

5 Anesthesia

Guiding Principles

In general, the aim of anesthesia is to reduce the client's anxiety and her perception of and experience of pain to allow performance of a surgical procedure. As such, it is particularly important in minilaparotomy, as this is an ambulatory procedure often performed under local anesthesia, with or without sedation.

In selecting the anesthesia regimen, providers should consider the following:

- The regimens chosen must be within the providers' technical capabilities.
- Drugs chosen should be safe, affordable, readily available, and in constant supply.
- Regimens must be comfortable for the client.
- In most cases, the type and frequency of likely complications must be manageable at the facility.
- Local protocols for anesthesia management are followed.

Because clients are usually awake during properly administered local anesthesia, the following are basic components of successful management of anesthesia for minilaparotomy procedures:

- Prior provision of information to clients on what to expect during the procedure
- Communication with, and support of, clients before, during, and after the surgery
- Gentle and precise surgical technique
- Adequate local anesthesia and, if used, appropriate sedation and analgesia

Preoperative Assessment

The preoperative assessment is usually performed before the procedure is scheduled (see Chapter 4). However, on the day of the surgery, the surgeon should confirm that the client still is a suitable candidate for the procedure to be done under local anesthesia, with or without sedation.

General, regional, or local anesthesia can be used for female sterilization procedures. Each of these broad categories of anesthesia has certain advantages and disadvantages, as well as risks and benefits. Selection of an anesthesia regimen will be determined by multiple factors, including the surgical approach, the skills of the surgeon, the availability of an anesthesiologist, the client's safety and comfort, the client's preference (in some instances), the availability of equipment and drugs, the site's emergency management capability, and local policies and protocols (WHO, 1992).

Although general and regional anesthesia can be used safely and effectively for minilaparotomy, the number of unexpected and life-threatening complications related to general or regional anesthesia is higher than the number associated with local anesthesia (WHO, 1992). Thus, general and regional anesthesia should be used only in settings that are properly equipped and staffed to provide such anesthesia and to handle emergencies.

General anesthesia may be indicated for a procedure that is expected to be difficult (e.g., such as when obesity, surgical scars, or other such problems are present). In instances in which a regional anesthetic regimen has already been given (e.g., a postpartum client with a continuous epidural), the surgeon should use that anesthetic regimen to perform the minilaparotomy procedure.

Local anesthesia has proven to be the most appropriate anesthesia for minilaparotomy and has allowed health institutions to provide sterilization services safely in many settings, including those with limited resources. Local anesthesia is considerably less expensive than general anesthesia, given the equipment and the level of training and of emergency management preparedness required for general anesthesia.

This guide discusses minilaparotomy with local anesthesia, with and without sedation. (Local anesthesia with sedation combines the local infiltration of anesthesia with the administration of systemic sedation and analgesics.) This technique is safe and cost-effective, and is associated with a significantly lower risk for complications than is general or regional anesthesia (WHO, 1992).

Local anesthesia:

- Facilitates access to female sterilization
- Is less risky
- Allows for faster recovery
- Promotes gentle surgery

Preparing the Client for Anesthesia

Since anxiety can contribute to acute pain, members of the surgical team should communicate with the client before, during, and after the procedure, to help her relax and feel comfortable. She should be told in simple language what to expect before each part of the procedure happens, as well as what is being done as it happens. It is *especially* important to communicate with the client during actions that can cause more discomfort, such as:

- Administering any injectable drugs
- Inserting and manipulating the uterine elevator (during suprapubic procedures)
- Administering the local anesthetic
- Opening the peritoneum
- Grasping and manipulating the fallopian tubes

Medications for Minilaparotomy under Local Anesthesia with Sedation

Preoperative interviews and explanations of anesthesia techniques diminish the level of preoperative anxiety (Egbert et al., 1963; Leigh, Walker, & Janaganathan, 1977). Providing this information in a standardized way during the counseling process and the preoperative assessment reduces the need for sedatives and other drugs (e.g., analgesics) and thus allows a procedure to be performed under local anesthesia alone or with light sedation.

Minilaparotomy can be performed under local anesthesia alone through an appropriately performed field block, while maintaining communication with the client. However, preoperative medications can be used to decrease fear and anxiety, as well as to sedate clients and increase their comfort. Preoperative medications and supplemental sedation can induce analgesia, prevent postoperative nausea and vomiting, and induce amnesia (World Federation, 1988). Depending on the drug, either oral or intramuscular administration is safer than intravenous administration, since the time to onset

is slower and the peak blood levels of the drugs are lower. Also, light sedation is preferable to heavy sedation, as the latter requires additional recovery time, closer client monitoring, and greater back-up capability.

Under light sedation, the client is fully responsive, appears awake, and is able to converse coherently but will sleep lightly if unstimulated. In contrast, under heavy sedation, it is difficult for the client to converse and she will easily fall into a deep sleep if unstimulated (WHO, 1992).

Oral medications should be given 30 to 60 minutes before the client enters the operating theater. Intramuscular (IM) and intravenous (IV) medications should be reserved for use in the operating theater, as this is the safest place for them to be administered. However, most medications used as premedication can be given outside the operating theater if the client is closely monitored.

HINT: Ideally, preoperative intravenous medication should be administered in the operating theater by a client monitor who is trained and qualified to give these medications and to monitor the client.

Preoperative medications. Atropine is used to decrease oral secretions, to prevent or to treat a slowed heart-beat (bradycardia) and to decrease the possibility of vasovagal syncope or cardiac arrest. The usual dosage is 0.6 mg, given intramuscularly or intravenously.

In ambulatory surgery, nonsteroidal anti-inflammatory drugs (NSAIDs) like ibuprofen or paracetamol or diclofenac can be used before the surgery begins, to help reduce uterine cramping, to decrease postsurgical pain, and to shorten recovery time (Chauvin, 2003).

Sedation. The anxiolytic, sedative, light muscle-relaxant, and amnesic effects produced in the client by sedation regimens allow surgery to be performed under local anesthesia without difficulty. Benzodiazepines (e.g., midazolam and diazepam) and some phenothiazine tranquilizers (e.g., promethazine) are used to decrease anxiety and to induce sedation. Most narcotic analgesics have sedative properties as well, but they primarily reduce pain. Table 5 shows recommended dosages for several sedatives, as well as their typical routes of administration.

TABLE 5. Drugs used for sedation and analgesia, and recommended dosages and routes

Drug	Dosing	Route
Midazolam	<i>Premedication:</i> 2.5 to 10 mg (0.05 to 0.2 mg/kg)	IM
	<i>Conscious sedation:</i> 0.5 to 5 mg (0.025 to 0.1 mg/kg)	IV
Diazepam	<i>Premedication or sedation:</i> 2 to 10 mg (0.05 to 0.2 mg/kg)	PO, IM, slow IV
Promethazine	<i>Premedication:</i> 12.5 to 50 mg	IV/IM (deep), PO
Fentanyl	<i>Premedication:</i> 25 to 100 µg (0.7 to 2 µg)	IV/IM
	<i>Analgesia:</i> 25 to 100 µg (0.7 to 2 µg)	IV/IM
Pentazocine	<i>Analgesia:</i> 30 mg	IM
Meperidine (pethidine)	<i>Analgesia:</i> 25 to 100 mg (0.5 to 2 mg/kg)	Slow IV
Nalbuphine	<i>Analgesia:</i> 5 to 10 mg (0.1 to 0.3 mg/kg)	IM/IV
Ketamine	<i>Sedation/analgesia:</i> 0.5 to 1 mg/kg	IV
	2.5 to 5 mg/kg	IM/rectal
	<i>Anesthesia induction:</i> 1 to 2.5 mg/kg	IV

Notes: IV = intravenous; IM = intramuscular; PO = by mouth.

Adapted from: Omoigui, 1999; Barash et al., 2001.

Analgesia. Narcotic analgesics (e.g., pentazocine, fentanyl, meperidine, or nalbuphine) primarily reduce pain and are used to complement local anesthesia agents. They are administered in the operating theater. Table 5 shows recommended dosages for a variety of analgesic medications, as well as their typical routes of administration.

In some rare situations, it may be necessary to administer general anesthesia, often in the following cases:

- An extremely obese client
- An anxious, noncooperative client
- A client with a history of allergy to drugs used for local anesthesia
- A difficult case in which it is necessary to put the client to sleep

Ketamine is a rapid-acting dissociative anesthetic that has been found to be safe and effective for managing these situations; the recommended dosage is shown in Table 5. If the use of ketamine is required, a sedative

dose of diazepam should be administered if the client has *not* already received one.

The goal of local anesthesia is to achieve an anesthetic field block that penetrates all layers of the abdominal wall, from the skin to the peritoneum. The three layers most sensitive to pain are the skin, the rectus fascia, and the peritoneum (Fig. 7). Each of these layers should be carefully infiltrated with local anesthetic. Additionally, dripping anesthetic over the fallopian tubes reinforces the effect of the anesthesia, as it decreases pain resulting from the manipulation of the tubes and also reduces postsurgical pain. There are two options for performing the anesthetic block: the fan-shape technique or the diamond-shape technique. Both techniques are described in detail on pages 33 to 37.

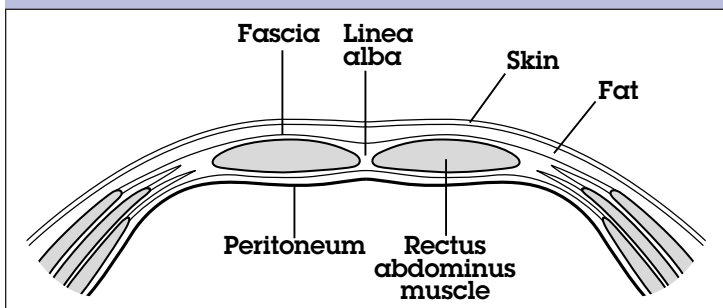
Lidocaine is the recommended local anesthetic, for the following reasons:

- It is widely known.
- It is available worldwide.
- It is inexpensive.
- Most providers know how to use it safely.

The recommended concentration is 1% lidocaine *without epinephrine*. There are two reasons why epinephrine (adrenaline) is not recommended: First, the vasoconstriction caused by epinephrine may mask bleeding in small blood vessels (it is best to detect and control all bleeding during surgery to prevent forma-

Techniques for Local Anesthesia

FIGURE 7. Cross-section of the layers of the abdominal wall



tion of hematomas); additionally, epinephrine is dangerous if accidentally injected intravascularly.

In general, *lower-concentration* preparations of lidocaine (0.5% to 1%) are preferred, since they provide the *same amount* of anesthetic in a greater volume; this facilitates infiltration of all layers of the abdominal wall and improves the anesthetic effect.

The usual dose for local infiltration is 4.5 mg/kg (2 mg/lb) of body weight. In general, *Physicians' Desk Reference* recommends that the maximum total dose not exceed 300 mg (Medical Economics, 2003). For this reason, the use of a lower concentration of anesthetic is safer and allows for a better and larger field block.

HINT: Solutions of 2% lidocaine must be diluted to 1% solution using normal saline or sterile water for injection.

The onset of action of lidocaine without epinephrine is typically three to five minutes, and the anesthetic effect lasts for up to 45 minutes. The variability of the anesthetic's effect depends on the area where it is injected: In general, absorption by muscle is greater than is absorption by skin, and in both of these two layers absorption is greater than is absorption by subcutaneous tissue. The absorption of anesthetic by the peritoneum is high; it is similar to the absorption of an IV injection.

HINT: The primary goal of local anesthesia is pain reduction through the proper administration of an anesthetic so as to obtain an appropriate field block. Sedation or administration of analgesics should *not* be used to compensate for inadequate local anesthesia. Preoperative medications can be used to increase clients' comfort and decrease their pain and anxiety.

Infiltration Techniques

Two techniques can be used to deliver local anesthesia for minilaparotomy: the fan-shape technique and the diamond-shape technique. Use of the two techniques

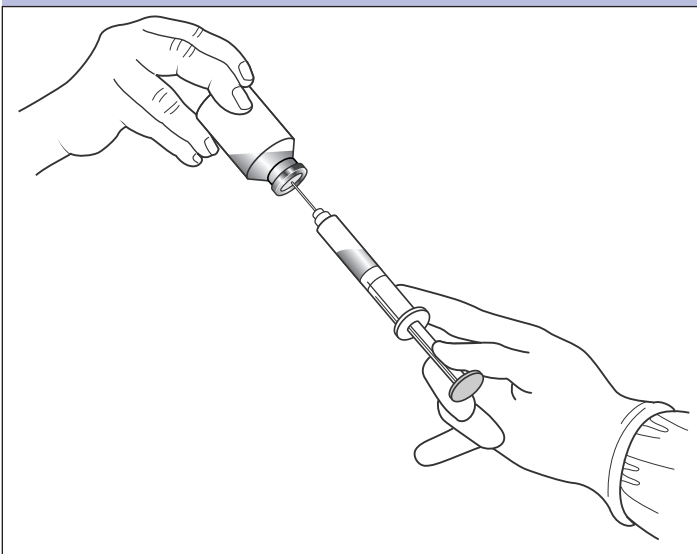
varies as a result of the training received by the surgeon. The relative efficacy of these techniques has not been compared, and both techniques are acceptable.

Using aseptic technique, draw 15 to 20 cc of 1% lidocaine without epinephrine into a 20-cc syringe. The recommended needle gauge is 21, which minimizes the time needed to draw up the anesthetic and to create a field block. The recommended needle length is 1.5 in., so the anesthesia can be applied along the entire length of the incision in one attempt.

The client monitor should clean the vial top using aseptic technique (wiping the top of the vial with a fresh cotton swab soaked with 60% to 70% alcohol and allowing it to dry). Then, the client monitor holds the vial while the surgeon or surgical assistant draws up the anesthetic solution (Fig. 8).

ALTERNATIVE: In facilities with few operating theater personnel or with many clients, the number of steps needed to provide the anesthetic solution to the surgeon may have to be reduced. In such instances, have the vial immersed in a chemical solution for high-level disinfection (e.g., in solutions containing glutaraldehyde) and then have the surgical assistant handle the vial and draw up the anesthetic.

FIGURE 8. Drawing the local anesthetic from the vial (held by the circulating nurse)



**Infiltration:
Fan-Shape
Technique**

Tell the client that her skin will now be anesthetized to reduce pain. Tell her that she may feel the initial sharp pain “prick” of the needle and a burning sensation while the anesthesia is injected.

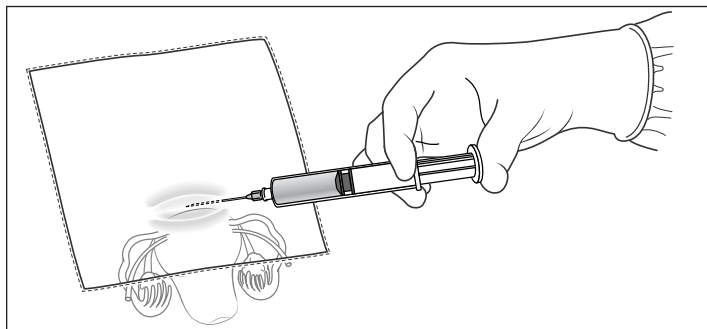
At one end of the planned incision site, introduce the needle through the skin, inserting the entire needle into the intradermal tissue and horizontally beneath the skin along the complete length of the planned incision site.

Once the needle is completely introduced, and before anesthetic is injected, gently aspirate it to ensure that the needle has not entered a blood vessel.

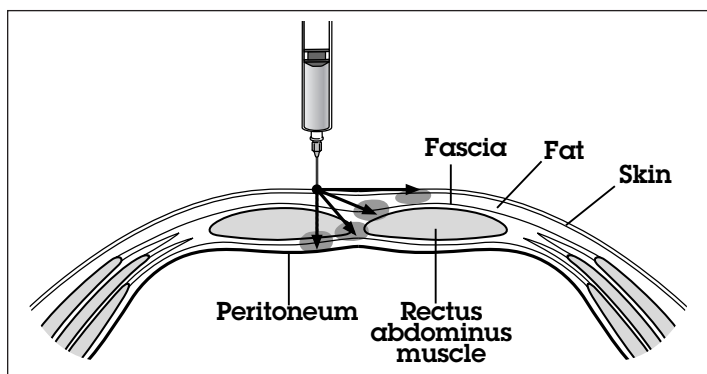
Inject the 1% lidocaine without epinephrine along the planned incision line while slowly withdrawing the needle until the tip is at the site of entry (Fig. 9a). The total injection volume should be about 3 cc.

FIGURE 9. Field block using the fan-shape technique

(a) Skin infiltration



(b) Infiltration of the different layers



PITFALL: A common pitfall is failing to administer enough anesthetic at the needle's entry point.

Repeat the preceding step at 30°, 60°, and 90° angles relative to the skin (Fig. 9b, page 33), *thus creating a fan shape*. This will ensure that all abdominal wall layers are anesthetized, down to the peritoneal layer. In each step, the local anesthetic is infiltrated along the needle track as the needle is withdrawn. The needle should be withdrawn slowly, while 2 to 3 cc lidocaine is injected in each layer.

HINT: It is not necessary to pull the needle out of the skin when reorienting the angle. Simply pull back until only the tip remains in the skin, and reintroduce the needle.

The result of using the fan-shape technique is that each layer (skin, fascia, muscles, and peritoneum) is anesthetized for the full length of the incisional area (3 to 5 cm for suprapubic procedures and 2 to 3 cm for subumbilical procedures). Achieving an appropriate field block of local anesthesia usually requires at least 10 to 12 cc of 1% lidocaine.

Wait at least two minutes for the anesthetic to take effect, and then test its effectiveness by pricking the area with a needle or a surgical dissecting forceps. If the client feels the prick, wait one to two minutes more. Test again and administer more local anesthetic, as needed (typically one-fourth of the initial dose).

HINT: Gently massaging the area being anesthetized will help spread anesthetic into the tissue (AVSC International, 1995).

Reserve the remaining lidocaine in the syringe to drip over the peritoneum, tubes, and mesosalpinx later in the procedure and to administer in the abdominal layers, as needed.

HINT: One of the most important steps in the local anesthesia regimen is to wait for the anesthetic to be absorbed and to take effect. Lidocaine without epinephrine requires at least two minutes to take effect.

**Infiltration:
Diamond-Shape
Technique**

Tell the client that her skin will now be anesthetized to reduce pain. Tell her that she may feel the initial sharp pain “prick” of the needle and a burning sensation while the anesthesia is injected.

Introduce the needle through the skin at the midline of the incision site and advance the needle into the intradermal tissue, first to one side of the planned incision site (Fig. 10a, page 36). Advance the full length of the needle (1.5 in.) without releasing any of the anesthetic. Gently aspirate it to ensure that the needle has not entered a blood vessel.

PITFALL: A common pitfall is failing to administer enough anesthetic at the needle's entry point.

Withdraw the syringe while slowly injecting 1 to 1.5 cc of 1% lidocaine without epinephrine into the tissue, until the tip of the needle is at the site of skin entry. Repeat this step three times, injecting lidocaine into the tissue horizontally toward the other side of the planned incision and then in the direction of the client's head and of the client's feet (Fig. 10b, page 36), thereby creating a *diamond shape*. A total of 4 to 6 cc should be injected into the skin layer.

Infiltrate the fascial layer, following the same steps as above. Repeat the same four-direction infiltration, but at a 45° angle relative to the skin (Fig. 10c, page 36). Always aspirate first.

Infiltrate the peritoneal layer by introducing the needle into the center of the planned incision site at a 90° angle to the peritoneum and injecting about 4 cc of lidocaine. Be sure to appropriately infiltrate the peritoneum (Fig. 10c).

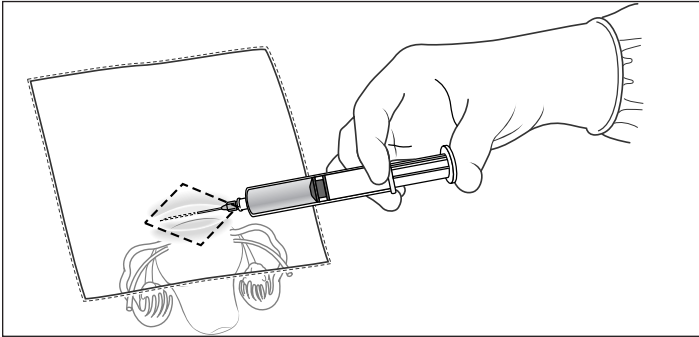
HINT: It is not necessary to pull the needle out of the skin when reorienting the angle. Simply pull back until only the tip remains in the skin, and reintroduce the needle.

Achieving an appropriate field block of local anesthesia usually requires at least 12 to 15 cc of 1% lidocaine without epinephrine.

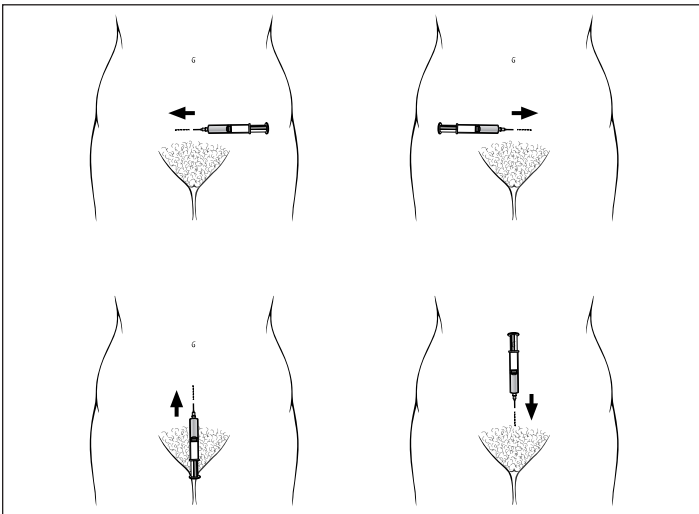
Wait at least two minutes for the anesthetic to take effect, and then test its effectiveness by pricking the

FIGURE 10. Field block using the diamond-shape technique

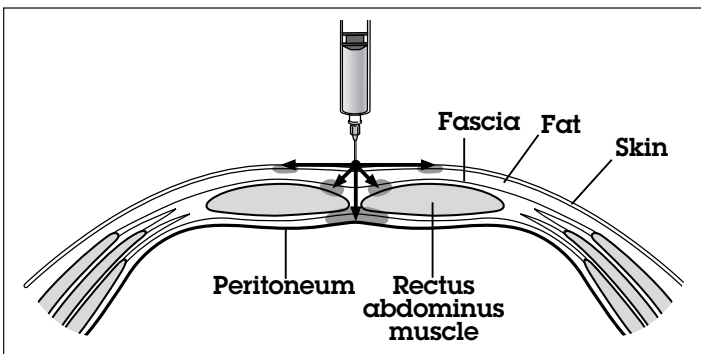
(a) Entry of the needle at the incision site



(b) Skin infiltration



(c) Infiltration of the different layers



area with a needle or a surgical dissecting forceps. If the client feels the prick, wait one to two minutes more. Test again and administer more local anesthetic, as needed (typically one-fourth of the initial dose).

HINT: Gently massaging the area being anesthetized will help spread anesthetic into the tissue (AVSC International, 1995).

Reserve the remaining lidocaine in the syringe to drip over the peritoneum, tubes, and mesosalpinx later in the procedure and to administer in the abdominal layers, as needed.

HINT: Regardless of the infiltration technique selected for a subumbilical procedure, be aware that the abdominal wall may be thin, and take care not to inject anesthetic too deeply.

Client Monitoring

As in any abdominal surgery, client monitoring is essential. It is of special importance during the use of local anesthesia, especially if sedatives and analgesics are also used, as the drugs may cause respiratory depression, cardiovascular depression, hypersensitivity reactions, or central nervous system toxicity. Monitoring enables the surgical team to detect these problems early and to respond before complications progress and become difficult to manage.

Client monitoring consists of observing and recording the client's vital signs—respiratory rate, pulse, and blood pressure. *Vital signs should be taken every five minutes.* Engaging the client in conversation distracts the client and helps reduce her anxiety. The client monitor is responsible for conducting this function.

HINT: Engaging the client in conversation is a key form of monitoring and an important component of local anesthesia; the ability to talk is a good sign that the client is in satisfactory condition.

6 Preoperative Preparation

Several tasks need to be taken care of, both before a client enters the operating theater and, once the client is in the operating theater, before starting the surgery. Most are related to ensuring infection prevention and making readily available everything that will be needed during the surgery.

Preparation of the Operating Theater

The operating theater should be cleaned and set up before the client enters.

- Decontamination solution (0.5% chlorine), freshly made on the day of the surgery, should be placed in containers in the operating theater.
- Appropriately processed and sterilized instrument kits should be opened and arranged on the instrument table by the surgical assistant, who should be scrubbed, gowned, and gloved.
- Supplies and drugs needed for the surgery should be readily and handily available (Appendix A).
- Equipment and drugs for emergency management should be readily and handily available (Appendix F).

Aseptic Technique

Aseptic technique refers to practices that help reduce clients' risk for procedure-related infection. Each surgical procedure must be done using aseptic technique. Because minilaparotomy is an ambulatory procedure and the client is likely to leave the facility relatively soon after the procedure, careful attention to asepsis is critical.*

Aseptic technique includes:

- Use of barriers to infection (i.e., surgical attire)
- Surgical scrub and gloving

* More information on aseptic technique can be found in EngenderHealth's *Infection Prevention: A Reference Booklet for Health Care Providers* (EngenderHealth, 2001).

- Client preparation
- Establishment and maintenance of a sterile field
- Use of good surgical technique

Surgical attire and surgical scrub and gloving. The minilaparotomy team should wear appropriate operating theater clothing, including head cover and mask. The surgeon and surgical assistant must both perform a surgical scrub and must wear surgical gowns and surgical gloves. Abdominal procedures require either sterile or high-level disinfected gloves on surgically scrubbed hands.

Proper client preparation before a surgical procedure is critical, since bacteria from a client's skin or mucous membranes can cause infection. This includes:

- Washing the operating area with soap and water. The client can do this at home (for interval clients), or the surgical team can do this in the operating theater.
- Providing the client with a surgical gown (or, if the availability of surgical gowns is limited, requesting the client to bring a clean garment, as culturally appropriate)
- Applying antiseptic solutions

Client Preparation

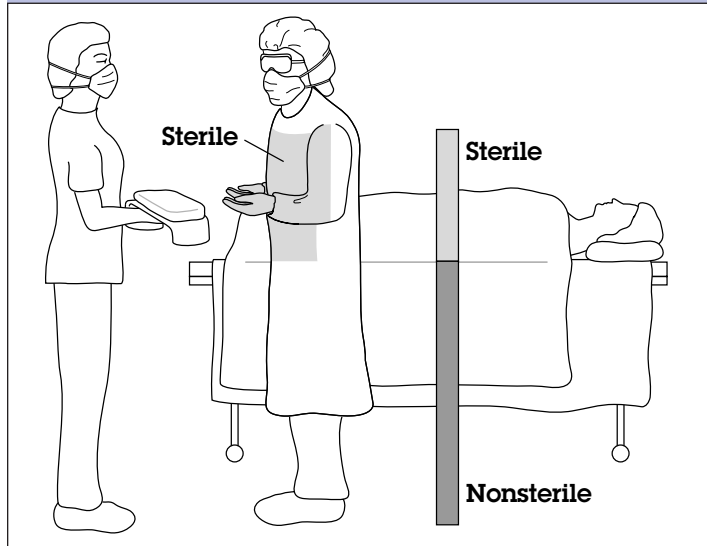
Preferred antiseptics for preparation of the skin and vagina

- Iodophors, such as povidone iodine (e.g., Betadine)
- Chlorhexidine gluconate (e.g., Hibiclens, Hibitane, or Hibiscrub)

Source: Liu et al., 1999.

Shaving the surgical site for the purpose of performing the procedure is *not* recommended, since it produces small nicks and breaks in the skin where bacteria can grow and multiply, and thus increases the risk for post-procedure infection. If hair around the surgical area is obstructing the operative area, it should be clipped while the client lies on the table (EngenderHealth, 2002).

FIGURE 11. The sterile field



Establishing and Maintaining a Sterile Field

A sterile field around the incision is established by applying antiseptic solutions to the abdominal area and by placing surgical drapes around the surgical field (EngenderHealth, 2001). The sterile field includes all sterile drapes, the front of the sterile gowns worn by the surgical team (from waist to neck, and from fingertips to elbow) (Fig. 11), and the instrument tray. Maintenance of the sterile field is the responsibility of *the entire surgical team (scrubbed and unscrubbed)* and consists of ensuring that only sterile items come into contact with the sterile field and that any contamination is immediately rectified.

Although any member of the team can perform skin preparation, draping can be performed *only* by those who are *scrubbed, gowned, and gloved*. Because draping is easier if two people participate, the surgeon and surgical assistant usually perform it together. The use of a single fenestrated drape facilitates establishment of the sterile field.

To maintain a sterile field:

- Allow only sterile items and personnel within the sterile field.
- Work only within the limits of the sterile field.

- Do not contaminate items when opening, dispensing, or transferring them.
- Consider any sterile item that has been penetrated (cut, wet, or torn) to be nonsterile.
- Never set up a sterile field near a door or an open window.
- When in doubt as to whether an item is still sterile, consider it to be contaminated.

The following are recommendations for preventing transmission of HIV infection and for decreasing risks for surgeons and operating theater staff (Rayburn & Schwartz, 1996):

- Use two gloves or thicker gloves
- Use a clear plastic face shield
- Use scissors instead of a scalpel, whenever possible
- Transfer sharp instruments by placing them in a tray or basin, or by handing them properly (inversed needle and scalpel) to the assistant
- Use retractors and instruments, not hands or fingers
- Reposition the needle with surgical forceps
- Provide counterpressure with an instrument, not with your hands or fingers
- Cut off the needle from the suture before tying knots
- Put the needle in the needle holder without touching it

Meticulous attention to bleeding and gentle handling of tissue during surgery can help reduce the risk of infection. Postprocedure infections are most likely to occur when tissues have been damaged through rough handling or excessive manipulation during surgery or when there is excessive bleeding.

It has been observed that to facilitate the surgery, a right-handed surgeon should stand on the left side of the client, which allows for easier manipulation of the uterine elevator in the suprapubic procedure and easier access to the tube (Fig. 12). Conversely, a left-handed surgeon should stand on the right side of the client.

Operating in the Era of HIV

Good Surgical Technique

Positioning of the Team

FIGURE 12. Positioning of the surgical team

