

VIDEOS IN CLINICAL MEDICINE

Examination of the Larynx and Pharynx

F. Christopher Holsinger, M.D., Merrill S. Kies, M.D., Y. Etan Weinstock, M.D.,
Jan S. Lewin, Ph.D., Shaheen Hajibashi, B.S., David D. Nolen, B.A.,
Randal Weber, M.D., and Ollivier Laccourreye, M.D.

From the Department of Head and Neck Surgery (F.C.H., Y.E.W., J.S.L., S.H., D.D.N., R.W.) and Thoracic–Head and Neck Medical Oncology (M.S.K.), University of Texas M.D. Anderson Cancer Center, Houston; and the Department of Otorhinolaryngology–Head and Neck Surgery, Hôpital Européen Georges Pompidou, Assistance Publique–Hôpitaux de Paris, Université René Descartes Paris V, Paris (O.L.). Address reprint requests to Dr. Holsinger at the Department of Head and Neck Surgery, University of Texas M.D. Anderson Cancer Center, 1515 Holcombe Blvd., Box 441, Houston, TX 77030-4009, or at holsinger@mdanderson.org.

N Engl J Med 2008;358:e2.
Copyright © 2008 Massachusetts Medical Society.

Visualization of the larynx and pharynx is an essential part of a complete head and neck examination. Although the location of these structures often precludes direct visualization, simple techniques can be used to evaluate them in the clinical setting.

Indirect laryngoscopy can be performed with either a simple dental mirror or a flexible fiberoptic endoscope. The procedure can be performed when patients are awake, and it is usually well tolerated. Laryngoscopy can identify a wide variety of disorders — acute or chronic, benign or malignant.

INDICATIONS

Common indications for laryngoscopy include chronic cough, laryngotracheal dyspnea, dysphonia, voice changes, chronic throat pain, persistent otalgia, swallowing problems, dysphagia, and symptoms of aspiration. Laryngoscopy can be used to elucidate the anatomic location of the problem and, in some cases, the cause.¹

Patients who are at high risk for head and neck cancer benefit from screening examinations with indirect mirror laryngoscopy or flexible endoscopic laryngoscopy. Any adult patient with ear pain, hoarseness, or a sore throat that lasts longer than 2 weeks should have a complete laryngopharyngeal examination because of the possibility of cancer.² Patients with a history of long-term tobacco and alcohol use merit special attention and require careful examination.

Laryngoscopy is also important for evaluating patients with a difficult airway. This examination can be performed in emergency departments when timely airway control is imperative. Patients presenting with angioedema, uncontrolled epistaxis, cervicofacial trauma, stridor, or suspected ingestion of a foreign body should be examined by laryngoscopy to evaluate the presenting problem and to rule out an airway compromise.

Finally, laryngoscopy may also be useful in the diagnosis of various diseases, such as gastroesophageal reflux, tuberculosis, sarcoidosis, allergy, or neurologic diseases.³

CONTRAINDICATIONS

There are few, if any, contraindications to performing laryngoscopy with the fiberoptic nasal laryngoscope. However, you should exercise great care when performing laryngoscopy in a patient with impending airway compromise (e.g., epiglottitis). Only a skilled operator should perform a laryngoscopic examination in this clinical scenario. Inadvertent trauma to the laryngopharynx may exacerbate swelling and precipitate respiratory arrest.

Laryngoscopy can usually be performed in young children, although the patient's tolerance and compliance may limit the extent of the examination.⁴

EQUIPMENT

For mirror laryngoscopy, a curved dental mirror, an external light, a 4-by-4-in. gauze pad, and antifogging solution are needed.

For a flexible laryngoscopic examination, you will need a standard flexible nasolaryngoscope, gloves, a nasal speculum, surgical lubricant, antifogging solution, decongestant spray, anesthetic spray, and a wall-suction setup with a Frazier-tip suction catheter. It is also useful to have tissues available. Decongestants, such as 0.05% oxymetazoline or 0.1% to 1.0% phenylephrine, are used to elicit mucosal vasoconstriction of the nasal passages, so that the endoscope can pass more comfortably. Lidocaine (4.0%) is used to anesthetize the pharynx and larynx. The flexible endoscope has a thumb-dial control that allows the examiner to deflect the tip up or down. When rotated 90 degrees, the thumb dial lets the examiner turn corners and maneuver from side to side, as well as up and down.

MIRROR LARYNGOSCOPY

During mirror laryngoscopy, the patient should sit opposite and slightly elevated relative to the examiner. The patient's legs should be uncrossed, and the patient should lean forward slightly, with mouth wide open and tongue protruding. To prevent fogging of the mirror, warm it to just above body temperature or coat it with an antifogging solution.

Gently grasp the anterior portion of the patient's tongue with a sterile, 4-by-4-in. cotton gauze pad and hold it just outside the mouth. Ask the patient to take slow, deep breaths through the mouth. Keep the light source focused on the patient's oropharynx while performing the exam. To avoid a gag reflex, pass the mirror into the patient's oropharynx without touching the mucosa of the oral cavity, soft palate, or posterior oropharyngeal wall. Gently angle the mirror downward until you can see the mucosal surfaces of the larynx and hypopharynx. Note that in mirror laryngoscopy, the image is inverted: the right vocal cord appears on the left side of the mirror and the left cord appears on the right side of the mirror. Ask the patient to say "e" (as in "eel") and observe the dynamic motion of the true vocal cords and arytenoid cartilages. The vocal cords will lengthen and adduct along the midline. The anterior aspect of the larynx can be seen by asking the patient to say "e" in a higher register. This maneuver fully exposes the anterior commissure, permitting complete visualization (Fig. 1). To increase visualization, ask the patient to stand when you are seated and vice versa while performing the examination. The oropharyngeal vallecula and base of the tongue, as well as the hypopharynx (pyriform sinuses and posterior pharyngeal wall), can also be seen with the mirror. Inspect these structures for symmetry and any potential mucosal abnormalities.

FLEXIBLE LARYNGOSCOPY

PREPARATION AND POSITIONING

Setup for this exam is quick and easy. Before you begin, explain the procedure to the patient and obtain consent. At the very least, the patient should provide verbal consent, but increasingly, the use of written informed consent is recommended. Ascertain whether the patient has any allergies to medication or medical contraindications before performing the procedure. Prepare the patient's nose by applying a decongestant and an anesthetic agent to the nasal mucosa. Any delivery method, whether by an atomized spray device or a plain syringe, is acceptable.

Administer the medication by opening the patient's nose with a nasal speculum.



Figure 1. The True Vocal Cords.

High-resolution freeze-frame digital laryngoscopy reveals the normal anatomy of the true vocal cords during phonation. In this image, anterior is toward the bottom.

Ask the patient to hold his or her breath during spraying to avoid inhalation of the agents. Once the nose is adequately prepared, position the chair so that the patient's face is at eye level with yours. Then have the patient lean slightly forward, with hands placed on the knees.

THE PROCEDURE

Place the tip of the laryngoscope into the nostril and slowly advance it lateral to the septum and medial to the inferior turbinate. Visualize the inferior meatus and follow along the inferior turbinate. Advance the scope posteriorly into the nose beyond the middle turbinate along the nasal floor. Visualize the eustachian tube orifice ("the torus tubarius") lateral to the entrance of the nasopharynx. Visualize the adenoid or the central lymphoid tissue of Waldeyer's ring. Immediately posterior to the eustachian tube opening is a shallow depression called Rosenmüller's fossa. Because nasopharyngeal carcinoma may arise from these recesses, this part of the exam merits especially careful evaluation. Any bleeding when the mucosa is touched with the tip of the laryngoscope should alert you to the possibility of nasopharyngeal carcinoma.

Examine the posterior nasal septum and the nasopharyngeal aspect of the soft palate. Ask the patient to breathe through the nose; this will separate the palate from the posterior nasal wall and allow passage of the scope into the oropharynx. From this location, the scope shows a panoramic view of the oropharynx below. Continue to pass the scope inferiorly until you can easily visualize the larynx. The true vocal cords should appear clean, white, and taut. Note any changes in the color of the mucosa or any superficial irregularities. When the patient is breathing deeply, the glottis remains wide open, with the vocal cords abducted. Some portion of the subglottic larynx can usually be seen. The anterior ring of the cricoid cartilage is often visible just below the true vocal cords. However, the laryngoscope should not be passed through the true vocal cords, since contact can elicit laryngospasm. Ask the patient to sniff or to inspire deeply through the nose. This causes maximal vocal cord abduction, permitting optimal assessment of the larynx.⁵ Then, ask the patient to say "e" or "ah" to assess the function and movement of the vocal cords and arytenoid cartilages. Examine the epiglottis, arytenoids, aryepiglottic folds, false vocal folds, true vocal cords, and subglottic region, or cricoid shelf.

Videostroboscopy can be performed to evaluate the patient's speech. During human speech, a vibratory wave is formed as the vocal cords produce sound. Stroboscopic illumination of the larynx can reveal subtle alterations of vocal-fold vibration that are not visible with standard laryngoscopy.⁶

The hypopharyngeal anatomy should be distinguished from both the larynx and the oropharynx, using the boundaries of the aryepiglottic and pharyngoepiglottic folds, respectively (Fig. 2). For all portions of this examination, advance the endoscope as close to the tissue being examined as possible without making contact. Touching the mucosa may elicit a gag reflex.

The paired pyriform sinuses are visible on either side of the larynx. Ask the patient to puff out the cheeks and hold them; this will push out the walls of the hypopharynx, allowing for an easier and more complete view. Rotate the head from one side to the other to maximize visualization of lateral structures.

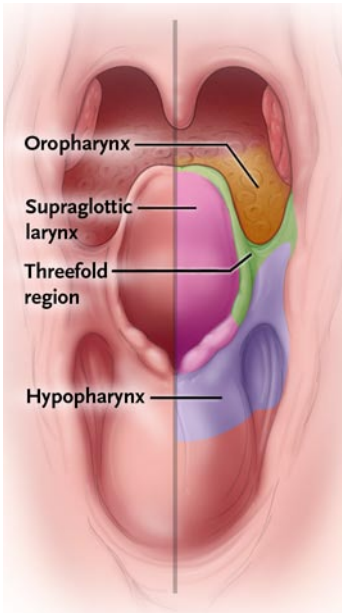


Figure 2. The Division between the Larynx and Pharynx.

The oropharynx, supraglottic larynx, and hypopharynx converge on the threefold region (pink, center). The vocal cords are found below the supraglottic larynx and are not shown.

TIPS AND TROUBLESHOOTING

Occasionally, patients may not tolerate the mirror laryngoscopic examination because of a prominent gag reflex, apprehension, or discomfort. In these circumstances, apply a mild topical anesthetic to the throat and allow sufficient time for the medica-

tion to take effect before reattempting the examination. Sometimes the procedure simply cannot be performed; flexible laryngoscopy should be attempted in such cases.

AFTERCARE AND COMPLICATIONS

Since laryngoscopy is generally painless, no postprocedure analgesia is necessary. Patients should be advised to avoid eating and drinking for 1 hour after the application of lidocaine. Until mucosal anesthesia resolves, reduced laryngopharyngeal sensation might predispose the patient to aspiration. Otherwise, there are few complications associated with laryngoscopy. Epistaxis and hemoptysis are uncommon.

CONCLUSIONS

Evaluation of the larynx and pharynx is an important part of a complete physical examination. Laryngoscopy by mirror or by flexible fiberoptic exam can be safely performed in adults and children for benign or malignant conditions. With the advent of multidisciplinary care for head and neck cancer, knowledge of laryngoscopy and laryngopharyngeal anatomy is important in an increasing number of medical specialties.

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Laccourreye H. How do I study laryngeal mobility? *Ann Otolaryngol Chir Cervicofac* 1993;110:234-6. (In French.)
 2. Diagnostic procedures and documentation. In: Kleinsasser O. *Tumors of the larynx and hypopharynx*. New York: Thieme, 1988:124-8.
 3. Ridley MB, Kelly JH, Marsh BR, Roa A. Office diagnostic techniques: the adult patient. In: Fried MP, ed. *The larynx: a multidisciplinary approach*. 2nd ed. St. Louis: Mosby, 1996:57-64.
 4. Hartnick CJ, Zeitels SM. Pediatric video laryngo-stroboscopy. *Int J Pediatr Otorhinolaryngol* 2005;69:215-9.
 5. Poletto CJ, Verdun LP, Strominger R, Ludlow CL. Correspondence between laryngeal vocal fold movement and muscle activity during speech and nonspeech gestures. *J Appl Physiol* 2004;97:858-66.
 6. Zeitels SM. *Atlas of phonosurgery and other endolaryngeal procedures for benign and malignant disease*. San Diego, CA: Singular, 2001.
- Copyright © 2008 Massachusetts Medical Society.*