

Section 12 – OTOLOGY

Chapter 107 – Office-Based Procedures in Otology

**Alyssa Hackett,
Yael Raz**

In otolaryngology, as in other surgical disciplines, minimally invasive procedures are increasingly being performed in the office setting. Some even envision a day when certain otosclerosis patients will routinely undergo office-based stapedectomy.^[1]

There are many advantages to an office-based surgical approach.^[2] The procedures are carried out under local anesthesia, and patients do not need to abstain from oral intake. The cost of both the facility and the anesthesia is significantly lower, and a family member or friend may be present throughout the procedure. However, an office-based approach is not appropriate for every patient. Patients who are poor candidates for office surgery include those with narrow ear canals or those whose anatomy makes the procedure too complex; highly anxious patients; most children, particularly those who are 3 to 6 years of age; and patients with neurocognitive deficits.^[2]

As with any procedure, the key to patient satisfaction is fostering trust between the patient and physician. Before selecting an office approach to any procedure, it is imperative that the patient/parent know what to expect during the procedure. The duration, noise, pain, and possibility of vertigo are all components that may have an impact on overall patient satisfaction with the experience. Attaching a video camera to the microscope and allowing the patient to watch the procedure on a monitor can sometimes reduce anxiety.

This chapter presents various techniques for anesthetizing the ear, as well as commonly performed office procedures. For foreign bodies involving the external auditory canal (EAC) or myringoplasty, readers are referred to Chapters 108 and 113, respectively.

ANESTHESIA

Giving proper care and consideration to anesthetic options before starting the procedure will minimize patient discomfort and the propensity to move during the procedure. Options include topical anesthesia (often used for myringotomy), local anesthesia (often used for biopsy of a mass in the ear canal), and regional blocks (useful for repairing lacerations or draining a hematoma of the auricle).

Topical Anesthesia of the Tympanic Membrane

Phenol, lidocaine, and tetracaine are all commonly used to topically anesthetize the tympanic membrane (TM). Before initiating anesthesia, an otoscopic examination should be performed to remove debris from the ear canal and completely visualize the TM for perforations, desquamated skin, and retraction pockets. The anesthetic agent is less effective if it must diffuse through debris to reach the TM. Perforations may allow anesthetic agents to reach the middle ear space and thereby result in temporary facial nerve palsy or vertigo.^[3]

Phenol

Phenol creates a small chemical burn at the point where it is directly applied to the TM. Therefore, when used in large uncontrolled quantities, phenol can cause significant chemical otitis externa. When used in small controlled quantities and directly applied to the eardrum, however, phenol can produce safe, effective, and rapid anesthesia. It is our preferred anesthetic for topical application to the TM.

An appropriately sized aural speculum is first used to visualize the TM. Moisture and debris, if present, are suctioned from its lateral surface. It is particularly important to ensure a dry TM when using phenol; otherwise, it will spread and cauterize the entire moist region. The tip of a phenol applicator is dipped in phenol such that a small drop is collected between the prongs (Fig. 107-1). The applicator is gently touched to the inside of the bottle to remove excess liquid. The phenol is applied to the area or areas of the TM to be manipulated (e.g., small dots for intratympanic injections or linear streaks for myringotomy). Immediate blanching will occur and indicates that the TM has been anesthetized. The phenol can also be applied with cotton over a metal applicator or via a phenol kit with a prepackaged sponge applicator (see Fig. 107-1). Patients should be warned that they will experience a transient burning sensation on application of the phenol. Used in these small amounts, phenol does not cause any

permanent damage to the TM.

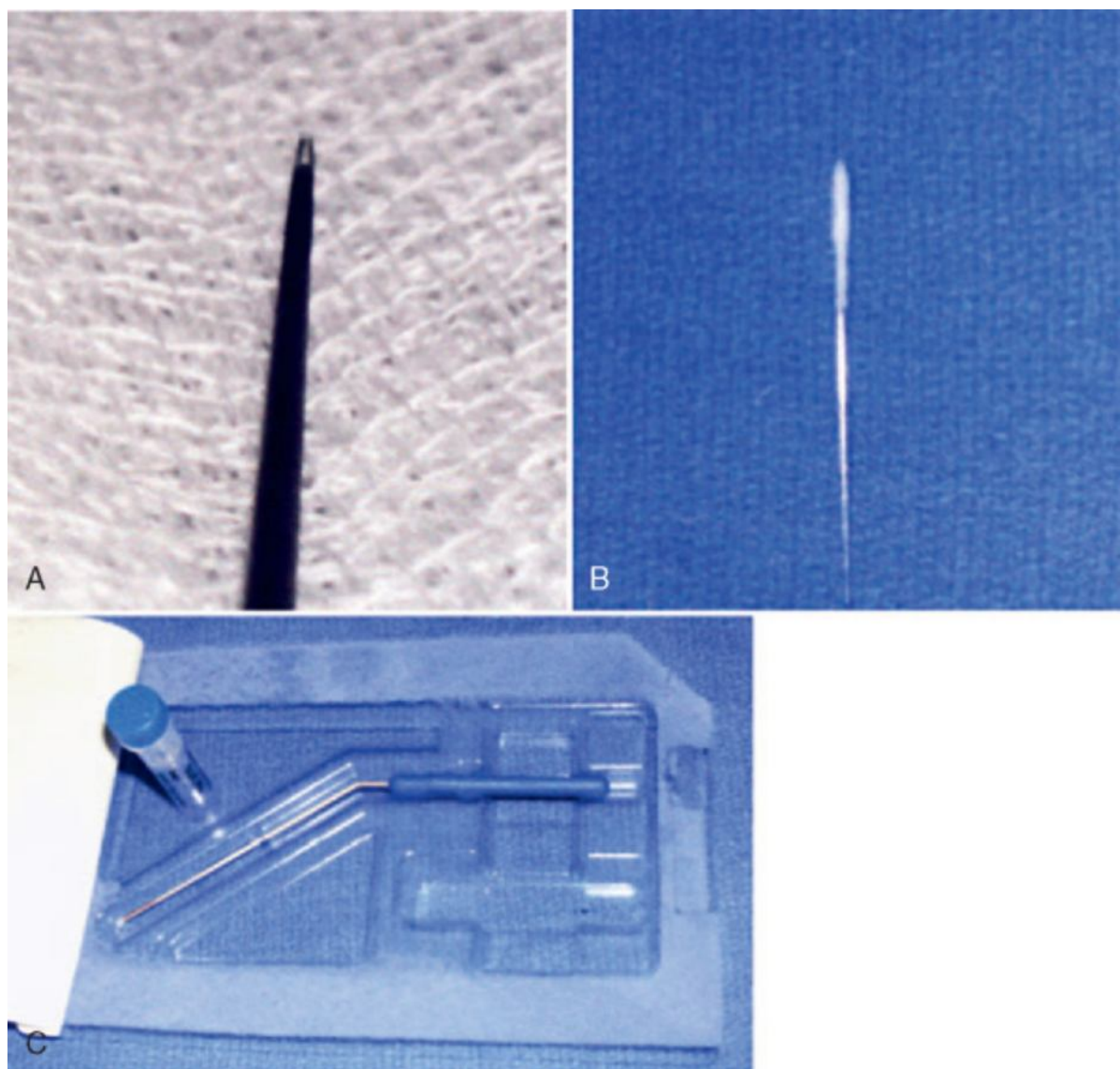


Figure 107-1 Options for application of phenol to the tympanic membrane. **A**, Phenol applicator. **B**, Cotton on a metal applicator. **C**, Prepackaged kit with sponge tip.

Tetracaine or Lidocaine

The literature does not support a standard concentration of lidocaine or tetracaine. Solutions of 4% to 10% lidocaine (amide) or 8% to 16% tetracaine (ester) dissolved in isopropyl alcohol are some of the more commonly described anesthetics used for TM anesthesia.

The patient is positioned supine with the head tilted to the side. The anesthetic should be room to body temperature before use to avoid a caloric effect. The solution is dropped into an ear canal with an intact TM until it is filled one third to one half full. The solution must remain in contact with the TM for at least 15 to 20 minutes for lidocaine and 60 minutes for tetracaine. A piece of cotton or a wick may be placed in the ear canal to allow the patient to ambulate during this time. The wick should be inserted slowly until it makes contact with the TM to ensure adequate exposure of the anesthetic to the TM. Before initiating the procedure, the wick is removed and a pick or the tip of the suction device (disconnected) is used to touch the TM to assess the effectiveness of the anesthesia. If the patient experiences pain distinct from noise produced by touching the TM, the anesthetic should be given more time to work. Once adequate anesthesia is achieved, the residual anesthetic is aspirated from the canal.

EMLA Cream

EMLA (eutectic mixture of local anesthetics) cream has been used for anesthesia of the eardrum by some authors. The cream is easy to apply directly to the eardrum with minimal risk of entry into the middle ear, but it does not

always provide adequate anesthesia.^[4] This may in large part be attributed to the long latency period for EMLA's full potency to be realized. One hour or more is generally accepted as the appropriate waiting period after application of EMLA, thus making it suboptimal for use in a busy office setting.

External Ear and Canal Anesthesia

Biopsy or repair of the external ear can be done in the office under local anesthesia. It is usually accomplished with local or regional injection of lidocaine or with a variety of topically applied anesthetics.

Topical Anesthetics

Topical anesthesia is often a good choice for children who cannot tolerate injectable anesthetic. EMLA or LET (lidocaine-epinephrine-tetracaine) is frequently used on both intact and broken skin.

EMLA or LET is applied directly to the surgical field while taking care to completely cover the area to be worked on. A temporary occlusive dressing can be placed over the medication for a minimum of 30 minutes for LET and 60 minutes for EMLA. Alternatively, LET can be mixed from its components (1% to 4% lidocaine, 1:1000 to 1:2000 epinephrine, 0.5% to 2% tetracaine) and applied with a cotton ball soaked in the mixture. Finally, a wide variety of commercially available patches, usually impregnated with lidocaine, are available for local procedures. Regardless of the local anesthetic used, it is prudent to test the sensation of the site with a needle prick or pinprick.

Local Injection of Lidocaine with Epinephrine

Traditionally, epinephrine has not been used for local anesthesia in regions of the body such as the outer ear, tip of the nose, fingers, toes, and penis because of the risk of skin necrosis from decreased blood flow. However, several recent studies have shown that epinephrine can be safe for local injection in the ear.^[5-7]

The injection site is sterilized with an alcohol swab or a surgical preparation of choice. A 1-mL syringe is filled with a solution of 1% lidocaine with 1:200,000 epinephrine. A 1:10 bicarbonate-to-lidocaine dilution can be formulated to buffer the acidity of lidocaine and reduce burning at the injection site. This solution must be used within 1 week of mixing. A 25-gauge or smaller needle is used to inject the deep dermis. The needle is inserted under the skin at a 10- to 15-degree angle as the anesthetic is simultaneously slowly injected until the entire region to be operated on has been infiltrated. A bleb of fluid can be both visualized and palpated as the anesthetic is injected. Pain during injection can be reduced by injecting slowly and minimizing the total number of skin punctures. A single needle puncture may be sufficient to cover small areas. If the skin is broken, injection can be performed through the open skin edges. The amount of anesthetic necessary depends on the size of the field but should be enough to completely cover the operative field. Despite being used locally, some of the lidocaine will reach the systemic circulation. The maximum dose of 1% lidocaine with epinephrine is 7 mg/kg up to 500 mg or 50 mL. The maximum dose of lidocaine without epinephrine is 4.5 mg/kg. Lidocaine provides adequate anesthesia within 2 minutes of injection, and the effect should last for several hours.

Regional Anesthesia

Regional anesthesia can be used for procedures involving the auricle, as well as the TM. Four nerves supply sensation to the ear (Fig. 107-2). The auriculotemporal nerve, a branch of the mandibular portion of the trigeminal nerve, supplies the superior portion of the outer ear. The great auricular nerve, which originates from the cervical plexus, supplies the inferior auricle. The middle section of the outer ear is supplied by the lesser occipital nerve, another branch of the cervical plexus. Finally, the auditory branch of the vagus nerve supplies the concha and the EAC. The EAC also has some innervation from the auriculotemporal nerve and branches from the tympanic plexus of the facial nerve.

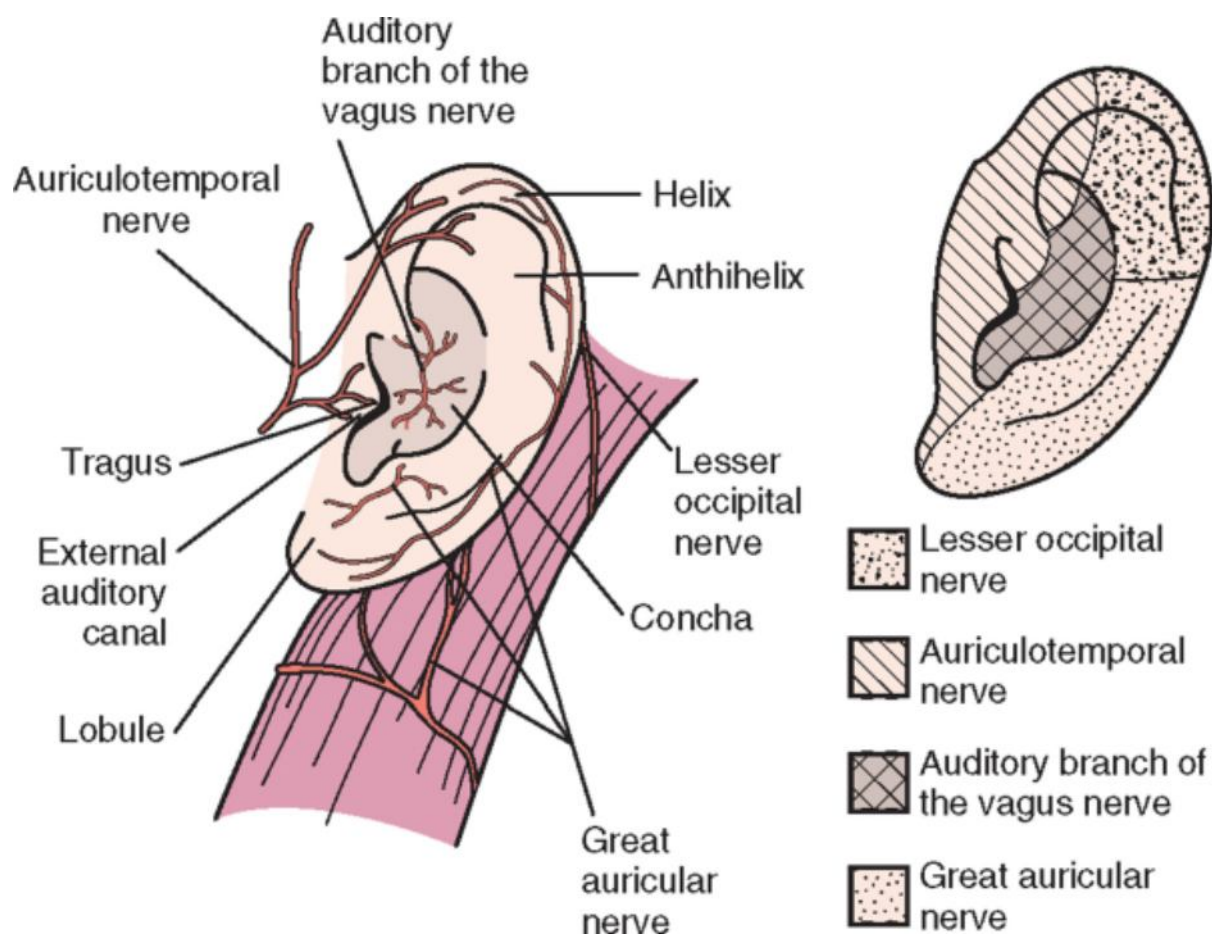


Figure 107-2 Innervation of the auricle.

(Adapted from Roberts R, Hedges JR [eds]: *Clinical Procedures in Emergency Medicine*, 4th ed. Philadelphia, WB Saunders, 2004.)

Sound knowledge of this anatomy is necessary to choose an effective regional anesthetic modality. Two are discussed here: an outer ear block and a four-quadrant canal block. An outer ear block does not supply anesthesia to the EAC or the TM. Conversely, a four-quadrant canal block does not supply anesthesia to the outer ear but does provide good anesthesia to the EAC and TM.

Outer Ear Block

Injections for an ear block are made at the junction of the most superior and inferior portions of the auricle with the head. The injection sites are disinfected with an alcohol swab, and a 10-mL syringe is filled with 1% lidocaine with epinephrine. A 25-gauge or smaller-bore needle is positioned at the superior pole. It is inserted at a 10- to 15-degree angle to the surface of the skin and directed toward the tragus (Fig. 107-3). The needle is inserted along the subcuticular plane while drawing back on the syringe. If no blood is returned as it is inserted, it can safely be assumed that the anesthetic can be injected as the needle is withdrawn without danger of intravenous injection. A total of 2 to 3 mL is injected. The needle is not completely removed from its initial puncture site as it is being repositioned to anesthetize along the posterior aspect of the pinna. A total of 2 to 3 mL of lidocaine is injected in the same manner as discussed earlier. The inferior pole is then injected. Anesthesia is obtained within a few minutes and lasts for more than one hour.

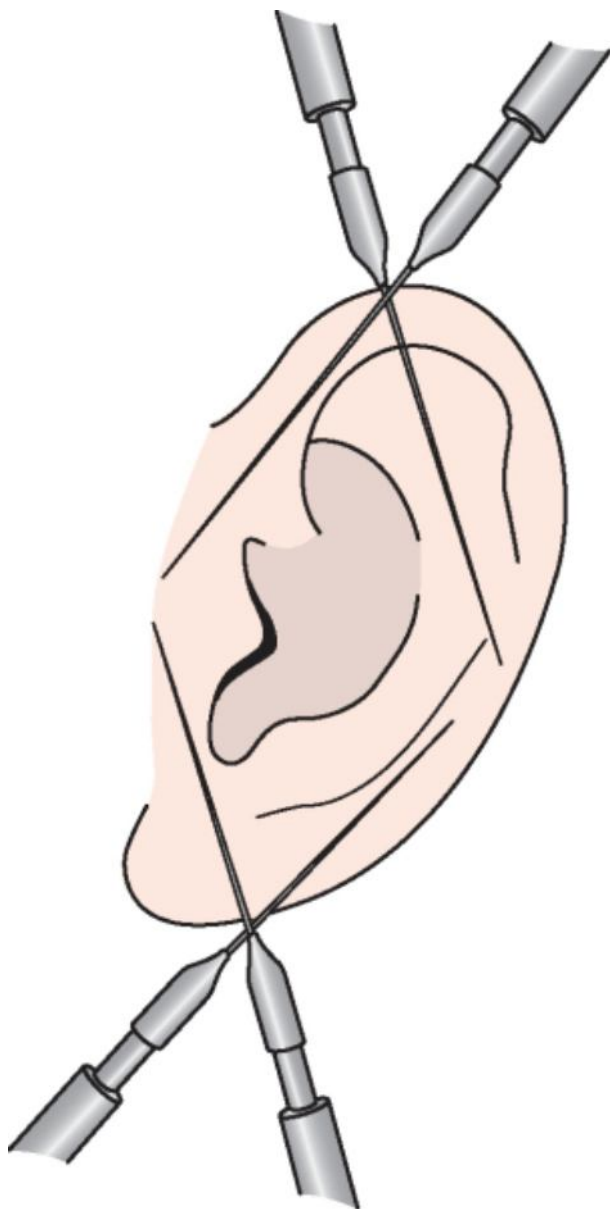


Figure 107-3 Outer ear block.

(Adapted from Roberts R, Hedges JR [eds]: *Clinical Procedures in Emergency Medicine*, 4th ed. Philadelphia, WB Saunders, 2004.)

Four-Quadrant Canal Block

Again, 1% lidocaine with epinephrine is used for anesthesia. This technique involves injection at the bony cartilaginous junction of the EAC. The most medial aspect of the hair-bearing portion of the EAC can approximate this junction. A 25- or 27-gauge needle is used on a small syringe (1 or 3 mL with a Luer-Lok). The EAC is injected anteriorly, inferiorly, superiorly, and posteriorly (Fig. 107-4). Slight pressure is applied with the speculum just lateral to the injection site to drive the anesthetic medially until blanching of the bony canal skin is noted. A moderate amount of resistance should be felt when the correct plane is infiltrated. If the injection is too superficial, a bleb may occur and hinder view of the canal for the procedure to be performed. Visualizing the more medial bony canal during the injection is helpful because blebs can be recognized early and the injection site may be adjusted.

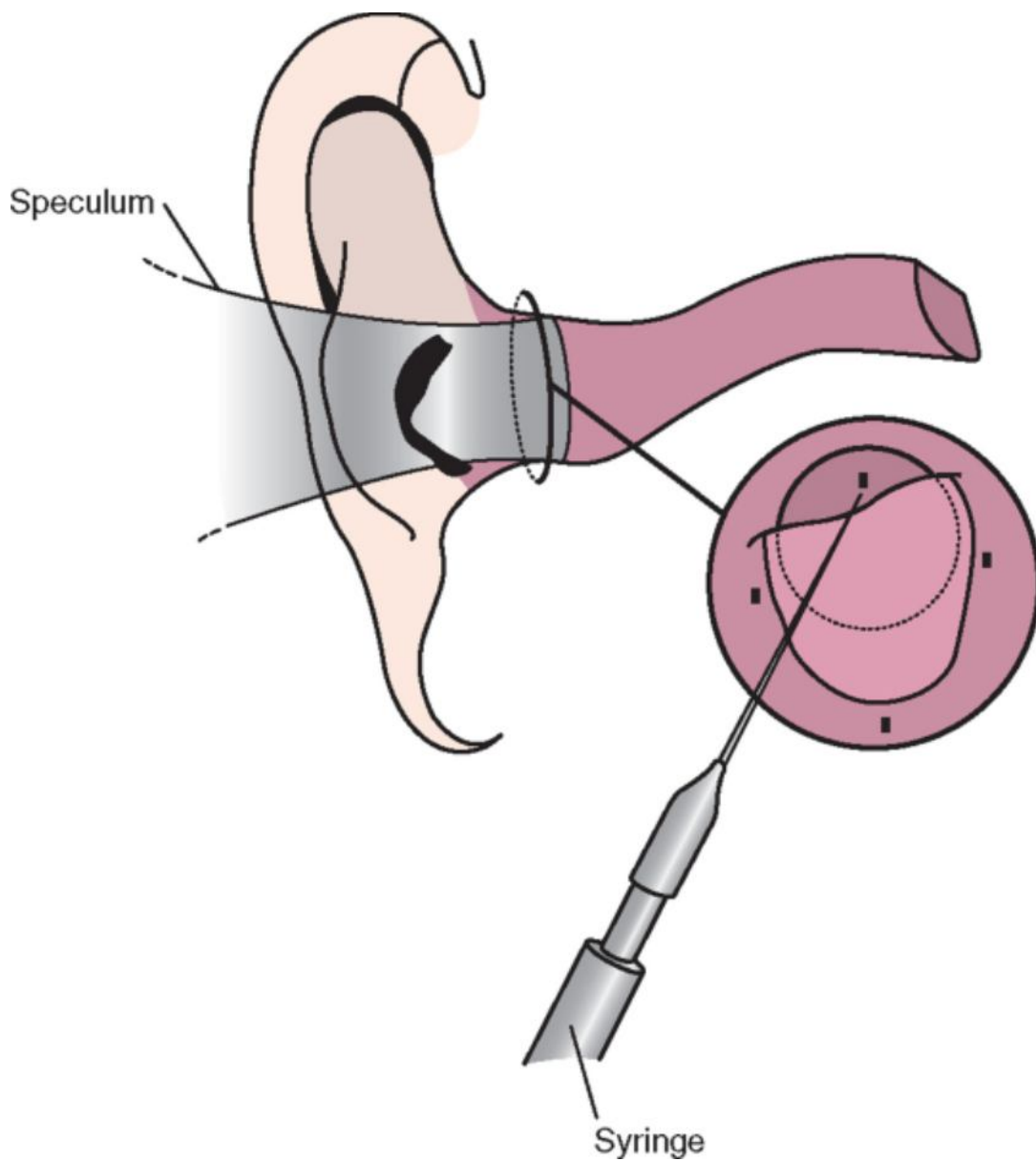


Figure 107-4 Four-quadrant canal block.

(Adapted from Roberts R, Hedges JR [eds]: *Clinical Procedures in Emergency Medicine*, 4th ed. Philadelphia, WB Saunders, 2004.)

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