
11. Define *right hemicolectomy with anastomosis*.
12. Which incision begins the procedure mentioned in question 11?

13. How is the bowel freed from the mesentery?
14. What is the surgeon's alternative to anastomosis?
15. Explain the process used in a *cholangiogram*.
16. List three incisions used to begin a cholecystectomy.
17. Describe the action taken by the surgeon if the gallbladder is found to be extremely tense or distended during cholecystectomy.
18. How is the thin peritoneal layer removed from the cystic duct and artery, and the common bile duct?
19. What material must the scrub have ready for a cholangiogram?
20. What result will air in the syringe have on a cholangiogram?
21. During cholangiogram x-rays, which member of the surgical team remains at the surgical field and does not retreat behind lead shielding?
22. Once the gallbladder is passed off the field, who usually cuts open the organ to inspect for stones?
23. How is the patient positioned for a simple mastectomy?
24. What additional skin prep is normally performed for a breast biopsy if skin grafting is anticipated?
25. Describe the incision used to begin a simple mastectomy.

26. Name the surgical procedure used to correct pyloric stenosis.
27. What preparations must be taken regarding room and table temperature when performing pyloric repairs on infants less than 25 pounds?

404. Minor and general surgery procedures

1. State the type of hernia described by the following statements:
 - a. A protrusion of the stomach through the diaphragm.
 - b. A protrusion of the peritoneum through the umbilical ring.
 - c. Usually acquired during heavy lifting.
 - d. Occurs most frequently in females.
 - e. Occurs due to defects between the xiphoid process and umbilicus.
2. State the danger involved with an incarcerated hernia.
3. Name the two bony prominences the surgeon uses to place an inguinal incision.
4. What will the scrub pass the surgeon to retract the spermatic cord during inguinal hernia repair?
5. List two prosthetic materials that can be used to close weak fascia.
6. Describe the following types of breast biopsy:
 - a. Incisional.

- b. Excisional.
 - c. Needle.
-
- 7. What study is used to determine the malignancy of breast tissue and performed while the patient is still on the table?
 - 8. Compare internal hemorrhoids to external hemorrhoids.
 - 9. In what position is the patient placed for a hemorrhoidectomy?
 - 10. Which suture is used to close a hemorrhoidectomy incision?
 - 11. List three devices used for excision of hemorrhoids.

405. Endoscopic and general laser surgery procedures

- 1. Define *colonoscopy*.
- 2. Define *sigmoidoscopy*.
- 3. List two procedures in which a colonoscopy and sigmoidoscopy can be useful.
- 4. List three positions in which the patient may be placed for a colonoscopy or sigmoidoscopy.
- 5. What dietary preparations are necessary for a colonoscopy?
- 6. What accessory instruments may be used during a colonoscopy/sigmoidoscopy?

7. Define *esophagoscopy*.
8. List some of the purposes of an esophagoscopy.
9. Describe the *direct* method of using the esophagoscope.
10. Once the esophagoscope has passed all the inferior constrictors, which areas can be examined?
11. What are four ways minimal access surgery benefits the patient?
12. What are the three most common general surgical operations performed laparoscopically?
13. Why should an “open” set-up be pulled and immediately available when a laparoscopic procedure is performed?
14. What is the *first* thing a surgeon should do after inserting and connecting the laparoscope?
15. Briefly describe how additional sheath/trocar units are inserted into the abdomen during operative laparoscopy.
16. Define Nissen fundoplication.
17. What type of condition is being treated when a surgeon performs a Nissen fundoplication?
18. What type of cleansing skin prep is typically performed for a laparoscopic Nissen fundoplication?
19. What type of insufflation device is generally used when performing a laparoscopic Nissen fundoplication?

20. Where is the initial incision made for a laparoscopic Nissen fundoplication?
21. Why is an insufflation needle inserted into the abdominal wall?
22. How many trocars are typically used during a laparoscopic Nissen fundoplication?
23. Name the organ that is retracted to expose the esophageal hiatus?
24. Once the gastrosplenic ligament and the vessels are isolated and coagulated, what does the surgeon do to the stomach?
25. What device does anesthesia pass to check for torsion?
26. What do surgeons employ various laser wavelengths and laser delivery systems to?
27. What conventional surgical devices can be replaced by lasers?
28. List two surgical procedures that lasers can be used on.

Answers to Self-Test Questions

401

1. The nurse must be ready with two drape setups and two instrument setups, as well as anticipated supplies and equipment.
2. (a) Keep the bladder empty, giving the surgeon more operating room in the lower abdomen.
(b) Monitor urine output and renal function.
3. All radiopaque sponges are removed from the field. If used, they must be folded and secured on a sponge stick.
4. Preventing gastrointestinal contents from flowing into the peritoneal cavity by using lap packs to isolate the area.
5. Normal saline.
6. Distilled water is a hypotonic solution.
7. The anesthetist or anesthesiologist needs the information to help determine the patient's blood loss during surgery.

8. The general surgeon may elect to bring in an OB/GYN surgeon for consultation. However, the general surgeon is not obligated to consult.

402

1. (1) Skin and subcutaneous tissue are incised and blood vessels are ligated.
(2) Anterior fascia is incised and each muscle layer is divided and/or separated with the bleeding vessels ligated.
(3) The posterior fascia and peritoneum are incised.
2. The incision must provide maximum exposure, minimum tissue trauma, maximum postoperative wound strength, and the least postoperative discomfort and scarring.
3. (1) Location.
(2) Direction.
4. c, g, e, b, a, d, f.

403

1. An opening made through the abdominal wall, into the peritoneal cavity, for diagnostic reasons.
2. On the anterior thigh.
3. Long instrument set, hemoclips, electrosurgical handpiece.
4. After the patient is draped and the sterile field is in place.
5. Surgeons feel that the “skin knife” carries bacteria from the skin into deeper layers of the body.
6. The electrocautery handpiece.
7. A Metzenbaum scissor.
8. Old abdominal adhesions.
9. (1) Balfour.
(2) Deavers.
(3) Large Richardson retractors.
10. The fascia is the strongest layer of the abdominal wall and the integrity of the closure depends on its strength.
11. The resection of the right half of the colon—including a portion of the transverse colon, ascending colon, and the cecum—and a segment of the terminal ileum and mesentery. The anastomosis is performed between the ileum and the transverse colon.
12. A right paramedian or midline incision.
13. By double-clamping, cutting, and tying with silk sutures or an LDS stapler.
14. Colostomy.
15. The injection of radiopaque contrast media into the common bile duct, and subsequent x-ray, to ascertain obstruction of the common bile duct due to stones or stricture.
16. (1) Right paramedian.
(2) Right subcostal.
(3) Midline.
17. The gallbladder is aspirated using a gallbladder trocar prior to removal.
18. Using sharp and blunt dissection, Metzenbaum scissors, Debaquey forceps, and kitners.
19. Catheter for insertion into the duct, radiopaque contrast media, and a 30cc syringe.
20. The air will appear as stones on the x-ray.
21. The surgeon.
22. The circulating nurse.
23. In a supine position, arms extended on boards, with a folded sheet or small sandbag placed under the shoulder on the affected side.
24. One thigh should also be prepped, in addition to the breast area.

25. The surgeon makes a transverse, elliptical incision on the infero-lateral aspect of the breast. (This is deepened with the cautery.)
26. Ramstedt-Fredet pyloromyotomy.
27. The room is warmed to 80 to 85 degrees F, and a warming blanket is placed onto the operating table.

404

1.
 - a. Hiatal hernia.
 - b. Umbilical hernia.
 - c. Inguinal hernia.
 - d. Femoral hernia.
 - e. Epigastric hernia.
2. Incarcerated hernias may become strangulated and begin to necrose due to the blood supply being cut off.
3.
 - (1) The anterior superior spine of the ilium above.
 - (2) The spine of the pubic bone, below and medially.
4. A moistened Penrose drain attached to a Kelly clamp.
5.
 - (1) Mersilene.
 - (2) Marlex mesh.
6.
 - a. The removal of a portion of the breast mass to be sent for pathological examination.
 - b. The removal of the entire breast mass.
 - c. The removal of a portion of the breast mass for study, using a Vim-Silverman, or disposal, cutting needle.
7. Frozen section.
8. Internal hemorrhoids are located inside, or above the external sphincter, covered with columnar mucosa, and may become thrombosed and bleed. External hemorrhoids are located below, or outside the external sphincter, covered with skin, and cause pruritus and pain.
9. Lithotomy or Kraske position.
10. Chromic gut.
11.
 - (1) Laser.
 - (2) Electrosurgical unit.
 - (3) Cryosurgical unit.

405

1. Endoscopic visualization of the mucosa of the lumen of the colon.
2. Endoscopic visualization of the anal canal, rectum, and sigmoid colon.
3.
 - (1) Biopsy of lesions.
 - (2) Removal of polyps from the large intestine.
4.
 - (1) Modified lateral/Sim's.
 - (2) Jackknife.
 - (3) Lithotomy.
5. The patient is placed on a liquid diet for two days prior to surgery and receives laxatives (prior to surgery, enemas are given until clear).
6. Biopsy forceps, irrigating tubes, and cytology brush.
7. An endoscopic visualization of the esophagus and the cardia of the stomach.
8. Esophagoscopy is done primarily for diagnostic purposes. Examples include removing tissue or secretions for study such as for identification of cancer, to visually diagnose esophagitis or hiatal hernia, or to clarify or confirm a radiology finding. Esophagoscopy may also be used for therapeutic procedures such as: dilating a stricture by insertion of an esophageal bougie, ablation of lesions via electrosurgery or laser, or removing a foreign body using forceps or graspers.

9. The esophagoscope is passed directly into the mouth; and the tongue, epiglottis laryngeal inlet, and cricopharyngeal lumen are identified. The scope is then passed to the right side of the tongue with the patient's head turned slightly to the left.
10. The entire esophagus, including the esophagogastric junction and proximal stomach.
11. (1) Less postoperative pain.
(2) A shorter hospital stay.
(3) A shorter recovery time.
(4) Smaller scars.
12. (1) Cholecystectomy.
(2) Appendectomy.
(3) Herniorrhaphy.
13. Every laparoscopic procedure can potentially revert to an "open" procedure.
14. The surgeon uses the scope to perform an examination of the abdomen, paying particular attention to structures susceptible to damage during insertion of the instrumentation.
15. A small incision is made through the skin and then the trocar/sheath unit is introduced into the abdominal cavity. Whenever an additional sheath is inserted, it is done under direct visualization. The surgeon uses the scope to watch exactly where and how the sheath enters the abdominal cavity, checking for inadvertent tissue damage during placement.
16. The wrapping of the stomach around the esophagus at the gastroesophageal junction.
17. Severe gastroesophageal or acid reflux.
18. From nipple line to pubis, and bedside to bedside.
19. A high-flow type.
20. Approximately 5 cm above the umbilicus.
21. To establish pneumoperitoneum.
22. Five.
23. Liver.
24. He grasps the fundus and passes it behind the esophagus.
25. A Maloney or Bougie dilator.
26. Cut, coagulate, vaporize, and remove tissue.
27. Scalpels or electrosurgical units.
28. Any of the following: breast surgery, bowel resection, hemorrhoidectomy, solid organ surgery, or treatment of pilonidal cyst.

Do the unit review exercises before going to the next unit.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter. When you have completed all unit review exercises, transfer your answers to a Field Scoring Answer Sheet.

Do not return your answer sheet to the Air Force Career Development Academy (AFCDA).

1. (401) All 4×8 radiopaque sponges are removed from the operative site after the
 - a. skin is incised.
 - b. fascia is incised.
 - c. abdominal cavity is entered.
 - d. abdominal cavity is explored.
2. (401) What does the surgeon use to isolate the operative area of the inner abdomen to prevent contamination of other structures and areas in the peritoneal cavity?
 - a. Laparotomy sponges.
 - b. 4×8 Raytex sponges.
 - c. A 36" Penrose drain.
 - d. A disposable drape sheet.
3. (402) Which incision is a vertical incision *approximately* two inches to the right or left of the midline in the upper or lower abdomen?
 - a. Subcostal.
 - b. Paramedian.
 - c. McBurney's.
 - d. Pfannenstiel's.
4. (402) Which abdominal incision converts the peritoneal and pleural cavity into one main cavity, allowing for excellent exposure of the upper stomach and lower end of the esophagus?
 - a. Median.
 - b. Midline.
 - c. Inguinal.
 - d. Thoraco-abdominal.
5. (403) An "open" abdominal operation performed for diagnostic reasons is known as
 - a. a Whipple procedure.
 - b. an exam under anesthesia.
 - c. an exploratory laparotomy.
 - d. a gastrojejunoduodenostomy.
6. (403) If during a procedure, the surgeon elects to do a colostomy. As this procedure involves fecal matter, what is the *first thing* the scrub should do?
 - a. Don a new gown and gloves.
 - b. Re-gown and glove the other team members.
 - c. Place a new sterile laparotomy drape over the patient.
 - d. Remove all sponges, instruments, and supplies from the contaminated field.

7. (404) During an open method herniorrhaphy, what does the surgeon do once the Scarpa's fascia has been reached?
 - a. The area is irrigated with warm saline.
 - b. Locate and isolate the ilioinguinal nerve.
 - c. Attaches two small Richardson retractors.
 - d. Dissect the hernia sac away from the spermatic cord.
8. (404) Which layer of tissue may be reinforced with Marlex or Mersilene mesh during a hernia repair?
 - a. Fascia.
 - b. Muscle.
 - c. Peritoneum.
 - d. Subcutaneous.
9. (404) Distended veins of the rectum are known surgically as
 - a. polyps.
 - b. fistulas.
 - c. hemorrhoids.
 - d. anorectal tumors.
10. (404) Which clamp is used to grasp the hemorrhoids for excision?
 - a. Pean.
 - b. Lahey.
 - c. Heaney.
 - d. Pennington.
11. (405) During laparoscopy, pneumoperitoneum is established by
 - a. insufflation with oxygen.
 - b. insufflation with carbon dioxide.
 - c. infiltration with sodium chloride.
 - d. infiltration with lactated Ringer's.
12. (405) During a Laparoscopic Nissen fundoplication, what is the last thing the surgeon does before closing the incisions?
 - a. Checks for hemostasis.
 - b. Severs the phrenogastric ligament.
 - c. Uses the dilator to check for torsion.
 - d. Replaces the dilator with a nasogastric tube.
13. (405) Laser devices can be used in place of what conventional surgical tools?
 - a. Hemostats.
 - b. Retractors.
 - c. Scalpels.
 - d. Mallets.
14. (405) Which procedure would benefit from the use of a laser?
 - a. Bunioectomy.
 - b. Total joint replacement.
 - c. Removal of the gallbladder.
 - d. Myringotomy tube placement.

Student Notes

Unit 2. Obstetrics and Gynecology Surgery

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VERY CLOSELY ALLIED WITH GENERAL SURGERY—mainly because of the anatomical positioning in the lower abdominal cavity—the procedures performed on the female reproductive organs are very similar to those in the general surgery realm. In fact, as we mentioned earlier, it is not uncommon for a general surgeon to encounter gynecological problems along with other lower abdominal disorders. Conversely, the gynecologist may run into conditions such as a diseased appendix, and have to enter the domain of the general surgeon by performing an appendectomy along with the original pelvic procedure. In spite of this slight overlap with general surgery, there are very distinct conditions that require the services of a gynecologist. This specialty is usually divided between the diseased conditions of the fallopian tubes, ovaries, uterus, cervix, vagina, and external genitalia, and the normal or abnormal conditions of pregnancy.

In this unit we first look at the preoperative preparation for obstetric and gynecologic (OB/GYN) patients. Then we discuss some of the medical complications that result in patients needing OB/GYN surgery to correct their illness. Finally, we look at common OB/GYN surgeries performed through the abdomen and/or vagina.

2–1. Fundamentals of Obstetrics and Gynecology Surgery

The abdominal operative approach is similar for both gynecological and general surgery procedures. However, because of the area involved—and diagnostic and operative procedures are often combined into one operation—there are additional preoperative cautions taken with OB/GYN patients.

406. Common preoperative preparations

One of the most distinctive features of the OB/GYN specialty is its concentration on the female patient. Some patients suffer severe anxiety preoperatively as OB/GYN operations can possibly end reproductive capabilities and produce menopause. There is also the potential for altered body image, loss of sexuality, and infertility problems. Therefore, the patient needs strong emotional support and reassurance to manage the anxiety effectively.

Because of sexual taboos in our society, there is some anxiety connected with any procedure that requires exposure of the genitalia. When surgery is performed in this area, we must be particularly conscious of the patient's apprehension about having her body uncovered. For this reason, a female chaperone should always be present when any pelvic procedure is performed.

Indwelling urinary drainage systems (catheters) are frequently inserted before or during the operation because OB/GYN procedures are often performed in close proximity to and involve the manipulation of the ureters, bladder, and urethra. Keeping the bladder empty aids with constant bladder drainage and prevents undue trauma to the bladder. A urethral Foley catheter is most often used, but radical procedures may require a suprapubic catheter.

Special emphasis should be placed on problems involved when the lithotomy position is used. Circulatory interference and strain on muscles and joints are especially prevalent. Some stirrups may

require padding between the calves of the leg and the post because pressure against soft tissue may predispose to venous thrombus. Even the manner of raising and lowering the legs can be traumatic. Both legs should be moved simultaneously, as a single unit, to prevent the extra hip strain that can result when one leg is raised while the other remains flat. The back and buttocks should not be allowed to extend beyond the end of the bed, and the lower legs and feet should *not* be allowed to dangle over the end of the table before or after the operation. This could cause pressure on the back of the legs with pooling of blood, thrombosis, and even embolism. You should know if the patient has any hip problems before trying to place her in a lithotomy position. The surgeon may want the legs wrapped with ace bandages or may request anti-embolism stockings to help prevent circulation problems. Finally, it is best to delay placing the legs in the stirrups until after the patient is asleep; therefore, she won't be uncomfortable or worried about her body being exposed.

407. Complications of obstetrics and gynecology surgery

Complications or problems that occur in the OB/GYN specialty fall into two general categories, obstetrical complications and gynecological complications. Obstetrical complications refer to those that occur during pregnancy, gynecological complications are those that occur when a female is not pregnant.

Obstetrical complications

There are numerous complications that may develop during the course of a pregnancy; some complications are minor, others result in fetal death. If the premature fetus dies in utero, and the products of conception (fetus and placenta) are discharged from the uterus, it is termed a *spontaneous abortion*; this may result because of injury or due to congenital defects of the mother or fetus. If the non-living products of conception are retained in the uterus for over two months, this condition is known as a *missed abortion*. If parts of the products of conception abort, and parts are retained, it is known as an *incomplete abortion*. If a patient begins to have uterine bleeding, this is sometimes an indication that the patient is about to abort. This is called an *imminent abortion*. Most of these conditions require that the patient undergo a dilatation of the cervix and uterine curettage (D&C).

There are many complications that can occur just before or during childbirth which require the patient to undergo an emergency Cesarean (C-section). Painful and difficult labor—called *dystocia*—may require a C-section. Also, there are two emergency situations that involve the placenta—*placenta previa* and *abruptio placentae*. Placenta previa occurs when the placenta is abnormally placed and completely covers the cervical os (opening), preceding the fetus during birth. Abruption placentae occur when the placenta prematurely separates from the uterine wall. Another complication, *Cephalopelvic disproportion*, occurs when the mother's pelvis is too small to accommodate the head of the fetus. Sometimes the fetus gets "acrobatic" and decides to make a different presentation into the world from the normal head down presentation, and may require a C-section. In a *transverse* presentation, the fetus is presented crosswise; in a *breech* presentation, the buttocks are presented; in a *vertex* presentation, the upper back of the head is presented; and in a *footling*, the feet are presented first. The final complication occurs when the fetal heart tones become very weak or are absent. In this situation, termed *fetal distress*, a C-section must be performed immediately. The lack of fetal heart tones is an indicator that the umbilical cord is twisted or obstructed, or some other serious complication is threatening the life of the baby.

Gynecological complications

Along with obstetrical complications, there may be gynecological complications as well. The absence of menstruation indicates *amenorrhea*. This may be caused by stress, emotional upset, disease, or physiological imbalance. *Dysmenorrhea* is difficult or painful menstruation. Excessive bleeding during menstruation is *menorrhagia*; bleeding at times other than during menstruation is referred to as *metrorrhagia*, and, excessive bleeding that occurs during both menstruation and at irregular intervals is called *menometrorrhagia*. To determine the cause of or to try to correct these conditions, the surgeon may perform a D&C.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

406. Common preoperative preparations

1. List five possible effects of OB/GYN operations that commonly cause the patient to suffer severe anxiety preoperatively.
2. When using the lithotomy position, what two problems are especially prevalent?
3. What action can be taken to prevent extra hip strain when placing the patient in the lithotomy position?
4. What can be done to prevent circulation problems when using the lithotomy position?

407. Complications of obstetrics and gynecology surgery

1. Under which two major categories do all gynecological problems fall?
2. Define missed abortion, incomplete abortion, and imminent abortion.
3. Define dystocia.
4. What phrase describes a placenta that completely covers the cervical os, preceding the fetus during birth?
5. Define abruptio placentae.
6. What is the condition called when the mother's pelvis is too small to accommodate the infant's head?
7. List and describe four positions, other than face first, of fetal presentation.

8. The sudden lack of fetal heart tones is usually an indicator of what problem?
9. Define and give three reasons for amenorrhea.
10. What term is given to painful or difficult menstruation?
11. Compare menorrhagia to menometrorrhagia.
12. What procedure may the surgeon elect to perform to determine the cause of irregular menstrual bleeding?

2-2. Commonly Performed Obstetrics and Gynecology Surgical Procedures

Any lengthy explanation of gynecological and obstetrical procedures is impractical for this CDC, so we review the more common operations that are performed in Air Force medical facilities.

408. Major obstetrics and gynecology procedures

Obstetrics and gynecology services include general gynecological care for women of all ages, from adolescence to menopause. Two common surgical procedures discussed in this lesson are hysterectomies and C-sections.

Total abdominal hysterectomy

A total abdominal hysterectomy (TAH) is the removal of the entire uterus, including the corpus and cervix, through an abdominal incision. A *panhysterectomy* is a total hysterectomy combined with a bilateral salpingo-oophorectomy. Some indications for an abdominal hysterectomy are dysfunctional uterine bleeding that failed to respond to simpler means of treatment; endometriosis; benign and malignant tumors; post-menopausal bleeding; and, chronic pelvic infection. In this lesson we discuss the procedures for a total abdominal hysterectomy.

Preparation of the patient

The patient is placed in the supine position with the arms at the side or extended on arm boards. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the nipple line to mid-thigh, bedside to bedside, including the vaginal area. Two separate cleansing skin preps are required for this procedure. The patient's legs are put in the frog leg position, and the vaginal area is prepped first. A Foley catheter is inserted and connected to a continuous drainage bag. The legs are returned to the normal position and the safety strap replaced. The abdomen is then prepped beginning at the incision site working outward. Prep from the nipples to the mid-thighs, and bedside to bedside.

Draping

The patient is draped by using four hand towels, a base or foundation sheet, and a laparotomy drape sheet (a typical laparotomy draping procedure).

Instrumentation

The basic instrumentation and supplies include the following:

- Basin set.
- Blades.
- Sponges.
- Suture material.
- Needle counter pad.
- Major instrument set.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Abdominal hysterectomy instruments.
- O'Connor-O'Sullivan self-retaining retractor.

Procedure

The abdomen is opened through a Pfannenstiel, paramedian, midline, or vertical incision. Normally, a Pfannenstiel incision is used. But paramedian or midline incision may be preferred when the patient is obese, the surgeon anticipates difficulty due to pelvic adhesions, or where there is a previous abdominal incision. The abdomen is explored and a self-retaining retractor is inserted; usually either a Balfour or O'Connor-O'Sullivan is used, with the latter being used most often. The abdominal contents are packed above the pelvic brim with a moistened laparotomy sponge and held in place by the third blade of the self-retaining retractor. The patient is placed in the Trendelenburg position.

The fundus of the uterus is grasped using a straight tenaculum and drawn out of the abdominal wound. The surgeon then separates the adnexa (ovaries and fallopian tubes) from the uterus, first on one side and then on the other, by double-clamping (using Kocher or Heaney clamps) the proximal ends of the round, utero-ovarian, and broad ligaments and fallopian tubes. The tissue between the clamps is divided using a knife or Metzenbaum scissors, sutured with absorbable suture, and tagged with a hemostat. The surgeon continues until deep into the pelvis.

The bladder is separated from the uterus by the surgeon transversely cutting the uterovesical fold of the peritoneum close to its uterine attachment. Using a sponge stick, the surgeon displaces the bladder downward, off the uterine corpus to a level well below the internal cervical os. This is called a bladder flap and will be reattached during the closure of the wound. The uterus is then pulled forward so the surgeon can make sure that there are no bowel adhesions to the posterior aspect of the cervix. The uterine arteries, uterosacral ligaments, and uterine vessels are then exposed, double clamped, and cut between the clamps. The uterus is held upward by two clamps placed in the cornual angles. The peritoneum and portion of the paracervical fascia enveloping the cervix between the ligated uterine vessels is superficially cut and grasped with two long Allis clamps. The fascial cuff is separated from the posterior aspect of the cervix with curved Mayo scissors. The uterus is now held upward over the sacral promontory, and the anterior paracervical fascia is cut at the same level as the fascial incision on the posterior aspect of the cervix. The lower margin of the fascia is grasped with Allis clamps and retracted downward as curved Mayo scissors are used to separate the fascia off of the surface of the cervix.

A straight Kocher clamp is placed on the right cardinal or transverse cervical ligament between the ligated uterine vessels and lateral surface of the cervix. The proximal ends of the cardinal ligaments are then cut and ligated. The ligature reattaches the paracervical fascia to the cardinal ligament which

assists in maintaining support of the vaginal vault. The cervix can now be drawn upward by firm traction on the body of the uterus. The cervix is elevated with a Kocher clamp. The vaginal vault is stabilized with two Allis clamps and cut with a long knife or long scissors, thus freeing the uterus. Instruments that have been used on the cervix or vagina should be treated as contaminated and placed in a basin and removed from the field with the specimen.

Hemostasis is secured and the vaginal vault is closed. Interrupted angled sutures are placed to help control bleeding and anchor all three connective tissue ligaments to the vaginal vault. The vaginal mucosa is approximated with a continuous suture to make the vault firm and provide resistance against prolapse. The bladder flap is re-peritonealized using a continuous absorbable suture. The abdomen is then closed beginning with the pelvic peritoneum. A purse string suture is passed through the edges of the broad ligament and surrounds the pedicles of fallopian tubes, round and utero-ovarian ligaments on the left. It is continued to the midline where it is tied to a similar suture that has been placed on the right. The remaining wound is closed in the routine manner. Some surgeons may insert a vaginal pack coated with sulfa cream into the vagina at the end of the procedure to control oozing.

Total vaginal hysterectomy

A total vaginal hysterectomy (TVH) is the removal of the uterus through the vagina. Indications are the same as those for an abdominal hysterectomy. A vaginal hysterectomy is less traumatic because the abdominal wall is left intact, and it is more comfortable for the patient postoperatively.

Preparation of the patient

After the patient is administered a general or regional anesthetic, the patient is placed in the lithotomy position with the arms at the side or extended on arm boards. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the pubic symphysis downward, including the vaginal area. The cleansing skin prep begins at the pubic symphysis, extending downward, including the inner thighs. The vaginal vault and cervix are cleansed using sponge sticks. The perineum and anus are the last areas to be cleansed. The bladder is drained with a straight catheter.

Draping

The patient is draped with a sheet under the buttocks, three hand towels, and a lithotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Vaginal hysterectomy set.
- Basin set.
- Blades.
- Sponges.
- Suture material.
- Needle counter pad.
- Suction tubing and tip.
- Electrosurgical handpiece.
- 10 cubic centimeter (cc) syringe (have available).
- 22-gauge needle (have available).

Procedure

The surgeon begins by grasping the cervix with a uterine tenaculum and placing a weighted vaginal speculum in the vaginal vault. To facilitate dissection and decrease bleeding, the surgeon may inject a phenylephrine (Neo-Synephrine) solution into the vaginal incision sites as shown being administered in figure 2-1. The surgeon then makes a circular incision around the cervix. The fascia covering the bladder is grasped with a toothed forceps, and a midline incision is made with the Metzenbaum scissors directly backwards to the cervix. The bladder is pushed upwards off the cervix exposing the uterosacral ligaments. The uterosacral ligaments are double-clamped, divided, and ligated with size O suture ligatures on a heavy tapered needle. The lateral vaginal wall on each side is pushed upwards to expose the cardinal ligaments. The posterior vaginal wall is mobilized, and further dissection is carried out through the connective tissue on either side of the midline until the peritoneum (pouch of Douglas) is seen. The peritoneum is grasped with two Allis clamps and opened with Metzenbaum scissors. The surgeon must be sure it is the peritoneum that is being cut or there is a chance of cutting the rectum or burrowing into the uterus. The opening is extended laterally to the uterosacral ligaments, which have already been exposed by previous dissection. The cardinal ligaments and uterine arteries are clamped, cut, and ligated, and the uterus is delivered. If the ovaries are to remain, two forceps are placed across the round ligament, ovarian ligament, and tube; and using a knife, they are detached from the uterus leaving both clamps on the pedicles. The uterus is then removed and the pedicles ligated.

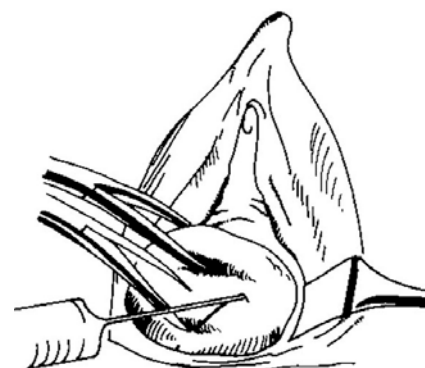


Figure 2-1. Vaginal hysterectomy—injecting the incision site.

The peritoneum between the vagina and rectum is closed with a continuous suture. The incisions into the cul-de-sac and vaginal apex are repaired, and the round ligament and uterosacral ends are sutured to the angles of the vaginal vault closure. If the patient has a cystocele and/or rectocele, an anterior and/or posterior repair may be performed at this point. A Foley catheter is inserted along with a vaginal pack coated with sulfa cream.

Cesarean section

A Cesarean section is the delivery of the fetus through an abdominal incision. Cesarean sections are performed whenever a vaginal delivery cannot be accomplished safely, and it is believed that a delay in delivery would compromise the life of the fetus, the mother, or both.

Because C-sections are mostly performed as an emergency, the patient needs careful assessment and emotional support. The mother may express grave concern for the child's well-being. She may feel she has failed in some way by not being able to have a normal vaginal delivery. Some hospitals will allow the father to sit next to the mother for emotional support during the procedure if he had childbirth classes during the pregnancy. This also allows him to take part in the bonding that occurs at birth.

A warmed mobile crib equipped with infant resuscitative equipment and suction is brought into the room. Nursery personnel should be in attendance to care for the infant immediately after delivery.

Preparation of the patient

The patient is placed in the supine position with the arms extended on arm boards. The right side of the patient will be elevated with a rolled towel or sheet to provide adequate venous return during preparation and surgery. If the patient is to have a general anesthetic, *all* preparations must be accomplished prior to the anesthesia being administered. This ensures that the infant will receive as little anesthetic as possible. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the nipple line to mid-thigh, bedside to bedside. *The vagina is not prepared.* A Foley catheter is inserted and the cleansing skin prep is begun. The cleansing prep starts at the incisional site working outward from the nipple line to mid-thigh, bedside to bedside.

Draping

The patient is draped using four hand towels, a foot sheet, and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Bulb syringe.
- Two test tubes.
- Suture material.
- Needle counter pad.
- Umbilical cord clamp.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Cesarean section instrument set.
- 10cc syringe & 18-gauge needle.

Procedure

The abdomen is most often entered through a Pfannenstiel's incision, though lower midline incision is preferred in some situations; the incision selection should be consistent with the estimated size of the fetus. The rectus muscles are separated and the uterovesical fold of the peritoneum is incised. The bladder is pushed downwards with a bladder retractor to keep it away from the uterine incisional site, as indicated in figure 2-2. At this point, the scrub should be prepared with a bulb syringe, dry lap sponges, and suction (the tip removed from the tubing) to quickly evacuate the field of amniotic fluid. The uterus is nicked with the deep knife and the incision is extended using bandage scissors. If the lower uterine segment is thin, the incision may be extended by using lateral pressure applied with each index finger. To prevent injury to the infant upon delivery, all retractors and unnecessary instruments are removed from the field. The surgeon then places a hand into the uterus (fig. 2-3) to deliver the fetal head while the assistant helps expel the fetus by supplying transabdominal fundal pressure. The head is delivered from the wound and the infant's airway is gently suctioned with the bulb syringe to minimize aspiration of amniotic fluid (fig. 2-4). The infant is then delivered the rest of the way through the wound. The umbilical cord is clamped with a cord clamp, cut with bandage scissors, and cord blood samples are taken using a needle and syringe. The drawn blood samples are then placed in test tubes and passed off the field as soon as possible. The infant is handed to the awaiting pediatrician and resuscitation measures are provided as needed. Before the mother or infant leave the operating room, the infant should be footprinted, and two newborn identification bands must be placed on the infant. The mother must also receive a newborn identification band.

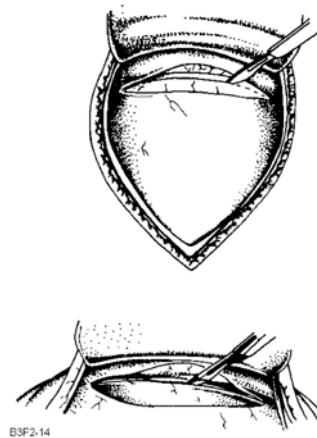
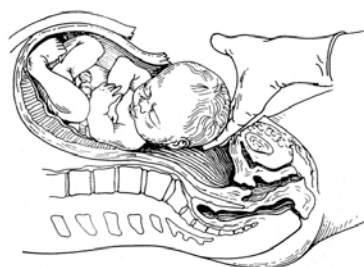


Figure 2-2. Cesarean Section—incisional site.

Once it is determined that the infant is in no distress, the circulator will show the infant to the mother, if she is awake, and to the father. The father will then escort the pediatrician and infant to the nursery.



LATERAL VIEW



ANTERIOR VIEW

Figure 2-3. Cesarean Section—Manual delivery of the fetal head.



Figure 2-4. Cesarean Section—suctioning the airway.

About 20 units of oxytocin are given intravenously to the mother to help the uterus contract, minimize blood loss, and aid in the expulsion of the placenta. Hemostasis is secured by clamping the uterine edges with Pennington clamps. The placenta is removed and placed in a basin. The uterine incision is closed with a size 0 suture in a single or double layer. The bladder flap is re-peritonealized with a

continuous 2-0 or 3-0 absorbable suture. A tubal ligation may be performed at this point. The wound is then closed in the routine fashion.

409. Minor obstetrics and gynecology procedures

The OB/GYN surgical services also include some minor procedures: dilatation of the cervix and uterine curettage (D&C) and conization of the cervix. The D&C is a common gynecologic procedure that is used to treat many different uterine issues. It is usually performed in the operating room with the use of local, epidural, spinal or general anesthesia. Conization of the cervix is the removal of a portion of the mouth of the cervix and endocervical canal.

Dilatation of the cervix and uterine curettage

Dilatation of the cervix is the gradual enlargement of the cervical canal using a series of graduated metal dilators which stretch the muscle and fibrous tissue of the cervix. Uterine curettage is the removal (by scraping) of endocervical or endometrial tissue to control dysfunctional uterine bleeding, diagnose uterine or cervical tumors, aid in evaluating infertility, remove tissue following a missed or incomplete abortion, and terminate a pregnancy.

Preparation of the patient

After the patient has been administered a general or regional anesthetic, the patient is placed in the lithotomy position with the arms at the side or extended on arm boards. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient is generally not shaved/clipped for this procedure. The cleansing skin prep begins at the pubic symphysis and extends downward. The vaginal vault and cervix are cleansed, and the perineum and anus are cleansed last. At the end of the prep, the bladder is drained with a straight catheter.

Draping

The patient is draped using a sheet under the buttocks, three hand towels, and a lithotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- D&C instrument set.
- Basin set.
- Sponges.
- Telfa (for the specimen).

Procedure

The anterior lip of the cervix is grasped with a tenaculum, and a weighted speculum is placed in the vaginal vault. As figure 2-5 illustrates, a graduated uterine sound is gently passed through the cervical canal to measure the depth and direction of the uterine cavity. Care must be used to avoid perforation of the uterus. The cervix is gradually dilated with Hegar or Hanks uterine dilators (fig. 2-6). After the cervix is dilated, a Randall stone forceps may be inserted into the cervix and used to explore the uterine cavity for polyps (fig. 2-7). The surgeon will then place a strip of Telfa or a 4 × 8 radiopaque sponge over the weighted speculum. The interior of the cervical canal and uterine cavity are gently curetted with a sharp uterine curette, allowing the specimen to fall on the Telfa or sponge, as shown in figure 2-8. If specific specimen site identification is required, the endocervix is scraped first and separated from the endometrium curettings. The cervix is checked for bleeding and the instruments are removed. A small vaginal pack may be inserted.

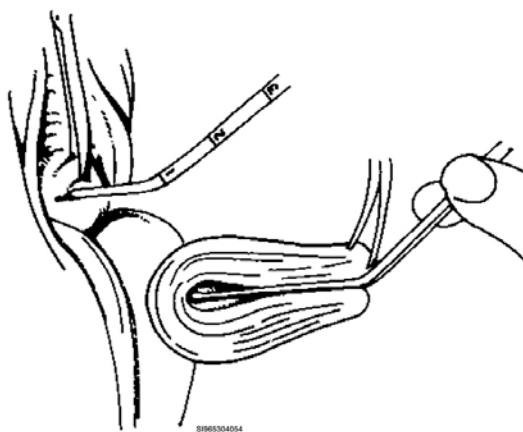


Figure 2-5. D&C—Measuring the uterine cavity.

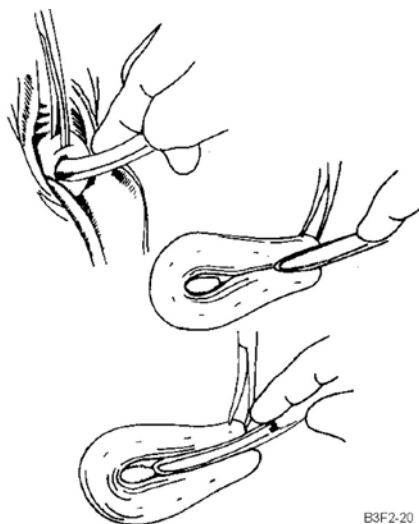


Figure 2-6. D&C—dilating the cervix.

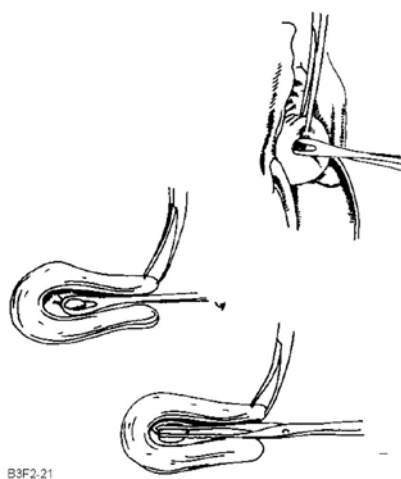


Figure 2-7. D&C—exploring for polyps.

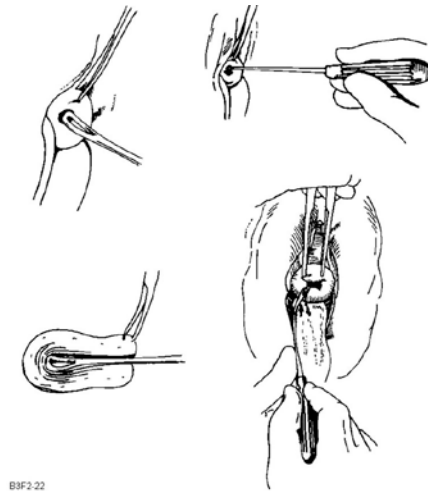


Figure 2-8. D&C—curettage of the uterus.

Conization of the cervix

Surgeons perform *cold* conization by scalpel resection and suturing, and *hot* conization using electrocautery or a laser. Conizations are performed to diagnose and/or treat major dysplasia, carcinoma in situ, cervicitis, and some cases of microinvasive carcinoma of the cervix in young females in which total hysterectomy is not feasible.

Preparation of the patient

After the patient has received a general or regional anesthetic, the patient is placed in the lithotomy position with the arms at the side or extended on arm boards. The electrosurgical ground pad is placed on the anterior thigh. The patient is placed in the Trendelenburg position.

Skin preparation

The patient is not generally shaved/clipped for this procedure. The cleansing skin prep begins at the pubic symphysis and extends downwards to each inner thigh. According to the surgeon's preference, the vaginal prep may be limited to the application of Betadine paint to the cervix and vaginal vault. This helps prevent the spreading of cancer cells.

Draping

The patient is draped using a sheet under the buttocks, three hand towels, and a lithotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Telfa.
- Suture.
- Sponges.
- Basin set.
- Needle counter pad.
- D&C instrument set.
- Electrosurgical handpiece.
- Hemostatic agent (have available).

Procedure

A weighted speculum is placed in the vaginal vault and the anterior and posterior lips of the cervix are grasped with a tenaculum. The cervix is then stained with a solution such as Lugol's solution; this solution will stain healthy tissue, but will not stain cancerous tissue, aiding in identification and removal. Two suture ligatures are placed (fig. 2-9A)—one at the 3 o'clock and one at the 9 o'clock position across the cervix. Using the knife, cautery, or laser, an incision is made circumferentially around the cervical os (fig. 2-9B). The specimen is removed (fig. 2-9C) and the cervix is checked for bleeding. Bleeding may be controlled with additional sutures, a hemostatic agent, or electrode desiccation. A vaginal pack and Foley catheter may be inserted.

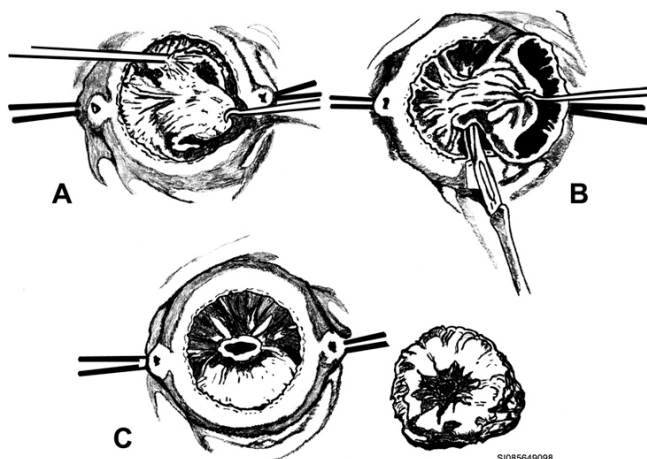


Figure 2-9. Cone Biopsy.

A. Ligature placement.

B. Incision.

C. Removed cervix.

410. Endoscopic obstetrics and gynecology procedures

The procedure and illustrations in this lesson refer to the traditional “direct visualization” method, i.e. the surgeon looks directly through the scope. Many surgeons prefer the more aseptically sound method of using a camera and monitor to perform the procedure.

Laparoscopy

As discussed in the lesson on general surgery, laparoscopy is direct endoscopic visualization of the abdominal contents through the anterior abdominal wall following the establishment of a pneumoperitoneum. Indications for a laparoscopy can be both diagnostic and operative. Diagnostic indications include infertility, suspected ectopic pregnancy, unexplained pelvic pain, and evaluation of pelvic masses. Surgical indications include biopsy of ovaries, aspiration of benign ovarian cysts, tubal sterilization, lysis of pelvic adhesions, and numerous other procedures.

Preparation of the patient

After the patient is administered regional or general anesthesia, the patient is placed in the lithotomy position with the arms at the side or extended on arm boards. For extreme Trendelenburg, shoulder braces are required. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the nipple line to mid-thigh, bedside to bedside, including the vaginal area. The cleansing skin prep begins at the umbilicus extending outward from the nipple line to the pubic symphysis, bedside to bedside. Then the prep is

continued from the pubic symphysis, extending down over the labia and the inner thighs. Cleanse the vaginal vault and cervix using sponge sticks. The perineum and anus are cleansed last. After the prep, the patient is catheterized with a straight catheter.

Draping

The patient is draped by using four hand towels, a drape sheet under the buttocks, leggings, and a laparoscopy sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- 10cc syringe.
- Suction tubing.
- Suture/Band-Aids.
- Insufflation device.
- Fiberoptic light source.
- Laparoscopy instruments.

For infertility, add the 20cc syringe and methylene blue dye.

Procedure

Initially the surgeons will double glove. They will then place a tenaculum on the cervix followed by the insertion of a uterine manipulator, often an intrauterine cone-cannula device, usually called the intrauterine cannula, inserted into the cervix and used to manipulate the uterus during the procedure, as shown in figure 2-10. Once these are in place, the surgeon will remove the outer pair of gloves and proceed with the operation.

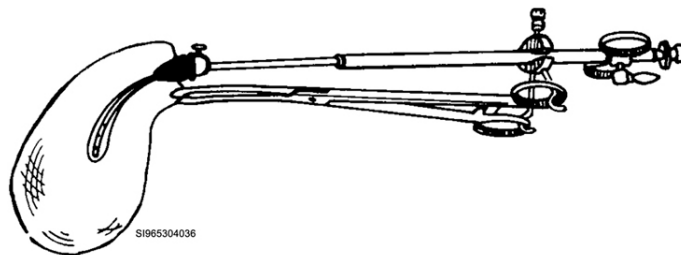


Figure 2-10. Insertion of tenaculum and uterine manipulator.

The laparoscopy often begins as shown in figure 2-11; the surgeon places two Allis clamps on the inferior rim of the umbilicus. This allows the surgeon to elevate the abdominal wall above the viscera to reduce likelihood of injury to the bowel and other abdominal structures. A semilunar incision is then made through the skin with a #11, or #15, knife blade in the lower aspect of the umbilical fold (fig. 2-11). Traction is placed on the Allis clamps; and the insufflation cannula, usually a double-barreled needle with a spring-loaded blunt tip, is inserted through the incision into the peritoneal cavity (fig. 2-12). To ascertain proper placement, a 10cc syringe partially filled with sterile saline may be attached to the insufflation cannula for aspiration. If blood is aspirated, the needle has entered a blood vessel. If bowel contents or malodorous gas is aspirated, the needle has entered the stomach or a loop of bowel. If nothing is aspirated, then the needle is positioned properly in the peritoneal cavity, as you can see in figure 2-13.

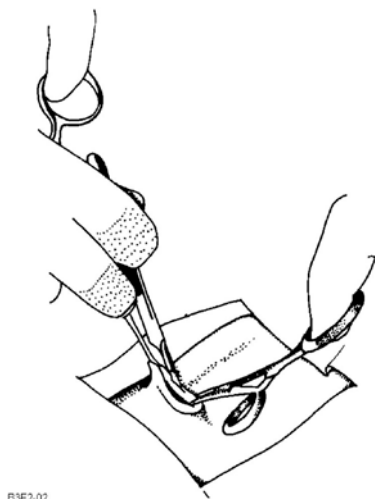


Figure 2-11. Laparoscopy—semilunar incision.

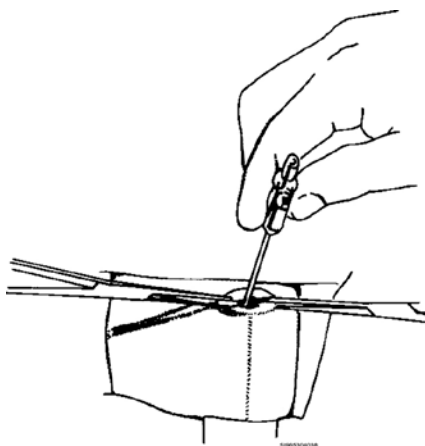


Figure 2-12. Laparoscopy—insertion of insufflation cannula.

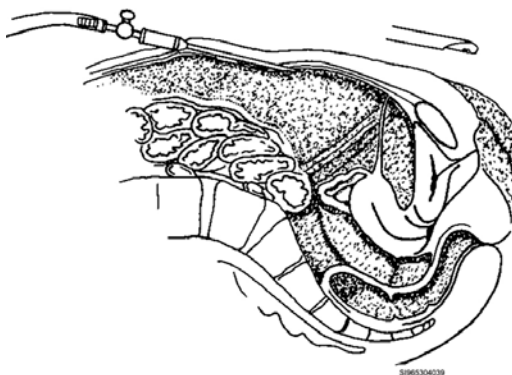


Figure 2-13. Laparoscopy—proper position of insufflation cannula.

Sterile insufflation tubing is attached to the insufflation cannula, and then connected to the carbon dioxide gas insufflator. Pneumoperitoneum is achieved with approximately two to three liters of carbon dioxide or nitrous oxide delivered into the peritoneal cavity. The intra-abdominal pressure must be monitored closely to prevent overdistention of the abdomen. On percussion of the abdomen (fig. 2-14), a tympanic resonance (drum-like reverberation) can be heard as the gas fills and distends

the peritoneal cavity. The absence of liver dullness indicates that pneumoperitoneum was achieved satisfactorily. After insufflation is complete, the needle is withdrawn and the incision is slightly elongated.

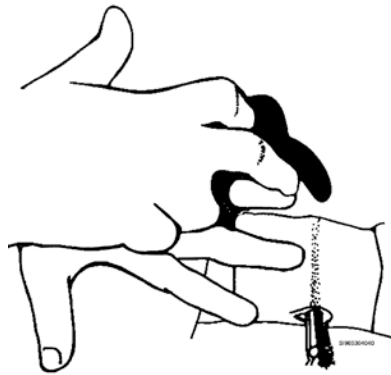


Figure 2-14. Laparoscopy—percussion of the abdomen.

Figure 2-15 shows the trocar and sleeve being inserted next through the incision at a 45 degree angle towards the pelvis. Penetration is achieved by a controlled twisting and thrusting movement (fig. 2-16). The polyethylene tubing is attached to the trocar sleeve to keep the abdomen inflated.

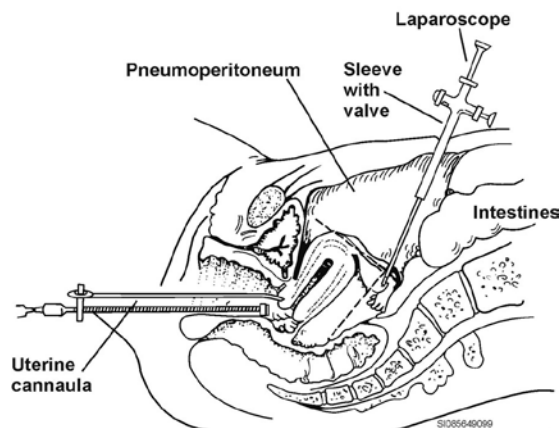


Figure 2-15. Laparoscopy—insertion of trocar and sleeve.



Figure 2-16. Laparoscopy—penetration of trocar and sleeve.

The trocar is withdrawn, the laparoscope is inserted, and the light source is connected (fig. 2-17). The uterus, tubes, ovaries, and other abdominal organs are identified and inspected. Manipulation of the uterus by the assistant, using the intrauterine cannula and tenaculum previously inserted, facilitates the examination. Most procedures require at least one ancillary incision for insertion of a second sheath/trocar unit into the right lower quadrant at a point halfway between the anterior superior iliac spine and symphysis pubis, as shown in figure 2-18. In order to avoid injury to the inferior epigastric vessels, the incision is guided by intraperitoneal illumination of the abdominal wall by pointing the laparoscope at the desired site (blood vessels show up as dark lines on the illuminated abdomen). After the incision is made, using direct visualization, the surgeon inserts an ancillary trocar and sleeve, illustrated in figure 2-19. The point of entry is inspected for bleeding. The trocar is removed and an ancillary instrument such as biopsy forceps or probe is inserted (fig. 2-20).



Figure 2-17. Laparoscopy—insertion of laparoscope.

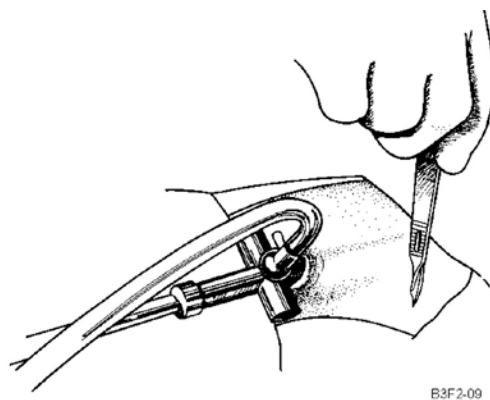


Figure 2-18. Laparoscopy—making the second incision.

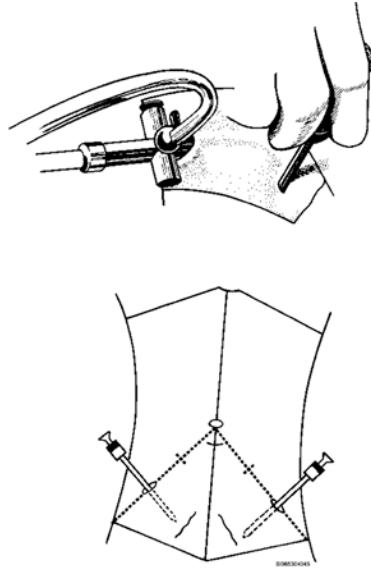
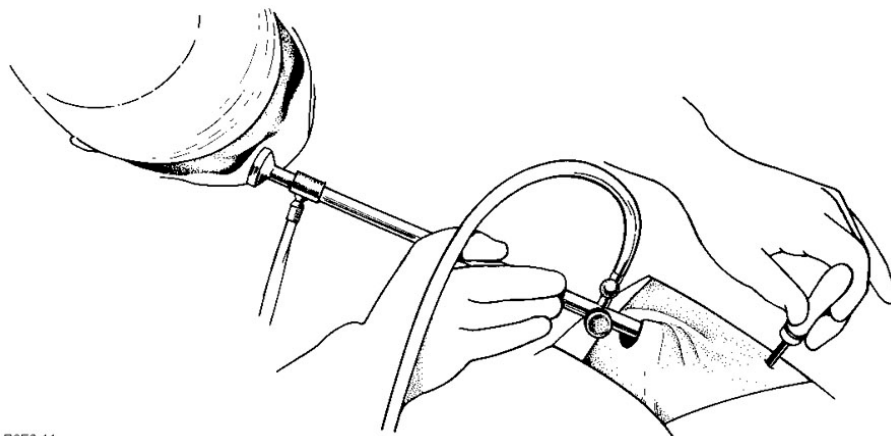


Figure 2-19. Laparoscopy—insertion of ancillary trocar and sleeve.



B3F2-11

Figure 2-20. Laparoscopy—insertion of probe.

If the laparoscopy is being done for tubal patency, diluted methylene blue is injected through the intrauterine cannula. If the fallopian tubes are patent, the methylene blue will appear in the fimbriated ends. If the procedure is performed for tubal ligation, biopsy forceps will be inserted through the ancillary incision. A portion of the tube is grasped by the forceps approximately 1 to 1½ inches from the uterus and pulled up, as illustrated in figure 2-21. No other pelvic structure or any loop of bowel should be near the fallopian tube or touching the forceps. Electrocauterization is performed, blanching about a one-inch segment of tube. The forceps sleeve is pushed down to transect the cauterized portion of tube. The cut ends of the tube are observed for bleeding, and the cauterized segment of tube is removed from the forceps (fig. 2-22) and saved for pathologic analysis. The process is repeated on the other tube.

At the completion of the procedure, the ancillary forceps and sleeve are withdrawn from the abdominal cavity. The laparoscope is then removed, and the insufflated gas is allowed to escape through the open laparoscope sleeve, assisted by manual compression of the abdomen; as much gas as possible is evacuated. The sleeve is then gently withdrawn. Any minimal residual gas will be readily absorbed, preventing postoperative diaphragmatic pain. The incisions are closed and the vaginal instruments are withdrawn.

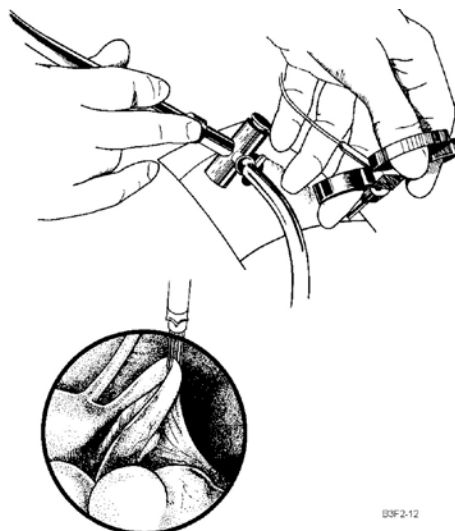


Figure 2-21. Laparoscopy—grasping the tube.

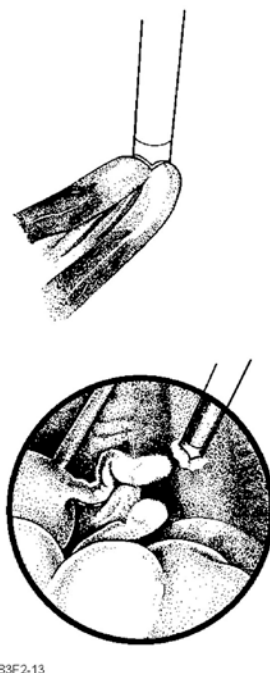


Figure 2-22. Laparoscopy—dissecting the tube.

Laparoscopic assisted vaginal hysterectomy

Another approach to performing a vaginal hysterectomy is the laparoscopic assisted vaginal hysterectomy (LAVH). In this procedure, the surgeon actually performs a vaginal hysterectomy by performing certain steps through laparoscopic techniques. This approach provides the surgeon better visualization of the internal structures over the traditional vaginal hysterectomy approach. Since we have already discussed the traditional approach to performing a vaginal hysterectomy, we will discuss only the laparoscopic portion.

NOTE: This procedure requires two distinctive set-ups—one for the laparoscopic portion and one for the vaginal portion. The abdominal and vaginal area will be prepped and a laparoscopy drape will be used for draping.

Additional instrumentation required

Additional instrumentation and supplies include the following:

- Blades: #15.
- Video system set-up.
- Fiberoptic light cord.
- Fiberoptic light source.
- Camera control unit and monitor.
- Operative laparoscopy instrument set.
- Electrosurgical instruments and cord(s).
- Camera (if not built-in to the scope) and cord.
- Insufflation device (generally a high-flow type).
- Endosurgical gastrointestinal anastomosis stapler.
- One 12mm trocar, two 10mm trocars, and one 5 mm trocar.
- Insufflating needle or trocar and sterile insufflating tubing.
- Surgeon's choice of laparoscope (diameter and view angle varies).

Procedure

The surgeon may use as many as four trocars to perform the laparoscopic portion of the procedure. Once the surgeon has inserted the laparoscope and visualized the operative field, he or she grasps the ovary and fallopian tube and moves them to expose the infundibulopelvic ligament. The surgeon identifies the ureter and places an endosurgical gastrointestinal anastomosis stapler across the infundibulopelvic and round ligaments. Once the stapler is closed and proper positioning is validated, the stapler is engaged; which ligates and cuts the enclosed structures. Similar steps are duplicated on the opposite side. The bladder is elevated and the lower portion of the uterus is transected with endoscopic scissors. The surgeon then performs the vaginal portion of the procedure. The surgeon may use the laparoscope towards the end of the procedure to verify hemostasis.

411. Laser obstetrics and gynecology procedures

Laser procedures are usually performed in the hospital under general or local anesthesia. A laser is used to destroy abnormal surface cells. The procedure discussed in this lesson is endometrial laser ablation.

Endometrial laser ablation

Endometrial ablation is performed to treat abnormal uterine bleeding. The overall goal of endometrial ablation is to create amenorrhea or to reduce menstrual bleeding to a normal, tolerable flow for the patient. It may be an alternative to hysterectomy in some patients with chronic menorrhagia. The procedure is most commonly done on an outpatient basis.

Preparation of the patient

After the patient is administered a general, regional anesthetic, or local, the patient is placed in the lithotomy position with the arms at the side or extended on arm boards. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient is generally not shaved/clipped for this procedure. The cleansing skin prep begins at the pubic symphysis and extends downward. The vaginal vault and cervix are cleansed, and the perineum and anus are cleansed last. At the end of the prep, the bladder is drained with a straight catheter.

Draping

The patient is draped using a sheet under the buttocks, three hand towels, and a lithotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Sponges.
- Basin set.
- Hysteroscopy set
- D&C instrument set.
- Fiberoptic light cord.
- Video system set-up.
- Fiberoptic light source.
- Telfa (for the specimen).
- Camera control unit and monitor.
- Camera (if not built-in to the scope) and cord.

Procedure

A weighted speculum is placed in the vaginal vault and the anterior and posterior lips of the cervix are grasped with a tenaculum and pulled toward the vaginal introitus. Just like with a D&C, a uterine sound is placed into the cervical canal to determine the direction and depth of the uterine cavity. Caution is used to not perforate the uterus. The cervix is dilated to the required diameter using well lubricated Hegar or Hank dilators. The surgeon inserts the hysteroscope and distends the uterus with carbon dioxide, glycine, or dextran solution. Intake and output of irrigating fluid must be accurately tracked by the circulating nurse to avoid fluid overload. Exploration of the uterine cavity is conducted using a video camera monitor to enhance visibility for the surgeon. Personal preference will dictate which type of disposable laser handset is used by the surgeon for the ablation portion of the procedure. With the laser handset inserted into the uterus, the surgeon may choose to use a blanching or dragging technique to treat the endometrium. In the blanching technique, the tip of the laser fiber is held away from the tissue. In the dragging technique, the laser fiber is held in direct contact with the endometrium. Upon completion of the procedure, the hysteroscope and laser handset are removed. The cervix is checked for bleeding and a small vaginal pack may be inserted.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

408. Major obstetrics and gynecology procedures

1. Define total abdominal hysterectomy.
2. Define panhysterectomy.
3. List five indications for abdominal hysterectomy.
4. Which incision is normally used for abdominal hysterectomy?

5. In the case of an obese patient, or if the surgeon anticipates pelvic adhesions, what alternate incisions may be used for hysterectomy?
6. During a hysterectomy, how are the abdominal contents held above the pelvic brim, out of the surgeon's way?
7. In what position is the patient placed for an abdominal hysterectomy?
8. What instrument is used to grasp the fundus of the uterus and draw it out of the abdominal wound?
9. What is a bladder flap?
10. What instrument is used to separate the fascial cuff from the posterior aspect of the cervix?
11. When the vaginal vault is closed, what types of sutures are used to help control hemorrhage and anchor all three connective tissue ligaments to the vaginal vault?
12. Why is vaginal removal of the uterus preferred over abdominal entry?
13. What action might the surgeon take to facilitate dissection and decrease bleeding in a vaginal hysterectomy?
14. What structures are exposed when the bladder is pushed upwards off the cervix, and how are they ligated?
15. During closure, where will the surgeon attach the round ligament and uterosacral ends?
16. A vaginal pack, inserted at closure, is coated with what antibiotic?

17. In performing a C-section, what factor determines the size of the Pfannenstiel incision?
18. During a C-section, once the bladder is pushed downwards, what must the scrub be prepared to use?
19. While the surgeon places a hand into the uterus to deliver the fetal head, what action should the assistant take to help expel the fetus?
20. Before the mother or infant leave the operating room, what must be done to properly identify the infant?
21. What effect does 20 units of oxytocin, given to the mother after a C-section, have on the patient?

409. Minor obstetrics and gynecology procedures

1. Concerning D&C, how is the cervix dilated?
2. List five reasons for performing a D&C.
3. How is the depth and direction of the uterine cavity measured prior to a D&C?
4. What material is best for collecting D&C specimens?
5. Compare *cold* and *hot* conization of the cervix.
6. List four indications for conization of the cervix.
7. What is the purpose of painting the cervix and vaginal vault with Betadine?
8. Explain the use of Lugol's solution.

410. Endoscopic obstetrics and gynecology procedures

1. List four diagnostic indications for laparoscopy.
2. List four surgical indications for laparoscopy.
3. Which equipment is necessary to hold a patient in the extreme Trendelenburg position?
4. What additional supplies are necessary if a laparoscopy is performed for infertility?
5. At what point of a laparoscopy does the surgeon, who previously double gloved, remove one pair of gloves?
6. How is proper positioning of the insufflation cannula ascertained?
7. What volume of gas is usually sufficient to achieve pneumoperitoneum?
8. What does the assistant use to manipulate the uterus and facilitate the examination?
9. How is methylene blue used to determine whether the fallopian tubes are patent?
10. Name an advantage of the LAVH approach over the traditional vaginal hysterectomy approach.
11. What additional instrument set is needed for a LAVH?
12. What three ligaments are ligated and incised with the endosurgical gastrointestinal anastomosis stapler during a LAVH?
13. Which instrument is used to transect the lower portion of the uterus after the bladder is elevated during a LAVH?

411. Laser obstetrics and gynecology procedures

1. Why is endometrial laser ablation performed?
2. Name two types of dilators that are used to dilate the cervix during endometrial ablation surgery?
3. What two techniques are used to treat endometrium?

Answers to Self-Test Questions
406

1. (1) Reproductive capability can be lost.
(2) Menopause may start.
(3) Body image may be altered.
(4) Loss of sexuality.
(5) Infertility problems.
2. (1) Circulatory interference.
(2) Strain on muscles and joints.
3. Both legs should be moved simultaneously.
4. Wrap the legs with ace bandages or use antiembolic stockings, at the surgeon's discretion.

407

1. Obstetrical complications and gynecological complications.
2. Missed abortion refers to the retention of a nonliving fetus for a period of over two months. Incomplete abortion indicates that only part of the fetus has been aborted. Imminent abortion is uterine bleeding indicating that abortion will likely take place soon.
3. Painful and difficult labor.
4. Placenta previa.
5. Premature separation of the placenta from the uterine wall.
6. Cephalopelvic disproportion.
7. (1) Transverse—crosswise.
(2) Breech—buttcks first.
(3) Vertex—upper back of head first.
(4) Footling—feet first.
8. The twisting of the umbilical cord or obstruction of the cord, blocking the blood flow to the fetus.
9. (1) The absence of menstruation, caused by emotional upset.
(2) Disease.
(3) Physiological imbalance.
10. Dysmenorrhea.
11. Menorrhagia means excessive menstrual bleeding; menometrorrhagia means excessive bleeding not only during menstruation, but at irregular intervals between menstrual periods.
12. D&C.

408

1. The removal of the entire uterus, including the corpus and cervix, through an abdominal incision.
2. A total hysterectomy combined with a bilateral salpingo-oophorectomy.
3. (1) Dysfunctional bleeding that doesn't respond to treatment.
(2) Endometriosis.
(3) Benign and malignant tumors.
(4) Postmenopausal bleeding.
(5) Chronic pelvic infection.
4. Pfannenstiel.
5. Paramedian or midline.
6. During abdominal exploration, a Balfour or O'Connor-O'Sullivan self-retaining retractor is inserted. The third blade of the retractor holds a moistened laparotomy sponge packed above the pelvic brim for this purpose.
7. Trendelenburg.
8. A straight tenaculum.
9. A bladder flap is formed when the bladder is separated from the uterus by the surgeon transversely cutting the uterovesical fold of the peritoneum close to its uterine attachment. Using a sponge stick, the surgeon displaces the bladder downward, away from the uterine corpus, to a level well below the internal cervical os.
10. Curved Mayo scissors.
11. Interrupted angled sutures.
12. The vaginal removal is less traumatic because the abdominal wall is left intact. Furthermore, this technique is more comfortable for the patient post-operatively.
13. Inject phenylephrine solution into the vaginal incision sites.
14. The uterosacral ligaments, which are double-clamped, divided, and ligated with size 0 suture ligatures on a heavy tapered needle.
15. They are sutured to the angles of the vaginal vault closure.
16. Sulfa cream.
17. The estimated size of the fetus.
18. A bulb syringe, dry lap sponges, and suction to quickly evacuate the field of amniotic fluid.
19. Supply transabdominal fundal pressure.
20. The infant must be footprinted and two newborn identification bands are put on the baby.
21. Oxytocin helps the uterus contract, minimizes blood loss, and aids in the expulsion of the placenta.

409

1. Using a series of graduated metal dilators which stretch the muscle and fibrous tissue of the cervix.
2. (1) To control dysfunctional uterine bleeding.
(2) Diagnose uterine or cervical tumors.
(3) Aid in evaluating infertility.
(4) Remove tissue following a missed or incomplete abortion.
(5) Terminate a pregnancy.
3. By passing a graduated uterine sound through the cervical canal, carefully avoiding perforation of the uterus.
4. Telfa or radiopaque sponge.
5. The cold procedure is performed using scalpel resection and suturing while hot conization uses electrocautery or a laser.
6. To diagnose and/or treat major dysplasia, carcinoma in situ, cervicitis, and microinvasive carcinoma of young females in which total hysterectomy is not feasible.

7. This helps prevent the spreading of cancer cells.
8. These solutions will stain healthy tissue, while cancerous tissue will not be stained.

410

1. (1) Infertility.
(2) Suspected ectopic pregnancy.
(3) Unexplained pelvic pain.
(4) Evaluation of pelvic masses.
2. (1) Biopsy of ovaries.
(2) Aspiration of benign ovarian cysts.
(3) Tubal sterilization.
(4) Lysis of pelvic adhesions.
3. Shoulder braces.
4. A 20cc syringe and methylene blue dye.
5. Once the tenaculum and uterine manipulator are in place.
6. A 10cc syringe partially filled with sterile saline is attached to the insufflation cannula for aspiration. If nothing is aspirated, the needle is positioned properly in the peritoneal cavity.
7. Approximately two to three liters of carbon dioxide or nitrous oxide.
8. The intrauterine cannula and tenaculum.
9. Methylene blue is injected through the intrauterine cannula and, if the tubes are patent, the blue will appear in the fimbriated ends.
10. It provides the surgeon better visualization of the internal structures.
11. Laparoscopy instrument set.
12. Infundibulopelvic, round, and broad ligaments.
13. Endoscopic scissors.

411

1. To treat abnormal uterine bleeding.
2. Hegar or Hank dilators.
3. Blanching or dragging technique.

Do the unit review exercises before going to the next unit.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter.

Do not return your answer sheet to AFCDA.

15. (406) Pressure against soft tissue of the leg in the lithotomy position predisposes the patient to develop
 - a. muscle strain.
 - b. venous thrombus.
 - c. radial nerve damage.
 - d. capillary hemorrhage.
16. (406) To prevent hip strain when the patient is in the lithotomy position,
 - a. lower legs and feet should be allowed to dangle over the end of the table.
 - b. the legs must be moved simultaneously, as a unit.
 - c. a pillow should be placed under the sacral area.
 - d. the feet and legs should be well padded.
17. (407) When nonliving products of conception are retained in the uterus for over two months, the condition is called
 - a. a missed abortion.
 - b. a complete abortion.
 - c. an imminent abortion.
 - d. an incomplete abortion.
18. (407) A complication of childbirth caused by the placenta prematurely separating from the uterine wall is known as
 - a. metrorrhagia.
 - b. placenta previa.
 - c. dystmenorrhea.
 - d. abruptio placentae.
19. (408) Which self-retaining retractor is most often used for an abdominal hysterectomy?
 - a. Leyla.
 - b. Wullstein.
 - c. Beckman-Adson.
 - d. O'Connor-O'Sullivan.
20. (408) Besides obstetric and surgical staff, what other hospital personnel should be in attendance during a Cesarean section?
 - a. Laboratory.
 - b. Nursery.
 - c. X-ray.
 - d. Ward.
21. (408) What type of incision is used for a Cesarean section?
 - a. Subcostal.
 - b. McBurney's.
 - c. Pfannenstiel's.
 - d. Infraumbilical.

-
-
22. (409) What chemical is used to stain the cervix during a conization of the cervix procedure?
- a. Fluorescein solution.
 - b. Neomycin sulfate.
 - c. Lugol's solution.
 - d. Methylcellulose
23. (410) What instrument is used to manipulate the uterus during a laparoscopy?
- a. Hank dilator.
 - b. Uterine sound.
 - c. Graves speculum.
 - d. Intrauterine cannula.
24. (410) During a laparoscopy, methylene blue is used to determine patency of the
- a. fallopian tubes.
 - b. urethra.
 - c. cervix.
 - d. uterus.
25. (410) During a laparoscopy, surgeons will initially double glove, what do they do *next*?
- a. Place a tenaculum on the cervix.
 - b. Manipulate the uterus.
 - c. Place two Allis clamps on the inferior rim of the umbilicus.
 - d. Connect a light source to the laparoscope.
26. (411) During an endometrial laser ablation, what is done *next* after the patient is administered a general, regional anesthetic, or local?
- a. The bladder is drained with a straight catheter.
 - b. The skin is prepped beginning at the incision site outward.
 - c. Patient is placed in the supine position with arms at the side or extended on arm boards.
 - d. Patient is placed in the lithotomy position with arms at the side or extended on arm boards.
27. (411) Endometrial ablation is performed to treat
- a. missed abortion.
 - b. spontaneous abortion.
 - c. abnormal uterine bleeding.
 - d. cephalopelvic disproportion.

Please read the unit menu for unit 3 and continue ➔

Student Notes

Unit 3. Orthopedic Surgery

3–1. Fundamentals of Orthopedic Surgery	3–1
412. Common preoperative and postoperative preparations.....	3–1
413. Fractures	3–6
3–2. Commonly Performed Orthopedic Surgical Procedures	3–12
414. Major orthopedic surgery procedures	3–12
415. Minor orthopedic surgery procedures.....	3–21
416. Endoscopic orthopedic surgery procedures	3–25

THE ORTHOPEDIC SPECIALTY is one of the most important services in most Air Force medical facilities. The orthopedic service usually has a very heavy surgery schedule and a very busy clinic. Because bone infections are serious, orthopedic surgeons are very particular about the care their patients receive from the time they are admitted until their wounds are completely healed. The orthopedic specialty includes procedures involving structures of the extremities and their attachments, as well as procedures involving bones in other anatomical regions. Orthopedic procedures rely heavily on the use of various radiology procedures and on the application of plaster splints and casts.

In our discussion of orthopedics, we first discuss some basic procedural considerations and common preoperative preparations. Then we look at the various types of fractures and how they are repaired. Finally, we discuss some surgical procedures commonly performed on the upper and lower extremities.

3–1. Fundamentals of Orthopedic Surgery

In this unit, we see that the field of orthopedics is very widespread. The average person probably thinks of orthopedics in terms of broken legs or arms in various types of casts. Actually, a closed reduction and cast application can be one of the least complicated procedures performed by an “orthopod.” This doesn’t mean, however, that all closed reductions are easy or that casting doesn’t take a good deal of skill. Orthopedic surgeons also repair many injuries and congenital deformities of bones, joints, tendons, cartilage, ligaments, nerves, and muscles. Not only are the surgical procedures often complicated, but the rehabilitation process following surgery can be quite long and painful for the patient. Some operations can be performed in stages, and you may have occasion to follow a patient’s progress through these stages. In fact, you will probably get a great deal of satisfaction from watching even the most simple fracture reduction. Whether the results are viewed by x-ray or through an incision, it is easy to see when the broken ends have been realigned. Orthopedics can be a very rewarding surgical specialty. It is one of the few surgical arenas where you can actually see how you have helped a patient even before the patient leaves the operating room (OR).

412. Common preoperative and postoperative preparations

Communication between nursing and surgical personnel is very important in treating the orthopedic surgical patient. Information regarding the patient’s diagnosis, physical disabilities, x-rays, surgeon’s plan of attack, and required special equipment will enable the nurse and technician to prepare for the surgical procedure better.

Preoperative preparations

Adjustments have to be made in some of the routine preoperative procedures in order to make the patient’s transfer from the ward to the operating room a pleasant one. Normally, patients are transferred from their bed to a stretcher prior to coming to surgery. However, patients in traction should be brought to the operating room in their own beds with the weights in place. The weights are

not removed from patients with a fracture unless a life-threatening situation occurs. The weights should be supported and prevented from swinging during transport, as the swaying creates uneven tension and can exert an opposite reaction from the intended force. By securing the weights and transporting them in their beds, the patients are much more comfortable and the process is safer than if you attempt to transfer them to a stretcher. Most operating room doors are wide enough to allow for entry of these beds with their traction apparatus. It is important to clean and decontaminate the ward bed before it is brought into the restricted area of the OR suite.

If casts must be removed before an operation, they should be bivalved before the patient is brought to the operating room, preferably in the ortho clinic or on the nursing unit. The dust that results during the sawing of a cast can undo much of the cleaning and sterilizing that goes into preparing the sterile setup.

It is extremely important that the orthopedic patient not be exposed to any condition that could bring about a wound infection. Bone infections are difficult to cure. Cases of osteomyelitis (inflammation of the bone marrow) may persist as a draining, painful wound for years. Patients are sometimes asked to bathe with antiseptic soaps for several days preceding the operation. Many surgeons also use an antibiotic solution for the irrigation of wounds during the procedure; therefore, have plenty of the solution on hand prior to surgery.

Positions used are so varied in orthopedics that it is practically impossible to generalize about them. The surgeon oversees the positioning, while the technician and circulating nurse provide the necessary table attachments and body supports used in positioning. A fracture table may be used during procedures involving the hip or leg. Sometimes, any movement or manipulation of the patient can be so painful that it is necessary to induce anesthesia before the patient is transferred from the orthopedic bed.

Instruments needed for orthopedic procedures range from general operating instruments to a series of special devices used for inserting nails, pins, and all sorts of prostheses. When prostheses are used, the surgical team must be careful that screws, plates, and other metal devices, as well as wire suture material, contain the same type of metal. Mixtures of metal in the same wound can cause metal breakdown and/or tissue reactions.

A pneumatic tourniquet is used during most operations on the extremities. The cuff is applied before the cleansing skin prep, but *it is not inflated* until the patient is fully draped. (An exception is the Bier-block discussed in course A during the lesson on Anesthesia.) Remember, ischemia time (the amount of time the limb is without blood) is a very important factor in patient safety. The doctor should be reminded regularly, usually at least hourly, of the tourniquet time.

For procedures performed on bones, and for those requiring implants, the surgeon may double glove. This is a safeguard against contamination of the wound; if the outer glove is torn by the hardware or a bone fragment, the inner glove prevents the surgeon's hand from contaminating the field.

Postoperative preparations

After most orthopedic procedures, a plaster cast or splint is applied. A cast prevents motion of various anatomical structures. Even though these plaster molds are generally considered to be a tool of the orthopedist, you will sometimes find them being used by other surgeons. Casts can be used for immobilization following open reduction surgery, after a closed reduction of a fracture, or as a means of keeping any moving parts at rest for a period. Casting a sprained ankle would be an example of this last type of immobilization. Some casting procedures require a fracture table so that the patient's body can be suspended while an encircling cast is applied, or so that traction can be maintained on one or both legs. Anesthesia may be required during any casting that causes the patient pain or discomfort.

A vital concern during any casting procedure is maintaining circulation. In the case of a body cast, room must be allowed for respiratory movements. No matter how accurately a fracture has been

reduced or how well a joint has been immobilized, if a vital function such as circulation is impaired, the patient may end up needing an amputation. Ordinarily, a cast immobilizes the joint at both ends of a fracture. This puts the fracture site at rest and allows nature to take its healing course.

Immobilization in a position of function is used, when possible, so that muscles, nerves, tendons, etc., will not become stretched or twisted. This means the foot should be cast at a 90 degree angle to the leg, or the hand positioned so that the fingers appear to be holding a ball while the wrist is slightly raised.

There are several other factors you should consider when applying a cast. Make sure the skin the cast will cover is clean and dry. Cover this skin with enough padding to prevent pressure or irritation. The padding often consists of a protective layer of stockinette followed by several thicknesses of webril or sheet wadding. All of this material should be smooth and wrinkle-free, with extra padding used over bony prominences. Immerse the plaster rolls and splints in water, one at a time; until the innermost layers are wet (the air bubbles will cease to rise). Squeeze out (do not twist) excess water by pushing both ends toward the middle and apply the rolls and splints, without tension, over the padding. You should be careful in determining the necessary thickness of a cast. A walking leg cast for an adult needs to be more stable than an arm cast on a baby. Also, consider the activities of the patient when you decide what areas of a cast will sustain more strain or pressure. The heel and foot of a walking cast should be sturdier than its top edge. This is why splints are often used in conjunction with rolls and incorporated in the cast over the heel area.

A cast should be trimmed and smoothed around the edges. Often the stockinette is brought out around this edge and held in place with a thin layer of plaster. The final stage is the drying process. Although this step may not seem important, its mismanagement can undo the best cast application. Do not allow a cast to rest against a hard surface while it dries. When you must hold a leg or arm during casting, use the palm of your hand rather than your fingers. The indentations made by fingers can cause the patient discomfort after the cast dries. Ordinarily, a leg or arm cast is elevated on a cloth-covered pillow until it dries. This helps prevent denting the plaster and lessens the possibility of swelling in the extremity. One note of caution here—do not use vinyl or plastic covered pillows or other non-porous items to rest a drying cast on; the plaster generates heat as it dries, and a non-porous pillow cover forces the heat to build inside the cast. A body cast is usually allowed to set while the patient remains positioned on the fracture table or is in a sitting position. Pay close attention to circulation in fingers or toes following casting of extremities. If these digits become pale or cyanotic, swollen, cold, or numb, there is a possibility that the blood supply is poor. Sometimes relief may be obtained by elevating the body part. In other instances, it may be necessary to bivalve the cast. If the original cast was applied over swollen tissue, a completely new cast may be necessary. After swelling subsides, this cast would not offer immobilization because of the space that had been occupied by the edema.

Types of casts

The type of cast used will depend on the fracture site. Figures 3-1 through 3-4 illustrate some common types of casts known as circular or cylinder casts because they encircle (or form a cylinder around) the extremity. A *short arm or thumb spica cast* is shown in figure 3-1; it is applied from below the elbow to the knuckles and used primarily for wrist fractures. A *long arm cast* (fig. 3-2) is applied from above the elbow to the knuckles and used for fractures of the elbow or forearm. A *short leg cast*, shown in figure 3-3, is applied from below the knee to the toes and used for fractures of the foot and ankle; this cast is reinforced and modified to create a walking cast in some instances. A *long leg cast* (fig. 3-4) is applied from the

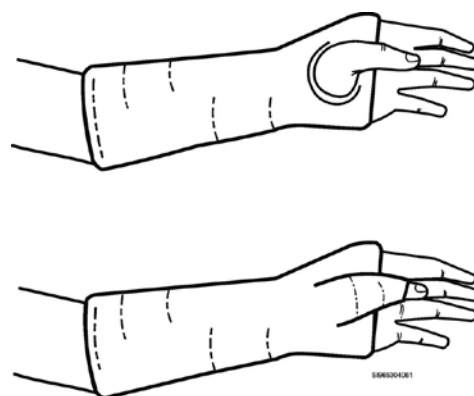


Figure 3-1. Cast—short arm & thumb spica.

groin to the toes and used for fractures of the tibia, fibula, and ankle; it may be modified to stop at the ankle for immobilization of the knee.

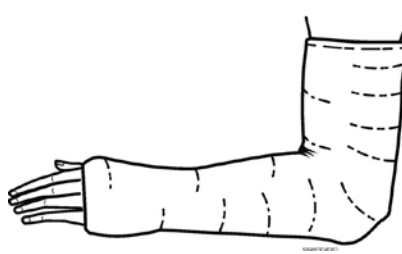


Figure 3-2. Cast—long arm.

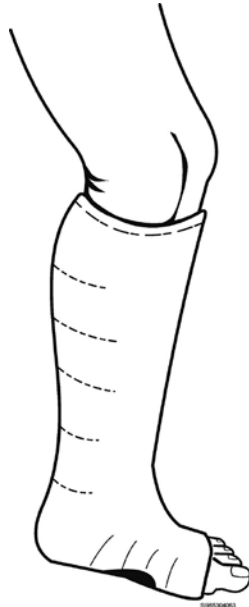


Figure 3-3. Cast—short leg.

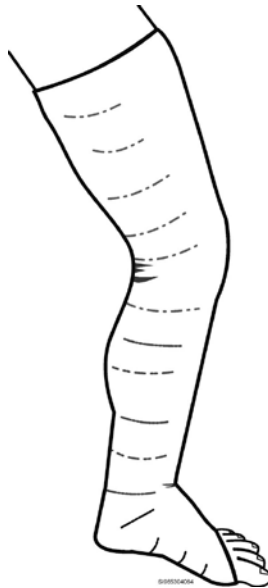


Figure 3-4. Cast—long leg.

Spica casts are shown in figures 3-5 and 3-6; they are used to immobilize different parts of the body. A *shoulder spica* (fig. 3-5) is used for injuries around the shoulder or humerus requiring complete immobilization of the arm. A *hip spica* (fig. 3-6) is used for fractures of the femoral shaft or to immobilize the pelvis and hip joint; a double hip spica (not illustrated) can immobilize both hip joints. *Splints* do not completely encircle the affected limb; they are generally made from long strips of plaster bandage, applied to a soft padded dressing, and then wrapped with an ace bandage. Splints are often used immediately post-operatively so the amount of swelling can be directly observed; a cast may be applied when swelling has begun to subside.

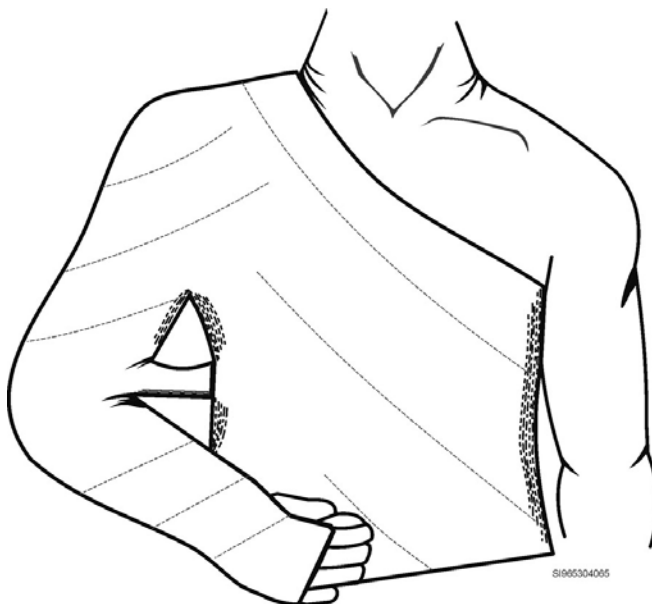


Figure 3-5. Cast—shoulder spica.

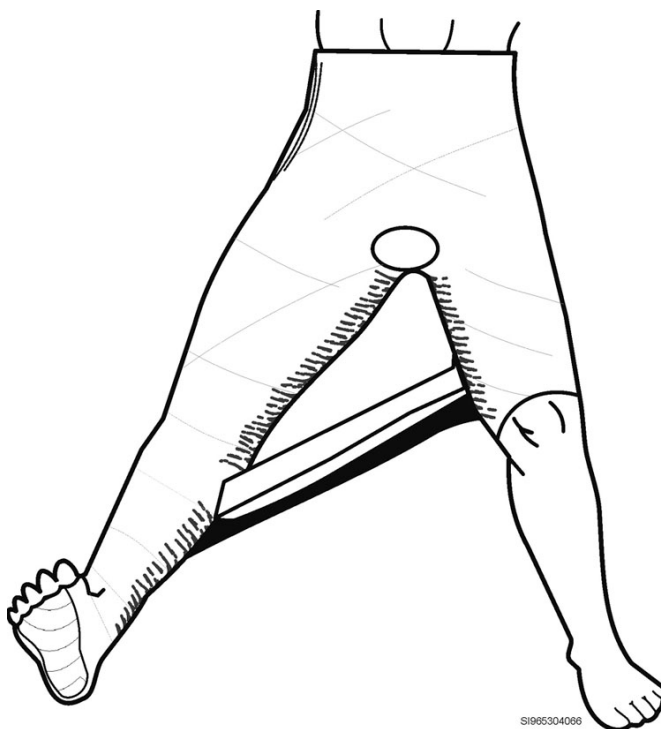


Figure 3-6. Cast—hip spica.

413. Fractures

Fractures are breaks in the continuity of a bone. They vary by location and type of fracture line, etiology, and extent of injury. We start the lesson with types of fractures, and then discuss the fundamentals of treating fractures.

Types of fractures

There are two basic types of fractures: pathologic and traumatic. *Pathologic* fractures are caused by primary or metastatic malignant bone disease. These fractures require more than simple fixation of the bone fragments; the condition that caused the fracture must also be treated. Fortunately, pathologic fractures are rare. *Traumatic* fractures are the most common type you see in surgery; they are caused by accidental impact, forced twisting, or excessive bending of a bone. Traumatic fractures are classified as either simple or compound. A *simple* fracture, shown in figure 3-7, does not penetrate the surface of the skin. In a *compound* fracture, one or both ends of the broken bone protrude from the fracture site through the skin (fig. 3-8).

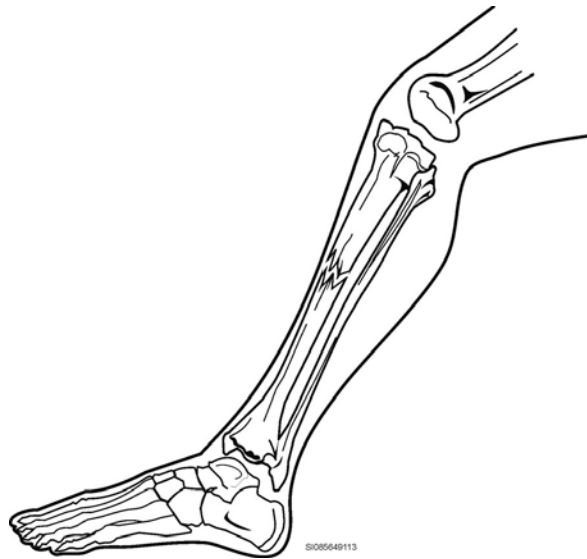


Figure 3-7. Simple fracture (tibia).

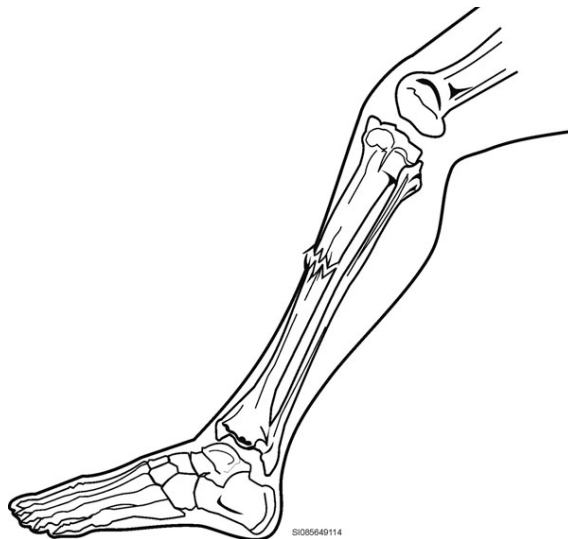


Figure 3-8. Compound fracture (tibia).

Figure 3-9 illustrates some of the classifications used to describe fractures. As you can see, there are many varieties of fracture architecture, including the ones listed in the following table:

Fracture	Description
Transverse	Fracture line lies perpendicular to the long axis of the bone.
Oblique	The break extends in an oblique direction.
Longitudinal	Runs along the length of bone.
Spiral	The bone has been twisted apart.
Greenstick	An incomplete fracture, only partly through the bone, commonly found in children whose bones have not yet calcified.
Impacted	One fragment is firmly driven into the other.
Depressed	A fracture of the skull in which a fragment is depressed.
Multiple	A variety in which there are two or more lines of fracture of the same bone not communicating with each other.
Comminuted	The bone is splintered or crushed.

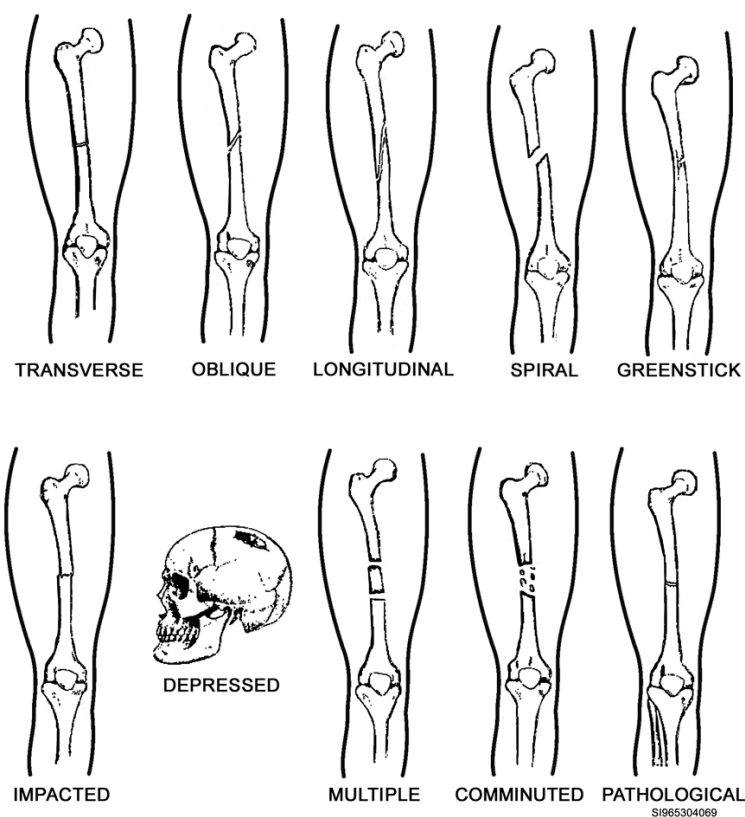


Figure 3-9. Classifications of fractures.

Principles of fracture treatment

Fracture treatment re-establishes the shape, length, and alignment of fractured bones and restores their anatomical function to as normal or near normal as possible. Whenever a bone is fractured, two parts are involved: the proximal and distal fragments. The pull of the attached muscles controls the position

of the proximal fragment; therefore, the distal fragment has to be manipulated into the position assumed by the proximal fragment.

For upper extremity fractures, the surgeon tries to preserve mobility because the patient needs a wide range of motion to perform delicate and skilled tasks. For lower extremity fractures, the surgeon tries to provide stability of the extremity and restore alignment and length.

The surgical team should keep in mind the following principles: (1) handle the extremity gently, (2) be prepared to treat impending or existing shock and control bleeding, (3) aseptic surgical technique must be maintained to prevent infection, (4) proper position must be provided for adequate circulatory and respiratory function, and (5) patient comfort must be considered.

Bone-healing process of fractures

There are five stages of bone healing: hematoma (serves as a fibrin network), cellular proliferation (fibroplastic and endothelial cells colonize fibrin to form clots), callus formation (osteoblasts produce osteoid matrix), callus ossification (this is the union stage), and consolidation (the bone is remodeled into mature bone).

Nonunion of a fracture means that the healing process has ended without producing bony union.

Delayed union means that the fracture has not healed in the proper amount of time for that type of fracture. The average time for a fracture to heal depends on many factors, and delayed union should not be considered nonunion until the healing process has ended without bony union. *Malunion* means the fracture has united with deformity, causing impairment of the function or a cosmetic defect.

Treatment of fractures

The method of choice used to reduce fractures (re-align the bones) is *closed reduction*. This procedure is done without incising the skin over the fracture site. The orthopedist simply manipulates the extremity until the bones are re-aligned, and then immobilizes the fracture by using a cast (preferred) or other device. By using this method, there is minimal chance of infection, less damage to surrounding tissue, and greater chance for more rapid union (healing) of the fracture. Closed reduction is usually performed in the emergency room or orthopedic clinic when the fracture will be immobilized using a cast. However it may also be performed in the operating room when the patient requires general anesthesia (such as a child), when the fracture will require extensive manipulation to reduce, or when the application of a stabilization device will require an invasive procedure.

Figure 3-10 shows another method of treatment. This method, called skeletal traction, does not ordinarily require a major anesthetic; in fact, it can be performed in the patient's room. This procedure is sometimes used when muscular contraction is forcing the bone ends to overlap to the extent that ordinary external manipulation can't overcome the tension to reduce the fracture. To perform skeletal traction, a simple sterile setup with a few basic instruments and a drill of some type is used to insert pins, wires, or tongs placed through or into the bone. A *traction bow* is attached to the pin and connected by ropes to weights and pulleys that provide a constant force by pulling on the fracture fragments and override the deforming muscle forces, thus reducing the fracture.

A fracture may also be corrected by closed reduction, but then require application of some type of apparatus other than a cast to immobilize or stabilize it. The three most common stabilization methods in this case are closed reduction with intramedullary nail or rod (internal fixation used mainly for humeral, femoral, or tibial fractures),

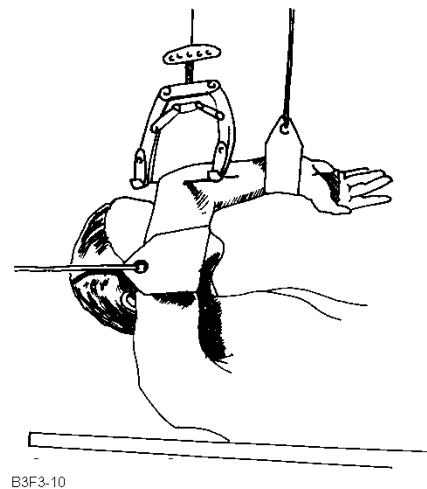


Figure 3-10. Skeletal traction.

closed reduction with external fixation (ideal for open fractures when risk of infection is great because the wound is not covered by a cast), and closed reduction with percutaneous pinning (used mainly on small bones of the hand or foot). To perform a closed reduction with intramedullary nail insertion, the surgeon reduces the fracture by manipulation, then makes a small incision at an articular end of the bone and inserts a rod or nail into the bone's medullary canal. The rod or nail passes through the fracture site and extends the full length of the canal. Application of an external fixation device involves anchoring pins or wires into the bone on both sides of the fracture, then reducing the fracture and attaching the pins to some type of external frame to immobilize the bone. Percutaneous pinning involves reducing the fracture, then driving Kirschner wires (K-wires) or pins (Steinmann pins) into the solid bone on one side, through the fracture site, and into the solid bone on the other side.

Many fractures require an *open reduction*. This is the most invasive method used, and also the types of fractures you will be most involved with in the operating room. To treat these fractures, the surgeon makes an incision over and exposes the fracture site, then reduces the fractured bones themselves—often employing bone clamps and other specialized instrumentation. These fractures also must be stabilized by either the external devices (cast or external fixator) or by *internal fixation* devices. Internal fixation devices include the K-wires, pins, and intramedullary nails or rods previously discussed, and also plates, screws, staples, bands, and wire. The surgeon must make the decision as to the best method to stabilize the particular fracture. Factors considered include whether the fracture is simple or compound (prone to infection), the specific classification or unstable nature of the fracture, the interposition of soft tissue between the fragments, joint involvement, or evidence of cancerous invasion. Radiology helps determine the type of fracture being dealt with so that the most suitable operative procedure can be planned.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

412. Common preoperative and postoperative preparations

1. Why are patients in traction brought into surgery in their own beds?
2. If a cast is to be removed before an operation, how should the cast be prepared and why?
3. Why is it necessary to use metal devices of the same type in an orthopedic procedure?
4. When is a pneumatic tourniquet applied and inflated for use in surgery on the extremities?
5. How often is the surgeon reminded of ischemia time?
6. What consideration is vital during any casting procedure?

7. Even though a fracture has been expertly reduced or a joint perfectly immobilized, what can still be the outcome if vital functions are impaired?
8. When casting, what does the technician do to ensure that the patient's muscles, nerves, or tendons are not stretched?
9. How much padding do you use to cast a patient?
10. When immersing the plaster bandages and splints in water, what indicates that the innermost layers of the material are wet?
11. How is excess moisture correctly removed from casting material?
12. When a leg or arm cast must be held for drying, how is it held?
13. Why are leg and arm casts ordinarily elevated on a pillow until properly dried?
14. Match each cast in column B with the correct fracture in column A. Items in column B may be used once.

Column A

- ____ (1) Fibula
- ____ (2) Wrist
- ____ (3) Patella
- ____ (4) Elbow
- ____ (5) Humerus
- ____ (6) Femoral shaft

Column B

- a. Long leg (or modified long leg).
- b. Long arm.
- c. Long leg.
- d. Short arm.
- e. Hip spica.
- f. Shoulder spica.

413. Fractures

1. Define pathologic fracture.
2. How are simple and compound fractures differentiated?
3. Which fracture classification is identified by a break in the bone that:

- a. results in a depression of the skull?
 - b. extends at an oblique angle to the normal line of the bone?
 - c. is the result of the bone being twisted?
 - d. lies perpendicular to the long axis of the bone?
 - e. is only partly through the bone, commonly found in children?
 - f. runs along the length of the bone?
 - g. results due to splintering or crushing of the bone?
 - h. is actually two or more noncommunicating breaks in the same bone?
-
- 4. Since the pull of the attached muscles controls the position of the proximal bone fragment (in a fracture), how must the fracture be realigned?
 - 5. List five principles that the surgical team must keep in mind as they treat a fractured extremity.
 - 6. List and explain the five stages of bone healing.
 - 7. Define *nonunion*, *delayed union*, and *malunion*, as they apply to the healing of fractured bone.
 - 8. What are the advantages of closed reduction by manipulation over open reduction?
 - 9. In the case of a fracture that involves overriding of bone ends that ordinary external manipulation cannot correct, what method is preferred?
 - 10. Briefly describe the method referred to in question 9.

11. List some of the factors which enter into the decision of how to treat a fracture.

3-2. Commonly Performed Orthopedic Surgical Procedures

In this unit we discuss the basic techniques of orthopedic surgery. Because of the continued rapid change in orthopedic technology due to new equipment and technology being developed, the instrumentation discussed may vary at your facility or at a deployed location. We begin with a look at surgical procedures performed on the upper extremities, then move to a discussion of the lower extremities.

414. Major orthopedic surgery procedures

Orthopedic surgery is needed to address injuries and disorders of the musculoskeletal system. This lesson discusses how you will assist with some of the major orthopedic procedures.

Repair of recurrent anterior dislocation of the shoulder

Recurrent dislocations of the shoulder cause the anterior fibers of the shoulder capsule to become stretched and weakened. A repair is designed to strengthen the anterior joint capsule. Of the multiple operations that have been used for shoulder repairs, the three most common are the *Bankart*, *Putti-Platt*, and *Bristow* procedures. In the Bankart, the glenoid labrum and the attenuated anterior capsule are reattached to the rim of the glenoid fossa with heavy sutures, pullout wires, or staples. The Putti-Platt involves overlapping and shortening the subscapularis tendon at its point of insertion, thus limiting external rotation and preventing dislocation. During the Bristow procedure, the coracoid process and attached muscles are detached and inserted onto the neck of the scapula, then fixed with a screw; this stabilizes the anterior joint capsule and prevents recurrent dislocation. In this lesson we discuss the Putti-Platt procedure.

Patient preparation

The patient is placed in the supine position with the affected shoulder elevated with a folded sheet or sandbag. The affected arm is draped free for manipulation during the procedure. The other arm is positioned at the patient's side or extended on an arm board. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the anterior aspect of the shoulder extending from the submandibular area to the inferior costal margin, including the axilla to the back of the shoulder and arm down to the bedside. The cleansing skin prep begins at the incisional site working outwards from the anterior aspect of the shoulder.

Draping

The patient is draped using a stockinette over the extremity, four hand towels, a foundation sheet (often a "U" drape), and a split sheet or extremity drape. Some surgeons will use a laparotomy drape with the arm passed through the fenestration.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Basin set.
- Sponges.
- Power drill.

- Osteotomes.
- Suture material.
- Needle counter pad.
- Suction tubing and tip.
- Electrosurgical pencil.
- Large orthopedic instrument set.

Procedure

For this procedure, an anterior curvilinear incision is made over the shoulder joint and dissected downward to the deltopectoral groove (fig. 3-11). The cephalic vein is identified and retracted medially with the pectoralis major muscle, and the deltoid muscle is retracted laterally. The short head of the biceps and coracobrachialis muscle are then retracted medially (fig. 3-12). The subscapularis tendon and underlying shoulder capsule are divided approximately one-

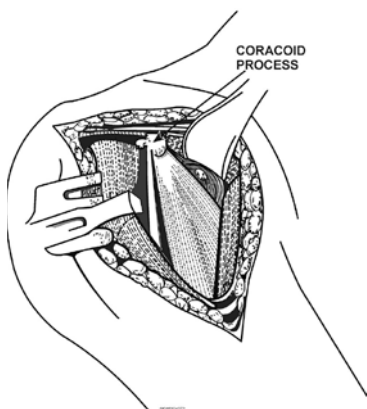


Figure 3-12. Shoulder repair—retracting the shoulder muscles.

inch medial to its insertion on the lesser tuberosity of the humerus (fig. 3-13). With the shoulder in full external rotation, the free edge of the lateral part of the subscapularis is taken across the joint and sutured (as shown in fig. 3-14). The shoulder is then moved into full internal rotation and the sutures are securely tied. The free edge of the medial part of the subscapularis is overlapped over the first row of sutures and secured with interrupted sutures (fig. 3-15). The wound is closed and the patient is placed in a sling and swath to immobilize the shoulder in internal rotation (fig. 3-16).

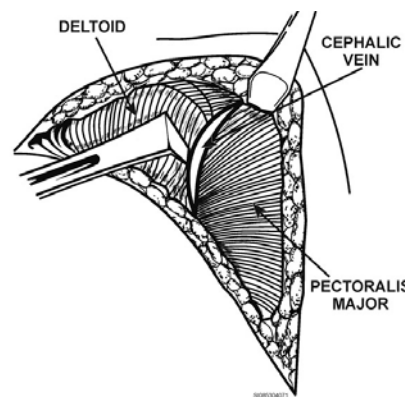


Figure 3-11. Shoulder repair—initial incision.

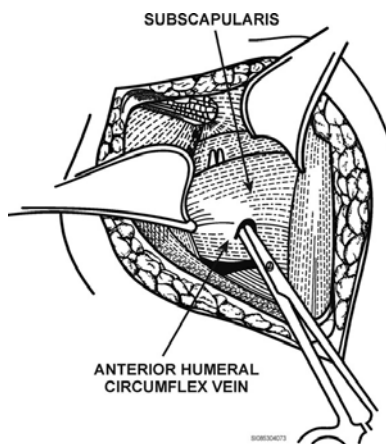


Figure 3-13. Shoulder repair—dividing the subscapularis.

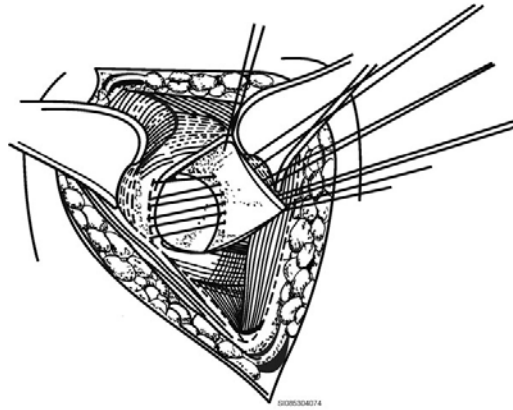


Figure 3-14. Shoulder repair—suturing the shoulder.

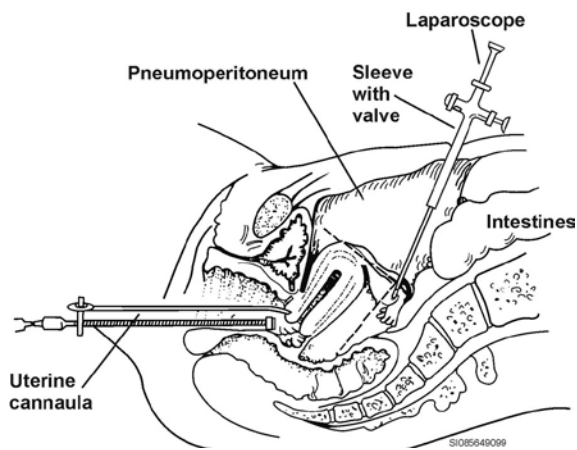


Figure 3-15. Shoulder repair—suturing the shoulder (cont'd.).

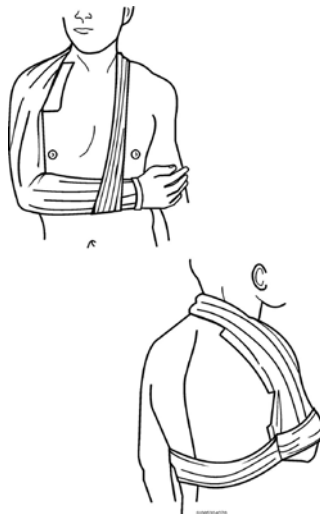


Figure 3-16. Shoulder repair—shoulder immobilized.

Total hip replacement

This procedure is the substitution of the femoral head with a prosthesis and reconstruction of the acetabulum with the placement of an acetabular cup, both of which are held in place with methylmethacrylate. Hip reconstruction is indicated in patients with disabling rheumatoid arthritis of

the hip, symptomatic severe degenerative arthritis of the hip, or hip destruction due to childhood hip disorders or trauma.

Wound infections can be disastrous after this type of surgery, so surgeons observe special precautions during total joint replacement, some facilities have specialized rooms with built-in precautions specifically developed for total joint replacement. Some of these include laminar airflow rooms, ultraviolet lights (require UV eye protection), and individual air/exhaust systems (space suits).

NOTE: Most surgeons will double-glove for these procedures; some change gloves after draping.

Patient preparation

The patient is placed on the regular operating room table or on a fracture table (surgeon's choice) in the lateral position. The arm on the unaffected side is extended on an arm board and the other arm is positioned on a Mayo tray stand padded with a pillow or on an over-arm board. A sterile, plastic adhesive drape may be draped across the perineum before the prep is done. The electrosurgical ground pad is placed on the thigh of the unaffected leg.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the nipple line to the knee on the affected side. The cleansing skin prep begins over the greater trochanter working outwards from the nipple to the toes, beyond the midline of the abdomen anteriorly and down to the table posteriorly.

Draping

The patient is draped using a stockinette over the leg, a foot sheet, four hand towels, a fenestrated sheet, and covered by a sterile, plastic adhesive drape.

Instrumentation

The basic instrumentation and supplies include the following:

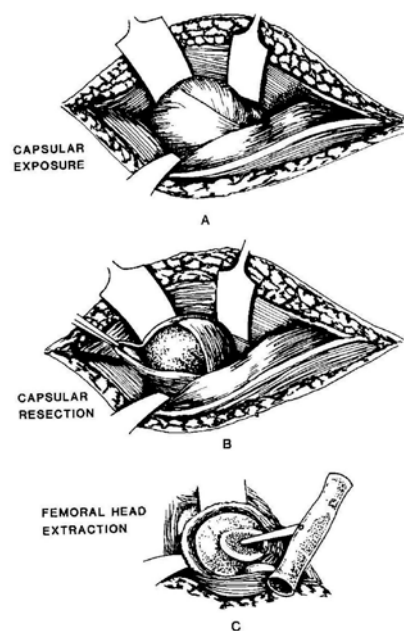
- Blades.
- Sponges.
- Curettes.
- Basin set.
- Osteotomes.
- Pulse-irrigator.
- Suture material.
- Needle counter pad.
- Power drill and saw.
- Suction tubing and tip.
- Electrosurgical pencil.
- Major orthopedic tray.
- Methylmethacrylate kit.
- Prosthesis and specific instrumentation.

Procedure

An anterolateral incision is made with the midpoint over the greater trochanter, extending 6 centimeter (cm) proximally and distally. The fascia is incised and the muscle fibers are separated. The gluteus medius and other abductors are retracted with a Hohmann retractor placed behind the neck in front of the greater trochanter. The tensor fascia lata muscles are retracted with another Hohmann retractor to expose the pericapsular fat. Using an osteotome, the surgeon clears the pericapsular fat, and the retracted head of the rectus is identified. A Cobra retractor is placed over the anteromedial

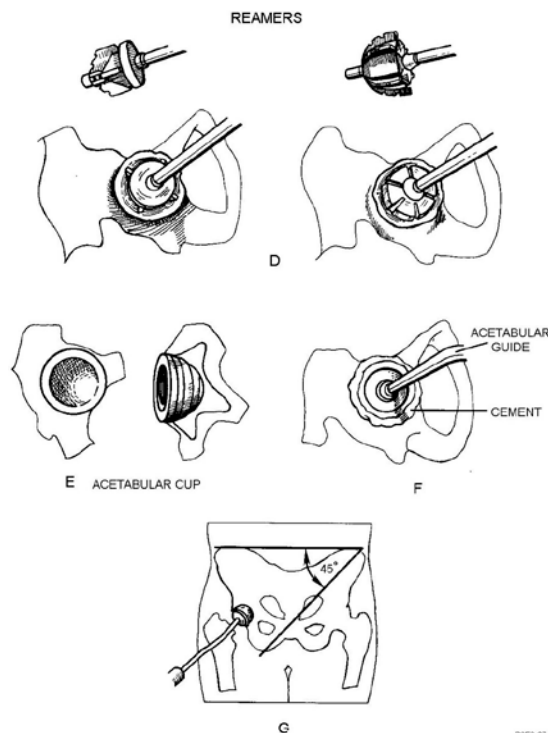
rim of the acetabulum allowing exposure of the capsule. The capsule is incised and resected. The femoral neck is osteotomized and the femoral head extracted with a corkscrew, as illustrated in figure 3-17. The soft tissue around the rim of the acetabulum is removed and the acetabulum is ready for deepening. A centering hole is drilled through the acetabulum into the pelvis, and acetabulum reamers are employed to prepare the acetabulum to accept the cup prosthesis. Anchoring holes are drilled, and a trial acetabular cup is placed in the acetabulum to determine proper position and angulation (fig. 3-18, D & E). The entire surface of the acetabulum is cleansed with a suction irrigator. Methylmethacrylate is applied firmly into the acetabulum and the cup is guided into place first with fingertip pressure and then with the acetabular guide. The cup must be placed at a 45 degree angle to the long axis of the body and 10 degrees of anteversion (fig. 3-18, F and G). Excess cement is trimmed from the edges of the acetabulum.

The femur is now prepared to accept the femoral prosthesis. A femoral rasp is carefully placed into the shaft of the femur. With the femoral shaft prepared, a trial reduction with trial prosthesis is performed. The femoral shaft is cleansed with a suction-irrigator. Methylmethacrylate is loaded into the gun and inserted distally too proximally in the femoral shaft.



B3F3-26

Figure 3-17. Total hip replacement—preparing femoral head for extraction.

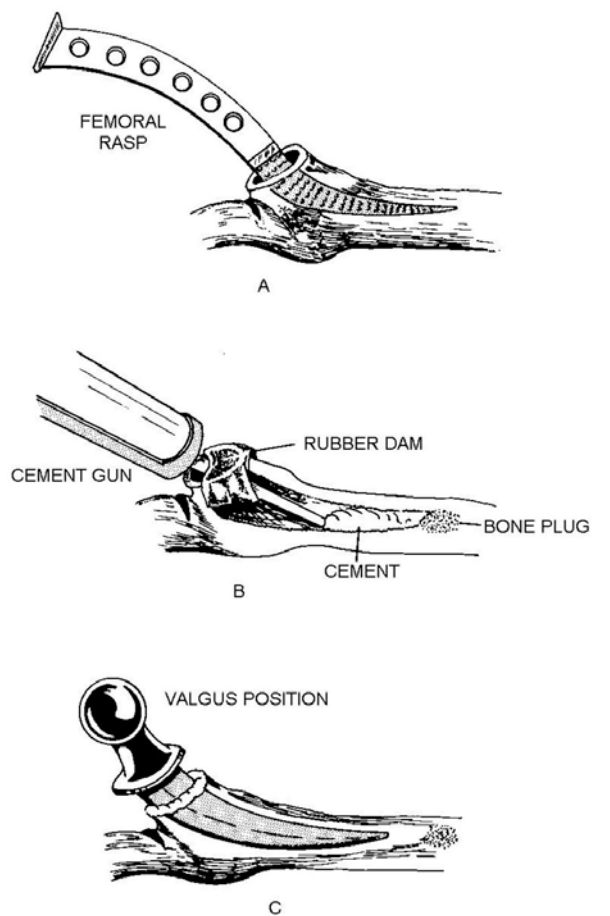


B3F3-27

Figure 3-18. Total hip replacement—insertion of cup prosthesis.

The prosthesis is carefully introduced in the shaft to obtain the valgus position, as shown in figure 3-19. While the cement is setting, the leg must be held absolutely still. The excess cement is removed.

After the cement has hardened, the femoral prosthesis is reduced into the acetabular cup and moved through a range of motion (fig. 3-20). A closed drainage system is inserted and the wound is closed in the routine fashion.



B3F3-28

Figure 3-19. Total hip replacement—insertion of femoral prosthesis.

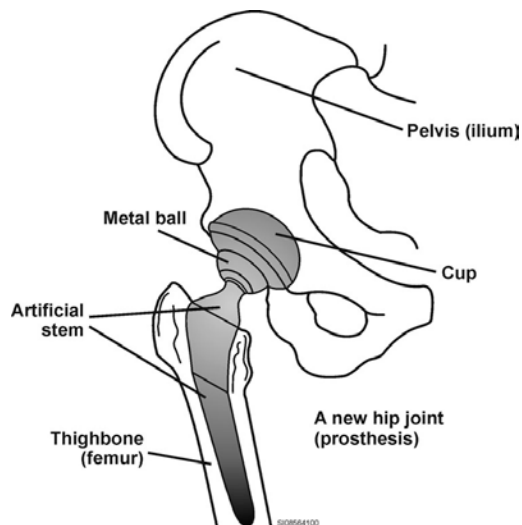


Figure 3-20. Total hip replacement—insertion of prosthesis.

Open reduction of the radius and/or ulna

This procedure is the realignment and fixation of forearm fractures through an operative incision. Fixation may be achieved with an assortment of devices including intramedullary nails, rods, plates, and bone screws (as discussed in the first section of this unit). An example of a radius/ulna fracture is shown in figure 3-21. Reduction of the radius is primarily done to restore alignment and structural strength; reduction of the ulna is necessary to permit proper rotation of the forearm. If the distal shaft of the radius is fractured, a plate may be placed on the anterior surface that is usually broad, flat, and smooth, versus the posterior surface, which is slightly convex. For proximal radius fractures the plate may be applied to the posterior surface of the radius. Ulnar shaft fractures may be plated to whichever surface seems best. Supplemental bone grafting may be necessary if comminution of midshaft forearm fractures is extensive.

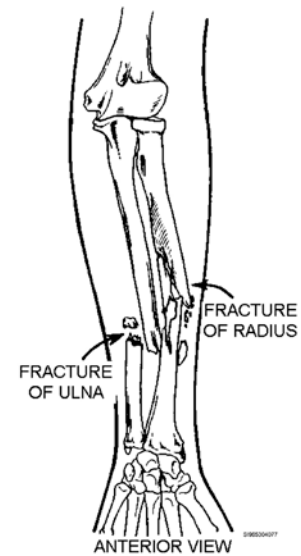


Figure 3-21. Fractured radius and ulna.

Patient preparation

The patient is placed in the supine position with the affected arm extended on a hand table and the other arm at the side or extended on an arm board. The tourniquet is applied to the affected arm and the electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient's affected hand and arm are shaved/clipped preoperatively to the elbow. The cleansing skin prep begins at the incisional site working outwards to include the hand, fingers, interdigital spaces, elbow, and upper arm to the level of the tourniquet.

Draping

The patient is draped using a stockinette over the extremity, a drape sheet over the hand table, a folded "rolled" towel around the arm, and a split or extremity sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Power drill.
- Suture material.
- Needle counter pad.
- Suction tubing and tip.
- Electrosurgical pencil.
- Esmarch bandage.
- Minor orthopedic tray.
- Fixation device: Compression set, plate and screws, Kirschner wires, Steinmann pins, intramedullary nails or rods (rarely).

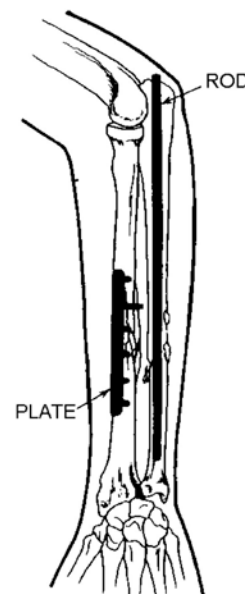
Procedure

With the forearm positioned in full supination, a longitudinal incision is made along the lateral aspect of the forearm. The surgeon will then develop a plane between the brachioradialis and flexor carpi

radialis muscles. The neurovascular structures are identified and retracted for protection. The forearm is pronated and the origin of the flexor pollicis longus and pronator quadratus muscles are retracted to expose the anterior surface of the radius. With the fracture site and the adjacent anterior surface of the radius on each side of the fracture now exposed, the fracture is aligned and plated. The length of the plate should be about five times as long as the diameter of the bone to afford good stabilization of the fracture, and should have a minimum of two transfixion screws on each side of the fracture.

The ulna is exposed over its subcutaneous border at the fracture site by a short longitudinal incision. The fracture is aligned and held in position with a small bone clamp, being careful to preserve the proper rotation. The ulna is then nailed or plated according to the surgeon's preference.

After both bones have been reduced and fixated, as in figure 3-22, x-rays are usually taken to verify the position of the screws, rod, or other fixation devices, as well as to verify reduction in all planes. The wounds are closed in a routine manner and a long arm cast is applied with the forearm in neutral rotation.



B3F3-18

Figure 3-22. Fractured ulna and radius repaired.

Amputations

Amputation is the partial or total removal of an extremity. Amputation may be indicated for vascular insufficiency, malignancy, severe trauma, and gangrene secondary to diabetes. The most commonly performed amputations are transmetatarsal (TM), above the knee (AK), and below the knee (BK).

The level of the amputation is determined by the patient's health, vascular status, and rehabilitative potential. When preparing a patient for amputation, compare both extremities in addition to checking the chart. *Be sure the correct extremity is prepared!* With more surgical technicians deploying to forward operating bases and the increased use of improvised explosive devices by the enemy you will definitely find yourself assisting with one of these procedures at some point in time.

Be sensitive to the patient's feelings during this stressful time. Since many lower extremity amputations are performed under spinal anesthesia, *do not place the specimen in the patient's sight.* Remove it as soon as possible from the operating room.

Patient preparation

The patient is placed in the supine position with the arms at the side or extended on arm boards. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

For a grossly septic distal part, the surgeon will probably not want the extremity shaved/clipped. Anaerobic and aerobic cultures may be taken. The extremity may be isolated by covering it with a plastic bag, hand towels, or plastic adhesive drape. The cleansing skin prep is done as directed, according to the area to be amputated:

- *TM*—begin at the ankle working outwards to the knee and down to the foot and toes.
- *AK*—begin at the thigh working distally to include the knee, leg, foot, and toes.
- *BK*—begin below the knee working outwards to include the thigh and leg, foot, and toes.

Draping

The patient is draped using a stockinette over the extremity, a rolled towel around the leg, a foundation sheet, and a split or extremity sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Oscillating saw.
- Suture material.
- Closed suction unit.
- Needle counter pad.
- Suction tubing and tip.
- Electrosurgical pencil.
- Minor orthopedic tray.
- Amputation saw and knife.
- Marking pen (have available).

Procedure

The surgeon may wish to map out the anterior and posterior skin flaps on the extremity with a marking pen before making the incision. For an AK amputation, shown in figure 3-23, a circular incision is made over the distal femur, creating anterior and posterior skin flaps. The anterior flap will be approximately 2 to 3 cm longer than the posterior flap. The flaps of skin and subcutaneous tissue are retracted proximally with retractors. The superficial femoral artery and vein and saphenous nerve are ligated and divided. Transection of the muscles circumferentially continues. The sciatic nerve is then ligated and divided. The periosteum of the femur is incised and the bone is transected with a saw. Sharp bone edges are smoothed with a bone rasp and/or rongeur. The wound is irrigated to remove any bone fragments or dust, hemostasis is achieved, and the wound is closed (fig. 3-23, bottom left). A closed suction unit may be used. A bulky compression dressing is applied. The patient is usually fitted for prosthesis four to six weeks post-operatively. Transmetatarsal amputations are performed in a similar fashion; two approaches are illustrated in figures 3-24 and 3-25.

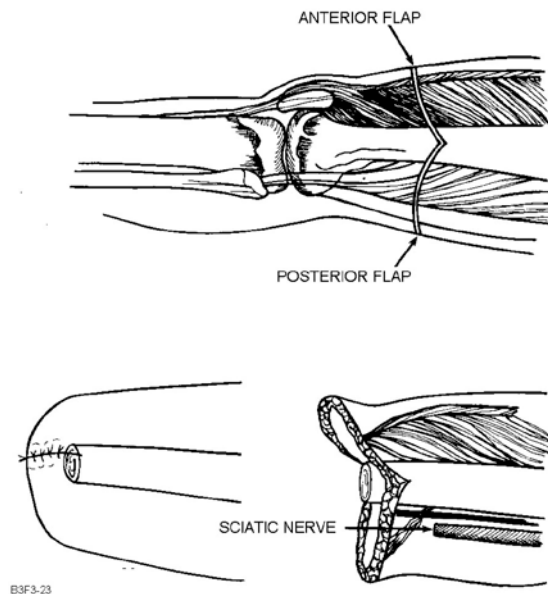


Figure 3-23. Above-the-knee (AKA) amputation.

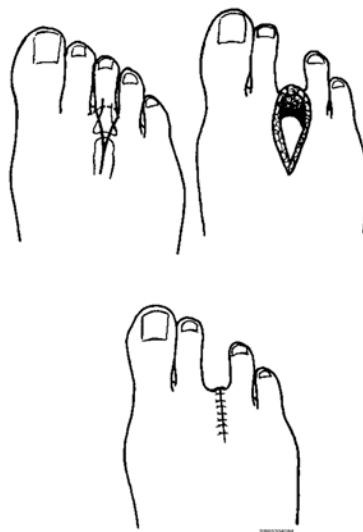


Figure 3-24. Transmetatarsal amputation—middle toe.

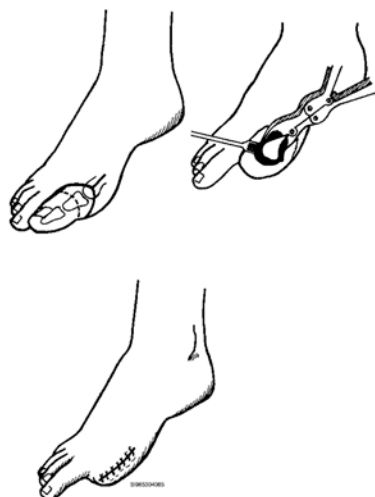


Figure 3-25. Transmetatarsal amputation—great toe.

415. Minor orthopedic surgery procedures

During this lesson, we will discuss some of the more common minor procedures that are performed in orthopedic surgery. We begin by looking at the most common procedure performed on the upper extremities.

Carpal tunnel release

A carpal tunnel release is decompression of the median nerve within the carpal canal at the wrist. Carpal tunnel syndrome usually occurs in patients between the ages of 30 and 60 years, and occurs five times more frequently in women than in men. The cause is primarily thought to be from long-term repetitious motions of the hand, fingers, and wrist, but is obscure in some patients. The syndrome is becoming more and more prevalent as jobs incorporate more keyboarding and mouse-clicking in this age of computer technology. The syndrome is also associated with rheumatoid and nonspecific tenosynovitis. One characteristic of carpal tunnel syndrome is pain, numbness, and tingling over the sensory distribution of the median nerve in the hand, which frequently causes the patient to awaken at night with burning and numbness of the hand that is relieved by exercise. Another characteristic is Tinel's sign, which is a tingling sensation in the distal finger produced by

tapping the median nerve at the wrist. Carpal tunnel syndrome is most often treated non-surgically through physical therapy, injections of anti-inflammatory agents, and other techniques; when these methods fail, surgery may be a “last resort.”

Patient preparation

The patient is placed in the supine position with the affected arm extended on a hand table and the other arm at the side or extended on an arm board. The tourniquet is applied to the affected arm and the electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient’s affected hand and arm are shaved/clipped preoperatively to the elbow. The cleansing skin prep begins at the hand (including fingers, nails, and interdigital spaces) working downwards, circumferentially, to the wrist, forearm, and elbow.

Draping

The patient is draped using a stockinette over the extremity, a drape sheet over the hand table, a folded “rolled” towel around the arm, and a split or extremity sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Hand tray.
- Suture material.
- Esmarch bandage.
- Needle counter pad.
- Electrosurgical pencil.
- Suction tubing and tip (have available).

Procedure

A curved incision is made paralleling the thenar crease and angled toward the ulnar side of the wrist. Dissection is extended to the level of the palmar fascia, being careful to avoid cutting the palmar sensory branch of the median nerve that lies between the palmaris longus and flexor carpi radialis tendons. After the skin and subcutaneous tissue are incised and retracted, the transverse carpal ligament is divided along its ulnar border; thereby relieving the discomfort. The flexor tendon synovium is inspected and a tenosynovectomy may be performed, if indicated. Only the skin is closed and a hand dressing is applied with an overlying plaster shell or incorporating a splint. This will maintain the wrist in 10 degrees of extension for about two weeks to prevent the risk of tendon and nerve prolapse against the wound with wrist flexion during the initial healing phase.

Bunionectomy

Hallux valgus (bunion) is a deformity of the foot that includes medial prominence of the first metatarsal head and lateral deviation of the great toe at the metatarsophalangeal joint. A large amount of the medial prominence is usually caused by inflammation and traumatic thickening of the bursa over the medial aspect of the first metatarsal head and any underlying exostosis. Ill-fitting shoes aggravate the problem and speed the development of bunions. Women are more prone to bunions than men because of the shoes they wear (pointed toes and high heels). Other factors are heredity, longer first toe, muscle imbalance, flat feet, and foot pronation.

Symptoms include pain directly over the medial exostosis or on the dorsomedial aspect of the first metatarsal head, painful plantar callus, plantar keratosis, swelling of the big toe, and discomfort to the whole foot with pain radiating to the leg and knee.

Surgical correction is seldom done for cosmetic reasons alone, but primarily to relieve pain. There is a variety of surgical procedures to treat hallux valgus: Akin, Keller (which we'll discuss in this unit), Lapidus, McBride, Mayo, and Silver. The goal of this procedure is cosmetic (correct the deformity), reconstruction (resect abnormal bony components), and function (provide normal or near-normal range of motion).

Patient preparation

The patient is placed in the supine position with the arms extended on arm boards. A leg holder may be used, and the tourniquet is placed on the proximal thigh of the operative leg. The electrosurgical ground pad is placed on the unaffected anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the knee down. The cleansing skin prep begins with the great toe, toenails, and interdigital spaces—including the foot and leg, extending to the knee.

Draping

The patient is draped using a stockinette over the extremity, a rolled hand towel around the leg, a foot sheet, and a split or extremity sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Power drill.
- Osteotomes.
- Kirschner wires.
- Suture material.
- Esmarch bandage.
- Needle counter pad.
- Minor orthopedic tray.
- Suction tubing and tip.
- Electrosurgical pencil.

Procedure

A curvilinear incision is made over the medial and dorsal aspects of the first metatarsophalangeal joint, carefully preserving the cutaneous nerves. The capsule and periosteum at the base of the proximal phalanx are incised and retracted, exposing the articular surfaces of the metatarsophalangeal joint (fig. 3-26). The dissection is continued, and the remainder of the metatarsophalangeal joint capsule is incised sufficiently to dislocate the base of the proximal phalanx dorsally. A bone cutter divides the proximal phalanx in its mid-portion. The protuberant exostosis is exposed and removed with an osteotome (fig. 3-27). A Kirschner wire is inserted aligning the toe and metatarsal head (fig. 3-28). The wound is closed and carefully bandaged to hold the great toe in the desired position (fig. 3-29).

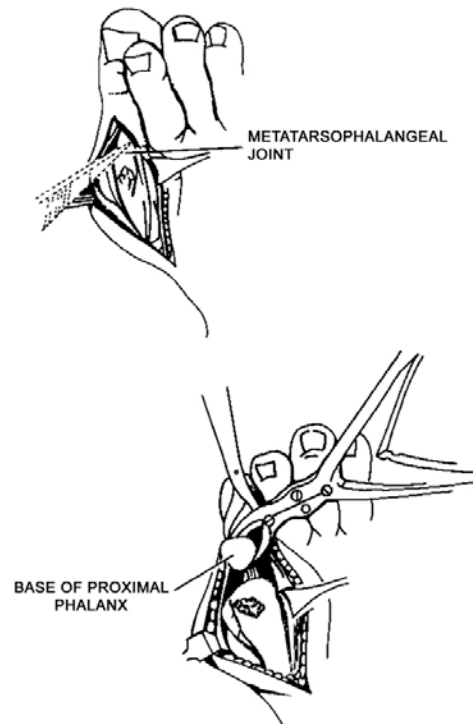


Figure 3-26. Bunionectomy—exposure.

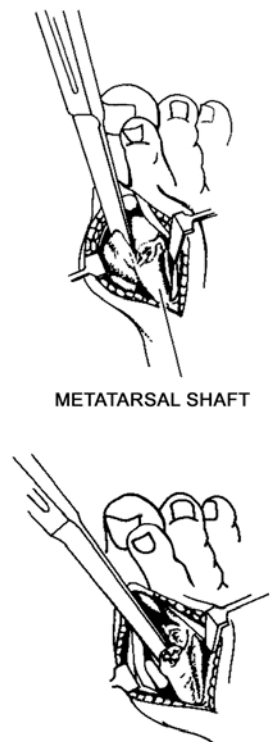


Figure 3-27. Bunionectomy—removing the exostosis.

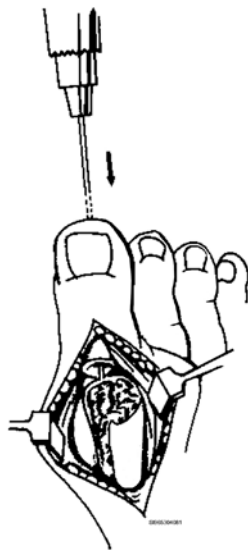


Figure 3-28. Bunionectomy—insertion of K-wire.



B3F3-22

Figure 3-29. Bunionectomy—closing and dressing.

416. Endoscopic orthopedic surgery procedures

Similar to the two previous specialties we discussed, orthopedics also uses endoscopic video equipment to perform many types of procedures. Arthroscopic surgery is becoming more popular everyday, so let's spend a few minutes taking a closer look at what it entails.

Arthroscopy

Arthroscopy is endoscopic visualization of a joint, most often the knee joint. Two types of arthroscopy are performed: *diagnostic* and *operative*. Diagnostic arthroscopy may be performed before a scheduled arthrotomy (opening the joint) that may result in the surgical treatment being modified due to the arthroscopic findings. Operative arthroscopy is more popular; some of the more

common procedures include shaving of the patella, meniscectomy, removal of loose bodies, and ligament reconstruction; there are many others.

If an arthrotomy is to follow the arthroscopy, two sterile setups are required. The patient must be re-prepped, redraped, the surgical team members must change gowns and gloves, and a new sterile instrument and supply set-up must be used.

To ensure visualization, the joint must be distended by use of a continuous flow of irrigation. Specialized pumps are available for this purpose, but if not available, the irrigating solution should be suspended on IV poles at least three feet above the joint. Warm irrigating solution may result in synovial inflammation from *hyperemia* (over-dilated local blood vessels); cold solution may result in a washed-out or blanched appearance from constricted blood vessels. For these reasons, the irrigation solution should be kept at room temperature. Copious amounts of irrigation may be used, depending on the procedure, so administration sets that can connect two to four 3000 cubic centimeter (cc)-bags (or bottles) of irrigation may be used during this procedure. The circulator must be prepared to change the irrigation and suction containers frequently. Although arthroscopy can be used on any joint, the procedure we discuss is for arthroscopy of the knee.

Patient preparation

The patient is placed in the supine position with the knees over the break of the table and the arms extended on arm boards. The foot of the table may be dropped and a leg-holding device may be used. The tourniquet is placed on the upper thigh of the operative leg, but may or may not be used, depending on the surgeon and the procedure—most surgeons do use it. The electrosurgical ground pad is placed on the anterior thigh of the unaffected leg.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the upper thigh down. The cleansing skin prep begins at the knee, working outward to include the entire leg, foot, and toes to the upper thigh.

Draping

The patient is draped using a stockinette over the extremity, a rolled hand towel around the leg, a foot sheet, and a split or extremity sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Video monitor.
- Suture material.
- Esmarch bandage.
- Camera controller.
- Needle counter pad.
- Fiberoptic light source.
- “Sucker-shaver” device.
- Video recorder (optional).
- Camera (if not built into scope).
- Extra (large) suction containers.

- Arthroscopy instruments (basic and operative).
- Irrigation tubing and solution (pump is optional).
- Fiberoptic light cord, power cords, suction tubing.
- Various sized sheaths with sharp and blunt trocars.
- Arthroscopes (surgeon's choice of sizes and view angle).

Procedure

The knee joint is initially distended with saline or lactated Ringer's solution (surgeon's preference) through an irrigation needle or cannula inserted laterally into the suprapatellar pouch. With a #11 blade, the surgeon makes a stab wound medially and/or laterally, two to three millimeter (mm) above the tibial plateau or patella tendon at the joint line. A sheath with a sharp trocar is inserted next; the sharp trocar penetrates the capsule and is replaced with a blunt trocar before the knee joint is entered. After the joint is entered, the blunt trocar is removed and the scope is inserted. Inflow and outflow irrigation tubing are attached to the sheath, with the outflow tubing also connected to suction. The knee is examined thoroughly. Probes, scissors, and hooks may be employed using additional skin incisions; many surgeons use additional sheaths for instrumentation. At the end of the procedure, before closing the incisions, the joint is irrigated copiously until clear of blood and any particles of tissue. Then the small wounds are closed, often with subcuticular closure, and the desired dressing, usually a compression dressing is applied.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

414. Major orthopedic surgery procedures

1. What is the resulting damage of recurrent dislocation of the shoulder?
2. Describe the Bankart procedure.
3. How does the Putti-Platt procedure limit external rotation and prevent dislocation of the shoulder?
4. Which procedure involves detaching the coracoid process and attached muscles, then inserting them onto the neck of the scapula?
5. How is the patient's affected shoulder positioned for the Putti-Platt procedure?
6. Describe the initial incision used in the repair of recurrent anterior dislocations of the shoulder.

7. For the free edge of the lateral part of the subscapularis to be taken across the joint and sutured, what position must the shoulder be in?
8. What structures are replaced in a total hip replacement?
9. List three indications for total hip replacement.
10. State the method used to retract the gluteus medius and other abductors in order to expose the pericapsular fat.
11. Name the retractor placed over the anteromedial rim of the acetabulum that allows exposure of the capsule.
12. What instrument is used to extract the femoral head once it has been osteotomized?
13. What material is applied into the acetabulum to hold the replacement cup?
14. List some devices used to repair the shaft of the radius by open reduction of the fracture.
15. What guideline determines the length of a plate to repair a broken bone?
16. What are the most commonly performed amputations?
17. How is the level of amputation determined?
18. Describe the initial incision required for an above-the-knee amputation.
19. Once the sciatic nerve is ligated, how is the procedure completed?

20. When is a lower extremity amputee fitted for a prosthesis?

415. Minor orthopedic surgery procedures

1. Define *carpal tunnel release*.
2. How is *Tinel's sign* demonstrated?
3. In repairing a carpal tunnel, describe the precautions to be taken as the initial incision is dissected and extended to the level of the palmar fascia.
4. What part of the carpal tunnel repair procedure actually relieves the discomfort that the patient has been experiencing?
5. What is a *hallux valgus*?
6. List six factors that may contribute to the development of a hallux valgus.
7. List three goals of hallux valgus repair.
8. What instrument is used to remove the protuberant exostosis and correct the hallux valgus?
9. Name the device the surgeon will use in the Keller procedure to align the toe and metatarsal head.

416. Endoscopic orthopedic surgery procedures

1. List some of the common types of surgeries that can be performed during an operative arthroscopy.
2. If an arthrotomy is to follow an initial arthroscopy, what preparations must be made between the two procedures?

3. If an irrigation pump is not used, how high should solutions hang on IV poles to ensure adequate flow of irrigation during an arthroscopy procedure?
4. To prevent hyperemia or blanching of the tissues, what is the proper temperature of IV fluid for use in an arthrotomy?
5. How is the knee initially distended for arthroscopy?
6. Describe the manner in which the surgeon will introduce the arthroscope into the knee.
7. At the end of the arthroscopic procedure, before closing the incisions, what is done to the joint?

Answers to Self-Test Questions

412

1. The patient is safer and more comfortable.
2. The cast should be bivalved prior to entry into surgery, which avoids dust from being dispersed into the operating room.
3. Mixtures of metal in the same wound can cause metal break-down and tissue reaction.
4. The tourniquet is applied prior to the cleansing skin prep, but not inflated until the patient is fully draped.
5. Usually hourly, once the tourniquet is applied.
6. Circulation.
7. Amputation.
8. The immobilization is done in a position of function.
9. Enough to prevent pressure or irritation, with extra padding over bony prominences.
10. Air bubbles will cease to rise from the casting material.
11. By squeezing (not twisting). The material is pushed from both ends toward the middle.
12. Using the palm of the hand, not the fingers.
13. This helps prevent denting the plaster and lessens the possibility of swelling in the extremity.
14. c, d, a, b, f, e

413

1. Fractures caused by primary or metastatic malignant bone disease.
2. Compound fractures break the skin, simple fractures do not.
3.
 - a. Depressed.
 - b. Oblique.
 - c. Spiral.
 - d. Transverse.
 - e. Greenstick.

- f. Longitudinal.
 - g. Comminuted.
 - h. Multiple.
4. The distal fragment has to be manipulated into the position assumed by the proximal fragment.
 5. (1) Handle the extremity gently.
(2) Prepare to treat impending or existing shock and control bleeding.
(3) Maintain aseptic surgical technique to prevent infection.
(4) Properly position the patient to provide for adequate circulation and respiratory function.
(5) Consider patient comfort.
 6. (1) Hematoma—serves as a fibrin network.
(2) Cellular proliferation—fibroplastic and endothelial cells colonize fibrin to form clots.
(3) Callus formation—osteoblasts produce osteoid matrix.
(4) Callus ossification—the union of bone stage.
(5) Consolidation—the remodeling of the repair into mature bone.
 7. Nonunion—the healing of a fracture without the production of a bony union.
Delayed union—a fracture that does not heal in the proper amount of time.
Malunion—the deformed union of a fracture that causes impairment of function or cosmetic defect.
 8. a. The skin is not incised.
b. The likelihood of infection is decreased, surrounding tissue damage is reduced, and chances for more rapid healing of the fracture are increased.
c. Depending on the amount of pain and manipulation involved, anesthesia is not normally required.
d. A sterile setup is not required.
 9. Skeletal traction.
 10. Using a sterile setup, a traction bow is attached to a pin in the bone and connected by ropes to weights and pulleys that provide a constant force by pulling on the fracture fragments.
 11. Whether the fracture is simple or compound (prone to infection); the specific classification or unstable nature of the fracture; the interposition of soft tissue between the fragments; joint involvement; or, evidence of cancerous invasion.

414

1. The anterior fibers of the shoulder capsule become stretched and weakened.
2. A procedure in which the glenoid labrum and attenuated anterior capsule are reattached to the rim of the glenoid fossa with heavy sutures, pullout wires, or staples.
3. By overlapping the scapularis tendon and shortening it at its point of insertion.
4. The Bristow procedure.
5. The affected shoulder is elevated with either a folded sheet or sandbag.
6. An anterior curvilinear incision is made over the shoulder joint and dissected downward to the deltopectoral groove.
7. Full external rotation.
8. The femoral head and acetabulum.
9. (1) Disabling rheumatoid arthritis of the hip.
(2) Symptomatic severe degenerative arthritis of the hip.
(3) Hip destruction due to childhood disorders or trauma.
10. The gluteus medius and other abductors are retracted with a Hohmann retractor placed behind the neck in front of the great trochanter. The tensor fascia lata muscles are then retracted with another Hohmann retractor to expose the pericapsular fat.
11. A Cobra retractor.
12. A corkscrew.

13. Methylmethacrylate.
14. Intramedullary nails, rods, plates, and bone screws.
15. The plate should be about five times as long as the diameter of the bone.
16. The most commonly performed amputations are TM, AK, and BK.
17. By the patient's health, vascular status, and rehabilitative potential.
18. A circular incision is made over the distal femur, creating anterior and posterior skin flaps.
19. The femoral periosteum is incised and the bone is transected with a saw. Sharp edges are smoothed with a rasp and the wound is irrigated to remove bone fragments and dust. The wound is then closed.
20. Four to six weeks postoperatively.

415

1. The decompression of the median nerve within the carpal canal at the wrist.
2. By tapping the median nerve at the wrist.
3. Care must be taken to avoid cutting the palmar sensory branch of the median nerve that lies between the palmaris longus and flexor carpi radialis tendons.
4. The problem is corrected when the transverse carpal ligament is divided along its ulnar border.
5. A bunion—a deformity of the foot that includes medial prominence of the first metatarsal head and lateral deviation of the great toe at the metatarsophalangeal joint.
6.
 - (1) High heel shoes.
 - (2) Heredity.
 - (3) Longer first toe.
 - (4) Muscle imbalance.
 - (5) Flat feet.
 - (6) Foot pronation.
7.
 - (1) Cosmetic—correct the deformity.
 - (2) Reconstruction—resect abnormal bony components.
 - (3) Function—provide normal or near-normal range of motion.
8. An osteotome.
9. A Kirschner wire.

416

1. Shaving of the patella, meniscectomy, removal of loose bodies, and ligament reconstruction; there are many others.
2. Two sterile setups must be available before the arthroscopy, because the patient must be re-prepped, redraped, and the surgical team members must re-gown and re-glove between the procedures.
3. At least three feet above the joint.
4. Room temperature.
5. With either saline or lactated Ringer's solution, through an irrigation needle or cannula inserted laterally into the suprapatellar pouch.
6. With a #11 blade, the surgeon makes a stab wound medially and/or laterally, 2 to 3 mm above the tibial plateau or patella tendon at the joint line. A sheath with a sharp trocar is inserted next; the sharp trocar penetrates the capsule, and is replaced with a blunt trocar before the knee joint is entered. After the joint is entered, the blunt trocar is removed and the scope is inserted.
7. The joint is irrigated copiously until clear of blood and any particles of tissue.

Do the unit review exercises before going to the next unit.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter.

Do not return your answer sheet to AFCDA.

28. (412) When transporting a patient in skeletal traction to surgery, the weights should be removed
 - a. only if a life-threatening situation occurs.
 - b. only if the patient complains about the tension.
 - c. immediately before entering the surgical suite.
 - d. immediately before leaving the patient's room.
29. (412) When screws, plates, and other metal implant devices are used, they should be
 - a. made of the same type of metal to increase absorption rate.
 - b. made of the same type of metal to prevent metal break-down.
 - c. rinsed with sterile water immediately after implant to prevent tissue reaction.
 - d. rinsed with sterile water immediately before implant to prevent tissue reaction.
30. (413) A fracture that does not heal in the proper amount of time is called
 - a. nonunion.
 - b. malunion.
 - c. faulty union.
 - d. delayed union.
31. (413) Correcting a fracture by manipulating the extremity until the bones are re-aligned without incising the skin is known as
 - a. open reduction.
 - b. closed reduction.
 - c. external fixation.
 - d. internal fixation.
32. (414) When performing the repair of a recurrent anterior dislocation of the shoulder, what does the surgeon do *next* after doing an anterior curvilinear incision and identifying the cephalic vein and medially retracting it with the pectoralis major muscle?
 - a. Moves the shoulder into full internal rotation.
 - b. Secures the subscapularis with interrupted sutures.
 - c. Sutures the free edge of the lateral part of the subscapularis.
 - d. Medially retracts the short head of the biceps and coracobrachialis muscle.
33. (414) When performing a total hip replacement, what does the surgeon do *next* after using osteotome to clear the pericapsular fat and the retracted head of the rectus is identified?
 - a. The acetabulum is cleaned with a suction irrigator.
 - b. The femur is prepared to accept the femoral prosthesis.
 - c. A centering hole is drilled through the acetabulum into the pelvis.
 - d. A Cobra retractor is placed over the rim of the acetabulum to expose the capsule.
34. (414) During a total hip arthroplasty, what material is used to hold an acetabular cup prosthesis in place?
 - a. Methylcellulose.
 - b. Methylmercaptan.
 - c. Methylmethacrylate.
 - d. Methylthionine chloride.

35. (414) When a bone plate is used for internal fixation of the forearm, it should be approximately
- a. five times as long as the diameter of the bone with a minimum of two transfixion screws on each side of the fracture.
 - b. two times as long as the diameter of the bone with a minimum of two transfixion screws on each side of the fracture.
 - c. five times as long as the diameter of the bone with a minimum of five transfixion screws on each side of the fracture.
 - d. five times as long as the diameter of the bone with a minimum of five transfixion screws on each side of the fracture.
36. (415) What procedure corrects a condition that is *primarily* thought to be caused by long-term repetitious motions of the hand, fingers, and wrist?
- a. Arthroplasty.
 - b. Palmar fasciectomy.
 - c. Carpal tunnel release.
 - d. Anterior shoulder repair.
37. (415) During a bunionectomy, after removal of the exostosis, the toe and metatarsal head are held in alignment with a
- a. staple.
 - b. lag screw.
 - c. Kirschner wire.
 - d. malleolus screw.
38. (416) During an arthroscopy, if an irrigation pump is not used, at what *minimum* height above the knee joint should the irrigation solution be suspended?
- a. Two feet.
 - b. Three feet.
 - c. Four feet.
 - d. Five feet.
39. (416) Other than normal saline, which solution distends the knee joint during an arthroscopy?
- a. Heparin.
 - b. Dextran.
 - c. Distilled water.
 - d. Lactated Ringer's.

Please read the unit menu for unit 4 and continue ➔

Unit 4. Genitourinary Surgery

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THE GENITOURINARY SPECIALTY is a very supportive specialty within medicine and surgery, and is interdependent with other specialties. Besides routine diagnostic and surgical work, the practice of urology involves infections in the urinary tract, male sexual problems, pediatric urologic problems, infertility and sterility, and endocrine problems as they relate to the testes and prostate. In this unit we discuss some basic procedural considerations and then take a look at some commonly performed surgical procedures.

4-1. Fundamentals of Genitourinary Surgery

The urologist is concerned with the urinary systems of males and females. However, urology procedures are scheduled more often for male patients than for females, mainly because there is no male counterpart to the gynecologist. Whatever the patient's sex, the extremely personal nature of most genitourinary (GU) conditions necessitates respect for modesty during all GU procedures.

Many operating room suites have a specially designed area often referred to as the "cysto room." The cysto room should have x-ray capability and contain a cysto table to allow for irrigation and drainage of the bladder during operative procedures. If the cysto room is located in the urology clinic, safety regulations are the same as in the operating room (OR) suite. Because of the risk of a patient getting a nosocomial urinary tract infection, aseptic technique must be strictly adhered to.

417. Common preoperative preparations

It is very important that each surgical team member have a thorough understanding of each proposed surgical procedure for proper patient preparation, OR, supplies, and equipment. Frequently, urological procedures are performed using only topical or local infiltration for anesthesia; regional or general anesthesia is usually reserved only for extensive procedures or for patients with special needs (such as children). Therefore, it is very important to keep reassuring the patient that he or she should have only mild discomfort throughout the procedure. If the patient becomes too uncomfortable, the surgeon may request that the patient be given a mild sedative.

As with all surgery, if the patient is awake, warm the prep solutions before doing the cleansing skin prep.

When an operating bed or cysto table is equipped with an irrigation drainage pan, ensure the pan is in place. Ensure a filter or screen is in place, over the pan or over the drain port; this will trap any stone or other specimen and prevent it from being lost or washed away when the surgeon irrigates the bladder.

Most urologists do not require a scrubbed assistant for cystoscopic and transurethral resections. After setting up the instrument table and equipment, the technician removes his or her gown and gloves and helps the circulating nurse throughout the procedure.

418. Special requirements

Urology is a surgical subspecialty that tackles a wide spectrum of disease involving the male and female urinary tract and the male reproductive system. However, there are special requirements for certain surgical procedures.

Irrigation fluids

During endoscopic bladder operations, a continuous flow of sterile distilled irrigating fluid is used to distend the bladder to provide effective visualization. Commercially prepared sterile irrigation solutions with closed administration sets should be used to prevent the risk of cross-contamination.

Sterile distilled water may be used without complication for simple observation cystoscopy, simple bladder tumor fulgurations, and retrograde pyelography. During transurethral resection of the prostate (TURP), varying amounts of irrigant are absorbed into the bloodstream because venous sinuses may be opened. Studies show that using distilled water for TURP may result in possible renal failure and hemolysis (breakdown of red blood cells). Cardiac decompensation and dilution hyponatremia are other important complications.

Whenever possible, a clear, isosmotic and nonelectrolyte solution should be used for transurethral resection procedures, particularly those using electrosurgery. Surgeon's preference will dictate whether water, saline, sorbitol or glycine will be used. The most widely used urological irrigating fluid for TURP is 1.5 percent glycine—an aminoacetic solution. At a concentration of 1.5 percent, which is slightly hypotonic, glycine does not induce hemolysis. Irrigating with normal saline causes dispersion of high-frequency current with consequent loss of electrosurgical cutting capacity. This will not happen when glycine is used because the solution is nonelectrolyte.

Solutions should be stored at not more than 65°C, as solutions tend to deteriorate at temperatures greater than this. Solutions should be used at body temperature. If cold irrigation solutions are used, bladder spasm or hypothermia could occur.

Commercially prepared sterile irrigation solutions come in collapsible plastic bags or rigid plastic containers that may be suspended above the operating table. To maintain the correct amount of pressure within the bladder, the bags should be hung from 2½ to 3 feet above the table. The collapsible bag is not dependent on air and may be hung in series; thereby providing continuous, uninterrupted irrigation. The surgeon evacuates the fluid from the bladder by rotating a stopcock on the cystoscope, or the cystoscope may be equipped with a suction attachment.

Urethral and ureteral catheters

Urinary catheters are used for a variety of purposes, both in and out of surgery. *Ureteral* catheters are graduated so the surgeon can determine the exact distance the catheter has been inserted into the ureter and are usually radiopaque. They are primarily used during cystoscopy procedures that require contrast media to be injected into them to help identify the ureters during pelvic or intestinal surgery. Ureteral catheters are known by the shapes of the tip. The most commonly used ureteral catheters include the whistle tip, olive-tip, and cone tip.

Urethral catheters can be classified as nonretaining or self-retaining. Common nonretaining catheters include Robinsons (straight cath) and Coudes. They are not designed to be left in the bladder, but instead are used primarily as a straight cath to drain the bladder or obtain a urine specimen. They usually range in size from 12 through 30 French and have no balloon. Retaining catheters on the other hand are designed to remain in place and continuously provide drainage for the bladder, diagnostic studies in the operating room, and as stents. Foley catheters are the most frequently used self-retaining catheter and are manufactured with a variety of tip styles, lengths, eye arrangements, and balloon sizes ranging from 5 cubic centimeters (cc) to 30cc. Other types of urethral catheters include the Pezzer (also called mushroom), Malecot.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

417. Common preoperative preparations

1. Since urological procedures are done without general or regional anesthesia, what special considerations must be made toward the patient?
2. After setting up the instrument table, what does the operating room technician do during a cystoscopy procedure?

418. Special requirements

1. Why are commercially prepared sterile irrigation solutions preferred for use during endoscopic bladder operations?
2. For a retrograde pyelography, what fluid can be used without complication in place of sterile saline?
3. Why is sterile distilled water *not* used during a TURP?
4. Name the most widely used urological irrigating fluid, and list the desirable qualities of that fluid.
5. Why are irrigating solutions used at body temperatures?
6. To maintain the correct amount of pressure within the bladder when using commercially prepared sterile irrigation solution, how are the fluid bags hung?
7. Why are ureteral catheters graduated?
8. List three commonly used ureteral catheters.
9. List three primary uses for urethral catheters.

10. List four urethral catheters.

4-2. Commonly Performed Genitourinary Surgical Procedures

Urogenital surgery involves procedures of the female and male urinary systems, and male reproductive structures. These procedures are classified as open or closed. Open procedures are done through an incision and closed procedures are performed through a cystoscopy. We first discuss the closed surgical procedures.

419. Major genitourinary surgical procedures

Urologists manage afflictions ranging from genitourinary malignancies and renal stones to congenital genitourinary defects, perineal reconstruction, and male infertility. This lesson covers three major surgical procedures: a simple nephrectomy, suprapubic prostatectomy, and ureterolithotomy.

Simple nephrectomy

A nephrectomy is the total or subtotal removal of a kidney. Some indications for a nephrectomy are severe infections that cause widespread damage to the kidney, cancer, severe trauma, and tuberculosis.

Patient preparation

The patient is placed in the lateral position with the affected side up. The patient's back is positioned close to the edge of the operating table. The upper arm is positioned on an overhead arm support, and the lower arm is flexed at the elbow so the hand rests on the head pillow. A pillow is placed between the legs and the lower leg is flexed at the knee. The upper leg remains straight. The kidney rest is raised and desired bed flexation is achieved. Three-inch tape is used to stabilize the patient on the table. The surgeon may request that a urinary catheter be inserted. The electrosurgical ground plate is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the axilla to the thigh. The cleansing skin prep is usually from the axilla to the thigh and anterior and posterior as far as possible.

Draping

The patient is draped using four hand towels and a traverse laparotomy drape. Additional sheets are used to cover the arm board if needed. A foot sheet may also be used.

Instrumentation

The basic instrumentation and supplies include the following:

- Kitners.
- Sponges.
- Hemoclips.
- Blades: #10.
- Penrose drain.
- Suture material.
- Needle counter pad.
- Long instrument set.
- Suction tubing and tip.
- Electrosurgical pencil.

- Major instrument set.
- Thoracic instruments.
- Kidney pedicle clamp.
- Self-retaining abdominal retractor.
- Chest tubes, water-seal drainage system and insertion tray (available).

Procedure

A subcostal flank incision is made approximately two centimeter (cm) below the 12th rib. The latissimus dorsi, external oblique and internal oblique muscles are exposed and transected. In some cases a rib may have to be removed to gain access to the retroperitoneal space where the kidney lies. If a rib is taken, a preinstall elevator and rib shears should be available. Muscles tissue may be double-clamped, cut and ligated or transected with electrocautery. Self-retaining retractors are inserted and the subcostal neurovascular bundle is identified and retracted with a vein retractor. The lumbodorsal fascia is opened with a fresh #10 blade and long Metzenbaum scissors. If needed, the transverse abdominus muscle may be partially split.

The Gerota's fascia is opened with Metzenbaum scissors and DeBakey forceps. Next, the surgeon exposes the renal pedicle, both anteriorly and posteriorly with blunt dissection. The perinephric fat and the adrenal gland at the upper pole of the kidney are dissected and the ureter is isolated. Once it is isolated, the ureter is double clamped with two heavy clamps (fig. 4-1), ligated and cut with Metzenbaum scissors. Hemoclips and suction should be available in case of bleeding. The kidney is retracted to expose the renal artery and vein. A pedicle clamp is placed on the renal artery first, and then the renal vein (fig. 4-1). Both are doubly secured with heavy non-absorbable sutures and cut. Any remaining tissue attached is cut and the kidney is removed. The wound is irrigated with warm saline solution and homeostasis is achieved. The surgeon may place a Penrose drain before closing the Gerota's fascia. The incision is closed in the routine fashion.

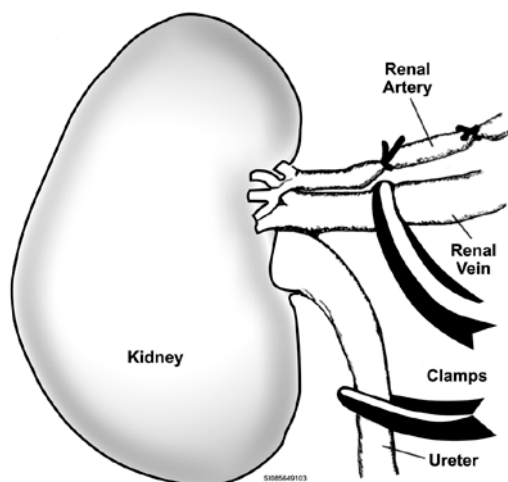


Figure 4-1. Nephrectomy – ligation and clamping of renal artery, renal vein, ureter.

Suprapubic prostatectomy

A prostatectomy is an operation to remove all or part of a cancerous prostate. Because the prostate completely surrounds the urethra, any enlargement or tumor can restrict the normal flow, causing symptoms such as difficult, painful, or frequent urination.

Patient preparation

The patient is placed in the supine position with the arms at the side or extended on arm boards. A Foley catheter is inserted and maintained within the sterile field. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient's abdomen and pubic area are shaved/clipped preoperatively. The cleansing skin prep is usually from the midchest to the thigh and laterally as far as possible.

Draping

The patient is draped using four hand towels and a laparotomy drape. Additional towels will be placed under the external genitalia. A foot sheet may also be used.

Instrumentation

The basic instrumentation and supplies include the following:

- Kitners.
- Sponges.
- Lubricant.
- Hemoclips.
- Blades: #10.
- Syringe, 30cc.
- Drainage bags.
- Suture material.
- Foley catheters.
- Needle counter pad.
- Jackson-Pratt drains.
- Long instrument set.
- Major instrument set.
- Electrosurgical pencil.
- Suction tubing and tip.
- Self-retaining abdominal retractor.

Procedure

A low transverse incision is made down to the level of the bladder. The surgeon will then use his or her fingers or a sponge stick to perform blunt dissection while controlling bleeding with cautery. After the placement of two traction sutures, the bladder is opened at the dome with a deep knife. Once the surgeon has achieved adequate visibility, he or she will use the tip of his or her index finger to perform the enucleation of the prostate (fig. 4-2). Once the specimen is removed, the main focus of the surgeon becomes maintaining hemostasis with the use of suture ligation or electrocautery. Once bleeding has been controlled the surgeon will place suprapubic and Foley catheters into the bladder for urine drainage. The surgeon may also choose to place a Jackson-Pratt drain in the retropubic space to aid with fluid drainage. The wound is closed and a pressure dressing is applied.

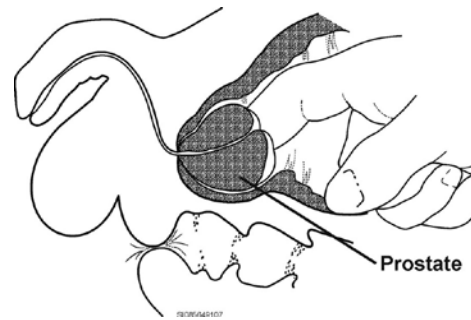


Figure 4-2. Suprapubic prostatectomy-enucleation of the prostate.

Ureterolithotomy

Ureterolithotomy is the removal of calculi (stone) from the ureter. Some indications for ureterolithotomy are the presence of calculus with a transverse diameter greater than the ureter; the presence of spurred, hooked, or jagged calculus that may impale the ureteral wall; and, delay in the progress of the calculus down the ureter.

Patient preparation

If the stone is in the proximal ureter, the patient is placed in the lateral position. If the stone is in the distal ureter, the patient is placed in the supine position. The electrosurgical ground plate is placed according to the patient's position on the table.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively according to the position. The cleansing skin prep will also be done according to whichever position the surgeon chooses.

Draping

The patient is draped using four hand towels, a foot sheet, and a transverse drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Kitners.
- Sponges.
- Hemoclips.
- Vessel loops.
- Penrose drain.
- Suture material.
- Kidney instruments.
- Needle counter pad.
- Long instrument set.
- Major instrument set.
- Suction tubing and tip.
- Electrosurgical pencil.
- Thoracotomy instruments (for lateral approach).

Procedure

The location of the stone determines which surgical approach the surgeon will use. Once inside the retroperitoneal space, the stone is located by manual examination. The stone is kept stationary with vessel loops applied above and below the calculus, or by using Babcock clamps. An incision is made in the ureter, over the stone, with a No. 15 blade. The stone is then grasped with a Randall stone forceps and removed. A No. 10 Fr Robinson catheter may be inserted proximally and distally into the ureter, and irrigated with saline. This checks the patency of the ureter and dislodges any remaining fragments of stone. The ureter and wound are closed in the routine manner.

420. Minor genitourinary surgical procedures

Certain minor genitourinary surgical procedures are carried out on a daily basis with most of them being done without general anesthesia or under local anesthesia. The more common ones are circumcisions, vasectomies, hydrocelectomies, and orchiopexies.

Circumcision

A circumcision is the excision of the prepuce (foreskin) of the glans penis. It is performed as a prophylactic health measure on infants, to treat recurrent balanitis (inflammation of the glans penis), to relieve phimosis (constriction of the foreskin), or as a religious rite on the Jewish male. If the procedure is performed for Jewish religious purposes, all female surgical team members may be barred from the operating room (OR) during the procedure.

Patient preparation

The adult patient is placed in the supine position with the arms at the side or placed on arm boards. Infants are immobilized on a special board that restrains the limbs and exposes the genitals. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient is not shaved/clipped preoperatively. The cleansing skin prep begins at the ventral surface of the penis and includes the small surrounding areas. It is important to retract the patient's foreskin if the condition allows.

Draping

The patient is draped using four hand towels, a foot sheet, and an adult or pediatric laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Basin set.
- Sponges.
- Suture material.
- Needle counter pad.
- Electrosurgical pencil.
- Minor or pediatric instrument set.
- Circumcision clamp (for infants and children).

Procedure

The surgeon begins by placing several hemostats on the edge of the prepuce. With Metzenbaum scissors, a longitudinal incision, followed by a circular incision, is made through the prepuce. The prepuce is removed (fig. 4-3) and passed to the technologist as specimen. Hemostasis is obtained and the skin edges are approximated with absorbable, interrupted sutures. Petrolatum gauze is generally used for dressing.

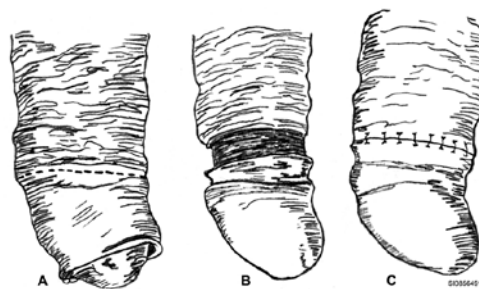


Figure 4-3. Circumcision-removal and suturing of the prepuce.

Vasectomy

A vasectomy is the excision of a small portion of the vas deferens. This procedure is performed bilaterally as a permanent method of sterilization or to prevent possible epididymitis prior to prostatectomy.

Patient preparation

The patient is placed in the supine position with the arms at the side or extended on arm boards. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved /clipped preoperatively. The cleansing skin prep begins at the scrotum, to include the entire external genitalia and the small surrounding area.

Draping

The patient is draped using four hand towels, a foot sheet, and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Suture material.
- Needle counter pad.
- Minor instrument set.
- Electrosurgical pencil.

Procedure

The surgeon first locates the vas by palpating the scrotum. After locating the vas, a scrotal incision is made over the vas. The vas is then grasped with an Allis clamp and delivered into the operative field. Tissue surrounding the vas is dissected away with scissors or a hemostat. On either side of the Allis clamp, straight hemostats are placed to crush the vas. A segment of vas between the clamps is cut and removed. The cut ends are ligated or cauterized (fig. 4-4) and allowed to retract to the scrotum. This procedure is repeated on the other side. The incisions are closed in the routine fashion.

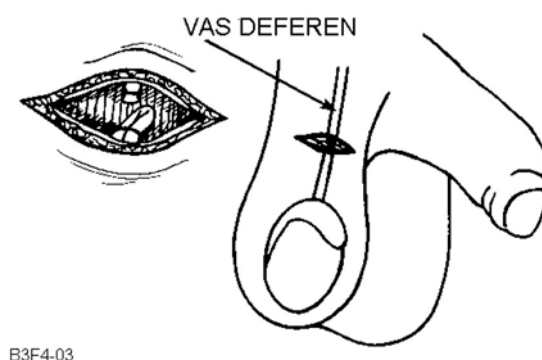


Figure 4-4. Vasectomy— vas deferens severed.

Hydrocelectomy

This procedure is the excision of a portion of the tunica vaginalis testis to remove an enlarged, fluid-filled sac located around the testicle in the scrotum. A hydrocele can be caused by an infection, irritation, trauma, or tumor within the scrotum. In children, a hydrocele is often discovered in conjunction with a congenital inguinal hernia.

Patient preparation

The patient is placed in the supine position with the arms at the side or extended on arm boards. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the nipple line to the mid-thighs, bedside to bedside. The cleansing skin prep for a scrotal approach begins at the scrotum working outwards to the umbilicus to the mid-thighs, bedside to bedside. For an inguinal approach, begin at the incisional site, working outwards to the nipple line and mid-thighs, bedside to bedside.

Draping

The patient is draped using four hand towels, a foot sheet, and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Syringe, 30cc.
- Suture material.
- Needle, 20-gauge.
- Needle counter pad.
- Penrose drain, small.
- Minor or pediatric instrument set.

Procedure

For this operation, a scrotal or inguinal approach may be used. Here we discuss the scrotal approach. A small incision is made in the scrotum over the mass, and hemostasis is obtained. The fascial layers are incised, exposing the tunica vaginalis. The hydrocele is dissected free and delivered. The hydrocele fluid is aspirated with a needle and syringe, or through a small incision. The sac is excised and passed off as specimen. The wound is checked for hemostasis; a small Penrose drain is inserted; and the scrotum is closed in the usual manner. To aid in reducing postoperative scrotal edema, a fluff compression dressing and scrotal support are used to dress the scrotum.

Orchiopexy

Orchiopexy is the surgical fixation in the scrotum of an undescended testis. An undescended testis occurs when the testis fails to descend into the scrotum during gestation. If after one year of medical treatment, the testis is still undescended, the testis is surgically placed in the scrotum for optimum maturation.

Patient preparation

The patient is placed in the supine position with the arms at the side or extended on arm boards. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient is not shaved/clipped preoperatively. The cleansing skin prep begins at the incisional site, working outwards to the nipple line to mid-thigh, bedside to bedside.

Draping

The patient is draped using four hand towels, a foot sheet, and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Suture material.
- Needle counter pad.
- Electrosurgical pencil.
- Minor or pediatric instrument set.

Procedure

Most undescended testes are located in the inguinal canal or superficial inguinal pouch. An inguinal incision is made over the area of the external ring, as for a hernia repair. The incision is deepened and the inguinal canal is exposed. Using blunt and sharp dissection, the spermatic cord is freed. A small hemostat is placed on the tip of the testicle.

The surgeon creates a tunnel for the testicle by pushing a finger or blunt clamp forcibly through the groin and into the scrotum. The testicle is then pulled through the tunnel. A scrotal incision is made to expose the scrotal septum to which the testicle will be secured. After the testicle is secured, the scrotal and inguinal incisions are closed in the routine manner.

421. Endoscopic genitourinary surgical procedures

Endoscopic surgery uses scopes to go through small incisions or natural body openings to help diagnose and treat genitourinary conditions. This type of surgery is minimally invasive and allows the surgeon to diagnose and treat patients with reduced body cavity invasion.

Cystoscopy

Cystoscopy is simply an endoscopic examination of the lower urinary tract and is an important part of urinary surgery. Like an exploratory laparotomy, it is primarily a diagnostic procedure; so when a therapeutic procedure is performed in conjunction with a cystoscopy, the procedure is described using the therapeutic description. For example, removal of a stone from the bladder may be described as “cystoscopy with bladder stone removal.” During cystoscopy of a female patient, the urethra, bladder neck, and bladder are examined. In a male patient, the ejaculatory ducts, bladder neck, and median and lateral lobes of the prostate are examined. Cystoscopy is indicated for hematuria, urinary tract infections, tumors, urinary incontinence, fistulas, and many other conditions.

Patient preparation

The patient is placed on the cystoscopy table in the supine position. After the administration of general or regional anesthetic, the patient is then placed in the lithotomy position. The arms are placed at the side or extended on arm boards. If the patient is receiving topical anesthesia, he or she is placed directly into the lithotomy position.

Skin preparation

The patient is not shaved/clipped preoperatively. For female patients, the cleansing skin prep begins at the pubic symphysis, extends downwards over the labia, and outwards to the inner thighs. The vaginal vault and cervix are cleansed, prepping the perineum and anus last. On male patients, the entire pubic area, including the scrotum and perineum, are cleansed.

Draping

The patient is draped using a sheet under the buttocks, three hand towels, and a cystoscopy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Sponges.
- Basin set.
- Stopcock.
- Lubricant.
- Syringe, 30cc.
- Urethral sounds.
- Irrigation tubing.

- Fiberoptic light cord.
- Fiberoptic light source.
- Cystoscope and accessories.
- Catheters (have available).

Procedure

The cystoscope is lubricated and carefully introduced into the urethra, as shown in figure 4-5. The urethra may be dilated initially with a urethral sound. The surgeon inspects the urethra as the cystoscope is advanced into the bladder. The obturator is removed and a urine specimen is obtained. The bladder is filled and distended with irrigation fluid to enable the surgeon to see clearly inside the bladder. Stone removal and bladder biopsy can be accomplished with cystoscope accessories, as needed (fig. 4-6). A radiological study often done in conjunction with cystoscopy is a retrograde pyelogram. This is done by passing ureteral catheters up to the kidney pelvis and injecting an x-ray detectable dye. These x-rays reveal an outline that helps doctors determine the presence of stones and tumors, as well as kidney and ureteral malformations and abnormal locations. At the completion of the surgery, the bladder is drained and the cystoscope is removed.

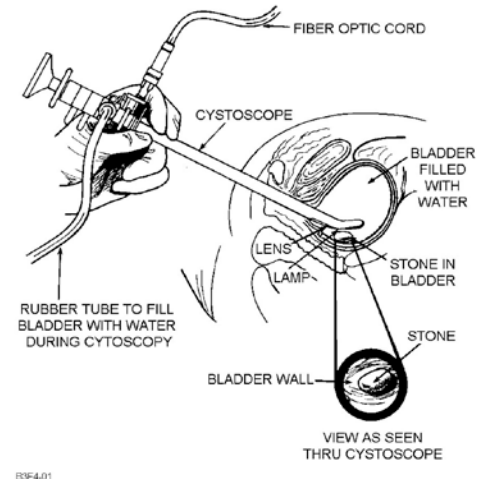


Figure 4-5. Cystoscopy.

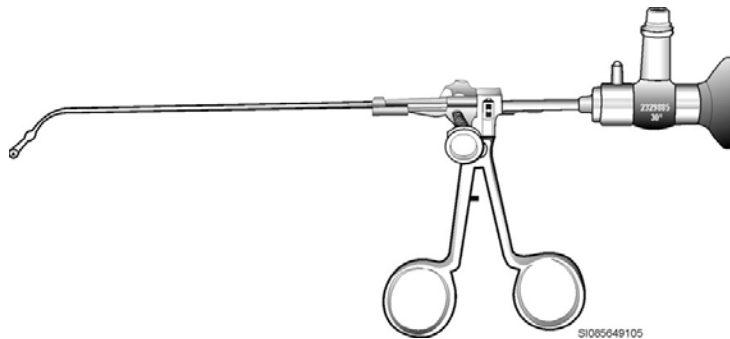


Figure 4-6. Optical biopsy forceps with endoscope.

422. Laser genitourinary surgical procedures

Urology surgeons often use lasers to breakup or dissolve tissue that can cause complications within the genitourinary system. This lesson looks at how you would assist with a transurethral resection of the prostate/bladder tumors.

Transurethral resection of the prostate and bladder tumors

Transurethral resection is the resection of prostatic tissue (fig. 4-7) and/or lesions of tissue or tumors from within the bladder. Resection can be accomplished by using a resectoscope or YAG/holmium laser. Transurethral resection of the bladder tumors (TURBT) and TURP are the two most common performed procedures. A TURBT is performed to remove bladder tumors located at the very top or dome of the bladder. A TURP is performed to treat obstructive enlargement of the prostate gland. It is also desirable when the patient is a poor surgical risk and may not do well with an open prostatectomy. Some surgeons feel that a prophylactic vasectomy, to prevent postoperative epididymitis, is necessary prior to the TURP.

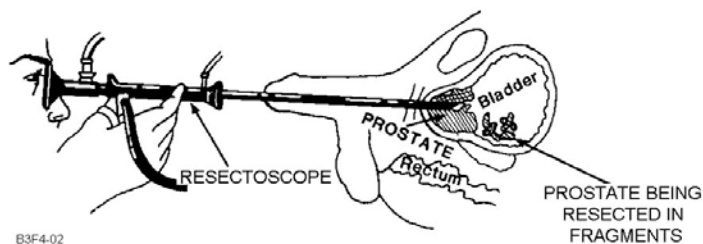


Figure 4-7. Transurethral resection.

Patient preparation

The patient is placed on the cystoscopy table in the supine position. After the administration of regional or general anesthesia, the patient is placed in the lithotomy position. The arms are at the side or extended on arm boards. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient is not shaved/clipped preoperatively. The entire pubic area, including the scrotum and perineum, is cleansed.

Draping

The patient is draped using a sheet under the buttocks, three hand towels, and a cystoscopy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Sponges.
- Strainer.
- Stopcock.
- Basin set.
- Lubricant.
- Laser bridge.
- Syringe, 30cc.
- Syringe, Toomey.
- Urethral dilators.
- Fiberoptic light cord.
- Fiberoptic light source.
- Resectoscope and accessories.
- Evacuator and basin of glycine solution.

Procedure

The surgeon begins by dilating the urethra with urethral sounds. A cystoscopy is performed next to assess the degree of prostatic obstruction or inspect the bladder for lesions. The resectoscope, complete with sheath and obturator, is well lubricated and passed into the urethra. The obturator is removed and the light cord, irrigation tubing, and cautery are connected. If the surgeon chooses to use laser, an additional laser bridge will be passed through the catheter channel of the cystoscope. The bladder is irrigated continuously. The urethra and bladder trigone are inspected. Electrosection or lasering begins after the surgeon determines the location of the ureteral orifice. At intervals the bladder is drained, washing out small blood clots and fragments of tissue; if a laser is used the

surgeon may not need to washout the bladder. It may be necessary for the surgeon to use an evacuator and Toomey syringe to remove resected tissue.

Upon completion of the resection, the prostatic fossa and bladder are examined to ensure that all bleeding is under control. One of the advantages to using laser is how well it controls and aids with hemostasis. The resectoscope is removed, and a Foley catheter is inserted into the bladder for urinary drainage. The balloon is inflated and gently pulled in traction against the bladder neck to help control hemostasis.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

419. Major genitourinary surgical procedures

1. Define nephrectomy.
2. What position is the patient placed in for a nephrectomy?
3. After the patient is positioned, what is used to stabilize the patient on the operating table?
4. Describe the type of incision made for a nephrectomy.
5. If a rib is taken during a nephrectomy, what special instruments are used to remove the rib?
6. Which instrument is used to retract the subcostal neurovascular bundle?
7. What type of dissection does the surgeon use to expose the anterior and posterior renal pedicle?
8. Which vessel is clamped first during a nephrectomy, the renal artery or renal vein?
9. Define prostatectomy.
10. What type of incision is made for a suprapubic prostatectomy procedure?

11. What becomes the surgeon's main focus once the prostate specimen has been removed from the patient?
12. List three indications for ureterolithotomy.
13. What determines the surgical approach the surgeon will use for ureterolithotomy?
14. How is the stone kept stationary for removal?
15. Name the instrument used to actually remove the calculus.
16. Describe the catheter which may be inserted into the ureter for irrigation.

420. Minor genitourinary surgical procedures

1. List four reasons for performing circumcision.
2. How is the circumcision area dressed postoperatively?
3. Name the instrument used in a vasectomy to deliver the vas into the operative field.
4. Describe the removal of the vas segment.
5. Define *hydrocelectomy*.
6. List five possible causes of hydrocele.
7. How is the hydrocele fluid removed?

8. Describe postoperative dressing for hydrocelectomy.
9. Define *orchiopexy*.
10. Where are most undescended testes located?
11. How does the surgeon form a tunnel for the testicle to enter the scrotum?
12. To which tissue is the testicle secured during orchiopexy?

421. Endoscopic genitourinary surgical procedures

1. What structures are examined during a cystoscopy on a female? On a male?
2. List five indications for cystoscopy.
3. What is the proper position for cystoscopy?
4. Before entering the urethra with the cystoscope, what may be used to dilate the urethra first?
5. As the surgeon advances the cystoscope into the bladder, what must be removed from the instrument in order to collect a urine specimen?
6. How is a retrograde pyelogram performed?

422. Laser genitourinary surgical procedures

1. Define *transurethral resection*.
2. Name two ways prostate or bladder resection can be accomplished?

3. If a patient is a poor surgical risk for an open prostatectomy, what is the desirable procedure used to treat obstructive enlargement of the prostate gland?
4. What procedure is preferred by some surgeons to precede a TURP?
5. During electrosection of the ureteral orifice, what instruments may the surgeon require to drain the bladder and remove resected tissue if it does not wash out easily?
6. How can a Foley catheter help maintain hemostasis after resection is completed?
7. Name one advantage to using a laser during a TURBT?

Answers to Self-Test Questions

417

1. Tell the patient that he or she will experience mild discomfort; use warm water for skin prep solutions; and be prepared for the surgeon to administer mild sedation if the patient becomes too uncomfortable.
2. Since most urologists do not require a scrubbed assistant for cystoscopy, the technician removes both gown and gloves and helps the circulating nurse throughout the procedure.

418

1. Commercially available solutions come in closed administrations sets that greatly help in prevention of cross-contamination.
2. Sterile distilled water.
3. Since certain amounts of irrigant are absorbed into the bloodstream, saline is preferable over water which can cause possible renal failure, hemolysis, cardiac decompensation, and dilution hyponatremia.
4. A 1.5 percent solution of glycine, which is slightly hypotonic, will not produce hemolysis and will not cause the dispersion of high-frequency current that saline does.
5. Cold irrigation can result in bladder spasm or hypothermia.
6. The bags are hung 2½ to 3 feet above the table.
7. This allows the surgeon to determine the exact distance the catheter has been inserted into the ureter.
8. (1) Whistle tip.
(2) Cone.
(3) Olive tip.
9. (1) Drainage.
(2) Diagnostic studies in the operating room.
(3) As stents.
10. (1) Foley.
(2) Pezzer (mushroom).
(3) Malecot.

(4) Straight (Robinson).

419

1. The total or subtotal removal of a kidney.
2. The lateral position with the affected side up.
3. 3-inch tape.
4. A subcostal flank incision is made approximately 2cm below the 12th rib.
5. A Periosteal elevator and rib shears.
6. A vein retractor.
7. Blunt dissection.
8. Renal artery.
9. An operation to remove all or part of a cancerous prostate.
10. A low transverse incision.
11. Maintaining hemostasis.
12. (1) The presence of calculus with a transverse diameter greater than the ureter.
(2) The presence of spurred, hooked, or jagged calculus that may impale the ureteral wall.
(3) Delay in the progress of the calculus down the ureter.
13. The location of the stone.
14. By using vessel loops above and below the calculus or Babcock clamps.
15. A Randall stone forceps.
16. A No. 10 Fr Robinson, inserted proximally and distally into the ureter.

420

1. (1) A prophylactic health measure (performed on infants).
(2) To treat recurrent balanitis.
(3) To relieve phimosis.
(4) As a religious rite of the Jewish faith.
2. With a petrolatum gauze.
3. Allis clamp.
4. On either side of the Allis clamp holding the vas, straight hemostats are used to crush the vas and the section between the clamps is cut and removed.
5. The excision of a portion of the tunica vaginalis testes to remove an enlarged, fluid-filled sac located around the testicle in the scrotum.
6. (1) Infection.
(2) Irritation.
(3) Trauma.
(4) Tumor within the scrotum.
(5) In children, in conjunction with an inguinal hernia.
7. By aspiration with a needle and syringe through a small incision.
8. To aid in reducing postoperative scrotal edema, a fluff compression dressing and scrotal support are used to dress the scrotum.
9. The surgical fixation in the scrotum of an undescended testicle.
10. In the inguinal canal or superficial inguinal pouch.
11. By pushing a finger or blunt clamp forcibly through the groin and into the scrotum.
12. The scrotal septum.

421

1. Female: urethra, bladder neck, and bladder.

Male: ejaculatory ducts, bladder neck, and median and lateral lobes of the prostate.

2. (1) Hematuria.
(2) Urinary tract infections.
(3) Tumors.
(4) Urinary incontinence.
(5) Fistulas.
3. Lithotomy.
4. A urethral sound.
5. The obturator.
6. Ureteral catheters are passed up to the kidney pelvis and x-ray detectable dye is injected. The outline obtained by x-ray then helps the doctor determine the presence of stones, tumors, kidney and ureteral malformations, and abnormal locations.

422

1. The resection of prostatic tissue and/or lesions of tissue from around the bladder neck through a resectoscope.
2. By using a resectoscope or YAG/holmium laser.
3. TURP.
4. A prophylactic vasectomy, to prevent postoperative epididymitis.
5. An evacuator and Toomey syringe.
6. The balloon is inflated and gently pulled in traction against the bladder neck.
7. It controls and aids with hemostasis.

Do the unit review exercises before going to the next unit.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter.

Do not return your answer sheet to AFCDA.

40. (417) What is the purpose of the screen on a cysto table irrigation drainage pan?
 - a. Filters irrigation fluid before administration.
 - b. Traps a stone or specimen before it is washed away.
 - c. Provides ventilation to facilitate gravity flow of irrigation fluid.
 - d. Breaks stones into smaller pieces to prevent blockage of suction.
41. (418) The *most* widely used irrigating solution during transurethral resection of the prostate surgery is
 - a. water.
 - b. saline.
 - c. glycine.
 - d. mannitol.
42. (419) What muscles are exposed and transected during a simple nephrectomy procedure?
 - a. Deltoid and triceps muscles.
 - b. Pectoralis and rectus muscles.
 - c. Gracilis and gastrocnemius muscles.
 - d. External and internal oblique muscles.
43. (419) After traction sutures are placed in the bladder during suprapubic prostatectomy, the dome of the bladder is opened with a
 - a. deep knife.
 - b. tonsil knife.
 - c. amputation knife.
 - d. emulsification knife.
44. (420) Circumcision refers to
 - a. removal of the glans.
 - b. removal of the foreskin.
 - c. lengthening of the foreskin.
 - d. widening of the urethral opening.
45. (420) What is *generally* used as a dressing after circumcision?
 - a. Webril.
 - b. Elastoplast.
 - c. Plaster bandage.
 - d. Petrolatum gauze.
46. (420) During an orchiopexy, what does the surgeon do *next* after deepening the incision and exposing the inguinal canal?
 - a. Frees the spermatic cord.
 - b. Creates a tunnel for the testicle.
 - c. Places a hemostat on the tip of the testicle.
 - d. Exposes the scrotal septum where the testicle will be secured.

47. (420) *Most* undescended testes are located in the
- a. renal calyx.
 - b. inguinal canal.
 - c. tunica vaginalis.
 - d. space of Retzius.
48. (421) During a cystoscopy, what does the surgeon do *next* after the cystoscope is introduced into the urethra?
- a. dilate the urethra.
 - b. conduct a bladder biopsy.
 - c. fill the bladder with irrigation.
 - d. perform a manual exam under anesthesia.
49. (421) What type of x-ray procedure is often done in conjunction with a cystoscopy?
- a. Cholangiogram.
 - b. Electromyogram.
 - c. Cystometrogram.
 - d. Retrograde pyelogram.
50. (422) Removal of prostatic tissue from within the bladder is known surgically as a
- a. retropubic resection.
 - b. suprapubic resection.
 - c. transurethral resection.
 - d. suprapubic cystostomy.

Please read the unit menu for unit 5 and continue ➡

Student Notes

Unit 5. Ophthalmology, Otolaryngology, and Oral Surgery

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ALTHOUGH EYE OR EAR, NOSE, AND THROAT (ENT) SURGERY is not performed at all medical facilities, it is important that you have a basic understanding of some of the more common procedures performed in these specialties. In this unit we discuss preoperative and intraoperative practices, medications used, and commonly performed eye, ENT, and oral surgical procedures.

5–1. Fundamentals of Surgery

Although there are anatomical and physiological connections between the eyes, ears, nose, and throat, there is very little similarity between the operations performed on each of these structures. Ear procedures are much like neurosurgical procedures in that they often involve the removal of a portion of bone before the delicate hearing apparatus can be reached. Nose operations are usually directed toward correcting bone and mucous abnormalities that cause discomfort and interfere with the free passage of air. Throat structures require a variety of approaches and techniques. Operations on these structures use many instruments and techniques similar to other surgical specialties.

Eye procedures are extraocular or intraocular in nature and have very little similarity with procedures involving other areas of the body. Oral surgery is also different; it encompasses some of the expertise of dentists, ENT, and orthopedics. This explains why eye techs and oral surgery techs have a different Air Force specialty code (AFSC) from operating room (OR) techs.

423. Common preoperative preparations and intraoperative procedures

As with all patients entering the hospital for surgery, there is the usual apprehension and fear of the unknown. Because the face and head is so visible, patients about to undergo eye, ENT, or oral surgery are naturally very concerned about the outcome.

Preoperative preparations

Preparing a patient for surgery involves decreasing anxiety, ensuring patient safety, and decreasing the risk of complications. Anxiety interferes with the effectiveness of anesthesia and the ability of patients to participate in their care. Information about what will occur and which sensations to expect should be provided.

Eye surgery

Sight is a precious gift, and it is unbearable for some patients to think they may lose it. The surgical team must be prepared to meet the specific needs of each patient when providing care. To make the postoperative period less stressful, the patient should have a thorough understanding of what will happen after surgery. Reassurance is extremely important for patients who will have eye patches postoperatively.

The surgeon may wish to clip the patient's eyelashes prior to the cleansing skin prep. The circulating nurse should have a pair of small scissors available with the blades coated with Vaseline.

Ear surgery

Patients undergoing ear surgery present a special challenge to the surgical team, too. These patients may have a significant hearing loss so you may need to talk a little louder and a little slower when explaining procedures to them. If your facility allows patients to wear their hearing aid into the operating room, arrangements should be made to return the device to the patients' room after anesthesia induction. This minimizes the risk of losing the hearing aid in the operating room.

Patients undergoing ear surgery should shampoo their hair as part of the preoperative preparation because they will be unable to shampoo for a period of 10 days to 2 weeks postoperatively. This is so that the ear canal can remain dry. Also, they should be informed that some of their hair may have to be shaved from around the ear, depending on the operation.

The patient undergoing middle ear surgery should be informed that vertigo may occur for a couple of days postoperatively, so they should request help in moving around. Moving smoothly and slowly may alleviate the sensation.

The patient should be cautioned against hard nose-blowing and coughing. If the patient has to sneeze, he or she should keep the nose and mouth open. This is necessary to prevent dislodging of a prosthesis or graft.

Nasal surgery

Patients who have had nasal surgery should be informed that a nasal pack will be inserted and they may have difficulty in breathing. There will also be some swelling and bruising which will gradually subside in a couple of days.

The patient should be cautioned against forceful nose-blowing to prevent movement of rearranged nasal bones. Finally, the patient should be aware that there will be some numbness postoperatively.

Intraoperative procedures

Many procedures require the use of a microscope. To allow proper positioning of the microscope, the patient's head may be placed at the foot of the bed as close to the edge of the bed as possible. The table is then rotated laterally.

Since most ophthalmic patients are operated on under local anesthesia, it is very important that the operating room be kept quiet to decrease anxiety and increase cooperation from the patient. Also, when the patient is draped, it is important that adequate air exchange be provided for the patient.

The scrub technician must be extra careful to prevent foreign substances from being introduced intraocularly or into the middle ear. Instruments should be cleaned strictly in accordance with manufacturer's recommendations, often with cellulose sponges. The functional ends of an instrument should not be touched with gloved hands.

424. Ophthalmic medications

Drugs used in diagnosing and treating disorders of the eye are extremely potent. One mistake could result in total, irreversible blindness. Here is a classification of medications and examples of use that you, as a scrub tech, may encounter.

Dilating drops

Dilating drops are commonly used to dilate the pupil to test for refraction and/or to examine the retina. In surgery, they are primarily administered about 20 minutes preoperatively to dilate the pupil and enable the surgeon to more easily remove the lens during cataract surgery. These drops are classified as *mydriatics* and *cycloplegics*. Mydriatic drugs permit the patient to focus after the pupil has been dilated. Phenylephrine 2 percent, 5 percent, or 10 percent is the most commonly used mydriatic drug. Cycloplegic drugs inhibit focusing of the eye after the pupil is dilated. Atropine 1 percent, which has a long-lasting effect, cyclopentolate 1 percent, and tropicamide 1 percent are the most commonly used cycloplegic drugs.

Constricting drops

Constricting drops, also known as Miotics, increase the contraction of the iris sphincter, which in turn causes the pupil to contract and constrict. Pilocarpine, 1 percent to 4 percent, and phospholine iodide 0.12 percent to 0.25 percent, are the most commonly used miotics. Miotics also decrease intraocular pressure by improving the ease with which aqueous fluid escapes from the eye. To prevent vitreous rupture after the extraction of a cataract lens, pilocarpine is often used. To produce rapid pupillary contraction (constriction) after the insertion of an artificial lens, acetylcholine (Miochol) is used intraocularly.

Antibiotics, lubricants, and stains

Topical antibiotics are often employed prophylactically to prevent infection and to treat lid and surface infections. The most commonly used antibiotics are Bacitracin and Neomycin sulfate. For infections in the posterior portion of the eye or orbit, systemic administration is prescribed.

In situations such as faulty lid closure and complications of lacrimal gland disease, ophthalmic lubricants are used to protect the cornea. An excellent ophthalmic lubricant is Methylcellulose 0.5 percent.

For diagnostic purposes, fluorescein sodium is commonly used. It can be used as a dye or stain. To diagnose retinal pathology, an intravenous preparation of the dye is used. To evaluate disruption of the corneal epithelium, such as corneal abrasions (scratches), fluorescein solution or strips are used to stain the cornea. Fluorescein strips are preferred over solutions because solutions are easily contaminated.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

423. Common preoperative preparations and intraoperative procedures

1. What instrument is used to clip a patient's eyelashes prior to the cleansing skin prep?
2. If a patient wears a hearing aid into the operating room, what is done to prevent loss of the device?
3. Why are candidates for ear surgery instructed to shampoo their hair before the surgery?
4. Why are patients for ear surgery asked to move slowly and smoothly for a couple of days after surgery?

5. What normal body function should be avoided because it can result in the rearrangement of nasal bones after surgery?
6. How is a patient positioned on the bed for surgery requiring a microscope?
7. Why is it important to keep the operating room quiet for ophthalmic surgery?
8. What material should be used to cleanse instruments for use in intraocular and middle ear surgery?

424. Ophthalmic medications

1. List three main uses for dilation drops.
2. List, describe, and give one example each of the two classifications of dilating drops.
3. What are *miotic drugs*?
4. Name the most commonly used miotics.
5. Name the most commonly used topical antibiotics for the treatment of eye lid and surface infection.
6. Which ophthalmic lubricant is excellent in the treatment of faulty lid closure and complications of lacrimal gland disease?
7. In what form is fluorescein sodium used to evaluate disruption of the corneal epithelium?
8. Which form of fluorescein sodium is preferred overall, and why?

5-2. Commonly Performed Ophthalmology Surgical Procedures

Eye surgery is very intense due to the delicate nature of the organs involved. Can you imagine the damage caused by dropping an instrument into a patient's eye? Watch, listen, and carefully follow directions when assisting with these procedures.

425. Major ophthalmology surgical procedures

The two primary areas involved in eye surgery are the internal and external structures. The first procedure we discuss looks at some internal structures, the second looks at external ones.

Cataract extraction

A cataract extraction is the removal of an opaque lens. Cataracts may be caused by certain medications, trauma, or may be a congenital defect. However, it is usually caused by the aging process. There are several different methods of removing cataracts. *Intracapsular method*, which is the method we discuss in this lesson, is the removal of the lens within its capsule. Using a cryoprobe, the cataract and lens are removed by gentle pressure. The *extracapsular method* uses irrigation and expression, and leaves the posterior capsule in situ. The final method is *phacoemulsification*. This is a variation of the irrigation/aspiration technique. The lens capsule contents are fragmented with ultrasonic energy as the lens material is irrigated and aspirated. An intraocular lens is usually implanted after the cataract has been removed.

Patient preparation

The patient is placed on an eye bed in the supine position with the arm on the affected side tucked in at the patient's side and the other arm left exposed for anesthesia access.

Skin preparation

The patient is not shaved/clipped preoperatively. The cleansing skin prep begins by cleaning the eyelids, eyelashes, eyebrows, and skin around the eye.

Draping

The patient's head is draped with a head drape, and a split sheet is brought around the patient's head to cover the eyebrows and nonoperative eye. The operative eye is then outlined with a plastic fenestrated sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Cautery.
- Basin set.
- Suture material.
- Cellulose sponges.
- Needle counter pad.
- Cataract instruments.
- Basic eye instrument set.
- Balanced salt solution (BSS).
- Intraocular lens implant (IOL).
- Cryoextractor or Irrigation/Aspirator unit.

Procedure

A lid speculum is placed in the eye and traction sutures are placed in the sclera. The conjunctiva is retracted and hemostasis is obtained. The anterior chamber is entered and an iridectomy is performed, as illustrated in figure 5-1. To dissolve the zonules suspending the lens, alpha-chymotrypsin is instilled into the anterior chamber. After three minutes, the cryoextractor is applied to the lens. When the tip of the cryoextractor touches the lens, the lens will adhere to it so it can be slowly withdrawn from the eye (fig. 5-2). The lens is passed off as specimen. The corneal incision is closed, traction sutures are removed, and the conjunctival flap is approximated (fig. 5-3). Ointment is placed, and an eye pad and shield are applied.

Following the extraction of the lens, an intraocular lens may be inserted. The lens is sutured to the iris or, by virtue of its shape, held in place by the iris. The wound closure proceeds as above.

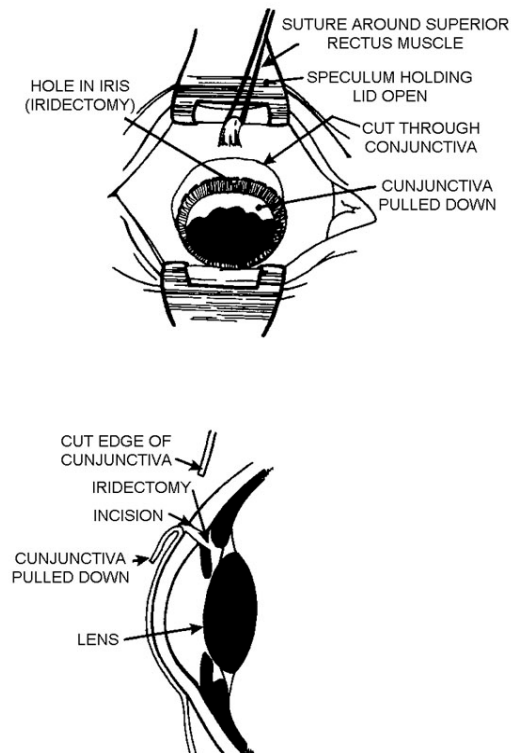


Figure 5-1. Cataract extraction—iridectomy.

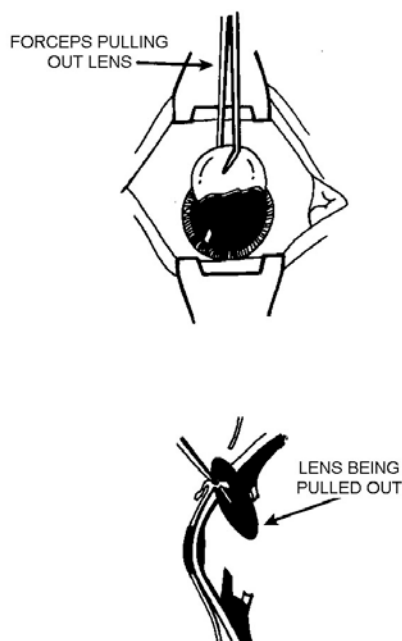


Figure 5-2. Cataract extraction—extraction of the lens.

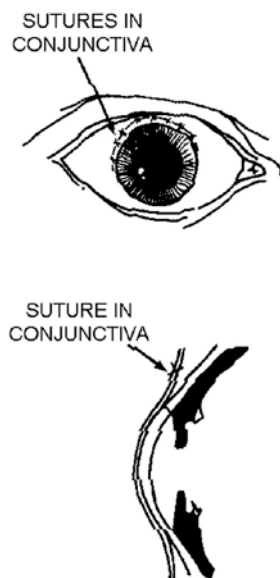


Figure 5-3. Cataract extraction—conjunctiva sutured.

Trabeculectomy

A trabeculectomy (filtering procedure for glaucoma) is a surgical procedure where an incision is made into the trabecular meshwork of the eye, providing an alternate drainage route for aqueous humor to exit the anterior chamber. This increases the outflow of aqueous humor from the eye, lowering intraocular pressure. This procedure is performed to treat patients who suffer from glaucoma. Glaucoma is a condition in which the intraocular pressure of the eye is increased. This condition prevents the aqueous humor from flowing into the anterior chamber to the limbal area where it is normally secreted. This pressure pushes on the optic nerve and retina; this causes a progressive loss of vision and can lead to blindness.

Patient preparation

The patient is placed on the table in the supine position with the arm on the affected side tucked in at the patient's side and the other arm extended on an arm board.

Skin preparation

The patient is not shaved/clipped preoperatively. The cleansing skin prep begins by cleaning the eyelid, eyelashes, eyebrow, and skin around the affected eye. *Do not allow the prep solution to enter the eye!* The lids should be everted and cleaned with cotton-tipped applicators. Using a bulb syringe, irrigate the eye with normal saline, from inner to outer canthus.

Draping

The patient's head is draped with a head "turban" drape (two towels and a sheet), and a split sheet is brought around the patient's head to cover the eyebrows and nonoperative eye. The operative eye is then outlined with a disposable plastic fenestrated plastic drape.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Basin set.
- Marking pen.
- Suture material.
- Needle counter pad.
- Disposable cautery.
- Basic eye instrument set.
- BSS.
- Cotton-tipped applicators or cellulose sponges.

Procedure

The surgeon inserts a speculum and incises the conjunctiva using toothed forceps and tenotomy scissors. A flap is created by making an incision about 5 to 10 millimeters (mm) back from the limbus and directed toward the limbus. Hemostasis is maintained. The limbus is incised with a scalpel to enter the anterior chamber. If the incision needs to be extended, the surgeon will use corneal scissors. The surgeon performs an iridotomy by making an incision in the iris with Van Ness scissors and Calibri forceps. Hemostasis is maintained and the conjunctiva is closed using interrupted sutures of silk or nylon. The surgeon repressurizes the anterior chamber of the eye with balanced salt solution just before placement of the last stitch. An antibiotic ophthalmic ointment is instilled and the eye is dressed with a cotton eye patch and a metal shield.

Keratoplasty (corneal transplant)

A keratoplasty is grafting of the corneal tissue of one human eye to another. The cornea is our anterior window to the eye and allows light into the eye; it bends (refracts) light rays and helps the lens focus on the retina. For proper function, the cornea must be clear and have proper curvature. If the cornea is not clear, it decreases our vision. An irregular or damaged cornea causes blurred vision. A keratoplasty can be performed to improve vision if the retina and optic nerve are functioning properly.

Patient preparation

The patient is placed on the table in the supine position with the arm on the affected side tucked in at the patient's side and the other arm extended on an arm board.

Skin preparation

The patient is not shaved/clipped preoperatively. The cleansing skin prep begins by cleaning the eyelid, eyelashes, eyebrow, and skin around the affected eye. *Do not allow the prep solution to enter the eye!* The lids should be everted and cleaned with cotton-tipped applicators. Using a bulb syringe, irrigate the eye with normal saline, from inner to outer canthus.

Draping

The patient's head is draped with a head "turban" drape (two towels and a sheet), and a split sheet is brought around the patient's head to cover the eyebrows and nonoperative eye. The operative eye is then outlined with a disposable plastic fenestrated plastic drape.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Basin set.
- Marking pen.
- Suture material.
- Needle counter pad.
- Disposable cautery.
- Corneal procedure set.
- Basic eye instrument set.
- BSS.
- Cotton-tipped applicators or cellulose sponges.

Procedure

Before the procedure begins, all powder is meticulously removed from the gloves to prevent irritation to the eye. The operating microscope is brought into place and the surgeon begins by positioning the eye speculum and placing bridle sutures in the superior and inferior rectus. The sutures, used for retraction, are clamped to the surgical drape with a mosquito clamp. The donor eye is removed from its container and the cornea is excised to the correct size from the donor eye. This is accomplished with a corneal trephine, a diamond knife, corneal scissors, and forceps. The graft is placed epithelial side down in a small container containing saline moistened gauze, and put in a safe place on the sterile field. A trephine is placed on the patient's cornea and a cut is made around the cornea and into the anterior chamber. Corneal scissors or a diamond knife may be used if the trephine cut was incomplete. Once the cornea has been removed, the graft is placed in the opening of the patient's eye and sutured in place with 10-0 polyamide sutures. Once the graft is sutured in place, BSS is injected into the anterior chamber with a fine cannula. Hemostasis is maintained, antibiotic drops are instilled into the eye and the traction sutures are removed. The eye is dressed with antibiotic-impregnated gauze, an eye pad, and a shield.

426. Minor ophthalmology surgical procedures

One minor ophthalmology surgical procedure is correction of strabismus. Strabismus, or "crossed-eyes," is the inability to direct the two eyes at the same object because of the lack of coordination of the extraocular muscles. This condition is corrected surgically by changing the strength of the ocular muscles. There are two surgical approaches for the correction of strabismus—*resection* or *recession*. A resection is performed to strengthen the ocular muscles. This involves removing a segment of the ocular muscle and suturing the remaining muscle ends together. A recession is performed to weaken the ocular muscle. This involves detaching the ocular muscle from its original attachment on the sclera, moving the muscle posteriorly and reattaching it.

Patient preparation

The patient is placed on an eye bed in the supine position with the arm on the affected side tucked in at the patient's side and the other arm left exposed for anesthesia access.

Skin preparation

The patient is not shaved/clipped preoperatively. However, the surgeon may request the eyelashes be clipped. The cleansing skin prep begins by cleaning the eyelid, eyelashes, eyebrow, and skin around the affected eye. *Do not allow the prep solution to enter the eye!* The lids should be everted and cleaned with cotton-tipped applicators. Using a bulb syringe, irrigate the eye with normal saline, from inner to outer canthus.

Draping

The patient's head is draped with a head "turban" drape (two towels and a sheet), and a split sheet is brought around the patient's head to cover the eyebrows and nonoperative eye. The operative eye is then outlined with a disposable plastic fenestrated plastic drape.

Instrumentation

The basic instrumentation and supplies include the following:

- Basin set.
- Marking pen.
- Suture material.
- Disposable cautery.
- Needle counter pad.
- Eye muscle instruments.
- Basic eye instrument set.
- BSS.
- Cotton-tipped applicators or cellulose sponges.

Procedure

The surgeon begins the lateral rectus resection by placing a speculum in the eye. Two silk sutures are placed through the episclera and an incision is made in the conjunctiva at the limbus. The eye is then rotated medially as far as possible and the conjunctiva is freed from underlying tissue. The muscle insertion is located and a muscle hook is passed under it to ensure there are no adhesions. The surgeon uses a precisely adjusted caliper to measure the amount of muscle to be resected (the amount is usually determined by, and the caliper adjusted by, the surgeon preoperatively). The rectus muscle is clamped with a muscle clamp, and the measured portion is excised. The excised muscle is passed to the technologist, who keeps it as specimen. Using a double-armed 5-0 or 6-0 suture, the surgeon reattaches the end of the muscle to the original point of insertion. Hemostasis is maintained and the conjunctiva is closed. Antibiotic ophthalmic ointment is placed, and an eye pad and shield are applied.

The procedure for medial rectus recession is the same as for the lateral rectus resection up to the point of the conjunctival incision. The distance from the original insertion point to the new one is measured with a previously adjusted caliper. The new point of insertion is marked with a marking pen. Two absorbable sutures are placed at the end of the muscle but left untied. A straight mosquito hemostat is placed across the muscle between the sutures and insertion point to crush tiny blood vessels and discourage oozing when the muscle is cut. The clamp is removed, and a muscle hook is placed under the muscle to elevate it away from the globe. The muscle is cut and hemostasis is obtained using the cautery. The muscle is moved back to the dye marks and sutured at its new location with the previously placed sutures. The conjunctiva is closed. Antibiotic ophthalmic ointment is placed, and an eye pad and shield are applied.

427. Laser ophthalmology surgical procedures

Photorefractive keratectomy (PRK) is the use of ultraviolet laser energy to vaporize corneal tissues. Each blast from the laser thins the corneal tissue by breaking down the molecular bonds. By varying the depth and diameter of the ablation, surgeons can correct different amounts of myopia, hyperopia, and astigmatism. Advancements within laser eye surgery have enabled the Air Force to approve the PRK procedure for active duty members at selected Air Force facilities.

Patient preparation

The patient is placed on an eye bed in the supine position with the arm on the affected side tucked in at the patient's side and the other arm left exposed for anesthesia access.

Skin preparation

The patient is not shaved/clipped preoperatively. The cleansing skin prep begins by cleaning the eyelids, eyelashes, eyebrows, and skin around the eye. A topical antibiotic and topical anesthetic are placed in the patient's eye prior to surgery.

Draping

The patient's head is draped with a head drape, and a split sheet is brought around the patient's head to cover the eyebrows and nonoperative eye. The operative eye is then outlined with a plastic fenestrated sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Eye drapes.
- Steroid drops.
- Fox eye shield.
- PRK instruments.
- Weck cells-lint free.
- Basic eye instrument set.
- BSS.

Procedure

The surgeon begins the procedure by placing a locking lid speculum in the eye. The patient's eye is centered under the microscope and the patient is directed to look at the red fixation light at all times during the procedure. Surface cells are removed and the epithelium is debrided using an Amoils epithelial scrubber. Once the surgeon cleans off the residual epithelium, he or she applies the laser treatment (anywhere from 10 seconds to two minutes). After the laser treatment is complete, the surgeon irrigates the eye with BSS solution. Once the procedure is finished, the surgeon places a bandage contact lens, antibiotic, and anti-inflammatory drops on the eye.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

425. Major ophthalmology surgical procedures

1. What is the usual cause of cataracts?

2. Briefly describe these cataract extraction techniques:

- a. Intracapsular method.
 - b. Extracapsular method.
 - c. Phacoemulsification.
3. What purpose is served by the sutures placed in the sclera as cataract surgery is begun?
 4. How are the zonules, suspending the lens, removed?
 5. Name the instrument that, upon touching the lens, adheres to the lens allowing its removal.
 6. Describe the three steps used in closure of cataract surgery.
 7. What is a trabeculectomy?
 8. What disease is being treated when a surgeon performs a trabeculectomy?
 9. What is glaucoma?
 10. What instruments are used to incise the conjunctiva during a trabeculectomy?
 11. Once the initial incision is made in the limbus, what instrument is used to extend the incision if needed?
 12. What procedure is being performed when an incision is made in the iris?
 13. What does the surgeon do just prior to placing the last stitch during a trabeculectomy?

14. Define keratoplasty.
15. What step should the operating team members take prior to beginning a corneal transplant to prevent eye irritation in the patient?
16. What four instruments are used to excise the donor eye to the correct size?
17. How is a corneal implant graft cared for on the surgical field?
18. What instruments can be used to complete a corneal cut if a trephine cut is incomplete?
19. What solution does the ophthalmologist use at the end of a keratoplasty to fill the anterior chamber?

426. Minor ophthalmology surgical procedures

1. Define *strabismus*.
2. How is strabismus corrected?
3. Describe how strabismus is corrected by recession.
4. In a resection of the lateral rectus, how will the surgeon prepare the eye for rotation so the conjunctiva can be freed?
5. How does the surgeon know how much of the rectus muscle to excise?
6. What suture is used to reattach the muscle ends?
7. In a recession of the medial rectus, how is the oozing of tiny blood vessels discouraged when the surgeon cuts the rectus muscle?

8. Name the instrument used to elevate the rectus muscle away from the globe.

427. Laser ophthalmology surgical procedures

1. Define photorefractive keratectomy.
2. How is the patient positioned for a PRK procedure?
3. What is used to outline the operative eye?

5-3. Commonly Performed Otolaryngology Surgical Procedures

Otolaryngologists diagnose and provide surgical care for patients with diseases and disorders that affect the ears, nose and throat, and related structures of the head and neck. This section covers some of the common otolaryngology surgical procedures you may be involved.

428. Major otolaryngology surgical procedures

Major otolaryngology surgical procedures discussed in this lesson include tympanoplasty, thyroidectomy, tracheostomy, and rhinoplasty.

Tympanoplasty

A tympanoplasty is the surgical restoration of an injured tympanic membrane (ear drum) and/or middle ear structure. Damage to the tympanic membrane is usually caused by chronic otitis media (infection of the middle ear) and cholesteatoma. Tympanoplasty is performed to repair both the perforation in the tympanic membrane and the sound transmitting mechanism to improve hearing. The damaged tympanic membrane is replaced with various types of grafts using postauricular fascia or a segment of a vein from the arm. Tympanoplasty is classified according to the condition of the ossicles. The following table lists the types of tympanoplasty, condition of the middle ear, and the placement of the graft in the repair:

Type	Condition	Placement of Graft
I	Malleus, incus, and stapes intact and mobile	Rests on the malleus
II	Malleus is eroded	Rests on incus
III	Malleus and incus are absent; stapes intact and mobile	Attaches to head of stapes
IV	All ossicles absent, except an immobile stapes footplate	Attaches to footplate of stapes
V	All ossicles absent, except an immobile stapes footplate	Is invaginated into the oval window

Sometimes it is not possible to repair the sound-transmitting mechanism and tympanic membrane in one operation. The membrane is repaired first, and several months later the sound-transmitting mechanism is reconstructed, if possible.

Patient preparation

The patient is placed in the supine position, the head positioned on a headrest with the affected ear up. The arm on the affected side is tucked at the patient's side and the other arm extended on an arm board. The hair is secured out of the way. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient may be shaved/clipped preoperatively around the ear. The cleansing skin prep begins on the operative ear extending from the hairline to the shoulder, to the midline of the face.

Draping

The patient is draped using a head drape, three or four hand towels around the ear, a plastic adhesive drape, and a split sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Gelfoam.
- Power drill.
- Bulb syringe.
- Syringes, 5 cubic cc.
- Suture material.
- Needle counter pad.
- Suction tubing and tip.
- Basic ear instrument set.
- Needles, 25 and 27 gauge.
- Electrosurgical handpiece.

Procedure

The surgeon may approach the ear through a postauricular incision, through the canal, or both. Once inside the ear, the pathology is assessed and diseased tissues; including fibrotic tissue, damaged ossicles, atrophic epithelium, or any portions thereof, are removed.

The temporalis fascia is harvested to provide material for a graft to repair the tympanic membrane. The graft may be taken prior to or after the initial ear operation begins. After the graft is taken, it is smoothed out with a tongue blade and placed on an overturned basin to dry out or placed within a press.

The canal skin is elevated from the canal, and the edges of the tympanic membrane are prepared for the graft. If the edge of the tympanic membrane cannot be visualized because of the bony canal, the surgeon may use a drill or curette to remove some of the bone. The ossicular chain is reconstructed as necessary. Once the middle ear is ready, the graft is prepared for insertion. The graft is inserted, and small pieces of Gelfoam or a paper patch may be used to hold it in place. The external ear canal is packed with moistened Gelfoam, gauze packing, or cotton. The skin flaps are closed, if necessary, and a mastoid dressing consisting of fluff sponges, 4 × 8 plain sponges cut to go around the ear, and kerlix is applied around the head to hold the dressing in place.

Thyroidectomy

This is the removal of the thyroid gland. There are several indications for removal of a lobe of the thyroid, or the whole thyroid: *nodules, either discrete or multiple*, must be surgically examined in order for the surgeon to obtain a benign or malignant diagnosis. If the nodules are malignant, the entire lobe involved or, at times, the whole thyroid is removed. A *hyperactive thyroid gland* is removed when the hyperactivity cannot be controlled through the use of medication. *Inflammation of the thyroid gland* justifies removal of the gland only if the condition cannot be distinguished from carcinoma. Lastly, for a *diffuse goiter*, the thyroid is removed for cosmetic purposes or as a preventative measure to keep the gland from becoming extremely large and causing tracheal compression.

Patient preparation

The patient is placed in the reverse Trendelenburg position, with the arms at the side or on arm boards, and the neck hyperextended. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped from the anterior neck region, lateral surfaces of the neck down to the outer aspects of the shoulders and upper chest. Generally, females and children are not shaved; children do not have enough hair to worry about, and the neck hair on a female may grow back more coarse after it is shaved. The cleansing skin prep includes the same area as the shave prep.

Draping

The patient is draped with four hand towels, a base or foundation sheet, and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Kitners.
- Sponges.
- Basin set.
- Minor set.
- Suture material.
- Needle counter pad.
- Thyroid instruments.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Marking pen (have available).

Procedure

Before the surgeon starts the procedure, he or she may mark the incision site (shown in fig. 5-4) by pressing a piece of fine silk suture against the neck, by scratching the neck with a scalpel, or by using a marking pen. These methods serve as a guideline for an incision line that will blend in with the patient's neck anatomy, leaving a nearly unnoticeable scar.

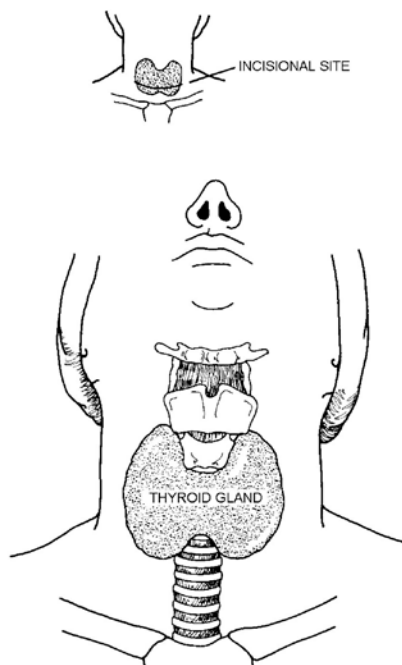


Figure 5-4. Thyroidectomy—incisional site.

Once the area is marked, the transverse incision is made above the sternal notch, through the skin, subcutaneous tissue, and underlying platysma down to the cervical fascia which is also incised. The fascia in the midline is cut between the strap (sternohyoid) muscles. The strap muscles are then divided and retracted from the operative site using green or Army-Navy retractors; thereby exposing the diseased lobe. Care is taken to avoid injury to the superior and recurrent laryngeal nerves and parathyroid glands.

The surgeon then places retractors in the wound and grasps the thyroid gland with two Lahey clamps, as shown in figure 5-5. Because the thyroid gland is highly vascular, it is immobilized by double-clamping small segments of tissue, cutting between the clamps with a number 15 knife blade, and ligating the ends with 3-0 or 4-0 silk sutures. The large arteries of the thyroid, superior thyroid, inferior thyroid, and middle thyroid veins are ligated with 2-0 or 3-0 silk on a fine atraumatic taper needle. Once the mobilization is complete, the gland is removed.

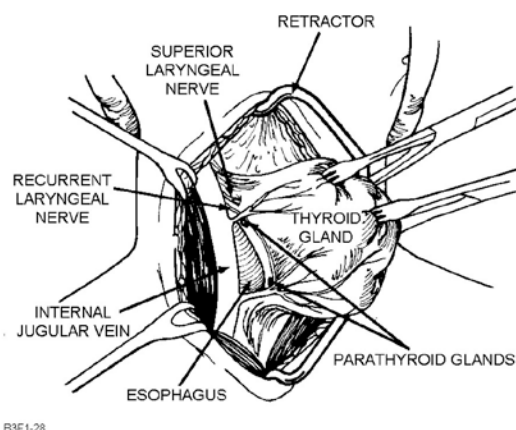


Figure 5-5. Thyroidectomy—grasping the thyroid gland.

The wound is irrigated and observed for bleeding. If the strap muscles were severed, they are approximated with interrupted sutures. A small drain may be inserted into the wound before it is

closed. Closure of the deeper layers is illustrated in figure 5-6; the remainder of the wound is closed in the routine fashion. Figure 5-7 shows a special thyroid collar dressing that some surgeons elect to apply.

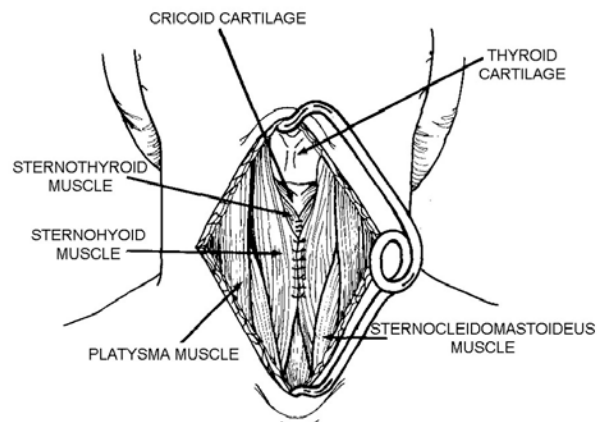


Figure 5-6. Thyroidectomy—closure of thyroid incision.

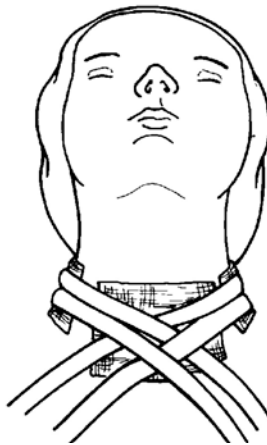


Figure 5-7. Thyroidectomy—thyroid dressing.

Tracheostomy

Tracheostomy is an opening made into the trachea and insertion of a cannula to allow air to enter the bronchi and lungs. The operative site is illustrated in figure 5-8. Tracheostomy may be done as an elective procedure for long-term respiratory support, or as an emergency to treat upper-respiratory tract obstruction.

Patient preparation

The patient is placed in the supine position with the arms tucked at the side. A small rolled towel is placed under the shoulders to hyperextend the neck. The electro-surgical ground pad is placed on the anterior thigh.

Skin preparation

The male patient may be shaved/clipped, if there is time, preoperatively. The entire neck is cleansed extending from the infra-auricular border to the axillae, bedside to bedside.

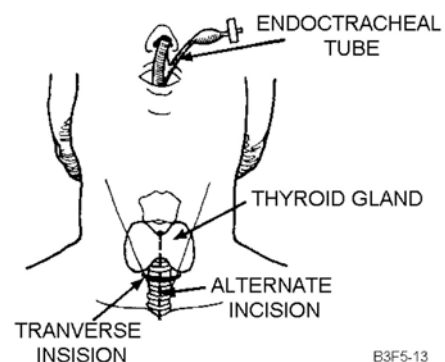


Figure 5-8. Tracheostomy—operative site.

Draping

The patient is draped using four hand towels, a foot sheet, and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Syringe, 10cc.
- Suture material.
- Needle counter pad.
- Tracheostomy tubes.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Tracheostomy instrument set.

Procedure

A transverse or vertical incision is made overlying the proximal trachea (fig. 5-9). The platysma muscle and deep fascia are dissected. The superior tracheal rings are exposed by retracting the thyroid isthmus superiorly. A vertical incision is made in the trachea across the third and fourth tracheal rings (fig. 5-10). The cut ends of the cricoid cartilage are elevated with a hook. A dilator may be inserted to expand the size of the opening. The tracheostomy tube and obturator are inserted; the obturator is then removed; the inner cannula is inserted and locked into place (fig. 5-11); and, the trachea suctioned. The wound edges may be lightly approximated with sutures or left open. The tracheostomy tube is held in place with cotton tapes tied into a square knot behind the neck. A gauze dressing split around the tube is applied to the wound (fig. 5-12). The obturator is cleaned and taped to the patient's gurney during transport to the recovery room or unit. Should the tube become dislodged, the obturator is needed for reinsertion of the tube.

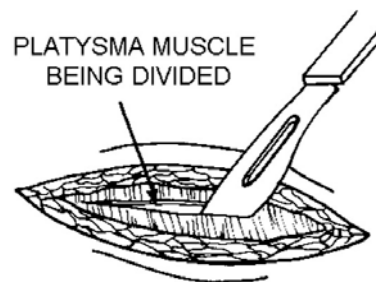


Figure 5-9. Tracheostomy—incision.

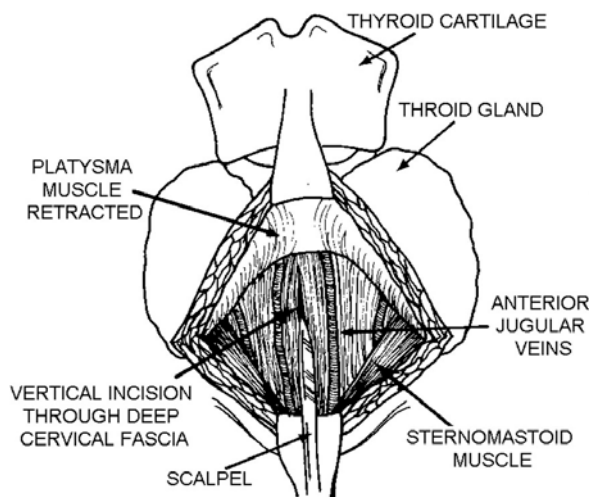


Figure 5-10. Tracheostomy exposure.

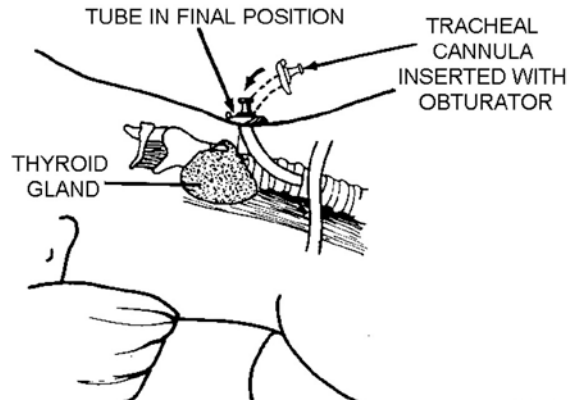


Figure 5-11. Tracheostomy—insertion of tube.

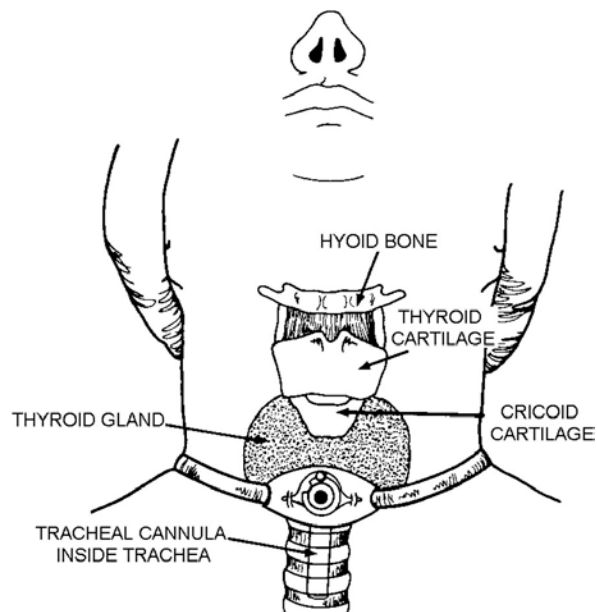


Figure 5-12. Tracheostomy—tube secured.

Rhinoplasty

A rhinoplasty is the correction of the external appearance of the nose. It is performed for cosmetic reasons and to alleviate nasal airway problems caused by a deviated septum. There are four interrelated steps that may be performed during rhinoplasty: hump removal, narrowing, tip remodeling, and septoplasty. This procedure is modified according to the needs of each individual patient.

Patient preparation

The patient is placed in the supine position with the arms tucked at the side. The table is tilted into a slight reverse Trendelenburg position.

Skin preparation

Male patients should shave their face preoperatively. The cleansing prep begins at the nose, cleaning the entire face and neck to the shoulders, and bedside to bedside. Iris scissors are used to remove nasal hair from the nostrils.

Draping

The patient is draped using a head drape and a split sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Syringe, 10cc.
- Suture material.
- Needle counter pad.
- Nasal instrument set.
- Suction tubing and tip.
- Needle, 25 or 27 gauge.
- Fiberoptic headlight and light source.

Procedure

The nose is opened intranasally, i.e. intranasal incisions are made to allow the skin and subcutaneous tissue to be lifted with a nasal elevator, as shown in figure 5-13. This is called uncapping the nose. The tip of the nose is reshaped by excising portions of the lateral and alar cartilages on each side (fig. 5-14). Portions of bone and septum are removed to reduce the nasal dorsum. The nasal bones are osteotomized laterally, medially, and compressed to narrow the nasal bridge (fig. 5-15). Any irregularities are smoothed with a rasp. The anterior septum and columella are sutured. Nasal packs are inserted, and a nasal splint and drip pad are applied.

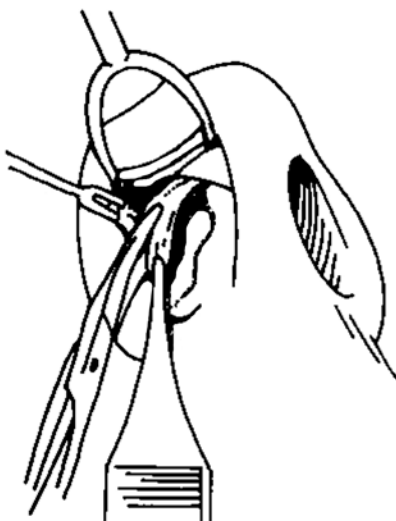


Figure 5-13. Rhinoplasty—exposure and incision.

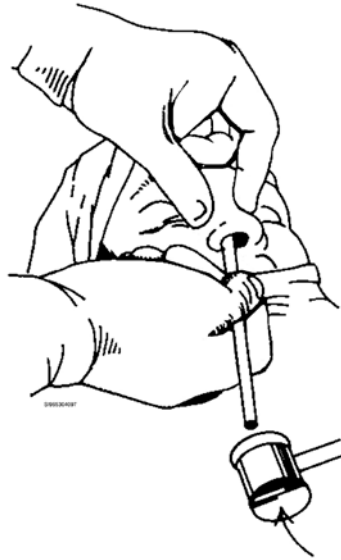


Figure 5-14. Rhinoplasty—reshaping the nose.

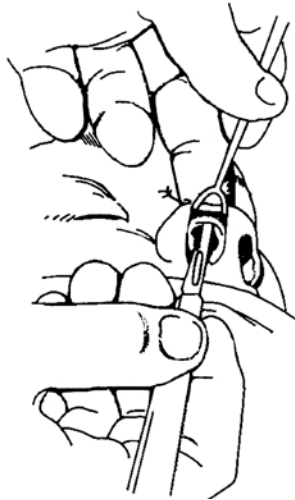


Figure 5-15. Rhinoplasty—internal osteotomy.

429. Minor otolaryngology surgical procedures

Some time during your career, you may be called upon to assist with minor Otolaryngology procedures such as myringotomies and tonsillectomies. Myringotomy is the incision of tympanic membrane with the insertion of polyethylene tubes for drainage. A tonsillectomy and adenoidectomy (T&A) is a surgical procedure in which the tonsils and adenoids are removed.

Myringotomy with insertion of drainage tubes

Myringotomy with insertion of drainage tubes is indicated in cases of chronic and/or acute otitis media when infectious fluid builds up in the middle ear space causing bulging of the tympanic membrane. This procedure is the initial surgical treatment (medical treatment is initially tried), but untreated or non-responsive otitis media may result in conditions such as mastoiditis and require more extensive procedures.

Patient preparation

The patient is placed in the supine position with the affected ear up. The arm on the affected side is tucked at the patient's side and the other arm extended on an arm board.

Skin preparation

The patient is not shaved/clipped preoperatively. Most surgeons do not require a cleansing skin prep.

Draping

The patient is draped using three hand towels. A drape sheet may be placed over the patient's body.

Instrumentation

The basic instrumentation and supplies include the following:

- Cotton.
- Small basin.
- Myringotomy tubes.
- Suction tubing and tip.
- Myringotomy instrument set.
- Culture tubes (have available).

Procedure

An ear speculum is placed into the ear and any excess wax is removed with a loop curette or Alligator forceps. The tympanic membrane is incised and the excess fluid is suctioned. The polyethylene tube is placed in the tympanic membrane using Alligator forceps (fig. 5-16). Any additional positioning of the tube is accomplished using a pick. Ear drops are applied and the ear canal is packed with a small ball of cotton.

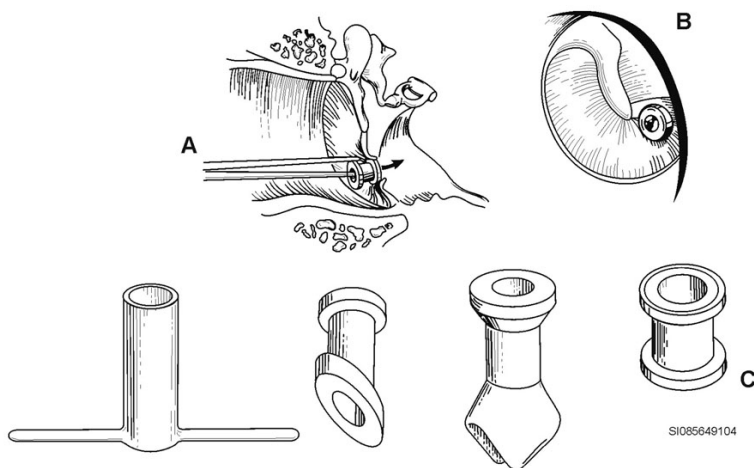


Figure 5-16. Myringotomy-tube placement.

Tonsillectomy and adenoidectomy

T&A is the excision of the faucial (palatine) and nasopharyngeal tonsils. Indications for T&A are chronic tonsillitis, associated otitis media, and nasal obstruction due to enlarged adenoid glands.

Patient preparation

The patient is placed in the supine position with the arms tucked at the side. A small rolled towel is placed under the shoulders to hyperextend the neck. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

No preparation is required for this procedure.

Draping

The patient is draped using a head sheet and a split sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Basin set.
- Tonsil sponges.
- Suction tubing and tip.
- Fiberoptic headlight and light source.
- Tonsillectomy and adenoidectomy instrument set.
- Electrosurgical handpiece (monopolar or bipolar).

Procedure

A mouth gag is inserted into the patient's mouth to retract it open and the tongue is depressed with a tongue blade (fig. 5-17). Once the mouth gag is in place the surgeon attaches it to the mayo stand; care must be taken not to move the mayo stand to avoid injury to the patient. The adenoids are removed with a curette and/or an adenotome (fig. 5-18). The first tonsil is grasped with a tonsil-seizing forceps (fig. 5-19) and an incision is made, with a scalpel, around the tonsil. Using a Hurd dissector or elevator, the tonsil is freed from the fossa, preserving the posterior tonsil pillar (fig. 5-20). A snare is looped over the tonsil and the tonsil is amputated and passed off as specimen (fig. 5-21). The fossa is packed with a tonsil sponge to help control the bleeding. The cautery or sutures may also be used to control bleeding (fig. 5-22). The procedure is repeated on the opposite tonsil.

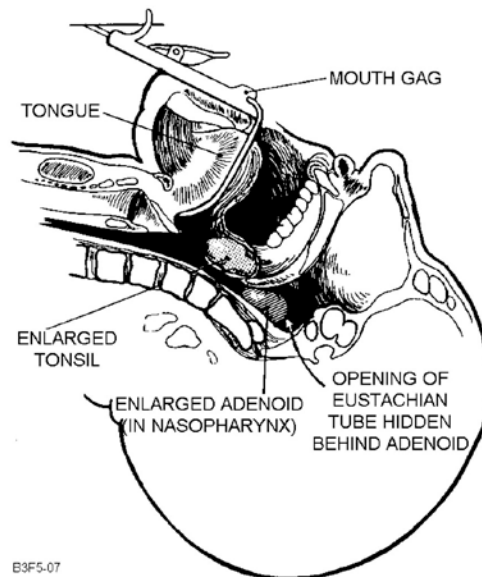


Figure 5-17. T&A—insertion of mouth gag.

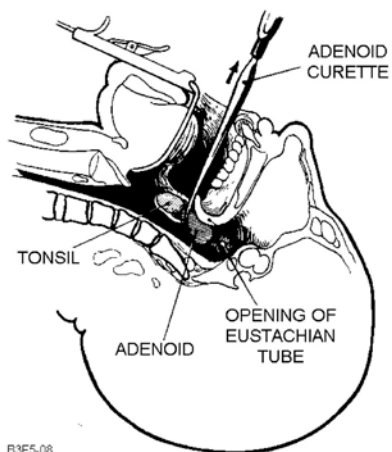


Figure 5-18. T&A—curettage of adenoids.

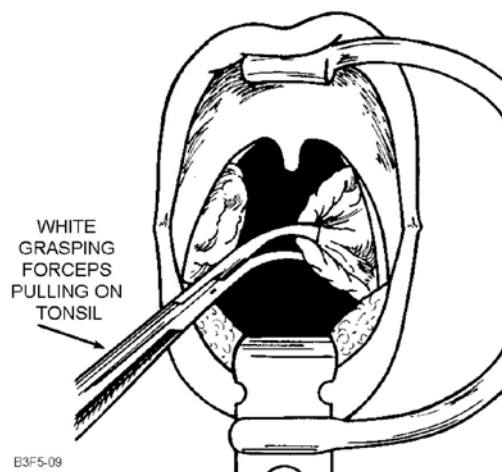


Figure 5-19. T&A—retraction of tonsils.

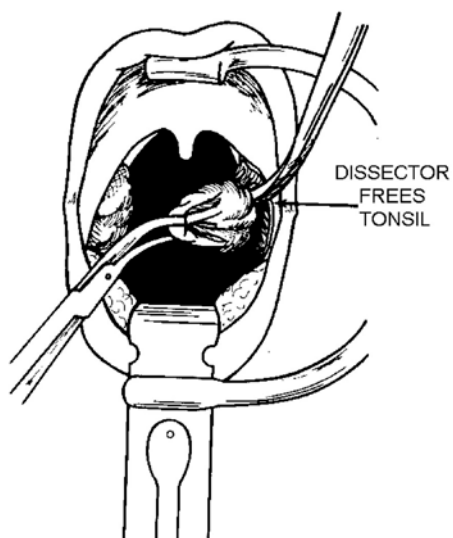


Figure 5-20. T&A—"freeing-up" tonsil by dissection.

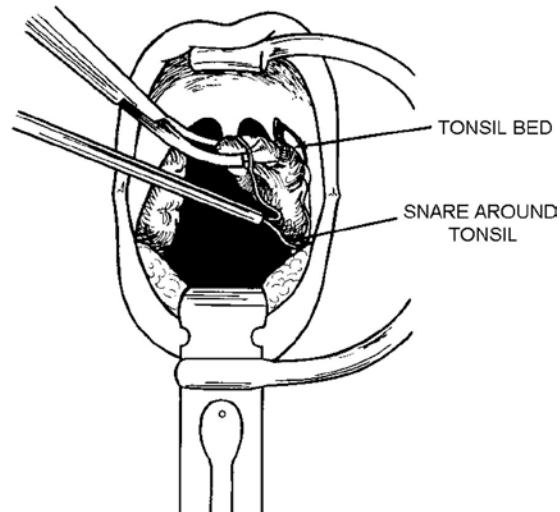


Figure 5-21. T&A—extracting tonsil with snare.

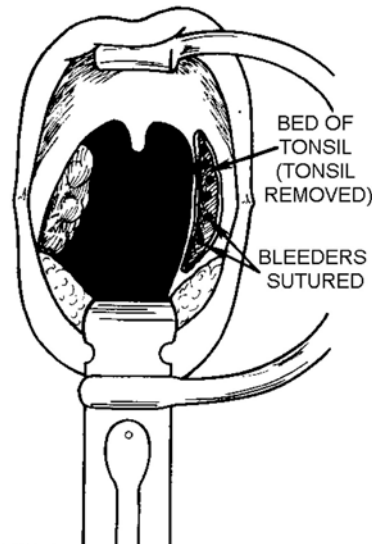


Figure 5-22. T&A—suturing “bleeders” (hemostasis).

430. Endoscopic otolaryngology surgical procedures

Functional endoscopic sinus surgery (FESS) is the resection of inflammatory and anatomic defects of the sinus. Sinus surgery is usually done to ensure adequate ventilation and restore mucociliary clearance in the sinuses. FESS is now the primary means of surgical treatment for chronic sinusitis.

Patient preparation

The patient is placed in the supine position with the arms tucked at the side. A donut or foam headrest may be used to stabilize the patient's head. Special attention must be made to protect the patient's eyes from injury during the procedure.

Skin preparation

The shave prep is usually not necessary even for male patients that have a mustache. The patient's face may be prepped with a mild antiseptic. Caution must be taken to prevent the pooling of solutions in or near the eyes and ears. The interior nasal cavity does not need to be prepped.

Draping

The patient is draped using a head drape and a split sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Sponges.
- Basin set.
- Suture material.
- Antifog solution.
- Needle counter pad.
- Suction tubing and tip.
- Nasal/sinus instrument set.
- Sinoscopy instrumentation.
- Endoscopes/Camera system.
- Fiberoptic headlight and light source.

Procedure

The surgeon begins the procedure by applying topical anesthetics and haemostatic agents into the nasal cavity followed by the insertion of the endoscope. It is important to remember to treat the endoscope with antifog solution every time the scope is extracted and reinserted into the nose. Endoscopes used in sinus surgery are much like scopes used in other surgical specialties and have different directions of view that vary between 0, 30, 70, or 120 degrees. The surgeon will use an antrum punch to enlarge each individual sinus. Once proper visualization has been achieved they will begin to remove any disease tissue or polyps. Biopsy forceps or polypectomy instruments will be used to remove the specimens. Special caution must be taken when handling all delicate scopes and instrumentation. The endoscope is removed, dissolvable gelatin splints are inserted into the patient's middle meatus, and a mustache dressing is applied. Since only a small incision is made suture placement is not required.

431. Laser otolaryngology surgical procedures

Uvulopalatopharyngoplasty (UPPP) is the removal of redundant tissue of the fauces, the tonsils, and a portion of the soft palate including the uvula. It is performed as the primary treatment for snoring and obstructive sleep apnea. This procedure can be complete with standard surgical techniques or for this example accomplished with a carbon dioxide laser. Indications for performing this procedure include: Apnea index worse than 20, significant daytime sleepiness, and O₂ saturation below 80 percent.

Patient preparation

The patient is placed in the supine position with the arms tucked at the side. A donut or foam headrest may be used to stabilize the patient head. The patient's neck should be hyperextended using a roll under the shoulders. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

No preparation is required for this procedure.

Draping

The patient is draped using a head wrap or cover sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Basin set.
- Bulb syringe.
- Tonsil sponges.
- Needle counter pad.
- Tracheotomy supplies.
- Suction cautery handpiece.
- Carbon dioxide laser equipment/supplies.
- Tonsillectomy and adenoidectomy instrument set.

Procedure

The procedure begins with the placement of a self-retaining mouth gag. The surgeon will use a knife blade or electrocautry pencil to outline the tissue that needs to be resected. Dissection continues into the soft palate and uvula with the use of a carbon dioxide laser; if the patient still has his or her tonsils at this time they will be removed. With dissection complete the surgeon will remove the specimen and check for proper homeostasis. Remember to follow the proper laser protocol that was discussed in previous units. A bulb syringe and irrigation solution is used to remove any blood clots or tissue debris that may have been left behind. A running stitch is used on mucosal edges if needed and the mouth gauge is removed.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

428. Major otolaryngology surgical procedures

1. List two purposes for tympanoplasty.
2. What are the two sites used to obtain tissue tympanic membrane replacement?
3. Tympanoplasty is classified according to the condition of which structures?
4. Which type (I-V) of tympanoplasty involves the following grafting procedures?
 - a. The graft attaches to the footplate of the stapes.
 - b. The graft is invaginated into the oval window.
 - c. The graft rests on the malleus.
 - d. The graft attaches to the head of the stapes.

- e. The graft rests on the incus.
-
5. List two methods the surgeon can use to approach the inner ear for tympanoplasty.
 6. What tissue is harvested for grafting, and how is it handled until it is used in the tympanoplasty?
 7. If a bony canal prevents the surgeon's view of the tympanic membrane, which instruments might be requested to correct this problem?
 8. Since the new tympanic membrane is not sutured into place, how is it held for healing?
 9. Once the ear is packed and a dressing applied, what holds the dressing in place?
 10. List four indications for removal of the thyroid gland, either whole or in part.
 11. In what position do you place the patient for a thyroidectomy?
 12. Why is the neck of a female or child *not* generally shaved preoperatively?
 13. What purpose does a marking pen have in a thyroidectomy?
 14. Describe the method used to expose the diseased thyroid once the fascia is cut.
 15. Since the thyroid gland is highly vascular, how is the organ immobilized?
 16. What is a *tracheostomy*?
 17. Describe the skin preparation of a male patient for tracheostomy.

18. Which tissues must be dissected and retracted to expose the superior tracheal rings?
19. How is the incision made to open the trachea for insertion of the tracheostomy tube?
20. When the obturator is removed, and the inner cannula inserted, what is done with the obturator?
21. List the four interrelated steps that may be performed during rhinoplasty.
22. How is the table tilted for rhinoplasty?
23. To begin rhinoplasty, what types of incisions allow the elevation of the skin and subcutaneous tissue?
24. Which structures must be partially excised in order to reshape the nose tip?
25. How is the nasal bridge narrowed?

429. Minor otolaryngology surgical procedures

1. What are the indications for myringotomy with insertion of drainage tubes?
2. List two instruments the surgeon may request to remove ear wax.
3. Which instrument is used to place the polyethylene tubing in final position prior to packing the ear with cotton?
4. Which tissues are excised in a T&A procedure?
5. List the indications for T&A.

6. Which instruments may be used to remove the adenoids?
7. As the tonsil is freed from the fossa, care must be taken to preserve which tissue?

430. Endoscopic otolaryngology surgical procedures

1. Define functional endoscopic surgery?
2. FESS has become the primary means of treatment for what chronic disease?
3. Endoscopes used during FESS surgery come in what degrees?
4. What type of splints is used postoperatively on FESS patients?

431. Laser otolaryngology surgical procedures

1. List two indications for performing an uvulopalatopharyngoplasty?
2. What should be used to hyperextend the neck during UPPP procedures?
3. What type of laser can be used for dissection during a UPPP procedure?
4. Why are a bulb syringe and irrigation used at the conclusion of a UPPP?

5-4. Commonly Performed Oral/Maxillofacial Surgical Procedures

Oral surgery is a specialty usually associated with the dental clinic. Because the more complex or extensive procedures are performed in the operating room, you may be called on to assist.

432. Major oral maxillofacial surgical procedures

Reduction of mandibular fractures is a procedure that corrects the malocclusion that resulted from a lower jaw fracture. Malocclusion occurs when the biting (occlusal) surfaces of the teeth do not meet properly. Some fractures can be treated with closed reduction and intermaxillary fixation. Most mandibular fractures require open reduction with internal wire fixation, plus supplemental intermaxillary fixation. Intermaxillary fixation is accomplished by using arch bars to the mandibular and maxillary teeth (fig. 5-23). If the patient wears dentures, the arch bars are attached to the dentures or specially made dental splints. Depending on the location of the fracture, some oral surgeons may elect to use miniature bone plates and screws similar to the implants used by orthopods.

Patient preparation

The patient is placed in the supine position with the arms tucked at the side. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The male patient should shave preoperatively. The face, ears, and neck are cleansed from the hairline to the shoulders. Some surgeons want the inside of the mouth prepared with swabs saturated in prep solution.

Draping

The patient is draped using a head sheet and a split sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Power drill.
- Marking pen.
- Bulb syringe.
- Suture material.
- Needle counter pad.
- Minor instrument set.
- Dental instrument set.
- Electrosurgical handpiece.
- Nerve stimulator (have available).
- Stainless steel wire, 25, 26, or 28 gauge.

Procedure

An incision is made below the inferior border of the mandible. The fracture site is exposed and the periosteum is retracted. Holes are drilled into the mandible on both sides of the fracture, and wires passed through the holes and twisted down tightly to maintain alignment. The incisions are closed and arch bars are applied.

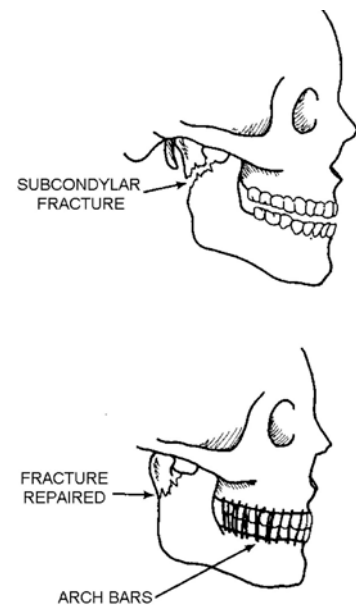


Figure 5-23. Lower jaw fractures.

Arch bars are available in precut lengths. The bar is bent to fit the contour of the patient's maxillary and mandibular arches (fig. 5-24). Short lengths of 25- or 26-gauge stainless steel wire are passed between the teeth and around the bar. Multiple small latex bands may be attached to the bars to provide occlusion. *Always send wire cutters with the patient to the recovery room in case the jaws must be freed in an emergency.*

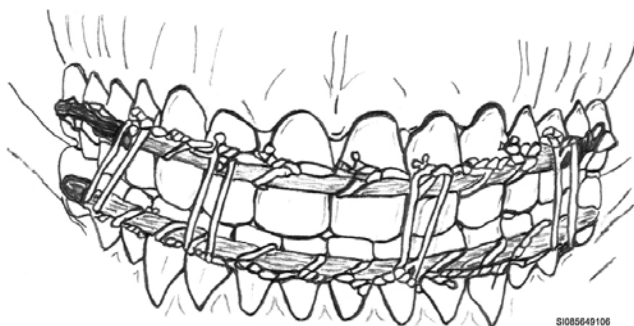


Figure 5-24. Arch bars placement.

433. Minor oral maxillofacial surgical procedures

Dental extraction (odontectomy) is the removal of one or more teeth. Usually, the patient has gingival (gum) or tooth disease. A *full mouth extraction* is the removal of all of the patient's teeth.

Patient preparation

The patient is placed in the supine position with the arms tucked at the side. The table is tilted in a slight reverse Trendelenburg position.

Skin preparation

No preparation is required for this procedure.

Draping

The patient is draped using a head drape and a split sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Power drill.
- Suture material.
- Needle counter pad.
- Dental instrument set.
- Suction tubing and tip.

Procedure

The patient's throat is packed with a saline-soaked sponge to prevent aspiration or ingestion of blood. *Make sure the packing is removed at the end of the procedure!* If left in place, the patient could aspirate it and suffocate postoperatively. To aid in hemostasis, a small amount of local anesthetic with epinephrine is injected around the diseased tooth. A small incision is made at the base of the tooth. The gingiva is loosened from the tooth with a periosteal elevator. The tooth is then loosened and removed from its socket. After the teeth have been removed, the mouth is irrigated with warm saline

and suctioned away. The incisions are closed with interrupted sutures and the throat packing is removed (which if not performed, could lead to the patient's death).

434. Endoscopic oral maxillofacial surgical procedures

A temporomandibular joint (TMJ) arthroscopy is an endoscopic procedure used to examine the TMJ. It is performed to diagnose and treat TMJ disorders. Some of the indications for performing this procedure are degenerative joint disease and hypermobility.

Patient preparation

The patient is placed in the supine position with the head turned to expose the operative side. A donut headrest may be placed under the patient's head for stabilization. The arms are tucked at the patient's side. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The male patient should shave preoperatively. The face, ears, and neck are cleansed from the hairline to the shoulders.

Draping

The patient is draped using a head sheet and a split sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Camera.
- Sponges.
- Light cord.
- Blades: #11.
- Suction tubing.
- Suture material.
- Small joint shaver.
- TMJ instrument set.
- Needle counter pad.
- 0-, 30- and 70-degree scope.
- Extension tubing with stopcock.
- Bipolar electrosurgical handpiece.

Procedure

To begin the procedure, the surgeon injects irrigation solution into the joint space to distend the capsule. A small stab wound is made over the temporomandibular joint with a # 11 knife blade. A trocar and cannula are inserted. The trocar is removed from the cannula and a telescope is inserted. The telescope is connected to the video camera and light source. Irrigation solution is instilled in the joint while the surgeon performs a visual examination of the area. If the surgeon chooses to perform any type of repairs, an additional stab wound is made, and a trocar and cannula are inserted to introduce instruments. Once the surgeon completes the visual inspection, the cannulae are removed and the wound is closed.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

432. Major oral maxillofacial surgical procedures

1. Define *malocclusion*.
2. What is required to repair most mandibular fractures?
3. How is intermaxillary fixation accomplished?
4. To reduce a mandibular fracture, where is the incision made that allows the fracture to be exposed?
5. What material is used to maintain the mandibular alignment tightly during healing?
6. When the patient leaves the operating room after mandibular repair, what surgical instrument is sent with the patient to the recovery room?

433. Minor oral maxillofacial surgical procedures

1. What is the purpose of injecting a small dose of local anesthetic with epinephrine around the teeth to be dissected in a full mouth extraction?
2. Which instrument is used to loosen the gingiva from the tooth?
3. What is the last step of a full mouth extraction, which if not performed, could lead to the patient's death?

434. Endoscopic oral maxillofacial surgical procedures

1. What is a TMJ arthroscopy?
2. Name two indications for performing a TMJ arthroscopy.

3. During a TMJ arthroscopy, what device is placed under the patient's head for stabilization?
4. Why does the surgeon inject irrigation solution into the joint space before making an incision into the temporomandibular joint?
5. If the surgeon chooses to perform any repairs during a TMJ arthroscopy, what additional steps must be taken, and why?

Answers to Self-Test Questions

423

1. A small pair of scissors with blades coated with Vaseline.
2. Once the patient is anesthetized, the hearing aid is returned to the patient's room.
3. Because they will be unable to wash their hair for a period of 10 days to two weeks postoperatively in order to keep the ear canal dry.
4. Vertigo may occur for a short amount of time and moving slowly may alleviate the sensation.
5. Forceful nose blowing.
6. The patient's head is placed at the foot of the bed as close to the edge of the bed as possible. The table is then rotated laterally.
7. Most ophthalmic patients are under local anesthetic only and the quiet decreases anxiety, as well as promotes patient cooperation.
8. Cellulose sponges.

424

1. (1) Test for refraction.
(2) Examine the retina.
(3) More easily remove the lens.
2. (1) Mydriatics—permit the patient to focus after the pupil has been dilated. Phenylephrine—2 percent, 5 percent, or 10 percent is the most commonly used mydriatic.
(2) Cycloplegics—inhibit focusing of the eye after the pupil is dilated. Atropine 1 percent (for long-lasting effects), cyclopentolate 1 percent, or tropicamide 1 percent are the most commonly used.
3. Drugs which increase the contraction of the iris sphincter, which in turn causes the pupil to contract and constrict. Furthermore, miotics decrease intraocular pressure by improving the ease with which aqueous fluid escapes from the eye.
4. Pilocarpine 1 percent to 4 percent and phospholine iodide 0.12 percent to 0.25 percent.
5. Bacitracin and Neomycin sulfate.
6. Methylcellulose 0.5 percent.
7. Either as a solution or in the form of strips.
8. Strips are preferred because solutions are so easily contaminated.

425

1. The aging process.
2. a. The lens, within its capsule, is removed by gentle pressure with a cryoprobe.
b. Using irrigation and expression, the cataract is removed leaving the posterior capsule in situ.

- c. The lens capsule contents are fragmented with ultrasonic energy as the lens material is irrigated and aspirated.
3. Traction.
4. By instilling alpha-chymotrypsin into the anterior chamber of the eye.
5. The cryoextractor.
6. (1) The corneal incision is closed.
(2) Traction sutures are removed.
(3) The conjunctival flap is approximated.
7. A surgical procedure where an incision is made into the trabecular meshwork of the eye, providing an alternate drainage route for aqueous humor to exit the anterior chamber.
8. Glaucoma.
9. A condition in which the intraocular pressure of the eye is increased.
10. Toothed forceps and tenotomy scissors.
11. Corneal scissors.
12. Iridotomy.
13. Repressurizes the anterior chamber of the eye with balanced salt solution.
14. Grafting of the corneal tissue of one human eye to another.
15. All powder is meticulously removed from the gloves.
16. Corneal trephine, diamond knife, corneal scissors, and forceps.
17. It is placed epithelial side down in a small container containing saline moistened gauze, and put in a safe place.
18. Corneal scissors or a diamond knife.
19. BSS.

426

1. Crossed eyes, or the inability to direct the two eyes at the same object because of the lack of coordination of the extraocular muscles.
2. By changing the strength of the ocular muscles.
3. Recession is performed to weaken the ocular muscle by detaching the ocular muscle from its original attachment on the sclera, moving the muscle posteriorly and reattaching it.
4. Once the speculum is in place, two silk sutures are placed through the episclera, and an incision is made in the conjunctiva at the limbus.
5. A precisely adjusted caliper to measure the amount of muscle to be excised.
6. Double-armed 5-0 or 6-0 suture.
7. A straight mosquito hemostat is placed across the muscle between the sutures and the muscle insertion point.
8. A muscle hook.

427

1. The use of ultraviolet laser energy to vaporize corneal tissues.
2. The patient is placed on the table in the supine position with the arm on the affected side tucked in at the patient's side and the other arm extended on an arm board.
3. A plastic fenestrated sheet.

428

1. (1) To repair the perforation in the tympanic membrane.
(2) The sound transmitting mechanism to improve hearing.
2. (1) Postauricular fascia.
(2) A segment of a vein from the arm.

3. The ossicles.
4.
 - a. IV.
 - b. V.
 - c. I.
 - d. III.
 - e. II.
5.
 - (1) By postauricular incision.
 - (2) Through the canal.
6. The temporalis fascia is harvested, and either smoothed onto an overturned basin using a tongue blade, or placed within a press.
7. A drill or curette.
8. The graft is inserted and small pieces of Gelfoam or a paper patch may be used to hold it in place.
9. Kerlix.
10.
 - (1) Nodules, either discrete or multiple.
 - (2) Hyperactive thyroid.
 - (3) Inflammation of the thyroid.
 - (4) Diffuse goiter, for cosmetic reasons, or if the gland causes tracheal compression.
11. Reverse Trendelenburg position.
12. Children do not have enough hair to worry about, and the neck hair on a female may grow back more coarse after it is shaved.
13. The surgeon may use it to mark the incision, so as to serve as a guideline and make the incision blend in with the patient's neck anatomy.
14. The strap muscles are divided and retracted from the operative site using green or Army-Navy retractors.
15. The thyroid is immobilized using double-clamping small segments of tissue, cutting between the clamps with a number 15 blade, and ligating the ends with 3-0 or 4-0 silk sutures.
16. The opening of the trachea, so a cannula can be inserted to allow air to enter the bronchi and lungs.
17. The patient is shaved/clipped, if there is time preoperatively. The entire neck is cleansed extending from the infra-auricular border to the axillae, bedside to bedside.
18. The platysma muscle and deep fascia are dissected, and then the thyroid isthmus is retracted superiorly.
19. Across the third and fourth tracheal rings, vertically.
20. The obturator is cleaned and taped to the patient's gurney for possible use in the recovery unit to reinsert the tube.
21.
 - (1) Hump removal.
 - (2) Narrowing.
 - (3) Tip remodeling.
 - (4) Septoplasty.
22. Slight reverse Trendelenburg.
23. Intranasal incisions.
24. The lateral and alar cartilages on each side.
25. The nasal bones are osteotomized laterally, medially, and compressed.

429

1. Acute otitis media with infectious fluid buildup in the middle ear causing the tympanic membrane to bulge.
2.
 - (1) Loop curette.
 - (2) Alligator forceps.
3. A pick.
4. The faucial (palatine) and nasopharyngeal tonsils.
5. Chronic tonsillitis, associated otitis media, and nasal obstruction due to enlarged adenoid glands.

6. A curette or adenotome.
7. The posterior tonsil pillar.

430

1. The resection of inflammatory and anatomic defects of the sinus.
2. Chronic sinusitis.
3. 0, 30, 70, or 120 degrees.
4. Dissolvable gelatin splints.

431

1. Apnea index worse than 20, significant daytime sleepiness.
2. A roll.
3. Carbon dioxide laser.
4. To remove any blood clots or tissue debris that may have been left behind.

432

1. Malocclusion occurs when the biting (occlusal) surfaces of the teeth do not meet properly.
2. Open reduction with internal wire fixation, plus supplemental intermaxillary fixation.
3. By using arch bars to the mandibular and maxillary teeth.
4. Below the inferior border of the mandible.
5. Stainless steel wire, 25 or 26 gauge.
6. Wire cutters.

433

1. To aid hemostasis.
2. A periosteal elevator.
3. The removal of the throat packing.

434

1. An endoscopic procedure used to examine the TMJ.
2. Degenerative joint disease and hypermobility.
3. A donut headrest.
4. To distend the capsule.
5. An additional stab wound is made, and a trocar and cannula are inserted to introduce instruments.

Do the unit review exercises before going to the next unit.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter.

Do not return your answer sheet to AFCDA.

51. (423) Prior to the cleansing skin prep, a patient's eyelashes are clipped using small scissors with the blades coated with
 - a. vaseline.
 - b. collodion.
 - c. xylocaine.
 - d. xeroform.
52. (424) During cataract surgery, dilating eye drops are *primarily* used to enable the surgeon to
 - a. identify corneal abrasions.
 - b. more easily remove the lens.
 - c. maintain a completely dry sterile field.
 - d. achieve hemostasis during eye lid surgery.
53. (424) Which chemical may be used as a dye or stain to diagnose retinal pathology or corneal abrasions?
 - a. Fluorescein sodium.
 - b. Neomycin sulfate.
 - c. Acetylcholine.
 - d. Pilocarpine.
54. (425) During a Keratoplasty, what must be done *before* the procedure begins?
 - a. all powder is meticulously removed from the surgeon's gloves.
 - b. The operating microscope is brought into place.
 - c. The cornea from the donor eye is excised.
 - d. a trephine is placed on the patient's cornea.
55. (425) At the completion of a cataract extraction, the lens is
 - a. thrown in the trash.
 - b. passed off as a specimen.
 - c. saved for future transplant.
 - d. given to the patient to take home.
56. (426) Which instrument is used to measure the amount of muscle to be resected during strabismus surgery?
 - a. Caliper.
 - b. Trephine.
 - c. Muscle hook.
 - d. Alligator clamp.
57. (426) During a lateral rectus resection, what does the surgeon do *next* after making an incision in the conjunctiva at the limbus?
 - a. Place a speculum in the eye.
 - b. Rotate the eye as far as possible medially.
 - c. Place two silk sutures through the episclera.
 - d. Measure the amount of muscle to be resected.

-
-
58. (426) During a medical rectus recession, what does the surgeon do *next* after the muscle is cut and hemostasis is obtained?
- Apply antibiotic ophthalmic ointment.
 - The muscle is sutured in its new location.
 - Use a straight mosquito hemostat to discourage oozing.
 - Check the distance of the insertion point with a caliper.
59. (427) The use of ultraviolet laser energy to vaporize corneal tissue is called
- vitrectomy.
 - keratoplasty.
 - trabeculectomy.
 - photorefractive keratectomy.
60. (427) During a photorefractive keratectomy (PRK), after the patient's eye is centered under the microscope, what is done *next*?
- a topical antibiotic and topical anesthetic are placed in the patient's eye.
 - surface cells are removed and the epithelium is debrided.
 - a locking lid speculum is placed in the eye.
 - laser treatment is applied.
61. (428) A tympanic graft is held in place with
- clips.
 - sutures.
 - gelfoam.
 - steri-strips.
62. (428) Which gland is removed if the patient suffers from a *diffuse goiter*?
- Adrenal.
 - Thymus.
 - Thyroid.
 - Pituitary.
63. (428) Which surgical procedure may be done to provide long-term respiratory support?
- Tracheostomy.
 - Trachelopexy.
 - Tracheorrhaphy.
 - Trachelorrhaphy.
64. (428) What part of the nose is reshaped by excising portions of the lateral and alar cartilages on each side?
- Tip.
 - Nares.
 - Septum.
 - Dorsum.
65. (429) A Hurd dissector is routinely used in which surgical procedure?
- Mastoidectomy.
 - Appendectomy.
 - Tonsillectomy.
 - Craniectomy.

66. (430) During functional endoscopic surgery, what instrument is used to enlarge each sinus?
- a. Nasal elevator.
 - b. Antrum punch.
 - c. Coakley curettes.
 - d. Takahashi forceps.
67. (431) Uvulopalatopharyngoplasty procedure begins with
- a. closure of the mucosal edges.
 - b. dissection of the soft palate and uvula.
 - c. removal of the self-retaining mouth gag.
 - d. placement of a self-retaining mouth gag.
68. (431) Following uvulopalatopharyngoplasty procedures, mucosal edges are closed with a
- a. running sutures.
 - b. vertical mattress sutures.
 - c. simple interrupted sutures.
 - d. horizontal mattress sutures.
69. (432) What occurs when the biting surfaces of the teeth do not meet properly?
- a. Malocclusion.
 - b. Conjunctivitis.
 - c. Hypermobility.
 - d. Atrophic epithelium.
70. (433) The removal of one or more teeth is known as
- a. enucleation.
 - b. evisceration.
 - c. odontectomy.
 - d. turbinectomy.
71. (433) Epinephrine is injected around a diseased tooth before extraction to
- a. aid in hemostasis.
 - b. loosen the tooth.
 - c. prevent nausea.
 - d. prevent edema.
72. (434) What joint is incised during a temporomandibular joint arthroscopy (TMJ) arthroscopy?
- a. Knee joint.
 - b. Synovial joint.
 - c. Fibrous joints.
 - d. Temporomandibular joint.

Please read the unit menu for unit 6 and continue ➡

Unit 6. Plastic and Neurosurgery

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ONE OF THE VERY INTERESTING SPECIALTIES we offer in some operating rooms is plastic surgery. Even though this specialty may involve procedures on many anatomical areas of the body, there is a tendency to think of plastic surgery as a restructuring of facial features. The repair of cleft palates and harelips on young children and the revision of facial scars are important among these plastic operations. But plastic repairs are also carried out on many other areas of the body. A burned abdomen, arm, or leg can receive a skin graft, just as a mangled hand may require bone and tendon grafts. In many instances where both skeletal and skin injuries are involved, the orthopedic and plastic surgeons work together to reestablish proper function and appearance of bone and skin. Plastic surgery is very varied and produces astonishing results.

6-1. Basic Plastic Surgery Procedures

For the most part, plastic surgery involves superficial areas of the body. But in a general sense, we can say that this specialty is primarily concerned with the rearrangement of skin. Very often, plastic procedures are done to correct old scars or other deformities that cause the patient more emotional distress than physical pain. Since the plastic surgeon is trying to minimize a scar or improve appearance, there are some precautionary measures taken preoperatively.

435. Common preoperative preparations

The instruments used in plastic surgery are very fine. A lot of the instruments have been hand-honed and should be carefully protected to prevent damaging them. Many surgeons have their own instrument sets. It is your responsibility to properly care for and ensure the safety of the surgeon's personal instruments while they are in your charge.

Silastic or Teflon implants are commonly used in many plastic and reconstructive surgeries. To prevent them from causing a foreign body reaction in the patient, some special steps must be used in handling them:

- Never handle the implants with bare hands. Oil from your skin may rub off on the implant and remain after sterilization, and could possibly cause a tissue reaction in a patient.
- If the materials arrive unsterile from the manufacturer, don gloves and wash them in a mild non-detergent soap (such as Ivory Snow), and then rinse thoroughly before sterilization. Carefully follow the manufacturer's guidelines for sterilization.
- Keep Silastic and Teflon implants covered since they tend to attract dust particles because of static electricity. If possible, use sterile paper drapes, because linen or towel drapes contain lint which could adhere to the implant.

Many plastic surgeons prefer a colorless prep solution so they can observe the true skin color. Also, this type of solution may be used to avoid skin discoloration on ambulatory surgical patients after minor facial procedures.

436. Major and minor plastic surgical procedures

Plastic surgery can change the appearance and function of a person's body. These procedures include both cosmetic enhancements as well as functionally reconstructive operations. This lesson covers common major and minor plastic surgical procedures.

Major plastic surgical procedures

Breast reduction and skin grafts are two major procedures you will be involved in.

Breast reduction mammoplasty

Reduction mammoplasty is the removal of excessive breast tissue and skin with a reconstruction of the breasts contour, size, shape, and symmetry. Indications for reduction include; giganotmastia resulting in back pain or intertrigo, or to achieve symmetry after a mastectomy.

Preparation of the patient

The patient is placed in the supine position with each arm abducted 90 degrees on a padded arm board. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient is shaved/clipped according to the surgeon's preference. The cleansing skin prep begins at the incision site and extends outwards from the neckline to the waist to include the axillae. Care should be taken not to remove any preoperative markings placed by the surgeon.

Draping

The patient is draped by using four hand towels, a transverse sheet, and a laparotomy drape or chest sheet. Skin staples may be used to secure drapes into place.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Medical scale.
- Suture material.
- Elastic bandage.
- Areolar template.
- Needle counter pad.
- Suction tubing and tip.
- Large rake retractors.
- Plastic instrument set.
- Electrosurgical handpiece.
- Sterile skin marker with ruler.
- Basic or minor instrument sets.
- Closed wound drainage unit (Hemovac or Jackson Pratt).

Procedure

The surgeon begins the procedure by incising the existing areola with an areolar template/cookie cutter, ensuring a perfectly round incision is made. The template is used to ensure accurate resizing of the breast later. A second incision is made vertically beginning at the bottom center of the areola

continuing to the inframammary fold and then extended laterally in each direction. Dissection begins at the inverted T in the existing incision and extends laterally until the breast has been exposed. Redundant tissue is removed using an electrosurgical cautery. Tissue removed from each breast should be measured and kept separate from one another. The surgeon may desire the removed tissue from each side to be weighed by the circulating nurse to ensure equal amounts are removed from each breast. Once the desired amount has been removed the wound is temporally closed with skin staples and the patient is placed in the Fowler's position to assess breast size and symmetry. The surgeon may need to reopen one or both incisions to make adjustments. Once symmetry has been achieved the surgeon replaces the nipple-areolar pedicle and begins permanent closure. Surgeon's preference will determine if a drain is placed.

Skin grafts

This is a segment of skin transplanted to an area of the body denuded of skin. Skin grafts are used to restore skin removed during radical disfiguring surgery (such as mastectomy), to cover areas that have been burned, and occasionally, on sites where tattoos have been removed. They also correct deforming scars that often result following accidental injury. The surgeon tries to transfer tissues of compatible color and texture. The skin may come from the patient's own body (autograft), the skin bank (previously donated skin from another patient), or a temporary dressing made of freeze-dried pigskin (porcine graft).

There are several types of skin grafts; the most common are:

1. Split-thickness graft: Epidermis and a portion of the dermis to a depth of 0.010 to 0.035 inch (0.3 to 1 millimeter [mm]) is removed. This thin layer of skin is sutured into place over the denuded area. The donor site heals by regeneration of epithelium because dermal elements remain intact after the graft is taken.
2. Full-thickness graft: Full depth of skin with attached fat at a depth greater than 0.035 inch (1 mm) is removed. This thicker layer is needed to provide a cushion in areas where pressure is exerted (hands), or to resurface wounds where cosmetic results are desired (face).
3. Pedicle graft: The application of one end of a strip of skin with its subcutaneous tissue to a distant recipient site. The opposite end remains attached to the donor site from which it receives nourishment while it implants itself against the recipient site. The donor site may be covered with a sliding flap or with skin from another body area. The pedicle graft is divided from the donor site after implantation is evident. This lesson covers the procedures for doing a split-thickness skin graft.

Preparation of the patient

The patient is positioned according to where the graft is to be placed and the donor site involved. The arms are placed at the side or on arm boards, according to the position. The electrosurgical ground pad is placed depending upon the position.

Skin preparation

The donor site may be shaved/clipped preoperatively. Because two areas of the body are involved, the recipient site and donor site, two separate cleansing skin preps are required. The preps are done according to the areas involved.

Draping

Extra drapes are usually required because there are two separate operative sites. The standard drapes of hand towels, sheets, and drape sheets will be used.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Mineral oil.
- Suture material.
- Tongue blades.
- Needle counter pad.
- Minor instrument set.
- Dermatome and blade.
- Electrosurgical handpiece.

Procedure

The donor site is lubricated with mineral oil. This allows the dermatome to glide easily over the skin. If necessary, the donor skin is pulled taut with the edge of a wooden tongue blade. The surgeon pre-sets the depth of the dermatome and then places it over the taut skin, applying just enough pressure to obtain the desired thickness of graft. As the skin comes through the dermatome, it is grasped with forceps to keep it from bunching under the dermatome. After the required amount of skin is obtained, the surgeon severs it from the donor site. The donor site is covered with a saline-soaked sponge temporarily.

The graft is placed in a basin with a few drops of saline solution. **DO NOT LAY IT ON A SPONGE!** The sponge may be thrown in the kick bucket accidentally, thus contaminating the graft.

The recipient site is débrided, as necessary. The graft is trimmed to fit the recipient site. The trimmed pieces should be saved in case they are needed later. If a larger graft is required, the surgeon may put the graft through a skin graft mesher (fig. 6-1). This allows the surgeon to stretch the graft over the recipient site. The graft is positioned and sutured into place with many fine sutures. A saline-soaked piece of cotton or gauze is placed in the center of the graft, and the sutures are tied over the cotton. This helps keep the graft in place over the recipient site. A pressure dressing is applied to the recipient site, and the donor site is dressed with petrolatum impregnated gauze with a kerlix or kling bandage.

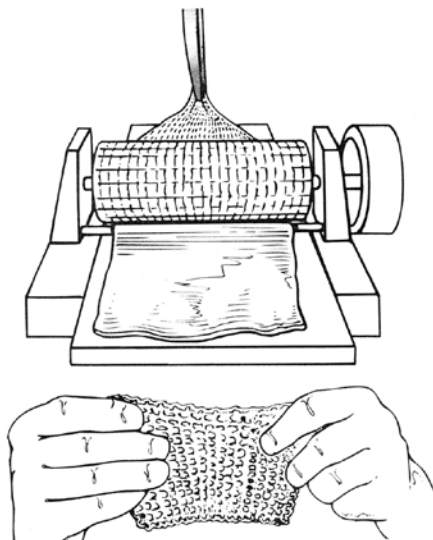


Figure 6-1. Manual skin-graft mesher.

Minor plastic surgical procedures

One minor procedure is a blepharoplasty, which is the removal of excessive redundant skin around the eyes. It is performed for functional and cosmetic purposes, and may be performed in conjunction with a rhytidectomy (facelift). Sagging skin on the upper eyelids may encroach on the patient's field of vision and cause a decrease in the visual field.

Preparation of the patient

You will place the patient in the supine position with the arms tucked at the side. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient is not shaved/clipped preoperatively. The cleansing skin prep begins at the eyelids working outwards to cleanse the entire face from the hairline to the shoulders and neck.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Marking pen.
- Suture material.
- Needle counter pad.
- Plastic instrument set.
- Cotton-tipped applicators.
- Bipolar electrosurgical handpiece.

Procedure

The surgeon may mark the incisional lines with a marking pen on the upper eyelids. The incision is made, and the skin encompassed by the lines is removed. A strip of the orbicularis oculi muscle, orbital septum, and periorbital fat is removed. Hemostasis is obtained, and the incision is closed in one layer with fine interrupted sutures. The procedure is repeated on the lower lids. A topical antibacterial ointment and ice-packs are applied to the eyes.

437. Endoscopic plastic surgical procedures

Endoscopic brow lift is the use of an endoscope to remove or reposition underlying muscle or tissue of the forehead. The procedure helps decrease muscle movement in the forehead as well as repositioning sagging eyebrows into a more natural position, often creating a younger and smoother look.

Preparation of the patient

The patient is placed in the supine position with the arms tucked at the side. Surgeon's preference will dictate if a Foley catheter will be placed.

Skin preparation

The cleansing prep begins at the incision site, cleaning the entire face, scalp, and neck to the clavicle.

Draping

The patient is draped using a head drape and a split sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Marking pen.
- Video monitor.
- Suture material.
- Lighted retractor.
- Needle counter pad.
- Plastic instrument set.
- Cotton-tipped applicators.
- Camera (if not built into scope).
- Bipolar electrosurgical handpiece
- Endoscopic brow lift instrumentation.
- Endoscopes (surgeon's choice of sizes and view angle).

Procedure

The endoscope is inserted into several small one-inch incisions placed just behind the hairline. Once the surgeon has a clear view of the underlying muscles and tissue he or she can begin dissection. Small facelift instruments are inserted through one of the incisions to remove or alter the muscle. With the muscle removed the surgeon will lift and secure the eyebrows and forehead to the optimal height using a forehead fixation device or suture. The wounds are flushed closed, and the dressings are applied. The surgeon may request the circulator wash and comb the patient's hair postoperatively removing any blood or tissue.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

435. Common preoperative preparations

1. Who is often the owner of the plastic surgery instruments entrusted to you during the procedure?
2. Why must you be careful not to touch plastic implants with your hands?
3. Is it necessary to cover Silastic/Teflon implants with paper drapes prior to use? If so, why?
4. Why do most plastic surgeons prefer a colorless prep solution?

436. Major and minor plastic surgical procedures

1. List three sources from which a surgeon may obtain tissue for grafting purposes.
2. Which type of skin graft is described in the following examples?
 - a. A thin layer of skin sutured over a denuded area.
 - b. A thick layer of skin with attached fat to resurface wounds where cosmetic results are desired.
 - c. One end of a strip of skin is applied to a distant site.
3. Why is the donor site for grafting lubricated with mineral oil?
4. Once the donor skin is removed, how is the wound temporarily treated?
5. Where is the graft placed until used?
6. What purpose is served by placing the graft through a skin graft mesher?
7. Why is a saline-soaked piece of gauze placed over the graft site and then tied in place?
8. List two indications for breast reduction mammoplasty.
9. Why is a cookie cutter used to incise the areola?
10. What is used to remove redundant breast tissue?
11. Define *blepharoplasty*.

12. In blepharoplasty, what tissue is actually removed?
13. What type of sutures is used to close a blepharoplasty incision?

437. Endoscopic plastic surgical procedures

1. What procedure uses an endoscope to remove or reposition underlying muscle or tissue of the forehead?
2. Where are the incisions located on an Endo Brow Lift procedure?
3. What does the surgeon use to secure the eyebrows and foreheads once optimal height is achieved?

6-2. Basic Neurosurgery Procedures

This next specialty is probably as rare as open heart surgery in most Air Force medical facilities. Even though there are many conditions that may be corrected by neurosurgeons, the expense is too great to provide a neurosurgical service in every facility. Usually, only the larger medical centers are equipped to care for patients with neurosurgical disorders.

Neurosurgery is broken down into three distinct categories. *Cranial* procedures may involve only the skull, or may extend into the brain. *Spinal* operations may have the bony vertebral column as the objective, or the removal of vertebral laminae to expose the spinal cord or nerve roots. *Peripheral nerve* operations may involve any body structure that the nerves innervate. Regardless of the location, gentleness is the key to minimize functional disability of surgical trauma during neurosurgery.

438. Common preoperative preparations

For cranial surgery, preparation begins with clipping the hair. The hair is removed with clippers and then shaved smooth. **DO NOT THROW THE HAIR AWAY.** The hair is placed in a plastic bag and taped to the patient's bed (some patients have a wig made from the clipped hair). A venous cutdown is performed to allow insertion of a right atrial or central venous pressure line on patients who are having major neurosurgery. This is needed for the management of air embolisms.

A special overhead table may be used in place of the Mayo tray stand. This table offers the scrub technologist ample working space on which to place the instrumentation required. Use caution because the scrub has to stand on a tiered platform or several footstools to work.

The technique of clamping, cutting, and tying—so prominent in most surgical procedures—is not followed in many neurosurgical procedures. On cranial procedures, only during the initial and closing stages are the usual forms of hemostasis used. Tissue is probed apart instead of being clamped and cut. Sponging is done with saline-moistened, cottonoid sponges. Irrigation with warm sterile saline is important in keeping the tissue moist and in washing away any loose tissue or capillary oozing.

Although noise control is important during any surgical procedure, sudden or unexpected sounds could be particularly destructive during certain stages of neurosurgery. The circulator for a neurosurgical procedure has the important job of maintaining a quiet environment. Can you imagine what damage might occur to the patient if a sudden loud noise caused the surgeon to jump while using an instrument to probe a vital area of the brain? Such an accident could paralyze, blind, deafen, or otherwise destroy vital functions in a patient.

439. Major neurosurgery procedures

Two major neurosurgery procedures you will assist with are a craniotomy and a lumbar laminectomy. Craniotomy is an incision into the skull to expose and/or surgically treat intracranial trauma or disease. A laminectomy is the creation of an opening in the lamina to remove one or more sections of the lumbar vertebrae.

Craniotomy

The most basic form of a craniotomy is burr hole, which is a limited opening through which fluid or blood may be evacuated. Burr holes are also used as connecting points when a bone flap is raised. If, to permit better exposure, the bone is completely removed instead of a flap being created, this is termed a craniectomy.

Preparation of the patient

The patient is placed in the supine, sitting, or prone position depending on the type of surgery to be performed. The electrosurgical ground pad is placed according to the position used.

Skin preparation

The patient is shaved/clipped preoperatively by the surgeon. The cleansing skin prep begins at the incisional site and covers the whole head. Try not to get prep solution in the eyes. Antibiotic ointment may be placed into the eyes and the eyelids taped shut with nonirritating tape. Cotton may be placed in the ears to prevent solution from pooling in them.

Draping

The patient is draped using hand towels around the operative site, secured with sutures or towel clips, a plastic adhesive drape, and a craniotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Basin set.
- Hemoclips.
- Cottonoids.
- Raney clips.
- Bulb syringe.
- Suture material.
- Aneurysm clips.
- Hemostatic agents.
- Needle counter pad.
- Power drill and saw.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Microsurgical instruments.

- Craniotomy instrument set.
- Bipolar electrosurgical handpiece.

Procedure

The scalp is incised and Raney scalp clips (or similar devices) are applied to achieve hemostasis via compression. The galea and pericranium are incised—exposing the skull. Two self-retaining retractors are placed to aid in holding back the skin flap. Using an elevator, the pericranium is stripped from the skull and burr holes are made with a craniotome or Hudson brace. Bone debris and dust are curetted from the hole, and the hole is enlarged using a rongeur. Bone wax aids in hemostasis.

The dura is loosened from the skull. The skull flap is created by cutting between the skull and the burr holes with a Gigli saw guide and wire (or by using a powered cranial saw). The flap is lifted and retracted and wrapped in a moist 4×4 sponge. Cottonoid sponges and Gelfoam may be placed at the edges of the open dura.

As the surgeon prepares to enter into the brain, the microscope may be moved into place. The dura is lifted away with a dura hook, and incised. The incision is lengthened with scissors and the brain is now exposed. The operation is performed and the brain is prepared for closure.

The wound is irrigated with antibiotic solution and the dura is closed. Small holes are drilled in the bone flap and edges of the skull so wire sutures can be inserted to reattach the flap to the skull. The wire ends are twisted down snugly against the bone. Burr hole covers are applied over the previously made burr holes. The pericranium and galea are attached over the burr holes and bone flap. The clips are removed and the remaining layers of the wound are closed. The wound is dressed, and the head is wrapped with a kerlix to form a turban-like gauze bandage.

Lumbar laminectomy

Four common indicators for laminectomy are removal of a spinal cord tumor, and aneurysm, a herniated disc (fig. 6-2), and repair of the spinal cord injured by trauma. Other procedures that can be performed in conjunction with laminectomy are rhizotomy and cordotomy. *Rhizotomy* is the interruption of spinal nerve roots for relief of intractable pain or spasm, and *cordotomy* is the division of anterolateral tracts of the spinal column for intractable pain.

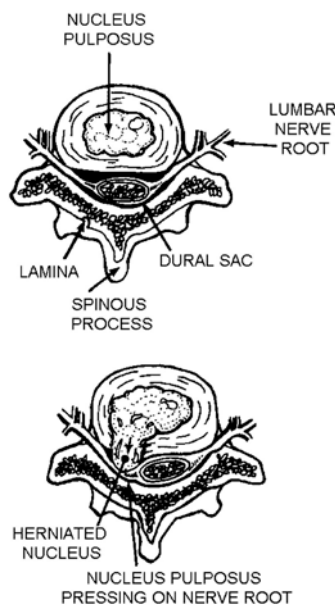


Figure 6-2. Normal (A) vs. herniated (B) disc.

Preparation of the patient

The patient is put into the prone position after being anesthetized on the gurney. The arms are extended on arm boards. A sterile, plastic adhesive drape is placed across the buttocks. The electrosurgical ground pad is placed on the posterior thigh.

Skin preparation

The patient is shaved/clipped from the shoulders to the coccyx, bedside to bedside, preoperatively. The cleansing skin prep starts at the incisional site, working outwards to the shoulders down to the coccyx, bedside to bedside.

Draping

The patient is draped using hand towels around the operative site and secured with sutures or towel clips, a plastic adhesive drape, a foot sheet, and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Cottonoids.
- Suture material.
- Needle counter pad.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Laminectomy instrument set.
- Bipolar electrosurgical forceps.

Procedure

A midline vertical incision is made over the spine. Self-retaining retractors are placed and the fascia is incised. To aid in hemostasis and expose the vertebra, sponges are packed along the vertebra with periosteal elevators. The paraspinous muscles and periosteum are retracted. The self-retaining retractors are removed and replaced with larger retractors (Taylor, Scoville, Adson-Beckman). A large rongeur bites off protruding bony spinous process and exposes the lamina. Kerrison rongeurs are then used to excise the lamina and provide access to the disc. Any dura attached to the lamina is loosened with a freer elevator. Hemostasis is achieved using bone wax. The ligamentum flavum (ligament that connects each vertebra to the next) is incised. Cottonoids are placed to protect the dura. Nerve roots are retracted, exposing the herniated disc. Pieces of disc are removed with a pituitary rongeur or curettes (fig. 6-3).

Once the disc is removed, the wound is irrigated. The area is checked to make sure the entire disc has been removed. The wound is then closed in the routine fashion.

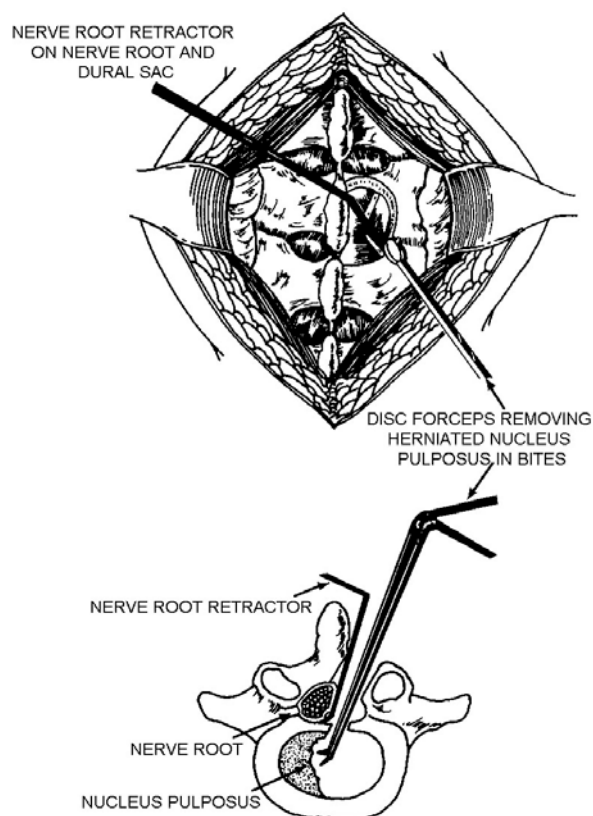


Figure 6-3. Removing the disc.

440. Minor neurosurgery procedures

Cubital tunnel syndrome is a condition caused by pressure on the ulnar nerve at the elbow. As you recall from previous units the nerves carry messages between the brain, spinal cord, and body parts. When a nerve is compressed, it cannot function properly. Cubital tunnel syndrome is the second most common nerve entrapment syndrome, after carpal tunnel syndrome. Traumatic or anatomic problems can cause the ulnar nerve to become irritated often resulting in discomfort. Many times orthopedic surgeons will perform this type of surgery; however, since this procedure deals with a nerve we can consider it to be performed under neurosurgery.

Preparation of the patient

The patient is placed in the supine position. The affected arm is supported in a functional position with Webril or elastic bandages and suspended from an IV pole, or may be left free for the surgeon to manipulate during the procedure. The tourniquet is applied to the affected arm and the electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient's affected hand and arm are shaved/clipped preoperatively to the elbow. The cleansing skin prep begins at the incisional site working outwards to include the hand, fingers, interdigital spaces, and upper arm to the level of the tourniquet.

Draping

The patient is draped using a stockinette over the extremity, a drape sheet over the hand table, a folded "rolled" towel around the arm, and a split or extremity sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Sponges.
- Basin set.
- Suture material.
- Esmarch bandage.
- Needle counter pad.
- Suction tubing and tip.
- Electrosurgical pencil.
- Minor orthopedic tray.
- Vessel loops or Penrose drain.

Procedure

Once the incision is made, Metzenbaum scissors and hemostatic forceps are used to dissect and free the nerve from the surrounding soft tissue. The surgeon may use a vessel loop or Penrose drain to aid in further dissection until a satisfactory length of the nerve has been exposed. Muscle and fascia tissue may need to be split at each end to ensure the nerve does not become kinked after closure. A fascial flap is created under the medial epicondyle of the humerus for the nerve to rest under. The fascia is closed loosely and the overlying tissues are closed with absorbable sutures and a restrictive dressing to include splinting material is applied.

441. Endoscopic neurosurgery procedures

Endoscopic discectomy is performed to remove herniated disc material that is causing pain and pressure in the back. This procedure is an alternative to open lumbar disc surgery. The biggest advantages of this procedure are that none of the muscles, ligaments, or other soft tissue structures needs to be cut or disrupted in any significant way. Recovery time for these patients is minimal and they are usually back to work in a matter of days.

Preparation of the patient

The patient is put into the prone position after being anesthetized on the gurney. The arms are extended on arm boards. A sterile, plastic adhesive drape is placed across the buttocks. The electrosurgical ground pad is placed on the posterior thigh.

Skin preparation

The patient is shaved/clipped from the shoulders to the coccyx, bedside to bedside, preoperatively. The cleansing skin prep starts at the incisional site, working outwards to the shoulders down to the coccyx, bedside to bedside.

Draping

The patient is draped using hand towels around the operative site and secured with sutures or towel clips, a plastic adhesive drape, a foot sheet, and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Cottonoids.
- Suture material.
- Needle counter pad.

- Suction tubing and tip.
- Micro video equipment.
- Electrosurgical handpiece.
- Laminectomy instrument set.
- Micro surgical instrument set.
- Bipolar electrosurgical forceps.

Procedure

The surgeon begins the procedure by placing a thin tube and an endoscopic probe through the skin, between the vertebrae and into the herniated disc space. Once the endoscope has been inserted a specialized micro video camera with specialized lighting is used to visualize the nerves and disc. Micro surgical instruments are passed through the hollow center of the probe and used to remove all or portions of the herniated disc. With removal of the disc complete the surgeon removes the endoscope and the incision is closed.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

438. Common preoperative preparations

1. What is done with hair clipped from the scalp prior to neurosurgery?
2. Why is a venous cutdown performed on patients scheduled for major neurosurgery?
3. Since the scrub technician stands on a tiered platform during neurosurgery, what allowance is made for the Mayo tray?
4. Which two stages of neurosurgery employ the usual forms of hemostasis?
5. During neurosurgery, who has the responsibility for maintaining a quiet environment?

439. Major neurosurgery procedures

1. What is the name given to a craniotomy in which bone is removed to permit better exposure instead of a flap being created?
2. Who shaves the head of the patient for craniotomy?

3. Once the scalp is incised and the scalp clips applied, which incisions must be made to expose the skull?
4. List two instruments used to make burr holes.
5. Which instrument enlarges the hole?
6. How is the skull flap created?
7. Why are small holes drilled in the bone flap and edges of the skull once the surgery has been performed?
8. List four common indicators for laminectomy.
9. In the performance of a laminectomy, how is hemostasis aided?
10. Which instrument bites the protruding bony spinous process and exposes the lamina?
11. Which instrument excises the lamina and provides access to the disc?
12. Once the ligamentum flavum is incised, how is the dura protected?
13. Name the instrument, other than curettes, used to remove pieces of the disc.

440. Minor neurosurgery procedures

1. What is the second most common nerve entrapment syndrome?
2. List two instruments that are used to dissect and free the nerve from surrounding tissues?

3. Why does the surgeon need to split muscle and fascia tissue at each end?

441. Endoscopic neurosurgery procedures

1. What is the biggest advantage to performing endoscopic discectomy surgery?
2. During endoscopic discectomy surgery, when is the patient placed in the prone position?
3. What specialized equipment is used to visualize the nerve and disc?

Answers to Self-Test Questions

435

1. The surgeon.
2. Oil from the skin may rub off onto the implant and remain after sterilization, possibly causing a tissue reaction in the patient.
3. Yes. Due to their content, these implants have a tendency to attract dust if covered with cloth—paper must be used.
4. So they can observe the patient's true skin color, and avoid skin discoloration on ambulatory patients.

436

1. (1) From the patient.
(2) From a skin bank containing previously donated tissue.
(3) For temporary dressing, a porcine graft of freeze-dried pigskin.
2. a. Split-thickness graft.
b. Full-thickness graft.
c. Pedicle graft.
3. To allow the dermatome to glide easily over the skin.
4. The donor site is covered with a saline-soaked sponge.
5. In a basin with a few drops of saline solution.
6. The graft is stretched to cover a larger area.
7. The gauze helps keep the graft in place over the recipient site.
8. Giganotmastia resulting in back pain or intertrigo, or to achieve symmetry after a mastectomy.
9. Ensuring a perfectly round incision is made.
10. Electrosurgical cautery.
11. The removal of excessive skin around the eyes.
12. A strip of the orbicularis muscle, orbital septum, and periorbital fat.
13. Fine interrupted sutures.

437

1. Endoscopic brow lift.
2. Just behind the hairline.

3. Forehead fixation device or suture.

438

1. It is placed in a plastic bag and taped to the patient's bed.
2. The line inserted is needed for the management of air embolisms.
3. The Mayo tray is replaced by a special overhead table.
4. During the initial and closing stages.
5. The circulator.

439

1. Craniectomy.
2. The surgeon.
3. The galea and pericranium must be incised.
4. A craniotome or Hudson brace.
5. A rongeur.
6. By cutting between the skull and burr holes with a Gigli saw guide and wire.
7. So wire sutures can be inserted to reattach the flap to the skull.
8. (1) Removal of a spinal cord tumor.
(2) Aneurysm.
(3) Herniated disc.
(4) Repair due to trauma.
9. Sponges are packed along the vertebra with periosteal elevators.
10. A large rongeur.
11. Kerrison rongeurs.
12. The dura is protected with cottonoids.
13. The pituitary rongeur.

440

1. Cubital Tunnel Syndrome.
2. Metzenbaum scissors and hemostatic forceps.
3. To ensure the nerve does not become kinked after closure.

441

1. That none of the muscles, ligaments, or other soft tissue structures needs to be cut or disrupted in any significant way.
2. After being anesthetized on the gurney.
3. Micro video camera with specialized lighting.

Do the unit review exercises before going to the next unit.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter.

Do not return your answer sheet to AFCDA.

73. (435) To assist them in observing the patient's true skin color, many plastic surgeons prefer to use
- tincture of benzoin.
 - a phenolic detergent.
 - a colorless prep solution.
 - only betadine paint (not scrub).
74. (436) During a skin graft, what is done to the donor site *after* the skin has been removed?
- Covered with a saline-soaked sponge.
 - Coated with petroleum jelly.
 - Coated with mineral oil.
 - Left to air dry.
75. (436) What kind of graft comes from the patient's own body?
- Autograft.
 - Cable graft.
 - Patch graft.
 - Porcine graft.
76. (436) During a skin graft, the donor skin is pulled taut with a
- ruler.
 - forcep.
 - hemostat.
 - tongue blade.
77. (437) The use of an endoscope to remove or reposition underlying muscle or tissue of the forehead is known as endoscopic
- brow lift.
 - rhinoplasty.
 - craniotomy.
 - keratoplasty.
78. (437) Once the muscle is removed during an endoscopic brow lift procedure, what do surgeons used to secure the forehead to optimal height?
- Steri strips.
 - Surgical skin staples.
 - Fixation device or suture.
 - Fixation plates and screws.
79. (438) The hair clipped from a neurosurgical patient's head is placed in a plastic bag and is
- thrown away.
 - sent as specimen.
 - taped to the patient's bed.
 - donated to a beauty school.

80. (439) Raney scalp clips are applied to the scalp flap during a craniotomy to
- a. aid in hemostasis.
 - b. prevent edema of the brain.
 - c. anchor self-retaining retractor blades.
 - d. keep hair out of the operative site.
81. (439) During a laminectomy, what type of rongeur excises the lamina and provides access to the disc?
- a. Leksell.
 - b. Cushing.
 - c. Kerrison.
 - d. Stille-Liston.
82. (440) What is the number one nerve entrapment syndrome?
- a. Down syndrome.
 - b. Carpel tunnel syndrome.
 - c. Cubital tunnel syndrome.
 - d. Chronic fatigue syndrome.
83. (440) What position is the patient placed in for an ulnar nerve transposition procedure?
- a. Prone.
 - b. Supine.
 - c. Lithotomy.
 - d. Jack-knife.
84. (441) What endoscopic procedure is performed to remove herniated disc material?
- a. Appendectomy.
 - b. Tracheostomy.
 - c. Craniotomy.
 - d. Discectomy.

Please read the unit menu for unit 7 and continue ➡

Student Notes

Unit 7. Cardiovascular and Thoracic Surgery

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FOR THE FINAL UNIT OF THIS VOLUME we come to two surgical specialties which have expanded rapidly—cardiovascular and thoracic surgery. Like neurosurgery, major chest and vascular procedures are only performed at larger medical facilities because of the expense of special supplies and equipment, as well as the need for specially trained personnel and patient care units. It is impractical to concentrate such effort in small hospitals where few patients would benefit.

7-1. Fundamentals of Cardiovascular and Thoracic Surgery

Any surgery that interrupts the mechanics of either respiration or circulation, or the relationship between these functions, must provide some means of meeting these vital body needs. For instance, when the thoracic cavity is opened, negative pressure is lost around the lungs. When the heart or main branches of the circulatory system are incised, tourniquets can be used for a short period to prevent leakage of blood. Prolonged procedures require artificial oxygenation and pumping the blood to vital body organs. This involves the use of a heart-lung machine. Operations must be planned with these problems in mind. Not only do we need to provide instruments and supplies for correcting the diseased condition, but also equipment to sustain life during the procedure.

442. Common preoperative preparations

Along with routine measures that apply to every surgical patient, some special considerations pertain to patients undergoing cardiovascular and thoracic surgery. Besides the normal preoperative instructions, the patient and family should be made aware of the presence and purpose of chest tubes and the water-drainage system.

A defibrillator with internal and external paddles should be readily available. Emergency medications used to treat hypovolemic shock and cardiac arrest should be readily available also. These medications include:

- Sodium bicarbonate, which raises the pH of the blood during cardiac arrest.
- Epinephrine, which raises the blood pressure.
- Calcium chloride, which increases cardiac muscle and tone.
- Digitalis, which strengthens the heartbeat and decreases the rate.
- Potassium chloride, which promotes normal electrical activity of the cells.
- Calcium gluconate and dopamine, which increases blood pressure by enhancing cardiac contractility.

There should be plenty of blood available in the blood bank prior to surgery. Preoperative x-ray studies should also be available for the surgeon's use in the operating room.

Electrocardiogram and arterial lines are used for monitoring and assessing the patient throughout the procedure. A urinary catheter may be inserted if considerable blood loss is anticipated, or if the procedure involves the renal arteries or clamping the aorta above the renal arteries.

443. Special supplies and equipment

Cardiovascular and thoracic procedure will require special equipment and supplies to sustain life during the surgery. One special piece of equipment is the heart-lung machine, which pumps blood to vital body organs. Other special items discussed in this lesson are monitoring equipment, prostheses, heparinization, and cardioplegic solution.

Heart-lung machine

The terms "heart pump," "lung bypass," "heart-lung machine," "oxygenator," or "extracorporeal circulation" are often used in connection with the process and equipment required during procedures that interrupt the flow of blood to and from the heart and lungs. When the heart must be opened, tubes are usually threaded into each vena cava. These tubes are connected to a pump that allows venous blood to exchange carbon dioxide for oxygen. The oxygenated blood is then introduced into a large artery with enough pressure to circulate through the body. Body temperature may be lowered during this time with the use of a hypothermia unit or by passing the blood through a cooler before it re-enters the body. Lowering body temperature is primarily done because it creates less need for oxygen in the body. When the corrective surgery is completed, the blood is warmed, and the tubes are disconnected from the veins and arteries. All openings are repaired, and the heart and lungs are allowed to resume their normal function.

Monitoring equipment

Vascular monitoring equipment may be used in the operating room to evaluate tissue perfusion. Assessment through palpation can be complicated by the cool environment of the operating room, spasms of the vessel walls, and alterations in blood pressure caused by hemorrhage. Most surgeons use a Doppler device; it uses ultrasonic, high-frequency sound waves to "hear" the movement of blood through a vessel. A pulse volume recorder can also be used. This device measures the volume of blood flow through the vessel by blood pressure cuffs placed distal to the surgical site.

Prostheses

Arterial prostheses are used to replace or bypass diseased vessels. These grafts are made of many different materials; two popular ones being Dacron and Gore-tex. They also may be straight cylinders or bifurcated ("Y"-shaped), and come in various diameters. They are available in knitted or woven form; knitted grafts must be pre-clotted with the patient's own blood. Pre-clotting minimizes blood loss from seepage through the graft interstices. To pre-clot the graft, 30 cubic centimeters (cc) of blood is withdrawn from the patient. The blood is then used to saturate the graft in a small basin a few minutes before it is to be inserted. Knitted grafts are softer and easier to suture and provide for tissue ingrowth. Woven grafts tend to fray on the ends when cut and DO NOT require pre-clotting. Grafts come in various sizes, from 14 millimeters (mm) to 22mm for abdominal procedures, and 4mm to 10mm for the extremities.

Heparinization

To prevent thrombosis during an operative procedure, heparin may be used locally or systemically. Heparin can also be injected directly into the distal artery before the clamp is secured when a vessel is completely occluded during an operation. Five thousand (5000) units of heparin in 500 milliliter (ml) of normal saline is the mixture normally used.

Cardioplegic solution

This solution stops the heart from beating. It contains Xylocaine, dextrose, insulin, potassium chloride, Plasmanate, and tromethamine (THAM). For best results, the solution should be stored at 4°C. It is administered intravenously.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

442. Common preoperative preparations

1. Before cardiovascular and thoracic surgery, what must the patient and his/her family be made aware of (in addition to normal preoperative instructions)?
2. List the emergency medications that must be available for the treatment of hypovolemic shock and cardiac arrest.
3. Under what conditions should a urinary catheter be inserted?

443. Special supplies and equipment

1. Explain how the veins and arteries are connected to the heart-lung machine to re-circulate blood.
2. How and why is blood chilled, and then reintroduced into the body?
3. How is tissue perfusion monitored in the operating room?
4. Why can't this monitoring be accomplished by normal palpation?
5. What is the purpose of a pulse volume recorder?
6. Describe the materials and shapes normally used for arterial graft prosthesis?
7. Why are knitted grafts pre-clotted with the patient's own blood?

8. What is the only benefit of using woven grafts over knitted grafts?
9. List three ways heparin can be used to prevent thrombosis during an operative procedure.
10. What is the normal mixture of heparin used in surgery?
11. What is cardioplegic solution and what does it contain?

7-2. Commonly Performed Cardiovascular Surgical Procedures

As we stated earlier, cardiovascular is not performed at all medical facilities. For those of you who are stationed at medical facilities where these procedures are performed, you will find it to be very challenging. For those of you at smaller medical facilities, hopefully you will be given an opportunity to go to a larger facility where you will be able to see some of these surgical procedures performed.

444. Major cardiovascular procedures

Two major cardiovascular surgeries you may be involved with are a femoral embolectomy and a carotid endarterectomy. A femoral embolectomy (Thrombolectomy) is the removal of an embolus from the femoral popliteal system. A carotid endarterectomy is the removal of an atheroma (a mass of plaque) at the carotid artery bifurcation.

Femoral embolectomy

An embolus is a mass, such as an air bubble, a detached blood clot, or a foreign body, that travels through the bloodstream and lodges in a way that obstructs or occludes a blood vessel. A femoral thrombolectomy is the removal of a thrombus from the popliteal system. A thrombus is a blood clot formed within a blood vessel and remaining attached to its place of origin. The purpose of the procedure is to remove the clot and restore circulation to the limb.

Preparation of the patient

The patient is placed in the supine position with the arms extended on armboards. A Foley catheter is inserted and the electrosurgical ground pad is placed on the non-affected thigh.

Skin preparation

The patient is shaved/clipped preoperatively from the nipple line to toes, bedside to bedside, with a circumferential prep around the legs. The cleansing skin prep begins at the incision site extending from the nipple line to the toes, bedside to bedside, and circumferential around the legs.

Draping

The patient is draped using hand towels around the incision site, a towel over the pubic area, a plastic adhesive drape sheet, and a cardiovascular split sheet and a ¾ sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Umbilical tape.
- Suture material.
- Hemostatic agents.
- Needle counter pad.
- Major instrument set.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Cardiovascular instruments.
- Balloon embolectomy catheter.

Procedure

An incision is made in the groin with a skin knife. The surgeon deepens the wound by dissecting with Metzenbaum scissors and an electrosurgical pencil. Two Weitlaner or Gelpi retractors are positioned to provide maximum operative exposure. The surgeon identifies and carefully dissects around and mobilizes the femoral artery. A moistened umbilical tape is placed around the artery for retraction. A small vascular clamp is clamped over the artery to occlude it and a small incision is made in the artery with a #11 knife blade or Potts scissors. An embolectomy catheter is threaded into the artery and advanced beyond the clot. Once the catheter is properly positioned, the balloon is inflated with a tuberculin syringe and the catheter is withdrawn. The balloon pulls the clot from the artery. The artery is clamped immediately to prevent backflow of blood. If the vessel is too small for the balloon catheter, the surgeon may dilate the vessel with vascular dilators before inserting the catheter. Once the embolus/thrombus is removed, the surgeon irrigates the wound with heparinized saline solution. The arterial incision is closed with 5-0 or 6-0 vascular sutures. A small piece of hemostatic agent may be placed over the suture line to control oozing. The wound is irrigated with normal saline and closed in the routine fashion.

Carotid endarterectomy

The goal of the procedure is to increase cerebral perfusion and to decrease the risk of an embolus forming. The primary indication for this procedure is transient cerebral ischemia; this is a condition where small pieces of plaque break away from the carotid arteries and lodge in small cerebral vessels temporarily blocking blood flow to that particular area of the brain.

Preparation of the patient

The patient is placed in the supine position with the head turned approximately 45 degree to the unaffected side. The patient's head is normally placed on a donut headrest. A shoulder roll may also be placed under the shoulder blades for neck extension. Both arms are tucked at the patient's side. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient's neck and shoulder on the affected side are shaved/clipped preoperatively. The cleansing skin prep begins at the incision site extending upwards to the middle ear on the affected side, across to the midline of the neck and downwards to just below the clavicle. A cotton ball is placed in the patient's ear to prevent solution from entering the ear. A light scrub is used not to dislodge any plaque.

Draping

The patient is draped using hand towels around the incision site and a thyroid drape sheet or pediatric laparotomy drape and a $\frac{3}{4}$ sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Sponges.
- Basin set.
- Vessel loops.
- Shunt clamps.
- Suture material.
- Hemoclip appliers.
- Needle counter pad.
- Minor instrument set.
- Suction tubing and tip.
- Carotid instrument set.
- Electrosurgical handpiece.
- Blades: #10, #11, and #15.

Procedure

The surgeon makes a longitudinal incision over the area of the carotid bifurcation in an anterior line of the sternocleidomastoid. A Weitlaner self-retaining retractor may be used to increase exposure. Small or medium Metzenbaum scissors and DeBakey forceps are used to dissect down to the bifurcation. The internal, common, and external carotid arteries are dissected free and isolated with vessel loops. Heparin is systematically administered, and angled vascular clamps and bulldog vascular clamps are applied to the internal carotid first, then to the external carotid, and finally to the common carotid artery. Vessel loops may be used to occlude the internal and external carotid arteries.

An arteriotomy is made along the lateral portion of the distal common carotid artery. The arteriotomy is extended into the internal carotid artery with Potts coronary scissors. The surgeon may decide to place a shunt. If so, the shunt is placed into the common carotid and internal carotid arteries and is held in place with shunt clamps or clamped with vessel loops or tapes (fig. 7-1). Starting with the distal common carotid artery and moving into the external and internal carotid arteries, plaque is carefully dissected free from the arterial wall with blunt dissection. A freer elevator may be used to elevate the plaque.

After the plaque is removed, the arteries are irrigated with heparinized saline. The arteriotomy is closed with 6-0 and 7-0 Prolene sutures. The surgeon removes the vascular clamp from the common, external, and internal arteries and places a drain. The wound is irrigated and closed in the routine fashion.

445. Minor cardiovascular procedures

Some minor cardiovascular procedures are greater saphenous vein ligation and stripping and coronary artery angioplasty. This greater saphenous vein ligation and stripping procedure is the excision of the saphenous vein and its tributaries. Angioplasty relieves stricture

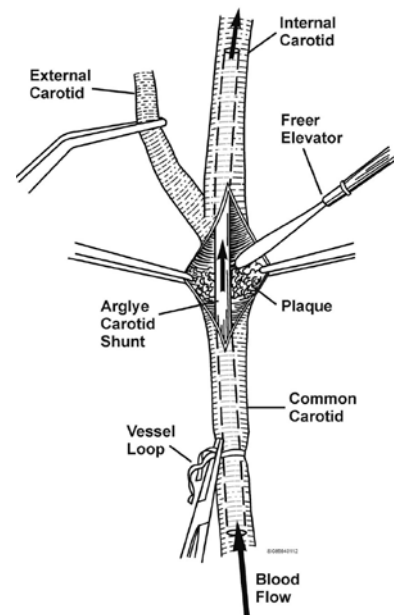


Figure 7-1. Carotid endarterectomy—clamps and shunts in place.

in the left coronary artery system.

Greater saphenous vein ligation and stripping

Vein stripping is indicated for superficial thrombophlebitis of the lower extremities and patients with varicose vein disease secondary to venous valvular incompetence. People whose jobs require long hours of standing (like operating room [OR] techs) are prone to varicose veins.

Preparation of the patient

The patient is placed in the supine position with the arms extended on armboards. The electrosurgical ground pad is placed on the anterior thigh of the unaffected leg if it is a unilateral vein stripping. The pad may be placed on the buttocks if it is a bilateral vein stripping.

Skin preparation

The patient is shaved/clipped preoperatively from the groin down to the ankle on the affected leg. The cleansing skin prep begins at the groin extending downward and circumferentially to the toes.

Draping

A foot sheet is placed over the end of the table while the circulator lifts up the legs. A towel is placed over the pubic area. A split sheet is draped around the leg and the foot is wrapped in a hand towel. A large drape sheet is used to cover the patient's upper body.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Hemoclips.
- Vein strippers.
- Suture material.
- Needle counter pad.
- Minor instrument set.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Marking pen (have available).

Procedure

The groin is entered through an oblique incision over the saphenous vein. The saphenous vein is identified and isolated, and a self-retaining retractor is inserted. The vein is mobilized, clamped, and divided with scissors. The proximal stump is ligated with silk. An incision is made at the distal portion of the ankle. The vein is identified, ligated, and divided. The vein stripper is inserted (fig. 7-2) and advanced to the proximal end of the vein in the groin, and secured with a suture (fig. 7-3). Numerous small incisions may be made along the course of the vein to ligate the tributaries. External compression is applied as the stripper is pulled up the leg (fig. 7-4). The stripper is removed (fig. 7-5 shows the stripped vein on the vein stripper) and all incisions are closed in the routine fashion (fig. 7-6). Fluff dressings are applied and the leg is wrapped with an elastic bandage. For a bilateral procedure, these steps are repeated on the other leg.

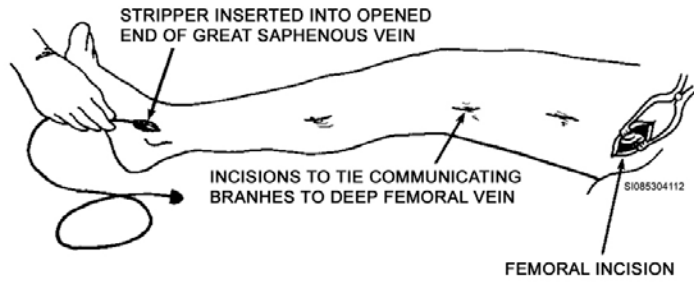


Figure 7-2. Vein stripping—inserting the vein stripper.

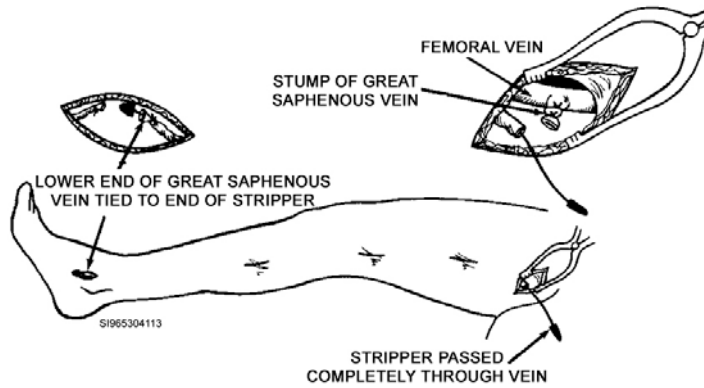


Figure 7-3. Vein stripping—stripper inserted.

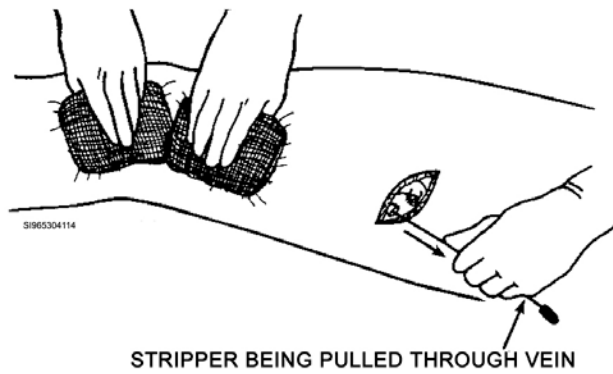


Figure 7-4. Vein stripping—"stripping" the vein.

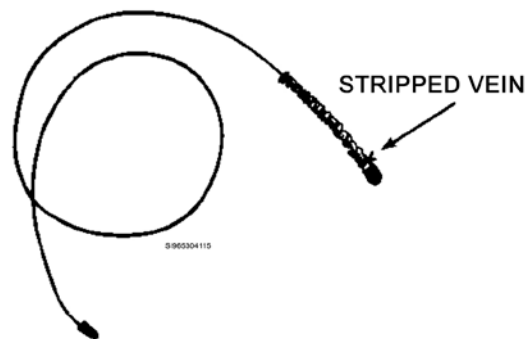


Figure 7-5. Vein stripping—stripped vein.

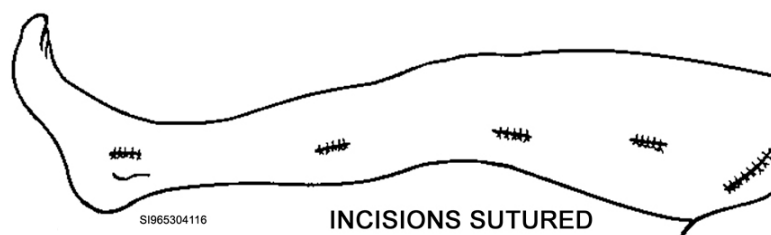


Figure 7-6. Vein stripping—incisions closed.

Coronary artery angioplasty

The angioplasty is a fluoroscopic procedure where a balloon tipped catheter is introduced into the coronary artery to relieve stricture in the left coronary artery system. This stricture is caused by atherosclerotic plaque. This procedure is performed on patients who cannot undergo a bypass grafting procedure. This procedure is usually performed in a catheterization lab. If the procedure is done in the catheterization lab, the operating team is on standby in case a problem occurs that requires surgical intervention. The surgeon can introduce the balloon catheter in an artery through an incision in the femoral or brachial arteries.

Preparation of the patient

The patient is placed in the supine position. Both arms are tucked at the patient's side.

Skin preparation

Appropriate skin preparation is dependent upon which approach the surgeon uses: femoral or brachial. Perform standard shave and cleansing prep for the appropriate area per surgeon's request.

Draping

The patient is draped using hand towels around the incisional site and a laparotomy drape or a cardiovascular split drape.

Instrumentation

The basic supplies include the following:

- Sponges.
- Balloon tipped catheter.
- Percutaneous catheterization kit.

Procedure

With the aid of fluoroscopy, a balloon tip catheter is threaded into the femoral or brachial artery and advanced through the coronary artery into the aorta. Contrast solution is injected to identify the affected area. Once the surgeon confirms the catheter is in the proper position, the balloon is inflated with a saline/water contrast solution so it can be observed under fluoroscopy. The inflation of the balloon enlarges the lumen diameter and forces the plaque against the arterial wall. Once the artery has dilated, the balloon is deflated and removed. Next, contrast media is injected into the coronary artery and films are made to record the results.

446. Endoscopic cardiovascular procedures

Endovascular aneurysm repair (EVAR) is a minimally-invasive (without a large abdominal incision) procedure performed to repair an abdominal aortic aneurysm. EVAR may be performed in an OR, radiology department, or a catheterization laboratory. Aortic aneurysms are often a result of arteriosclerosis. Infection, syphilis, trauma, or a congenital defect may also result in an aneurysm. Symptoms may be vague until the aneurysm enlarges, producing pressure on surrounding organs.

This is usually an elective procedure. If the aneurysm ruptures, emergency surgery must be performed.

Preparation of the patient

The patient is placed in the supine position on a radiolucent OR bed with the arms extended on armboards. A Foley catheter is inserted and the electrosurgical ground pad is placed on the posterior thigh.

Skin preparation

The patient is shaved/clipped preoperatively from the xiphoid process to the mid-thighs, bedside to bedside. The cleansing skin prep begins at the midline extending from the axillae to the mid-thighs, and bedside to bedside.

Draping

The patient is draped using hand towels around the incision site, a towel over the pubic area, a plastic adhesive drape sheet, and a laparotomy drape sheet to allow conversion to an open surgical technique, if necessary.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Hemoclips.
- Cell saver.
- Stent-Graft.
- Suture material.
- Needle counter pad.
- Hemostatic agents.
- Major instrument set.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Endo cardiovascular instruments.
- Penrose drains, umbilical tapes, vessel loops.

NOTE: Traditional open instrumentation should always be pulled and on standby during this procedure just in case the aneurysm ruptures.

Procedure

The physician will make a small cutdown incision in each groin to expose the femoral arteries. Using fluoroscopy, the physician will insert a needle into the femoral artery through which a guidewire will be passed and advanced to the aneurysm site. The needle will be removed and a sheath slid over the guidewire. An arteriogram will be performed with contrast dye to mark the renal arteries and aortic bifurcation clearly. The final length of the device to cover the aorta from the renal arteries to a suitable section of the common iliac arteries is chosen. The physician will use special endovascular instruments and x-ray images for guidance. A stent-graft will be inserted through the femoral artery and advanced up into the aorta to the site of the aneurysm. The stent-graft, in a collapsed position until after it is inserted, will be advanced up into the aorta and situated at the aneurysm site. The stent-graft will be expanded (in a spring-like fashion) and attached to the wall of the aorta. An arteriogram

will be repeated to check for an endoleak (blood leaking out into the aneurysm sac) of the stent-graft. Once no leak has been determined, the instruments will be removed and the incisions are closed with subcuticular sutures.

447. Laser cardiovascular procedures

The Endovenous Laser Treatment (EVLT) procedure is an alternative minimally invasive laser procedure in treating varicose veins. The laser energy minimizes the vein walls, shrinking them and closing the faulty vein so that the blood cannot flow through it. This eliminates the bulging of the vein at its source. After the treatment, the blood in the faulty veins will be diverted to the many normal veins in the leg. The procedure leaves no visible scarring; there is minimal postoperative pain, and a quick recovery period gains immediate relief from symptoms.

Preparation of the patient

The patient is placed in the supine position with the arms extended on armboards. The electrosurgical ground pad is placed on the anterior thigh of the unaffected leg if it is a unilateral vein ablation. The pad may be placed on the buttocks if it is a bilateral vein ablation. The patient is given a pair of laser glasses to avoid eye injury.

Skin preparation

The patient is shaved/clipped preoperatively behind the knee if needed. The cleansing skin prep begins at the lower thigh extending downward and circumferentially to the toes.

Draping

A foot sheet is placed over the end of the table while the circulator lifts up the leg/legs. A towel is placed over the pubic area. A split sheet is draped around the leg and the foot is wrapped in a hand towel. A large drape sheet is used to cover the patient's upper body.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Laser probe.
- Marking pen.
- Suture material.
- Needle counter pad.
- EVLT procedure kit.
- Minor instrument set.
- Ultrasound probe and sterile cover.
- Electrosurgical handpiece (have available).

Procedure

The surgeon begins the procedure by using ultrasound equipment to map out the vein that will be lasered. Once the vein has been mapped small amounts of local anesthetic is applied and a needle is placed in the diseased vein through a small entry point near the knee. A laser probe is then inserted through the catheter using ultrasound visualization of the vein to verify its position and the laser is slowly heated with low energy. The laser energy damages the vein walls causing it to shrink and collapse around it. The collapsed vein soon shrinks and disappears. Following the procedure, a bandage or compression hose is placed on the treated leg.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

444. Major cardiovascular procedures

1. What is an embolus?
2. What is a thrombus?
3. What is the purpose of performing a femoral embolectomy/thrombolectomy?
4. What position is a patient placed for a femoral embolectomy/thrombolectomy?
5. Why is an umbilical tape placed around the femoral vein during an embolectomy/thrombolectomy?
6. How is an embolectomy catheter used to help remove a blood clot?
7. What type of syringe is used to inflate an embolectomy catheter?
8. What does the surgeon do if a vein is too small for a balloon catheter?
9. What does the surgeon irrigate the wound with once the embolus/thrombus is removed?
10. Define carotid endarterectomy.
11. What is an atheroma?
12. What is the goal of performing a carotid endarterectomy?

13. When performing cleansing skin prep for a carotid endarterectomy, why is it important to perform a soft, gentle skin prep?
14. Where does the surgeon make the initial incision for a carotid endarterectomy?
15. During a carotid endarterectomy, which three carotid arteries are dissected free and isolated with vessel loops?
16. What order are the carotid arteries clamped during a carotid endarterectomy?
17. If the surgeon decides to place a shunt in the common carotid and internal carotid arteries during a carotid endarterectomy, how is the shunt held in place?
18. What instrument may be used to elevate plaque from the carotid arteries?
19. Once the plaque is removed from the carotid arteries, what type of irrigation solution is used to irrigate the wound?

445. Minor cardiovascular procedures

1. When is stripping of the greater saphenous vein indicated?
2. How is a procedure for ligation and stripping of the saphenous vein started?
3. Describe the method used to insert the vein stripper.
4. What is an angioplasty?
5. If an angioplasty is performed in the catheterization lab, what is the role of the operating room team?

6. What two arteries can be used to introduce the balloon catheter during an angioplasty?
7. What type of solution is injected during an angioplasty to help identify the affected area?
8. What happens when the balloon catheter is inflated during an angioplasty?

446. Endoscopic cardiovascular procedures

1. List five possible causes of aortic aneurysms.
2. What is the usual symptom of aortic aneurysm?
3. Describe the incision used for an endovascular aneurysm repair.
4. Why is an arteriogram performed at the beginning of an endovascular aneurysm repair?

447. Laser cardiovascular procedures

1. What procedure is a minimally invasive alternative to correct varicose veins?
2. Describe the beginning of an EVLT procedure.
3. What item is used to verify catheter placement within the diseased vein?

7-3. Commonly Performed Thoracic Surgical Procedures

With the AF downsizing many of its medical facilities thoracic surgery has become much like cardiovascular surgery and is only performed in a few of the larger facilities. Improved techniques with lasers and video equipment have allowed the field of thoracic surgery to expand, increasing the recovery rates for those patients diagnosed with thoracic disease. Let's take a look at a few of the more commonly performed thoracic procedures.

448. Major thoracic procedures

Surgeons perform thoracic procedures to treat ailments concerning the thoracic organs.

Cardiothoracic surgery involves major procedures such as a thoracotomy, coronary artery bypass, and closure of patent ductus arteriosus.

Thoracotomy

A thoracotomy is an incision into the thoracic cavity to provide surgical access to the organs of the chest.

Preparation of the patient

The patient is placed in the lateral position with the bottom arm extended on an armboard and the top arm extended on a Mayo tray cushioned with a pillow. The electrosurgical ground pad is placed on the lateral thigh.

Skin preparation

The patient is shaved/clipped preoperatively from the mid-sternum to mid-back on the affected side. It also includes the area from the neck to the hip, including the arm, shoulder, and axilla. The cleansing prep starts at the incisional site extending from the mid-sternum to the mid-back.

Draping

The patient is draped using four hand towels, a foot sheet, and a transverse drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Chest tubes.
- Suture material.
- Needle counter pad.
- Chest drainage setup.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Thoracotomy instrument set.
- Stapling devices (have available).

Procedure

An incision is made over the area to be resected. When the intercostal space has been reached, the chest cavity is entered. The intercostal incision is extended and hemostasis of the periosteum is maintained. If a rib is to be removed, the periosteum is incised along the anterior surface. An elevator is then used to strip the rib free from the periosteum. The rib is cut free with rib shears and removed (fig. 7-7). The sharp edges of the remaining rib stump are trimmed with a Stille-Leur rongeur to prevent trauma to the surrounding tissues. The wound edges are protected with lap sponges and the appropriate retractor is placed between the ribs. The retractor is opened slowly; the chest cavity is now open.

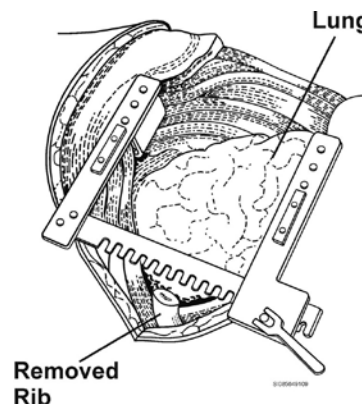


Figure 7-7. Thoracotomy—lung exposed.

After the surgical procedure is completed, chest tubes are inserted. Pericostal sutures are placed around the ribs. A rib approximator is used to bring the ribs together. The pericostal sutures are tied while the approximator is in place. The wound is then closed in the routine fashion.

Coronary artery bypass

This procedure is the bypass of a blocked portion of one or both coronary arteries by using a portion of the greater saphenous vein, internal mammary artery, or both, to improve circulation to the heart muscle.

Preparation of the patient

The patient is placed in the supine position. The arms are tucked at the sides after the necessary arterial lines are placed. A Foley catheter is inserted and the electrosurgical ground pad is placed on the buttocks.

Skin preparation

The patient is shaved/clipped preoperatively from the neckline to the ankles, bedside to bedside, including the groin area. The cleansing skin prep requires two people or the use of a leg holder. The prep begins at the middle of the chest, extending to the neckline, down to the pubic symphysis, bedside to bedside. Both of the legs are prepped circumferentially, with the groin area prepped last.

Draping

A foot sheet is placed on the end of the table while the legs are lifted up by the circulators. A towel is placed over the genitalia. Split sheets are wrapped around each leg and the feet are wrapped in towels to form “boots.” Towels are placed along the sides and across the sternal notch, followed by large drape sheets. Sterile, adhesive plastic drapes are applied across the chest and abdomen.

Instrumentation

The basic instruments and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Hemoclips.
- Oscillating saw.
- Suture material.
- Hemostatic agent.
- Heparinized saline.
- Needle counter pad.
- Suction tubing and tip.
- Cardiac instrument set.
- Electrosurgical handpiece.
- Assorted syringes and needles.

Procedure

A median sternotomy (opening the chest by splitting the sternum) is performed, and the heart is cannulated for a cardiopulmonary bypass. The graft is taken from the greater saphenous vein, internal mammary artery, or a combination of both. (We discuss the procedure using the saphenous vein.) To help control possible contamination from the patient’s legs and feet to the chest, the assistant and a second technologist use a separate setup to remove the vein.

The aorta is occluded and cardioplegic solution is administered into the aortic root through an indwelling catheter. The coronary artery is isolated and opened with dilators. The graft is anastomosed to the artery and checked for leaks. The aorta is released and the indwelling catheter is removed. A segment of the aorta is occluded with a vascular clamp. A hole is created in the occluded portion with a number 11 knife blade and aortic punch. The vein is cut to the appropriate length, and the anastomosis is performed between the vein and hole in the aorta. Each anastomosis is completed and the clamp is removed from the aorta. The grafts are checked for leaks, and all sources of air bubble accumulation are vented. Cardiopulmonary bypass is ended and the surgeon decannulates. The wound is irrigated with antibiotic solution. Temporary pacemaker electrodes are sutured to the heart. Chest tubes are inserted and the wound is closed in the routine fashion.

Closure of patent ductus arteriosis

This procedure is the closure of an unnatural opening between the pulmonary artery and descending thoracic aorta. This opening is normal prenatal, but if the ductus remains patent after birth, the heart has to work harder. This causes subsequent enlargement and hypertrophy of the left ventricle and atrium. In many infants where this occurs, there are no signs of distress. Because the blood is oxygenated, there is no cyanosis, clubbing, or peripheral arterial oxygen saturation. A harsh, continuous murmur is a frequent clinical sign associated with this condition.

Preparation of the patient

The infant is placed in the right lateral position. The pediatric electrosurgical ground pad is placed.

Skin preparation

The infant is not shaved/clipped preoperatively. The cleansing skin prep begins at the incisional site and extends outwards to the axilla, mid-back and chest, down to the iliac crest.

Draping

The patient is draped using hand towels and a pediatric laparotomy drape sheet.

Instrumentation

The basic instruments and supplies include the following:

- Blades.
- Sponges.
- Basin set.
- Suture material.
- Needle counter pad.
- Patent ductus clamps.
- Suction tubing and tip.
- Electrosurgical handpiece.
- Pediatric thoracotomy instrument set.

Procedure

A left posterolateral approach is used to begin this procedure. A thoracotomy is performed, and the pleura is retracted with stay sutures. With the advancement of video-assisted thoracoscopic surgery, surgeons may opt to perform this procedure using pediatric thoroscopes and instrumentation. For a traditional thoracotomy, the surgeon dissects between the aortic arch and pulmonary artery exposing the ductus. If a thorascopic approach is used the surgeon performs dissection with endoscopic graspers and electrocoagulation. Silk sutures on a passer are passed around the ductus. The parietal pleura is dissected, and stay sutures are inserted for retraction. The adventitial layer is dissected free. Dissection is continued until the ductus is totally isolated. A ligature is placed near the aorta, the other

near the pulmonary side of the ductus, and tied into place. Two transfixation sutures are placed between the two ligatures. An endoscopic clip applier is used during a thorascopic approach to achieve closure of the ductus. Using interrupted sutures, the mediastinal pleura is closed. A chest tube is inserted, and the chest is closed in the routine fashion.

449. Minor thoracic procedures

Implanting a pacemaker involves the placement of pacemaker electrodes to the heart. The purpose of the pacemaker is to manage dysrhythmias or irregular heartbeats. The pacemaker corrects bradycardia and heart block, and controls arrhythmias. The implantation of a pacemaker can be on a temporary or permanent basis. Pacemakers are used on a temporary basis during cardiac procedures. They are used on a permanent basis to continually regulate the heartbeat and manage dysrhythmias.

The permanent pacemaker has a pulse generator and electrodes. There are two types of electrodes that can be used: endocardial leads and epicardial leads. The endocardial leads are usually placed through the subclavian vein into the right ventricle or atrium. The epicardial leads are attached directly to the myocardium. A lithium battery powers the pulse generator. It usually has a battery life of 6-10 years before needing surgical replacement.

The pulse generator has two modes: asynchronous (fixed rate) and standby (demand). The asynchronous mode fires at a preset rate and is rarely used because it competes with the heart's regular beat. The standby mode senses the patient's heartbeat and is activated when the heart rate drops below a preset standard. There are three approaches used for the implantation of a permanent pacemaker; they are transvenous, epicardial, and subxiphoid. For the purposes of our discussion, we will discuss the transvenous approach.

Preparation of the patient

The patient is placed in the supine position. Both arms are tucked at the patient's side. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

If the surgeon desires, the patient is shaved/clipped preoperatively from the lower jaw to the umbilicus. The cleansing skin prep begins at the incision site extending upwards to the neck and lower jaw, across the chest, and downwards to the pubis, bedside to bedside.

Draping

The patient is draped using hand towels around the incisional site and a laparotomy drape.

Instrumentation

The basic instrumentation and supplies include the following:

- Blades.
- Sponges.
- Suture material.
- Needle counter pad.
- Minor instrument set.
- J-tipped guidewire set.
- Suction tubing and tip.
- Electrosurgical handpiece.

Procedure

For placement of a permanent pacemaker, the surgeon makes a short transverse incision on the upper chest. This creates a pocket for the generator to be placed in (fig. 7-8). The patient is placed in the

Trendelenburg position and the head is rotated to the opposite side. The surgeon attaches a large gauge needle to a syringe and introduces it into the right subclavian vein. Venous blood is aspirated into the syringe to verify correct placement. The syringe is removed and a J-tipped guidewire is threaded through the needle and guided into the right atrium. Fluoroscopy is used to aid the surgeon in guiding the wire and ensuring proper placement. The needle is then removed from over the J wire and a dilator sheath assembly is placed over the wire and into the subclavian vein. Under fluoroscopy, an electrode is inserted into the sheath and into the right ventricle apex where it is stabilized. The surgeon verifies proper lead placement and the sheath is removed. The electrodes are attached to an external generator and tested. Once the proper pacing is set, the electrodes are attached to the pulse generator. The pulse generator is inserted into the chest pocket and the incision is closed in a routine fashion.

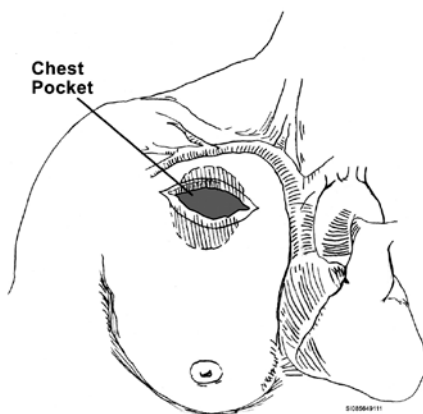


Figure 7-8. Pacemaker—generator pocket.

450. Endoscopic thoracic procedures

Mediastinoscopy is the insertion of a lighted instrument into the mediastinal space. It is done to confirm a diagnosis of cancer or obtain tissue specimens for examination.

Preparation of the patient

The patient is placed in the supine position with the arms tucked at the side. A small rolled towel is placed under the shoulders to hyperextend the neck. The electrosurgical ground pad is placed on the anterior thigh.

Skin preparation

The patient is shaved/clipped from the neckline to the waist preoperatively. The cleansing skin prep begins at the suprasternal notch working outwards to the neckline down to the waist, bedside to bedside.

Draping

The patient is draped using four hand towels, a foot sheet, and a laparotomy drape sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Sponges.
- Basin set.
- Suction tubing.
- Suture material.
- Needle counter pad.

- Fiberoptic light cord.
- Fiberoptic light source.
- Electrosurgical handpiece.
- Mediastinoscopy instrument set.

Procedure

A small incision is made above the suprasternal notch to expose the pretracheal fascia. The plane beneath the pretracheal fascia is developed into the mediastinum on both sides of the trachea. The mediastinoscope is inserted under direct vision. The tracheal bifurcation, bronchi, aortic arch, and lymph nodes are visualized. If needed, tissue specimens are collected. The mediastinoscope is withdrawn and the incision closed in the routine manner.

451. Laser thoracic procedures

Bronchoscopy is the direct visualization of the mucosa of the trachea, the main bronchi and their openings, and most of the segmental bronchi. It is also performed to identify and determine the presence of a lesion in the tracheobronchial passage.

Preparation of the patient

The patient is placed in the supine position with the arms tucked at the side, to protect the ulnar nerves. A small rolled towel is placed under the shoulders to hyperextend the neck and a donut or foam headrest may be used to stabilize the patients head. The operating table is turned 90 degrees to allow the surgeon to be positioned above the patients head.

Skin preparation

No prep is required for this procedure.

Draping

The patient is draped using a head wrap or cover sheet.

Instrumentation

The basic instrumentation and supplies include the following:

- Sponges.
- Small basin.
- Lukens trap.
- CO₂ laser supplies.
- Specimen containers.
- Fiberoptic light carrier.
- Fiberoptic bronchoscope.
- Fiberoptic bronchoscope telescopes.
- Aspirating tubes and suction tubing.

Procedure

The surgeon begins the procedure by connecting light cords, suction tubing, and the placement of a tooth protector inside the patient's mouth before inserting the rigid scope. With the scope inserted and suspended for better visualization, the surgeon can begin to explore and biopsies may be taken. Benign lesions may be removed with the use of a CO₂ laser. It is important to remember to follow and employ proper laser safety measures when a laser is used. Some surgeons may opt to remove lesions using traditional surgical techniques.

Once all lesions are removed, hemostasis is verified and the scope is removed. Cleansing of the patient face is performed if needed.

Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

448. Major thoracic procedures

1. In a thoracotomy procedure, if a rib is to be removed, how is the periosteum incised?
2. How is a rib removed?
3. Which instrument is used to bring the ribs back together?
4. Where is the electrosurgical ground pad placed for bypass surgery?
5. How are the feet and legs draped for bypass surgery?
6. What is the usual source for arterial grafts for coronary artery bypass surgery?
7. How is possible contamination from the patient's legs and feet avoided when excising a portion of the saphenous vein?
8. Once the aorta is occluded, how is the cardioplegic solution administered?
9. Which knife blade is used to open the occluded portion of the aorta?
10. Why is it advantageous to surgically close an unnatural opening between the pulmonary artery and the descending thoracic aorta?
11. What type of approach is used to begin the closure of a patent ductus arteriosus?

12. Once the parietal pleura are dissected, which sutures are inserted for retraction?

13. How far is dissection continued once the adventitial tissue is isolated?

449. Minor thoracic procedures

1. What is the purpose of implanting a pacemaker?
2. Name the two types of electrodes used on an external pacemaker; and describe how each is connected to the heart.
3. What type of battery is used to power the pulse generator of a pacemaker; and how long does it usually last before needing surgical replacement?
4. Briefly describe the difference between the asynchronous (fixed rate) and standby (demand) modes of the pacemaker.
5. What are the three approaches used for the implantation of a permanent pacemaker?
6. Why does the surgeon make a short transverse incision on the left upper chest during the implantation of a pacemaker?
7. Which vein is used to introduce the J-tipped guide wire when implanting a pacemaker?
8. What does the surgeon use to ensure proper placement of the guide wire in the atrium?
9. Where is the permanent pacemaker electrode inserted into and stabilized when using the transvenous approach?

450. Endoscopic thoracic procedures

1. List two purposes for mediastinoscopy.
2. To perform mediastinoscopy, where is the incision made to expose the pretracheal fascia?
3. In particular, which structures are visualized?

451. Laser thoracic procedures

1. Why is rigid bronchoscopy performed?
2. What item is used to hyperextend the patient's neck and where is it placed?
3. Briefly describe the beginning of a rigid bronchoscopy procedure.
4. Why does the surgeon suspend the rigid scope after insertion?

Answers to Self-Test Questions**442**

1. The presence and purpose of chest tubes and the water-drainage system.
2. Sodium bicarbonate, epinephrine, calcium chloride, digitalis, potassium chloride, calcium gluconate, and dopamine.
3. If considerable blood loss is anticipated, or if the procedure involves the renal arteries or clamping the aorta above the renal arteries.

443

1. The tubes are usually threaded into each vena cava and connected to a pump that allows venous blood to exchange CO₂ for O₂. The oxygenated blood is then introduced into a large artery with enough pressure to circulate through the body.
2. Body temperature may be lowered by passing the blood through a chiller after it leaves the body, before the heart-lung unit pumps it back into the body. Lowering body temperature allows the body to use lowered levels of oxygen during extended surgeries.
3. By using vascular monitoring equipment, usually a Doppler device.

4. Because of complications due to the cool temperatures of the operating room, spasms of the vessel walls, and alterations in blood pressure caused by hemorrhage.
5. The measurement of the volume of blood flow through the vessel by blood pressure cuffs placed distal to the surgical site.
6. These grafts are made of many different materials, two popular ones being Dacron and Gore-tex. They also may be straight cylinders or bifurcated ("Y"-shaped), and come in various diameters.
7. Pre-clotting minimizes blood loss from seepage through the graft interstices.
8. Woven grafts do not require pre-clotting.
9. Heparin may be used locally, systemically, or injected directly into the distal artery.
10. 5000 units in 500 ml of normal saline.
11. The solution stops the heart from beating. It contains Xylocaine, dextrose, insulin, potassium chloride, Plasmanate, and THAM.

444

1. A mass, such as an air bubble, a detached blood clot, or a foreign body, that travels through the bloodstream and lodges so as to obstruct or occlude a blood vessel.
2. A blood clot formed within a blood vessel and remaining attached to its place of origin.
3. To remove clot to restore circulation to a limb.
4. The patient is placed in the supine position with the arms extended on armboards.
5. For retraction.
6. It is threaded into the artery and advanced beyond the clot. Once the catheter is properly positioned, the balloon is inflated with a tuberculin syringe and the catheter is withdrawn. The balloon pulls the clot from the artery.
7. Tuberculin syringe.
8. Dilates the vessel with vascular dilators before inserting the catheter.
9. Heparinized saline solution.
10. The removal of an atheroma at the carotid artery bifurcation.
11. A mass of plaque.
12. To increase cerebral perfusion and to decrease the risk of an embolus forming.
13. So you will not dislodge any plaque.
14. Over the area of the carotid bifurcation in an anterior line of the sternocleidomastoid.
15. The internal, common, and external carotid arteries.
16. Internal carotid first, then to the external carotid, and finally the common carotid artery.
17. It is held in place with shunt clamps or clamped with vessel loops or tapes.
18. A freer elevator.
19. Heparinized saline.

445

1. For superficial thrombophlebitis of the lower extremities, or in patients with varicose vein disease secondary to valvular incompetence.
2. By entering the groin through an oblique incision over the saphenous vein.
3. The vein stripper is inserted through an incision at the distal portion of the ankle and advanced to the proximal end of the vein in the groin, where it is secured with a suture.
4. A fluoroscopic procedure where a balloon tipped catheter is introduced into the coronary artery to relieve stricture in the left coronary artery system.
5. To be on standby in case a problem occurs that requires surgical intervention.
6. The femoral or brachial arteries.
7. Contrast media.
8. The lumen diameter is enlarged and the plaque is forced against the arterial wall.

446

1. (1) Arteriosclerosis.
(2) Infection.
(3) Syphilis.
(4) Trauma.
(5) Congenital defect.
2. Pressure on surrounding organs.
3. A small cutdown incision in each groin.
4. To clearly mark the renal arteries and aortic bifurcation.

447

1. EVLT.
2. The surgeon begins the procedure by using ultrasound equipment to map out the vein that will be lasered.
3. Ultrasound.

448

1. Along the anterior surface.
2. The rib is stripped free from the periosteum using an elevator, and then cut free with rib shears.
3. A rib approximator.
4. On the buttocks.
5. Split sheets are wrapped around each leg and the feet are wrapped in towels to form “boots.”
6. The greater saphenous vein or internal mammary artery.
7. A separate setup is used by the assistant and a second technologist.
8. Through the indwelling catheter.
9. Number 11.
10. If not performed, the heart has to work harder and causes subsequent enlargement and hypertrophy of the left ventricle and atrium.
11. A left posterolateral approach.
12. Stay sutures.
13. Until the ductus is totally isolated.

449

1. It is used to manage dysrhythmias or irregular heartbeats. It also corrects bradycardia and heart block, and controls arrhythmias.
2. Endocardial leads and epicardial leads; the endocardial leads are usually placed through the subclavian vein into the right ventricle or atrium, and the epicardial leads are attached directly to the myocardium.
3. A lithium battery; it usually has a battery life of 6-10 years.
4. The asynchronous mode fires at a preset rate and the standby mode senses the patient's heartbeat and is activated when the heart rate drops below a preset standard.
5. Transvenous, epicardial, and subxiphoid.
6. To create a pocket for the generator to be placed in.
7. Right subclavian vein.
8. Fluoroscopy.
9. Into the right ventricle apex.

450

1. To confirm cancer or obtain specimens for examination.
2. Above the suprasternal notch.
3. The tracheal bifurcation, bronchi, aortic arch, and lymph nodes.

451

1. To identify and determine the presence of a lesion in the tracheobronchial passage.
2. Small rolled towel is placed under the shoulders.
3. The surgeon begins the procedure by connecting light cords, suction tubing, and the placement of a tooth protector inside the patient's mouth before inserting the rigid scope.
4. For better visualization.

Unit Review Exercises

Note to Student: Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter. When you have completed all unit review exercises, transfer your answers to the Field Scoring Answer Sheet.

Do not return your answer sheet to AFCDA.

85. (442) During cardiovascular or thoracic surgery, electrocardiogram and arterial lines are used for
- infusing blood or blood products.
 - administration of anesthetic agents.
 - monitoring and assessing the patient.
 - all of the above.
86. (443) To prevent thrombosis during surgery, when can heparin be injected directly into the distal artery?
- Heparin should not be injected into an artery.
 - Before a clamp is secured when a vessel is completely occluded.
 - After a clamp when a vessel is completely occluded.
 - While the clamp is secured on the vessel.
87. (443) What material is used to preclot a graft?
- Blood.
 - Saline.
 - Heparin.
 - Avitene.
88. (444) During a femoral embolectomy, once the embolectomy catheter is properly positioned, what happens *after* the balloon is inflated and the catheter is withdrawn?
- The artery is immediately clamped to prevent backflow of blood.
 - A moistened umbilical tape is placed around the artery for retraction.
 - A small vascular clamp is clamped over the artery to occlude it.
 - A small incision is made in the artery.
89. (444) What instrument is used to elevate plaque during a carotid endarterectomy procedure?
- DeBakey forceps.
 - vascular dilators.
 - Potts scissors.
 - freer elevator.
90. (445) Greater saphenous vein stripping is indicated for patients with superficial
- ulceration.
 - embolism.
 - atheriosclerosis.
 - thrombophlebitis.
91. (446) Why is an arteriogram performed at the end of an endovascular aneurysm repair procedure?
- Check for retrobulbar blockage.
 - Check for an endoleak of the stent-graft.
 - Make sure the fluoroscopy machine is working.
 - Make sure the radiolucent OR bed is positioned properly.

92. (446) What type of sutures is used to close the incision site after endovascular aneurysm repair?
- a. Running.
 - b. Interrupted.
 - c. Purse string.
 - d. Subcuticular.
93. (447) What position is the patient placed in to perform an endovenous laser treatment?
- a. Prone.
 - b. Supine.
 - c. Fowler's.
 - d. Lithotomy.
94. (447) At the *beginning* of an endovenous laser treatment procedure, the surgeon uses ultrasound equipment to
- a. verify proper needle placement.
 - b. to check for femoral aneurysms.
 - c. map out the vein that will be lasered.
 - d. to check and see if the patient is pregnant.
95. (448) During a coronary artery bypass, what must be done *before* the aorta is released and the indwelling catheter is removed?
- a. The graft is anastomosed to the artery and checked for leaks.
 - b. The anastomosis is performed between the vein and hole in the aorta.
 - c. Cardiopulmonary bypass is ended and the surgeon decannulates.
 - d. Each anastomosis is completed and the clamp is removed from the aorta.
96. (448) The opening between the aorta and pulmonary artery, which exists prenatally, but closes soon after birth, is called a
- a. tricuspid valve.
 - b. pulmonary artery bond.
 - c. coarctation of the aorta.
 - d. patent ductus arteriosus.
97. (449) A pacemaker is implanted into a patient to manage
- a. angina.
 - b. dysrhythmias.
 - c. gastric reflux.
 - d. high blood pressure.
98. (449) What equipment is used to aid the surgeon in guiding a J-tipped guidewire into the right atrium when implanting a pacemaker?
- a. Teflon pledgets.
 - b. Doppler probe.
 - c. Fluoroscopy.
 - d. Vessel loops.
99. (450) Which structure is visualized during mediastinoscopy?
- a. Spleen.
 - b. Larynx.
 - c. Tracheal bifurcation.
 - d. Common bile duct bifurcation.

100. (451) What type of laser is used to remove benign lesions during laser assisted rigid bronchoscopy procedures?
- a. CO₂.
 - b. Argon.
 - c. Excimer.
 - d. Holmium.

Student Notes

Glossary

Terms

anastomosis—The joining of two parts.

aneurysm—A sac-like bulge in an artery or vein.

anteversion—Tipping forward or tilted.

approximate—To bring tissue together with sutures or another means.

attenuated—Thinned or weakened.

bifurcated—Having two branches; Y-shaped.

blunt dissection—The use of a sponge or blunt instrument to separate tissue.

cannula—A tube for insertion into the body; lumen has a trocar in place for insertion.

cannulate—Introduce a cannula.

cornu—Anatomical description of a structure resembling a horn in shape.

cystocele—Bulging of the bladder.

desiccation—Drying up of a substance.

esmark bandage—A rubber bandage used to wrap an extremity to force blood from it before applying a tourniquet.

exostosis—A bony growth on a bone usually covered with cartilage.

extracorporeal—Occurring outside of the body.

fixation—To hold fractured bone fragments in place.

hematuria—Blood in the urine.

hemostatic agent—A drug which induces coagulation of blood.

hydronephrosis—Occurs when the ureter becomes obstructed and urine backs up into the renal pelvis.

hypertrophy—The overgrowth or enlargement of an organ.

ilioinguinal—Pertains to the iliac and inguinal area of the body.

in situ—In the original or natural place.

ligate—To tie, usually a vessel.

lumen—Cavity or channel within a tubular structure.

methylnmethacrylate—Acrylic bone cement used to hold prosthesis in place.

patent—Open.

pneumoperitoneum—Gas or air in the peritoneal space.

polyp—Protruding mass of mucous membrane.

rectocele—Bulging of the rectum.

reperitonealization—Replacement of the bladder flap.

resect—To cut off and remove a segment of tissue or bone.

scarpa's fascia—Membranous layer of subcutaneous abdominal fascia.

sharp dissection—The use of a scalpel or sharp instrument to separate tissue.

stricture—A narrowing in a body cavity.

systemic—Involving the whole body rather than a localized area.

torsion—The twisting of an organ, causing a diminished blood supply to the affected area.

tromethamine—An alkalizer, used intravenously to correct metabolic acidosis.

tunica vaginalis—Serous membrane which covers the front and sides of the testes and epididymis.

vaginae fornix—Area formed between the vaginal part of the cervix and vaginal wall.

Abbreviations and Acronyms

AK	above the knee
AFSC	Air Force specialty code
BK	below the knee
BSS	balanced salt solution
C	Cesarean
cc	cubic centimeter
CDC	career development course
cm	centimeter
D & C	dilatation of the cervix and uterine curettage
ENT	ear, nose, and throat
EVAR	endovascular aneurysm repair
EVLT	endovenous laser treatment
FESS	functional endoscopic sinus surgery
GIA	gastro-intestinal anastomosis
GU	genitourinary
IOL	intraocular lens implant
LAVH	laparoscopic assisted vaginal hysterectomy
LDS	ligate and dividing stapler
ml	milliliter
mm	millimeter

OB/GYN	Obstetric and Gynecological
OR	operating room
PRK	photorefractive keratectomy
T&A	tonsillectomy and adenoidectomy
TA	thoraco-abdominal
TAH	total abdominal hysterectomy
THAM	tromethamine
TM	transmetatarsal
TMJ	temporomandibular joint arthroscopy
TURB	transurethral resection of the bladder
TURBT	transurethral resection of the bladder tumors
TURP	transurethral resection of the prostate
TVH	total vaginal hysterectomy
UPPP	uvulopalatopharyngoplasty
UV	ultraviolet

Student Notes

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