

TITLE: Unsedated Office-Based Laryngeal Surgery
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Background

Laryngology has a unique and rich history that originates from the early 1800s when Bozzini developed the use of a mirror to perform indirect laryngoscopy for examination of laryngeal anatomy. In 1852, Green first described the use of direct laryngoscopy to perform a visually controlled endoscopic excision of laryngeal neoplasm. Cohen advanced the field of laryngology by performing office-based mirror-guided surgery in his home in Philadelphia. With the use of cocaine to anesthetize mucosa, Koller and Jelinek provided another integral step towards office-based laryngeal surgery. Chevalier Jackson in the 1900s provided technical advances that are still in use today including perfecting direct laryngoscopy in the supine position. Advancements in technology including the development of various types of rigid laryngoscopes, the use of an operating microscope, microlaryngeal instruments, optical telescopes, and CO2 laser have substantially increased the breadth of surgical possibilities. Accordingly, the ability to provide appropriate anesthesia including jet ventilation, laser endotracheal tubes, and other techniques have made surgical intervention for laryngeal disorders safer for patients. As we continue to broaden the scope of minimally invasive surgical interventions, office-based laryngeal surgery will likely continue to grow and become popular not only for patients but for surgeons and likely reimbursement organizations.

Technologic Advanced for Office-Based Laryngeal Surgery

Among the advances that allow office-based laryngeal surgery possible is the advent of the flexible fiberoptic endoscope in the 1970s. Transoral laryngeal procedures with specialized instruments also provide an ability to perform office-based surgery. Additionally, the integration of a distal chip camera in 1999 for transnasal esophagoscopy provided improved resolution, brilliant illumination, and the ability to pass instruments through a 2 mm working channel including the ability to suction or insufflate. Finally, most recently, the ability to pass a fiber through this working channel to perform laser assisted surgery has allowed the ability to perform various procedures for unsedated patients for certain disease processes.

Patient Selection

As with all surgical interventions, patient selection is important for office-based laryngeal surgery. First and foremost, informed consent is required with a thorough description of the risks and benefits involved in the procedure from the use of anesthesia to the post-procedural care and management. Patients should be willing and cooperative in the office setting. Although a gag reflex is not necessarily a contraindication for an office-based procedure, it should be assessed prior to attempting it. For patients with an exquisitely hypersensitive gag reflex despite the use of anesthesia, an office-based procedure may not be successful. Patients should also be assessed for anxiety and pain tolerance to optimize the setting for procedures. At times, a mild oral sedative may be taken 30 minutes to an hour prior to the procedure. Comorbid conditions such as cardiopulmonary disease, movement disorders, and the use of anticoagulation therapy must also be assessed. Patients that may not pass operative clearance may still be amenable to unsedated office-based surgery with appropriate level of monitoring. Patients with movement disorders may require surgical intervention in the operating under general anesthesia as office-based procedures require a stationary patient. Finally, appropriate anatomy is required to perform procedures. A patent nasal airway and the ability to open the mouth at least 2 cm in interdental distance for transoral instruments is necessary.

Anesthesia

The sensory innervation to larynx, trachea, and esophagus is from the vagus nerve. The internal branch of the superior laryngeal nerve innervates the glottic and supraglottic structures and the recurrent laryngeal nerve innervates the subglottis. The trachea and esophagus are directly innervated from branches of the vagus nerve directly.

There are a variety of techniques that have been used for anesthetizing the nose and upper aerodigestive tract. Although cocaine has been used extensively in the past, it has lost some popularity as adequate anesthesia may be achieved by other means. In an article by Simpson et al. in 2004, the steps for topical anesthesia for the airway and esophagus were described. First, topical 2% oxymetazoline/tetracaine spray was administered into the nasal cavities. Then, topical benzocaine/tetracaine spray was applied to the palate and posterior pharynx. Finally, 3-5 cc of 4% lidocaine was dripped onto the tongue base and larynx under fiberoptic guidance in several 0.5 – 1 cc aliquots. After about 10 – 15 minutes of this topical anesthesia the procedure could be performed. Patients should also be informed to avoid oral intake of food or liquids for at least 45 – 60 minutes after the procedure to avoid the risk of aspiration.

An alternative to this regimen is using nebulized form of 2% or 4% lidocaine, followed by the direct application of lidocaine to the site of surgery through the flexible endoscope. Tessalon perles may also be used to topicalize the pharynx. Additionally, local nerve block of the internal branch of the superior laryngeal nerve may be performed at the thyrohyoid membrane. There are various techniques available, and choice of anesthesia may be by surgeon preference after appropriate experience.

When anesthesia is used, it is important to adhere to maximal dosing guidelines to avoid complications that may occur. For topical 4% lidocaine, 7 – 8 cc should be the limit used for an adult (4.5 mg/kg or about 300 mg for a 70 kg patient). For 2% tetracaine is used, a maximal

amount that may be safely used is 0.9 cc. For benzocaine/tetracaine spray a maximum of a 2 second spray may be used. When benzonatate perles are used a maximal dose of 200 mg can be given to an adult patient.

Although adverse reactions to anesthesia are rare, it must always be acknowledged. A thorough history is important in determining any previous anesthesia-related complications for a patient. Systemic toxicities may include cardiovascular depression or arrest, convulsions, and respiratory arrest. Additionally, in patients that have renal, hepatic, and cardiac conditions these toxicities may be potentiated.

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