Critical ENT Skills and Procedures in the Emergency Department

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AURICLE AND EAR CANAL ANATOMY

Knowledge of the anatomy of the external ear is essential to the emergency provider; from laceration repair to foreign bodies removal, it is fundamental for the success of the procedures to be performed. The auricle (pinna) consists of the visible and convoluted external part of the ear, it is a thin cartilage surrounded by thin skin. Fig. 1 shows in detail the external anatomy of the ear. The auditory canal measures about 2.5 cm, it extends from the external side at the concha to the internal portion at the level of the tympanic membrane. The canal is lined by squamous and hairy epithelium that produces cerumen. Its arterial supply is derived from the external carotid artery via superficial branches such as the maxillary, superficial temporal, and posterior. The greater auricular, auriculotemporal, and auricular branch of the vagus nerve provide innervation to the ear.1 The external ear canal has two anatomical narrowing areas. The first one is found at the junction of cartilage and bone, while the second one is lateral to the tympanic membrane. The emergency physician must consider these narrowing areas when attempting to remove foreign bodies.2

KEY POINTS

- Emergency physicians (EPs) must be familiar with otolaryngologic emergencies.
- They must be dexterous while performing otolaryngologic (ear, nose, and throat [ENT]) procedures to maintain function while avoiding complications.
- Among critical skills needed and procedures performed by the emergency practitioner are complex auricular lacerations repair, auricular hematoma incision and drainage, epistaxis management, and peritonsillar abscess incision and drainage.

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Knowledge of the anatomy of the external ear is essential to the emergency provider; from laceration repair to foreign bodies removal, it is fundamental for the success of the procedures to be performed. The auricle (pinna) consists of the visible and convoluted external part of the ear, it is a thin cartilage surrounded by thin skin. Fig. 1 shows in detail the external anatomy of the ear. The auditory canal measures about 2.5 cm, it extends from the external side at the concha to the internal portion at the level of the tympanic membrane. The canal is lined by squamous and hairy epithelium that produces cerumen. Its arterial supply is derived from the external carotid artery via superficial branches such as the maxillary, superficial temporal, and posterior. The greater auricular, auriculotemporal, and auricular branch of the vagus nerve provide innervation to the ear.1 The external ear canal has two anatomical narrowing areas. The first one is found at the junction of cartilage and bone, while the second one is lateral to the tympanic membrane. The emergency physician must consider these narrowing areas when attempting to remove foreign bodies.2

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KEYWORDS

- Ear laceration • Foreign body • Epistaxis • Peritonsilar abscess
- Nasal septal hematoma

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- They must be dexterous while performing otolaryngologic (ear, nose, and throat [ENT]) procedures to maintain function while avoiding complications.
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ANESTHESIA OF THE EAR

Field Blocks of the Auricle

The term field block is used to describe the technique in which anesthesia is infiltrated to the subcutaneous tissue surrounding the operative field. It is indicated when large lacerations, hematomas, and incision and drainage (I & D) of the auricle are to be performed, because extensive local infiltration is not desired. Among the advantages of field blocks are longer duration of anesthesia and less swelling and anatomic disruption when compared with local infiltration. The use of small needles and stretching the skin is found to be effective in decreasing injection site pain. Local care must be provided with cleansing solution to the injection site. There are various approaches to provide anesthesia to the auricle. The procedure consists of 2 simple anesthetic injections. The first injection site is located about 1 cm over the superior pole of the ear. The needle (25–27 gauge) with lidocaine or bupivacaine is directed toward the anterior portion of the tragus up to the middle of the ear infiltrating anesthesia (2–3 mL) as the needle is withdrawn to the insertion point; then the ear is infiltrated posteriorly. The second infiltration site is located at the inferior pole of the ear to the remaining portion of the anterior and posterior ear. A diamond-shaped area is anesthetized around the ear (Fig. 2), but changing the number and direction of the anesthetic walls could modify the shape. Another alternative method uses approximately 3 to 4 mL of anesthetic, both at a point anterior to the tragus and in the posterior ear sulcus. If only the central concha and/or ear canal anesthesia is desired, a series of 0.5- to 1.0-mL injections of 1% lidocaine to the external ear meatus are performed. Complications could arise if epinephrine is used in conjunction with local anesthesia, because often the patient’s auricular vascular area is already compromised and there is an existent risk of necrosis to inject epinephrine to the terminal arterial branches in the ear lobes.

EAR LACERATION

When dealing with ear lacerations, the primary goals are repair of the structure, early management of the cartilage exposure, and prevention of complications. The EP should assess the need for immediate evaluation, approximate wound the margins to evaluate large gapping areas or anticipate gross deformities. Preserving the skin is a major concern because of the need for stretching it to cover the cartilage. No cartilage should be left exposed; if needed, up to 5 mm of cartilage can be excised before
the ear starts to show a deformed appearance.\textsuperscript{1} Local care to the affected area is vital; it is prepared in the usual fashion. When suturing the cartilage, the anatomic areas and landmarks of the ear are approximated first at the areas of the ridge and the pinna to preserve the anatomy of the ear. Suturing the cartilage is done in a gentle manner and with the amount of force necessary to touch the borders of the cartilages to avoid ripping. The suture must include the anterior and posterior perichondrium using 4-0 and 5-0 absorbable sutures. After managing the cartilage, the skin is sutured using 5-0 to 6-0 nonabsorbable synthetic sutures, taking into consideration the landmarks of the ear and using it as anchors to maintain the anatomy of the ear (Fig. 3). The use of oral antibiotics is highly advised on scenarios that involve cartilage debridement, dirty wound, and injuries that raise concern for infection. Finally, after suturing the laceration, the use of compression dressing over the ear (Fig. 4) or a bolster for 7 days is highly advised to prevent the formation of ear hematoma. Both methods are discussed in detail in the section dealing with auricular hematoma management.

Complications (Box 1) that might compromise the normal anatomy of the ear could arise, resulting in a hematoma formation, which separates the skin from the cartilage, resulting in the interruption of the vascular supply to the cartilage.\textsuperscript{1,2}

**AURICULAR HEMATOMA**

Auricular hematomas (Fig. 5) are commonly encountered in wrestlers and boxers and people involved in other unprotected contact sports.\textsuperscript{6} Usually, hematomas occur as a result of blunt trauma to the ear, whereby shearing forces separate the skin, subcutaneous tissue, and perichondrium of the ear from the underlying cartilage, forming pockets where blood can accumulate. Disruption of the perichondrium–cartilage interface disrupts the vascular anatomy of the ear, leading to deficient nutrient transport causing devitalized cartilage. This cartilage has a propensity for fibrosis formation and results in “cauliflower ear” (Fig. 6).\textsuperscript{7} Cauliflower ear is also known as “wrestler’s
Hence, auricular hematoma requires prompt treatment because it may lead to cartilage necrosis, contracture, new cartilage formation, and ultimately ear deformity. Auricular hematomas are treated with evacuation of fluid collection and subsequent bolster of the ear. Indications and contraindications of the procedure are mentioned in Box 2. There are many approaches to addressing hematomas and subsequently

Fig. 3. Ear laceration suture repair. Cartilage is repaired using 4-0 and 5-0 absorbable sutures. Skin is sutured using 5-0 to 6-0 nonabsorbable synthetic sutures. (A) Complex ear laceration. (B) Ear laceration repaired using 5–0 to 6–0 nonabsorbable synthetic sutures, taking into consideration the landmarks of the ear and using it as anchors to maintain the anatomy of the ear.

Fig. 4. After suturing the laceration, the use of compression dressing over the ear for 7 days is advised to prevent the formation of ear hematoma.
restoring the anatomy of the ear. For small hematomas of the ear, needle aspiration and subsequent bolster dressing or splint is recommended. Larger hematomas require aggressive incision and drainage and also bolster dressing placement. If there are accompanying lacerations, then they must be primarily repaired.

Needle aspiration is usually done with hematomas that are less than 1.5 cm in diameter. Equipment recommended to perform this procedure is mentioned in Box 3. An 18-gauge needle is used with a 5-mL syringe to evacuate the contents of the hematoma. If small hematomas do not resolve because the blood clot is not completely evacuated with the needle, incision and drainage must be done. Nonetheless, even if the hematoma is small, it is recommended to leave a bolster dressing on for 5 to 7 days. The technique of bolster dressing placement is explained later.

Larger hematomas usually require incision and drainage (see Box 3). Lidocaine/epinephrine solution is used to infiltrate the skin over the hematoma. Parallel vertical incisions are made with a number 15 blade on the anterior and, if necessary, posterior skin of the auricle. The hematoma is evacuated. Penrose drainage is inserted at this point for large hematomas and secured with prolene sutures. Penrose drainages are removed when serous fluid and bloody drainage stop within 2 to 3 days of placement; if left in place, they need close follow-up in the outpatient setting. Otolaryngology consult is recommended for evaluation of these patients.

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**Box 1**

Auricular laceration repair complications

- Chondritis
- Auricular hematomas including cauliflower hematoma (chronic)
- Keloid

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Fig. 5. Auricular hematomas occur as a result of blunt trauma to the ear. Shearing forces separate the skin, subcutaneous tissue, and perichondrium of the ear from the underlying cartilage, forming pockets where blood can accumulate.
Complications of auricular hematoma include hematoma reaccumulation, infection, and cosmetic deformity, among others (Box 4).

**COMPRESSION DRESSING AND EAR BOLSTER**

After hematoma aspiration or drainage, a compression dressing is applied to avoid hematoma reaccumulation. Dry cotton is placed into the external canal. All external auricular crevices are filled with moist gauzes. Alternatively, Vaseline gauze may be used. A gauze pack is placed posterior to the auricle. The ear is covered with multiple layers of gauzes. An elastic bandage is used to keep the gauzes in place. An alternative to compression dressing is the ear bolster (Fig. 7). A 14F or 16F suction catheter is cut into 1.5- to 2-cm pieces. These pieces are used as anterior and posterior bolster dressings. Prolene 2-0 or 3-0 sutures are usually used for this procedure. A horizontal mattress suture is used to hold the French catheters against the skin of the auricle in

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**Box 2**

Auricular hematomas—indications and contraindications

- **Indications**
  - Subperichondrial auricular hematoma less than 7 days old

- **Contraindications**
  - Subperichondrial auricular hematoma older than 7 days
  - Severe trauma requiring extensive repair of ear
  - Physician unrelated to procedure

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Fig. 6. Cauliflower ear or wrestler’s ear is a chronic deformity that results from fibrosis due to unsolved or recurrent auricular hematoma.

Complications of auricular hematoma include hematoma reaccumulation, infection, and cosmetic deformity, among others (Box 4).
the area of the drained hematoma. This procedure results in eliminating the pocket of blood accumulation and obliterating the subperichondral space. Bolster splints are usually removed 7 days after being sutured. Bolsters have been made of cotton dressings, silicone rubber splints, and removable auricular stents, among other things. A recent Cochrane review of the literature revealed that there is no consensus on how to treat auricular hematomas and no advantage of one technique over another.

Patients who undergo auricular soft-tissue trauma with associated immunocompromise are prophylactically administered antipseudomonal and antistaphylococcal antibiotic to avoid posttraumatic chondritis. Patients without marked leukocytosis, altered vital signs, or associated head trauma are discharged home and followed up as outpatients. The bolster dressing is removed in 7 days. If persistent fluid, auricular edema, erythema, or pain is still present when the bolster dressing is removed, then evaluation by an otolaryngologist is needed.

**CERUMEN IMPACTION**

Cerumen is a natural product of the ear canal, composed of epithelial cells, hair, and sebaceous glands. The glands produce sebum and sweat to protect, lubricate, and clean the ear canal. Cerumen can occlude the ear canal easily as a result of

<table>
<thead>
<tr>
<th>Box 3</th>
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<tbody>
<tr>
<td><strong>Equipment recommended to perform an auricular hematoma evacuation</strong></td>
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<tr>
<td><strong>Equipment</strong></td>
</tr>
<tr>
<td>Sterile gloves</td>
</tr>
<tr>
<td>Local anesthetics</td>
</tr>
<tr>
<td>Antiseptic topical solution</td>
</tr>
<tr>
<td>Needle (27 gauge) for local anesthesia infiltration</td>
</tr>
<tr>
<td>Needle (18 gauge) for drainage</td>
</tr>
<tr>
<td>Syringes (2)</td>
</tr>
<tr>
<td>Suction catheter</td>
</tr>
<tr>
<td>Scalpel with number 15 blade</td>
</tr>
<tr>
<td>Sterile rubber drain for bolsters</td>
</tr>
<tr>
<td>Sterile gauze pads</td>
</tr>
<tr>
<td>Normal saline solution</td>
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<tr>
<td>Compression dressings</td>
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</table>

<table>
<thead>
<tr>
<th>Box 4</th>
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<tbody>
<tr>
<td><strong>Auricular hematoma drainage complications</strong></td>
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<tr>
<td><strong>Complications</strong></td>
</tr>
<tr>
<td>Hematoma reaccumulation</td>
</tr>
<tr>
<td>Cellulitis</td>
</tr>
<tr>
<td>Abscess formation</td>
</tr>
<tr>
<td>Cosmetic deformity</td>
</tr>
<tr>
<td>Cartilage necrosis</td>
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</tbody>
</table>
excessive accumulation, causing tinnitus, pain, external ear infection, hearing loss, fullness, itching, and even cough. About 8 million ear irrigations are performed annually for this condition. The 2 most common populations affected are the elderly (up to 57%) and patients with mental retardation (up to 36%). Available techniques for cerumen removal are manual removal, irrigation, and ceruminolytics. Cerumen removal is indicated in symptomatic patients and those who require an evaluation of the tympanic membrane.

Manual removal of cerumen has the benefit of being faster to perform as it allows the physician to have direct visualization of the anatomic area. However, the required equipment for the procedure is not readily available in most emergency departments. The need for a cooperative patient and a skilled physician are also important considerations for successful removal and therefore can become contraindications. The common complications are tympanic membrane perforation and trauma to the external ear canal that could lead to secondary infection. If cerumen cannot be removed manually, then the irrigation technique is performed or the patient referred to an outpatient evaluation by the otorhinolaryngologist.

Irrigation for cerumen removal is often used alone or with a ceruminolytic pretreatment. Even though there are no randomized controlled clinical trials of ear irrigation versus no treatment, there is a consensus that aural irrigation is effective in removing cerumen. Because ear syringes and oral jet irrigators are widely available and inexpensive, they are great alternatives for performing this procedure, although there still exists the risk of tympanic membrane perforation especially with the use of oral jet irrigators. There are commercially available kits, but a 20- to 30-mL syringe with an 18-gauge plastic intravenous catheter or the plastic portion of a butterfly needle is an acceptable instrument for irrigating the ear.

The procedure is simple and involves applying soft traction up and back to make a straighter canal and equal soft irrigation to the ear, checking sporadically for the cerumen. Contraindications include recent ear surgery, any concern for tympanic membrane perforation, myringotomy tube presence, a history of middle-ear disease, radiation therapy to the area, severe otitis externa, sharp foreign objects in the external auditory canal, or vertigo.

Topical therapy for ceruminolytic agents is regularly used to manage cerumen impactions either alone or in combination with other techniques, including irrigation of the ear canal and manual removal of cerumen. Water-based agents act by inducing hydration and fragmentation, whereas oil-based products lubricate and soften
cerumen without decomposing it. The exact mechanism of the non–oil-based or non–water-based agents has not been completely defined yet (Table 1).10,12 Evidence shows that any type of agent seems to be superior to no treatment, but it is not shown that any particular agent is superior to any other. Evidence exists that supports a true ceruminolytic rather than an oil-based lubricant for dissolution of cerumen for a longer period of treatment. The use of these agents improves success of irrigation, but no agent has been shown to be better than the other. Using an agent immediately before irrigation has not been shown to be superior or inferior to using one several days before irrigation either. As with other procedures, there are complications related to the use of ceruminolytic agents, such as dermatitis, allergic reactions, and otitis externa.12

Ear Foreign Bodies Removal
There is a wide range of foreign bodies that could be trapped in the external auditory canal because of its anatomic narrowings: from small objects in children, such as organic material like popcorn kernels,16 toys and beads, food and inorganic objects, to small living insects in adults.2 Even though many foreign bodies are successfully removed, the procedure has a wide range of complications.16

To manage foreign bodies in the ear, physicians should be aware of their skills and expertise of the anatomic area, the number of attempts to be performed with a realistic goal, and the need for consultation with the otolaryngology service.2 There is little evidence of which intervention is the best method for foreign body removal.17 There are many factors that contribute to higher failure rates such as patient’s young age and the period the foreign body was in the external ear canal.18,19

There are many options for ear foreign body removal (Box 5), which include water irrigation, forceps removal, and use of cerumen loops, cyanoacrylate, and even suction catheters. The EP should be cautious if there is concern of tympanic membrane rupture. The first attempt of removal of a foreign body is the most critical because it is related to higher success and further attempts are related to failure.19–21

Fig. 8. Use a 20- to 30-mL syringe with a plastic angiocatheter (18 gauge) or a butterfly cannula without the needle to irrigate the ear for foreign body removal.
### Table 1
Cerumen removal agents

<table>
<thead>
<tr>
<th>Agent</th>
<th>Use</th>
<th>Dosing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water based</strong></td>
<td></td>
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</tr>
<tr>
<td>Water</td>
<td>Soften cerumen</td>
<td>Instill water to area to achieve softening of the cerumen</td>
</tr>
<tr>
<td>10% Sodium bicarbonate</td>
<td>Soften cerumen</td>
<td>Fill ear with 2–3 mL 15–30 min before irrigation or, alternatively, for 3–14 d at home with or without irrigation</td>
</tr>
<tr>
<td>Docusate sodium</td>
<td>Soften cerumen</td>
<td>Fill ear canal with 1 mL 15–30 min before irrigation</td>
</tr>
<tr>
<td>10% Triethanolamine polypeptide oleate condensate</td>
<td>Soften cerumen</td>
<td>Fill ear canal 15–30 min before irrigation</td>
</tr>
<tr>
<td>3% Hydrogen peroxide</td>
<td>Soften cerumen</td>
<td>Fill ear canal 15–30 min before irrigation</td>
</tr>
<tr>
<td>2.5% Acetic acid</td>
<td>Outpatient treatment</td>
<td>Fill ear with 2–3 mL twice daily for up to 14 d</td>
</tr>
<tr>
<td><strong>Non–water based/non–oil based</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbamide peroxide</td>
<td>Soften cerumen before irrigation or as an alternative to irrigation</td>
<td>Put 5–10 drops into the affected ear twice daily</td>
</tr>
<tr>
<td>50% Choline salicylate and glycerol; ethylene oxide polyoxypropylene glycol; propylene glycol; 0.5% chlorbutol</td>
<td>Soften cerumen</td>
<td>Put 3 drops into the affected ear twice daily</td>
</tr>
<tr>
<td><strong>Oil based</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57.3% Arachis oil, 5% chlorbutol, 2% paradichlorobenzene, 10% oil of turpentine</td>
<td>Soften cerumen</td>
<td>Fill ear with 5 mL twice daily for 2–3 d</td>
</tr>
<tr>
<td>Mineral oil</td>
<td>Soften cerumen</td>
<td>Put 3 drops into the affected ear at bedtime for 3 or 4 d</td>
</tr>
</tbody>
</table>


### Box 5
Equipment recommended for ear foreign body removal

**Equipment**
- Curette
- Probe
- Hook
- Forceps
- Suction under direct visualization with headlight
- Otoscopy or microscopy
Consultations to an ENT specialist include tympanic membrane perforation or trauma to the canal, a nongraspable object, and objects with sharp edges, or unsuccessful attempts to remove it.\textsuperscript{16,22,23} Visualization of the foreign body has been associated with a low complication rate, and the rate of lacerations of the canal was as low as 4\% when a microscope was used versus a 48\% when a microscope was not used (Fig. 9).\textsuperscript{17,24}

Irrigation technique is the preferred method to retrieve small objects. The procedure is simple; a 30- to 60-mL syringe with a plastic angiocatheter (18 gauge) or a butterfly cannula without the needle is used as previously described. It is introduced in the ear with water at room temperature to achieve the extraction of the object. The stream is directed toward the superior aspect of the ear canal.\textsuperscript{25} This is a simple procedure that has a low complication rate but is contraindicated in patients with foreign bodies that could swell or are made of vegetable material.\textsuperscript{24}

Another available technique is suction of the foreign body, which is easily available at the emergency department. It is effective for round objects. Negative pressures about 100 to 140 mm Hg are used.\textsuperscript{17,26,27} Often it could be performed with soft catheters such as the ones used for endotracheal tube suctioning.\textsuperscript{25} A pitfall of this procedure is the noise that is generated; it could easily increase the fear and anxiety in patients, especially among pediatric population.

The glue technique was first described in India in 1977 using gum-based glue.\textsuperscript{17,28} Now it has been replaced with a faster-acting material called cyanoacrylate or the so-called superglue.\textsuperscript{17,29,30} Its use is indicated to remove smooth, round, dry, and easily visualized foreign bodies that are hard to grasp. It is recommended to use a small amount of glue preferentially on a tip of a paper clip or a wooden stick with a cotton tip to limit the amount of glue inside the ear and decrease the risk for new material trapped in the ear canal. Even though it is a simple technique, it requires patient compliance and is generally an acceptable method for children.\textsuperscript{17}

The manual technique is the most related to complications and highly associated with abrasions, lacerations of ear canal, bleeding, and tympanic membrane perforation. This technique requires the direct visualization of the foreign body. The choice of the instrument to use varies depending on the foreign body. Recommended instruments are alligator forceps, hooks, curettes, and loops. This technique is not the best option with foreign bodies that could easily tear apart while removing or with uncooperative patients.\textsuperscript{17}

Fig. 9. Foreign body removal through a microscope has been associated with low complications rate.
An alternative method uses a Foley or Fogarty balloon catheter. The literature shows that its use has been successful for both nasal and ear foreign bodies retrieval.\textsuperscript{31,32} The noninflated balloon tip is passed beyond the object. The balloon is filled with 3 mL of air, then the catheter is pulled back to recover the object.\textsuperscript{17}

Insects inside the ear canal raise a concern, because a living insect is disturbing to the patient. The first step in removing the insect is killing it. The best way to accomplish this is filling the ear canal with mineral oil or lidocaine 2\% solution.\textsuperscript{25} The mineral oil is the fastest way to kill the insect as compared with lidocaine.\textsuperscript{33} Mineral oil becomes more viscous in the ear than lidocaine. After the insect is dead, extraction can proceed with one of the above-described methods. If the physician is unable to remove the dead insect, the patient is referred for outpatient removal.

Complications could arise from ear foreign body removal, including simple abrasions, lacerations, infection, bleeding, and tympanic membrane perforation.\textsuperscript{17,25} Most of the ear foreign bodies could be referred to outpatient management. The only case that requires immediate management would be a button battery because of complications such as ulceration and necrosis of the ear canal.\textsuperscript{17,34} There is no routine follow-up needed in uncomplicated cases except for the above-mentioned condition.\textsuperscript{17}

\textbf{Nose}

The nose is the external portion of the respiratory system and is found at the entrance of the airway, where it acts as a filter, a humidifier, and a chemosensor. It should not be considered as 1 single airway but rather 2 separate nasal passages, each with its own blood supply and nervous pathways. Considering the position of the nose in relation to the rest of the structures in the face, one could be at great risk to injure the nose when trauma occurs.

\textbf{Anatomy of the Nose}

Understanding the basic anatomy of the nose is of great importance when it comes to treating the most common encounters in the emergency department. The structural composition of the nose is essentially of cartilage and bone covered by skin, with mucosa lining the inner surface. The nose consists of the vestibule, nasal septum, lateral wall, and nasopharynx.\textsuperscript{2} The most ventral portion of the nares is composed of the vestibule. The midline structure is formed by the septum, and the lateral wall is formed by the turbinates.

Three major arteries provide blood supply to the nose (\textbf{Fig. 10}). The ophthalmic artery divides into the ethmoidal artery to supply the superior nasal mucosa. The sphenopalatine artery supplies the posterior septum and the lateral turbinates. To complete the triad, the superior labial artery supplies the nasal septum and vestibule. The terminal branches of these major arteries supply an arterial anastomotic triangle known as Kiesselbach plexus; 90\% to 95\% of episodes of epistaxis arise from the anterior nasal septum.\textsuperscript{35} The most common arterial source of posterior nosebleeds is the sphenopalatine artery.

The sensation of the nose is divided into the internal and external innervation.\textsuperscript{36} The ophthalmic and maxillary branches of the trigeminal nerve innervate the external aspect of the nose. The infratrochlear and supratrochlear nerves and a branch of the anterior ethmoid nerve, the external nasal nerve, supply the superior aspect of the nose, including the tip. The infraorbital nerve innervates the inferior and lateral aspects of the nose.

To better understand the innervations of the internal nasal cavity, it is subdivided into the nasal septum, the lateral walls, and the cribriform plate. The ethmoid nerves supply the inner aspect of the lateral nasal wall. The sphenopalatine ganglion
innervates the posterior nasal cavity. Fibers of the previously mentioned ethmoid nerves and the sphenopalatine ganglion provide sensation to most of the septum.

**Physical Examination**

When examining the nose, some important points are to be taken into consideration. Both the internal and external anatomy should be assessed. Both the ability to smell and the sensation in the nasal region should be assessed, but it is considered as part of the neurologic examination instead of as part of the nose examination itself. When preparing the instruments for the procedure, a light source, suction, and a nasal speculum can all be of aid in the examination of the anterior nasal cavity. Topical sprays of anesthetics may also assist in the examination.

**Epistaxis**

Epistaxis is the most common otolaryngologic emergency. It is idiopathic in most patients, but it is also caused by neoplasm or trauma. Hypertension and coagulopathy are frequent comorbidities (ie, liver disease and renal dysfunction) seen in these patients. Many patients with epistaxis use either prescription anticoagulation medication (ie, coumadin, enoxaparin, acetylsalicylic acid, and clopidrogel) or natural herbal supplements with anticoagulation properties (ie, garlic, ginkgo, ginseng, and vitamin E).

The nasal cavity is highly vascular; branches of the internal and external carotid arteries that frequently anastomose with each other supply it. The internal carotid system supplies the ethmoidal arteries, whereas the external carotid system supplies the sphenopalatine artery, a branch of the internal maxillary artery. The area of more frequent bleeding is in the anterior nasal septum, called Kiesselbach or Little area. It is a confluence of the internal and external carotid system.

Blood loss in epistaxis can range from mild bleeding to massive life-threatening hemorrhage. The amount of blood loss is quantified, and a complete blood count, type and group, and coagulation parameters are obtained. The patient is asked if
bleeding was enough to fill a spoon, a teacup, or a larger container. The EP should ask if the bleeding was enough to soak a napkin or a towel. Melena is also a sign of excessive bleeding and should be warranted during taking of patient history. A clinical assessment of the patient’s overall blood volume is established. Signs of tachycardia and hypotension cause worry especially in young individuals, as these are signs of significant blood loss.

Physical examination aims at identifying the type of bleeding. If the patient has intermittent episodes of bleeding and is not actively bleeding at the time, then anterior rhinoscopy is performed to identify areas of vessel exposure in the anterior septum. In the emergency room (ER), the aim is to control the bleeding with pressure in the anterior portion of the nose. If this technique does not control bleeding, 4% lidocaine with a vasoconstrictive agent (Fig. 11) such as cocaine or oxymetazoline is used. This method aids in 2 ways: it decongests the nasal cavity, leading to better visualization, and anesthetizes the nasal cavity to reduce patient discomfort and to better manage heavy bleeding. If bleeding continues despite the previously described interventions, then nasal packing is immediately warranted.

Management aims at stopping the bleeding and addressing any underlying comorbidities that may precipitate epistaxis. Anticoagulation medication and natural supplements are discontinued. Hypertension is controlled. Renal and hepatic dysfunctions are identified. History of nasal obstruction, pain, or unilateral hearing loss associated with epistaxis may represent a nasal tumor.

**Direct Pressure**

Direct pressure is indicated for initial mild to moderate bleeding. Patients are instructed to sit upright to decrease venous return. They should pinch the nose with the thumb and index finger for at least 20 minutes; this exerts pressure on the septal

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Fig. 11. Mild epistaxis tray. From left to right: Bayonet forceps, nasal speculum, bacitracin ointment, silver nitrate sticks, oxymetazoline 0.05% solution, lidocaine topical solution.
vasculature and stops the bleeding. If bleeding is associated with trauma, coagulation disorders, anticoagulation medication, or renal or hepatic disorder, then the patient is referred to a specialist.  

**Silver Nitrate Cauterization**

Silver nitrate cauterization is indicated in patients who have recurrent episodes of mild epistaxis without other comorbidities or a history of use of anticoagulation medica-
tions. Patients with recurrent epistaxis usually rebleed from vessels in the anterior portion of the septum. This bleeding is frequent during cold months when there is less humidity of the nasal cavity, leading to mucosal irritation and vessel exposure. A light source, nasal speculum, and silver nitrate stick are needed for this procedure. Using a nasal speculum with the nondominant hand helps to identify the area of bleeding. Then, gentle pressure is applied on the nasal septum with a silver nitrate cautery stick over the hyperemic blood vessel. This procedure is done in patients who have subtle active bleeding from the anterior septum. Suction instruments may be required if bleeding or a clot obliterates the vestibule. After cauterization, the patient is advised against nose blowing, lifting heavy objects, or any activity that involves a Valsalva maneuver. If moderate to heavy bleeding is present, then the patient may need anterior or posterior nasal packing.

**Anterior Nasal Packing**

Anterior nasal packing is usually used when epistaxis is unrefractory to the treatments described earlier. The purpose of anterior nasal packing is to collapse the bleeding vessel or vessels to cause clot and thrombus formation and eventually vessel obliter-
ation. Nasal packing of all types requires broad-spectrum antibiotic coverage for prophylaxis against toxic shock syndrome. The traditional approach to packing involves ribbon gauze packing, but with the widespread availability of prefabricated nasal packings (Fig. 12), this has fallen into less usage. Both methods of packing are discussed later.

First, the nose is decongested and anesthetized. One must be careful about the amount of decongestant used, especially in patients with a history of arrhythmias or cardiac conditions. Prefabricated anterior packings are dressed in ointment and aligned with the floor of the nasal cavity on insertion. Sometimes the addition of another pack is needed to exert more pressure on the nasal cavity, and, although dis-
comforting, it is well tolerated by the patient. Anterior ribbon gauze packing requires

![Fig. 12. Nasal packings.](image-url)
the availability of 3% bismuth tribromophenate (Xeroform) gauze or Adaptic strip impregnated with petroleum jelly or antibiotic ointment. The procedure is performed using bayonet forceps, and packing should proceed from posterior to anterior and inferior to superior. Packing continues with additional ribbon gauze until the nasal cavity is completely packed (Fig. 13). A gauze drip pad is taped against the nose and changed periodically when necessary. Patients with any nasal packing are admitted for laboratory workup, observation for 24 hours, and otolaryngology consult. If no rebleeding occurs for 24 hours, the patient is discharged home with broad-spectrum antibiotics and followed up in 5 days for nasal packing removal.

Posterior Packing

Posterior packing requires evaluation by an otolaryngologist. Posterior bleeding is rare and is reported in less than 15% of patients with epistaxis. The usual source of bleeding is the posterior septal branch of the sphenopalatine artery. In recent years, the paradigm has shifted to perform transnasal sphenopalatine artery ligation to avoid the morbidity of posterior nasal packing. Various prefabricated posterior packing is also available in the form of balloons. The purpose is to completely fill the posterior nasal cavity. Alternatively, Foley catheters are used for posterior nasal cavity packing until the patient is stabilized and transferred to an institution with an on-call otolaryngologist. Traditional posterior nasal cavity packing required the availability of gauze, Foley or any other plastic catheter, umbilical tapes, sponge metal instrument or any type of forceps, and an excellent light source. This procedure is morbid and used in patients with severe epistaxis that has not been controlled with any of the methods described earlier.

Fig. 13. (A–D) Anterior nasal packing. (A) Grasp Vaseline gauze strip. (B) Then place the first layer on the floor of the nose through the nasal speculum. Withdraw the bayonet forceps and nasal speculum. (C) Reintroduce the nasal speculum on top of the first layer of packing, and place a second layer in an identical manner. Apply several layers. (D) A complete anterior nasal pack can tamponade a bleeding point.
The patient is made to sit upright. The nose is thoroughly anesthetized and decongested. Gauze packing should be prepared beforehand. Three umbilical tapes are tied to the rolled gauze. The 2 lateral umbilical tapes should be facing toward one side; these are the tapes that come out of the nose. The other umbilical tape is tied at the middle and facing toward one side. This umbilical tape ultimately comes out through the mouth and is used for packing removal. Two 14F catheters are inserted, one through each nostril, and the tip of the catheters should be pulled through the oropharynx toward the oral cavity. The ends of the 2 lateral umbilical tapes are tied to the end of the catheters firmly. Then, the catheters are pulled through the nose so that the gauze traverses the oral cavity and the oropharynx and is pulled tightly into the nasopharynx. The umbilical tapes are tied with care not to exert pressure on the columella and cause columellar necrosis. The middle umbilical tape is brought through the mouth and secured to the cheek skin with tape. Otolaryngologist consult is warranted. If no otolaryngologist is available, then the patient is admitted and observed with constant cardiac monitoring and constant O₂ saturometry. Packing is removed in 7 days and the patient discharged home.

NASAL ANESTHESIA

Nasal anesthesia is required for the management of common emergency procedures such as nasal inspection after trauma, laceration repair, closed nasal bone reduction, and nasal or facial abscesses drainage. The choice of anesthesia depends on the complexity of the lesion and procedure, as well as the area to be anesthetized. To achieve an adequate internal and external nasal anesthesia, a combination of 3 different methods is used; these include application of topical solutions (applied to the internal mucosa of nares), nerve block, and/or local infiltration. The clinical presentation of the patient determines which type is most appropriate for the resolution of pain. Conscious sedation must be considered as an adjunct in pediatric and noncooperative adults. The emergency medicine provider must know the different methods to provide nasal anesthesia, its indications, contraindications (Table 2 and 3), and complications.

Contraindications

True allergy to local anesthetics is the only absolute medical contraindication to both topical and peripheral nerve blocks of the nose. Regional blocks should be avoided when cutaneous or subcutaneous lesions are present at the contemplated site of puncture. If coagulation disorders are either known or suspected, it is prudent to avoid

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Indications and contraindications for internal nasal anesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indications</strong></td>
<td><strong>Contraindications</strong></td>
</tr>
<tr>
<td>Nasal endoscopy</td>
<td>Allergy to anesthetic topical solutions</td>
</tr>
<tr>
<td>Nasal evaluation with speculum</td>
<td>Uncontrolled hypertension, coronary artery disease</td>
</tr>
<tr>
<td>Nasal abscess incision and drainage</td>
<td>Uncooperative patient</td>
</tr>
<tr>
<td>Septal hematoma evacuation</td>
<td></td>
</tr>
<tr>
<td>Nasotracheal intubation</td>
<td></td>
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<tr>
<td>Nasogastric tube</td>
<td></td>
</tr>
<tr>
<td>Foreign body removal</td>
<td></td>
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<tr>
<td>Nasal packing placement</td>
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</tbody>
</table>
techniques in which compression is difficult (an infraorbital nerve block by intraoral approach). The use of vasoconstrictors is a relative contraindication in patients with coronary artery disease or uncontrolled hypertension.

**Topical Nasal Anesthesia**

Oxymetazoline 0.05% solution or a topical decongestant is sprayed into the nasal cavity to decrease bleeding during the procedure; it also decreases the systemic absorption of topical anesthesia.

Topical agents (Table 4) are sprayed into the nasal cavity, followed by the placement of cotton pledgets soaked in topical agents for 5 to 10 minutes. Branches of the anterior and posterior ethmoid, sphenopalatine, and nasopalatine nerves are anesthetized by these pledgets. If copious nasal secretions are suspected to hinder the topical anesthesia procedure, then the use of intramuscular glycopyrrolate is highly advised. The pledgets are removed, and swabs containing topical anesthetics are inserted for blockage of the ethmoidal nerves branches, which are located in an anterior–superior aspect of the internal nose; the swabs are then moved posteriorly along the medial meatus for blockage of the sphenopalatine nerve. This process is repeated after 5 minutes if no adequate anesthesia is achieved.

### Table 3

<table>
<thead>
<tr>
<th>Indications</th>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laceration repair</td>
<td>Allergy to anesthetic agents</td>
</tr>
<tr>
<td>Nasal wound evaluation</td>
<td>Signs of infection</td>
</tr>
<tr>
<td>Abscess incision and drainage</td>
<td>Uncooperative patient</td>
</tr>
<tr>
<td>Septal hematoma evacuation</td>
<td></td>
</tr>
<tr>
<td>Nasal bone fracture</td>
<td></td>
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<tr>
<td>Nasal debridement</td>
<td></td>
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</tbody>
</table>

### Table 4

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage</th>
<th>Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topical anesthesia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxymetazoline 0.05% nasal solution</td>
<td>2–3 sprays in nostril</td>
<td>Produce nasal mucosa vasoconstriction</td>
</tr>
<tr>
<td>Glycopyrrolate</td>
<td>0.004 mg/kg Intramuscular, 30–60 min before intervention</td>
<td>Preoperative, reduces secretions, and blocks cardiac vagal reflexes</td>
</tr>
<tr>
<td>Lidocaine 4% topical</td>
<td>Apply with cotton swab to affected area</td>
<td>Local anesthetic. Inhibits nerve impulse initiation and conduction</td>
</tr>
<tr>
<td>Tetracaine 2%</td>
<td>Apply with cotton swab to affected area</td>
<td>Local anesthetic. Inhibits nerve impulse initiation and conduction</td>
</tr>
<tr>
<td>Cocaine 4%</td>
<td>Apply with a cotton swab directly to affected area</td>
<td>Local anesthetic. Inhibits nerve impulse initiation and conduction</td>
</tr>
</tbody>
</table>
**Field Blocks of the Nose**

The physician should be familiar with the medications to be used when a regional block is being considered. The safety, dosages, and adverse effects of any local anesthetic agent used should be known (Table 5).41–43

### Field Block Technique

After explaining the technique to the patient and discussing the risks and benefits of the procedure, the patient is positioned depending on the area to be infiltrated. Before preparing the puncture site, the area of interest is examined for any overlying breaks in the skin, signs of infection, or superficial lesions. Once a technique is decided, the area is cleaned and prepared using a cleaning solution.

The infraorbital nerve block has shown to be an effective way to produce anesthesia of the ipsilateral side of the nose, and it is often used for surgical procedures and post-operative pain.44–46 However, the nasal mucosa is not anesthetized by this technique.

Two different approaches are used for an infraorbital nerve block, the intraoral and the extraoral (Fig. 14). Their use is basically based on personal preferences; however, the intraoral approach has been associated with a longer duration of anesthesia.47 When performing either technique, the infraorbital foramen is located by palpating the infraorbital rim. It is found directly below the pupil as the patient stares straight ahead when no strabismus is present. For the intraoral approach, the needle is inserted just anterior to the apex of the first premolar into the mucolabial fold and directed parallel to the axis of the tooth until it is palpated near the foramen, to a depth of approximately 2 cm. When proper needle location has been determined and aspiration performed, about 2 mL of solution is injected adjacent to, but not within, the foramen.48

As mentioned previously, the infraorbital foramen is also located when performing the extraoral approach. The skin is prepared, and the injection site is at the same point where the foramen was previously located. The needle is directed toward the foramen, and the solution is injected adjacent to it but not within it.

### Complications

Complications associated with the regional block in the area of the nose are due to the solution used as well as the structural injury to the tissue adjacent to the puncture wound and infiltration. When epinephrine and cocaine are used, tachycardia, seizures, hypertension, and hyperpyrexia are seen.43 Structural complications include orbit injury, bleeding, infection, neuropraxia, needle breakage, and pain at the injection site.

**Table 5**

**Local anesthetic agents and equipment used during nasal field blocks**

<table>
<thead>
<tr>
<th>Anesthetic Agents</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lidocaine</td>
<td>20–100 mg of 2% solution</td>
</tr>
<tr>
<td>Bupivacaine</td>
<td>12.5–25 mg of 0.25%–0.5% solution, to a maximum of 400 mg</td>
</tr>
<tr>
<td>Mepivacaine</td>
<td>50–400 mg of 1% solution or 100–400 mg of 2% solution</td>
</tr>
<tr>
<td>Other equipment</td>
<td></td>
</tr>
<tr>
<td>Sterile gauze</td>
<td></td>
</tr>
<tr>
<td>27-Gauge needle</td>
<td></td>
</tr>
<tr>
<td>5-mL Sterile syringe</td>
<td></td>
</tr>
</tbody>
</table>
NASAL SEPTAL HEMATOMA

A nasal septal hematoma (Fig. 15) is the accumulation of blood between the mucoperichondrium and the septal cartilage. The most common cause is direct trauma to the nose. Blood in the confined space is a perfect medium for bacterial overgrowth and cartilaginous destruction, with resultant saddle-nose deformity if left untreated.

Treatment of a septal hematoma consists of incision and drainage of the stagnant blood and clot with immediate septal pressure to approximate the perichondrium to the cartilage (Fig. 16). The indication to proceed with this procedure is

Fig. 14. Infraorbital nerve block. Two different approaches are used for an infraorbital nerve block, the intraoral and the extraoral. The intraoral approach has been associated with a longer duration of the anesthesia.

Fig. 15. Left nasal septal hematoma. Notice the accumulation of blood between the mucoperichondrium and the septal cartilage.
straightforward; any nasal septal hematomas should be drained in an urgent manner.\textsuperscript{50} No absolute contraindications exist with nasal septal hematoma. Appropriate anesthesia can effectively be achieved in a topical manner with lidocaine. If injectable lidocaine is used, epinephrine is not recommended.

**Incision and Drainage**

The equipment needed to drain a nasal septal hematoma is described in Box 6. Anesthesia is achieved with local infiltration of 2% lidocaine or topical application of 4% cocaine solution and packing the affected nostril with soaked gauze for 3 to 5 minutes.\textsuperscript{51} To drain the hematoma, blade number 11 is used to incise the mucosa over the hematoma in a horizontal direction. The procedure is done by starting with a small incision and increasing the diameter as needed to achieve complete extraction of the blood. The content is then suctioned out, followed by copious irrigation with normal saline. A small amount of mucosa is excised to prevent premature closure of the incision. After irrigation, a drain is left in place that also helps in preventing

![Fig. 16. Left nasal septal hematoma incision and drainage.](image-url)

(A) Left nasal septal hematoma. (B) Apply anesthesia (topical/infiltrate). (C) To drain the hematoma, use a blade number 11 to incise the mucosa over the hematoma horizontally. (D) Place a drain and packing.
premature closure. It may take up to 3 days for drainage to stop.\textsuperscript{52–54} When there is no further hematoma formation for a 24-hour period, the drain is removed.

A critical step of the procedure is to approximate the perichondrium to the cartilage by packing the nostril, as in anterior epistaxis. The nose pack is left in place for 24 hours.

Disposition consists of home discharge with prescription of oral antibiotics to cover \textit{Streptococcus pneumoniae} and beta-lactamase producing organisms and early follow-up with an otolaryngologist.

As with any surgical procedure, complications may occur with this procedure also; among them are hematoma reaccumulation, bleeding, and infection (Box 7).

**NECK ANATOMY/PHYSICAL EXAMINATION**

The anatomy of the neck is often simplified into triangles for the purpose of organizing the components of this complex area of the body. These triangles are multilayered, consisting of a superficial cervical fascia and 3 layers of deep fascia.\textsuperscript{55} For clinical purposes, the neck is partitioned into 3 zones.\textsuperscript{56} An understanding of the layers of the deep fascia of the neck is important because these layers form planes that provide routes of surgical procedures, or pathways for hemorrhage and infection. The deepest layer, known as the prevertebral fascia, encloses the C1–C7 vertebrae and the muscles that flex them. It also contains the carotid and jugular vessels. The external and internal jugular veins return blood from the head and face. The triangles mentioned previously are 3-dimensional spaces composed of blood vessels, nerves, lymphatic vessels, and lymph nodes and bounded by bone and muscles.

The sternocleidomastoid muscle, the anterior border of the trapezius muscle, and the middle portion of the clavicle form the first of the triangles, the posterior cervical
triangle. It contains numerous lymph nodes, branches of the cervical plexus, the accessory or cranial nerve XI, and 2 arterial branches of the thyrocervical trunk.

The second triangle, the anterior cervical triangle, runs alongside the posterior triangle, sharing the sternocleidomastoid muscle. The remaining 2 sides of the anterior triangle are formed by the body of the mandible superiorly and midline of the neck anteriorly. Most of the important vascular and visceral organs lie within the anterior triangle, including the major vascular structures of the neck and glandular structures including the thyroid, parathyroid, submandibular, and parotid glands.

**Peritonsilar Abscess**

If bacterial pharyngitis is left untreated or partially treated, cellulitis of the pharyngeal space with phlegmon and ultimately abscess formation between the tonsillar capsule, the superior constrictor muscle, and the palatopharyngeus muscle could develop. A capsule surrounds the tonsils, and it is within this potential space between the tonsils and the capsule that peritonsilar abscesses form. It remains the most common head and neck abscess in children and adults.

The clinical presentation consists of an ill-appearing patient presenting with a sore throat, odynophagia, dysphagia, neck pain, low-grade fever, trismus, and ipsilateral otalgia. On physical examination, bulging of the superior tonsillar pole and soft palate and deviation of the uvula away from the abscess are often seen.

Together with the clinical diagnosis, the use of the ultrasound for the diagnosis of peritonsilar abscess in the emergency department is of considerable benefit in emergency medicine practice. In a cooperative patient, this method is cost-effective, safe, and fast. Although most studies involve small numbers of subjects, intraoral ultrasonography has been reported to have a sensitivity of 89% to 92% and a specificity of 80% to 100%. A 5.0- to 10.0-MHz curved array endovaginal probe is used for intraoral ultrasonography. Preapplication of a topical anesthetic spray is recommended to reduce gagging and overcome trismus. During the ultrasound evaluation of a peritonsilar abscess, the carotid artery and its relationship to the abscess cavity

<table>
<thead>
<tr>
<th>Physical examination findings</th>
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<tbody>
<tr>
<td>Ill appearing</td>
</tr>
<tr>
<td>Fever, tachycardia</td>
</tr>
<tr>
<td>Dehydration</td>
</tr>
<tr>
<td>Poor oral intake</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
</tr>
<tr>
<td>Anterior chain cervical/submandibular</td>
</tr>
<tr>
<td>Sore throat</td>
</tr>
<tr>
<td>Worsens, becomes unilateral</td>
</tr>
<tr>
<td>Trismus</td>
</tr>
<tr>
<td>Internal pterygoid muscle spasm</td>
</tr>
<tr>
<td>Present in peritonsilar abscess</td>
</tr>
<tr>
<td>Absent in severe pharyngitis</td>
</tr>
<tr>
<td>Muffled voice (“hot potato”)</td>
</tr>
<tr>
<td>Drooling</td>
</tr>
<tr>
<td>Halitosis</td>
</tr>
</tbody>
</table>
should be identified. It is generally located posterolaterally to the tonsil and within 5 to 25 mm from the abscess. Sonographically, its anechoic and tubular shape identifies the internal carotid artery. Its location should be evident with systematic scanning of the peritonsillar area in both the sagittal and transverse planes. A peritonsillar abscess most commonly appears as a hypoechoic or complex cystic mass.

**Peritonsillar Abscess Drainage**

When a peritonsillar abscess is suspected, either based on history plus physical examination or on ultrasonographic findings, drainage is indicated. For the successful and safe drainage of a peritonsillar abscess, it is required that the patient does not have severe trismus because drainage is achieved with the intraoral approach and adequate opening of the mouth is necessary. Cooperation is also required to decrease the risks associated with the procedure. Sedation is recommended before attempting aspiration. Local infiltration of 1 to 2 mL of 1% lidocaine with epinephrine via a 27-gauge needle in the area of major fluctuance provides anesthesia and decreases discomfort.2

Start by preparing the equipment. Take a 16- to 18-gauge needle attached to a 5-mL syringe. Cut the plastic needle cover into 2, and slide the proximal half back over the needle. Tape the cover to the syringe, and it functions as a “depth gauge,” preventing deep tissue penetration to avoid puncturing the carotid arteries, which are located 2.5 cm behind and lateral to the tonsil.

After appropriate anesthesia and preparation, the abscess is better reached by having the patient sit upright with a support behind the head and with the help of an assistant to pull the ipsilateral cheek laterally to increase the visual field.61 Next, find the point of maximal bulging, which is usually near the top of the tonsil, lateral to uvula consistent with the 10 to 11 o’clock position when facing the patient (Fig. 17). When inserting the needle, advance it in the sagittal and medial planes only, avoiding lateral angulation toward the carotid artery. Aspirate as much pus as possible (on average only 3–5 mL of pus). If no pus is collected, try again 1 cm lower. The inability to get pus may indicate peritonsillar cellulitis only, but it does not fully rule out abscess. If bedside ultrasound machine is available and the physician is experienced with its use, it is preferable to do the procedure with the help of sonographic imaging.

For ultrasound-guided drainage, as explained earlier, once the abscess is identified on the screen as a hypoechoic or complex cystic mass, insert the needle adjacent to

![Fig. 17. Peritonsillar abscess drainage. Find the point of maximal bulging, which is usually near the top of the tonsil, lateral to uvula consistent with the 10 to 11 o’clock position when facing the patient.](image)
the probe head and direct into the abscess cavity. The ability to simultaneously image and introduce the needle allows the EP to track the course of needle and prevent complications such as puncturing the carotid artery.62–64

Larger abscesses may require incision and drainage, and if the emergency provider is not comfortable with this procedure or the patient presents with severe trismus, an otolaryngologist must be consulted.

If incision and drainage are required, a small incision is made using preferably a guarded scalpel above the tonsil, in the soft palate. The best approach to avoid injury to the internal carotid artery is to make medial and superior incisions. The incision is then blunt dissected using a curved Kelly clamp, which is gently directed inferiorly, posteriorly, and slightly laterally. Gentle dissection in the area of fluctuance is usually sufficient to penetrate the abscess cavity, and once in there, dissection is continued with the clamp to break up any septation inside the abscess.

Caution has to be taken in the uncooperative patient, and it is for this reason that sedation and good pain management are important when attempting the procedure in a patient with significant apprehension or in the pediatric population, which make these 2 scenarios contraindications.

**Contraindications**

There are cases when incision and drainage are absolutely contraindicated in the emergency department. One of these special situations is when the patient has a known vascular malformation that could have altered the anatomy around the abscess, increasing the risk for vascular damage. Another absolute contraindication is for patients with malignancy in the periphery of the peritonsilar abscess.

**Complications**

After successful drainage, the patient might complain of bad taste, as the abscess continues to empty the pus. This condition puts the patient at risk for aspiration of the content into the lungs, which can complicate the procedure. Another complication of peritonsilar abscess drainage is severe bleeding, which may or may not be related to the puncture of the carotid artery.

**Disposition**

Both needle aspiration and incision and drainage can be done in combination with hospital admission and administration of intravenous antibiotics or as an outpatient treatment with oral antibiotics.2 Studies have shown that adjuvant steroids therapy has demonstrated benefit for severe, acute pharyngitis.65

For patients who appear toxic and dehydrated with severe trismus or who have any signs of airway compromise, admission is indicated for the administration of intravenous antibiotics and surgical evaluation in case drainage in the operating room is necessary. If patients are nontoxic and are able to take medications by mouth, with adequate oral intake and managing secretions well, they could be discharged home with antibiotic coverage. Clear instructions are given to follow up with the primary care physician or ENT on an urgent basis. Patients are also instructed to return to the emergency department if increasing dyspnea occurs, sore throat worsens, or there is enlarging of the mass and even persistent high fever.

**POSTTONSILLECTOMY HEMORRHAGE**

Posttonsillectomy bleeding is one of the most feared surgical complications by otolaryngologists. The reported incidence of postoperative hemorrhage is between 3% and
Peak incidence in postoperative bleeding occurs between days 5 and 7. Hemorrhage is classified as immediate bleeding, which occurs during surgery; early postoperative bleeding, which occurs in the first 24 hours after surgery; and delayed postoperative bleeding, which occurs more than 24 hours after surgery. Postoperative bleeding is a serious emergency that warrants an immediate otolaryngology consult for evaluation and possible surgical management.

Patients with delayed posttonsillectomy bleeding are the ones who are usually seen at the ER. They are classified in 2 groups: those who are actively bleeding and those who have a blood clot in the tonsillar fossa. There is another group of patients who have had episodes of bleeding but at initial presentation at ER have no evidence of previous episodes of bleeding or active bleeding.

Patients who are not actively bleeding are evaluated for the presence of a clot in the tonsillar fossa. If no blood clot is present, then hemoglobin and hematocrit, as well as coagulation parameters, are drawn to assess the patients blood volume. These patients are usually admitted for observation. Posttonsillectomy patients are often dehydrated. When IV fluid resuscitation occurs and circulating volume is restored, collapsed arterial vessels expand and rebleeding occurs. For this reason, patients are admitted and observed for 24 hours after an episode of posttonsillectomy hemorrhage.

Patients who are not actively bleeding and have a clot in the tonsillar fossa should be managed by an otolaryngologist. If no otolaryngologist is available, then the patient is transferred to a tertiary center with available subspecialists. There is some debate in the otolaryngology community as to whether blood clots in the tonsillar fossa should be evacuated or not. Some advocate avoiding evacuating the clot and 24-hour hospital admission and observation, whereas others advocate removing the clot, especially, in patients in whom there is a suspicion of active bleeding but the oropharynx cannot adequately be assessed because of the presence of a large blood clot. Evacuation of the blood clot leads to active bleeding. Hence, one must be prepared to manage this. If this occurs, the probability that the patient needs surgical treatment is high. In a retrospective review done in 2004 of 90 children with posttonsillectomy hemorrhage, 90% of the children evaluated at ER for signs of bleeding necessitated surgical treatment.

Patients who arrive at the ER with active bleeding from the tonsillar fossa should be evaluated immediately and treated by an ER physician. The ABCs of emergency care are used if needed. Immediate vital signs are taken. Two large-bore needles are used for IV access. If massive bleeding is present, then the patient is intubated to protect the airway. This situation rarely occurs but must be taken into consideration if necessary. If the patient is actively bleeding but the airway is stable, then treatment in the ER should aim at hemostasis. There are various techniques that are used to achieve this.

McGill forceps or a large sponge holder, several gauzes, and 1:10,000 diluted adrenaline solution are used to achieve temporary hemostasis. The gauzes are soaked in the solution, folded, and mounted on the tip of the McGill forceps. Then, the area of active bleeding is identified. A headlamp with tongue depressors is used to evaluate the oral cavity and the oropharynx for adequate visualization. If no headlamp is available, then any light source will suffice. The tongue is gently depressed with the nondominant hand, and the folded gauzes are applied with the dominant hand against the tonsillar fossa with significant pressure. This method has a twofold purpose. One is to exert pressure on the arterial bleeding to collapse the blood vessels. The second purpose is to impregnate the tonsillar vault with adrenaline. In patients who have limited bleeding, the tonsillar pillar is injected with lidocaine/epinephrine 1% 1:100,000. A 3-mL syringe is recommended for this purpose, and a long 25- or 27-gauge needle
is used. The site of bleeding and the surrounding tissue is injected. Otolaryngology consult is highly advisable for all cases of postoperative bleeding because of the large number of patients who need surgical treatment. If no otolaryngologist is available, then the patient is transferred to a facility with otolaryngology services.

SUMMARY

EPs must be proficient in the short-term management of otorhinolaringologic (ENT) conditions, especially those that require performing procedures. Most ENT conditions, injuries, and postoperative complications are initially evaluated in the ED. Several disorders can be evaluated in an outpatient setting; however, a subset of conditions such as complex auricular lacerations, moderate to severe epistaxis, peritonsillar abscess aspiration, and posttonsillectomy bleeding require immediate identification, expedite intervention, and proficiency in the execution of otolaryngologic procedures. It is of utmost importance for the emergency practitioner to be proficient while performing these procedural skills.

REFERENCES