Office-based arytenoid palpation for diagnosis of disorders of bilateral vocal fold immobility

Priya Krishna, MD; Clark A. Rosen, MD, FACS

Abstract
Bilateral vocal fold immobility is an uncommon but serious condition with many causes. Accordingly, accurate diagnosis is essential in order to treat patients promptly and avoid long-term sequelae. Historically, diagnosis has been performed in the operating room with the patient under general anesthesia. We present the case of a patient who was diagnosed with bilateral vocal fold immobility by an in-office arytenoid palpation that required only topical anesthesia of the larynx. The patient subsequently underwent appropriate treatment. In our opinion, office-based arytenoid palpation is a simple, safe, and accurate procedure for diagnosing bilateral vocal fold immobility.

Introduction
Bilateral vocal fold immobility is a potentially life-threatening disorder. Therefore, a prompt and accurate diagnosis followed by appropriate treatment is imperative. Vocal fold immobility or fixation has several etiologies that should be distinguished from one another because treatments vary. Four conditions account for nearly all cases of bilateral vocal fold immobility: (1) neurogenic bilateral vocal fold paralysis, (2) cricoarytenoid joint fixation, (3) laryngeal synkinesis, and (4) interarytenoid scar/posterior glottic stenosis. Differentiation of these etiologies is based on the history and findings on flexible laryngoscopy, direct laryngoscopy (with arytenoid palpation), and laryngeal electromyography (EMG). Historically, diagnostic laryngoscopy has been performed in the operating suite. Recently, an advanced technology called chip-tip flexible laryngoscope with a working channel (EndoEYE model CYF-V; Olympus Surgical America; Orangeburg, N.Y.). A flexible Silastic spray catheter (model PW-6P-1; Olympus Surgical America) with an inner diameter of 1.8 mm and a working length of 19 cm was inserted through the working channel of the laryngoscope. Topical lidocaine 4% droplets were administered to the endolarynx by the surgeon. A total of 1.5 ml of lidocaine was applied to the base of the tongue, laryngeal surface of the epiglottis, aryepiglottic folds, posterior glottis, and the true and false vocal folds (figure 2). An Abraham cannula from a peroral approach was used to palpate the endolarynx to test for adequate depth of anesthesia. Once anesthesia was confirmed, two
Abraham cannulas passed perorally were used simultaneously to passively move the arytenoids laterally and expose the posterior glottis (figure 3). The arytenoids displayed minimal mobility on simultaneous passive movement. When one arytenoid was pushed laterally, the other moved medially. An interarytenoid scar band was noted with lateral retraction of the arytenoids.

The patient tolerated the procedure well and experienced no complications. She ultimately underwent CO$_2$-assisted laser lysis of the scar band with application of mitomycin C, and she was decannulated. She was prescribed a daily proton-pump inhibitor and a behavior-modification regimen to treat gastroesophageal reflux disease.

Discussion
Bilateral vocal fold immobility is a broad term that is used to describe any condition in which both vocal folds do not exhibit purposeful motion. From among the four most common etiologic categories—paralysis, cricoarytenoid joint fixation, synkinesis, and interarytenoid scar/posterior glottic stenosis—the most important specific causes are iatrogenic surgical trauma, intubation trauma, neoplasms, neurologic disorders, inflammatory diseases, and psychogenic disorders.$^{1,3}$

Patients with bilateral vocal fold immobility present with one of two histories: (1) a worsening of stridor over weeks to months culminated by a rapid onset of dyspnea or (2) a gradually progressive dyspnea over the course of months. Patients with gradual dyspnea are frequently misdiagnosed as having asthma or chronic obstructive pulmonary disease, but the misdiagnosis becomes evident when they do not respond to a bronchodilator or other standard therapy. A flow-volume loop on pulmonary testing may indicate extrathoracic obstruction and prompt a referral to an otolaryngologist.$^4$

Historically, diagnosis has been based on the results of one or more assessments from among laryngeal EMG, operative evaluation, and imaging studies. If the history does not suggest a probable cause, it is best to proceed with laryngeal EMG and arytenoid palpation. Laryngeal EMG evaluates neuromuscular activity and integrity of the arytenoid muscles (thyroarytenoid and lateral cricoarytenoid) and abductors (posterior cricoarytenoid).$^2,5$ A normal laryngeal EMG rules out paralysis and narrows the diagnosis to posterior glottic stenosis (interarytenoid scar) and/or cricoarytenoid joint fixation. The next step after a normal EMG is evaluation of the cricoarytenoid joints and posterior laryngeal area. Traditionally, this examination is done in the operating room by direct laryngoscopy and with either local or general anesthesia.

Imaging with computed tomography (CT) has been used (1) to evaluate the position of the arytenoids if there is a suspicion of dislocation and (2) to investigate the distal airway, because patients with posterior glottic stenosis are usually at risk for subglottic or tracheal stenosis from previous intubation trauma.$^6$ CT of the cricoarytenoid joints can be more difficult to interpret when there is insufficient mineralization of the laryngeal cartilages, as in the case with younger patients. A study that is nondiagnostic does not exclude a diagnosis of cricoarytenoid joint derangement.
The value of imaging for definitive information about the cricoarytenoid joint is therefore limited.\(^7\)

Indirect laryngoscopic procedures were performed as early as the mid-1800s without the benefit of topical anesthetics. Patients today have the luxury of undergoing painless procedures, and interest is high in performing laryngeal procedures in awake, sitting patients prepped with local anesthesia. Our technique for arytenoid palpation completely obviates the need for external injections (i.e., superior laryngeal nerve blocks and transtracheal injections) and significantly decreases the amount of topical anesthetic required to provide 30 to 45 minutes of targeted mucosal anesthesia.\(^8,9\) To the best of our knowledge, the use of topical anesthesia for arytenoid palpation in the awake patient has not been previously reported.

The amount of resting muscle tone in our patient was insignificant because passive motion of the arytenoids (when palpated separately) was easily demonstrated, indicating that the cricoarytenoid joint itself was not fixed. The essentially normal laryngeal EMG ruled out paralysis and synkinesis. Our patient did not require an operative evaluation as a further means of establishing the diagnosis.

Ultimately, our technique of office-based palpation of the arytenoids can be used as part of the initial evaluation. A fiberoptic laser beam (e.g., CO\(_2\)) can then be delivered through the flexible scope to the posterior glottic scar or web at the same sitting if such a finding is noted.

In conclusion, time is of the essence in treating patients with bilateral vocal fold immobility. Our method of in-office arytenoid palpation is safe and expedient and therefore can obviate the need for a costly alternative procedure requiring an operating suite. This technique warrants incorporation into the armamentarium of tests to assist in the diagnosis of bilateral vocal fold immobility.

References