# Office-Based Injection Laryngoplasty for the Management of Unilateral Vocal Fold Paralysis

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**Summary: Objective.** Office-based injection laryngoplasty (OBIL) is a common method of addressing glottal insufficiency. This retrospective chart review identifies the demographics, laterality, technique, success rate, injectates, and complications of OBIL performed over a 3-year period at a single institution.

**Study Design.** Retrospective chart review.

**Methods.** All OBILs performed for the management of UVFP by the senior author over 3 years (2007–2009) were identified from billing records. The age, gender, laterality, underlying disease process, augmentation material, route of injection, and complications were recorded.

**Results.** Eighty-two OBILs were attempted on 57 patients. The most common route of access was transoral (85.6%). All OBILs were able to be completed. Injectates used were hyaluronic acid derivatives (57.3%), calcium hydroxyapatite (16%), and Cymmetra (16.5%). Three complications (3.7%) occurred. Thirty percent of patients ultimately elected for thyroplasty or ansa reinnervation, 22% found their condition to self-resolve, 14% died, and 25% were lost to follow-up.

**Conclusions.** Using a variety of approaches, OBIL is possible in almost all patients. The single surgeon transoral route using a rigid angled telescope and curved injection needle was the most commonly used approach. Multiple injectates can be used and have good safety records. The final disposition of patients may be variable and warrants further investigation.

**Key Words:** Laryngology–Laryngeal surgery–Office-based–Procedures–Surgery–Vocal fold paralysis–Hoarseness–Thyroplasty–Reinnervation.

## INTRODUCTION

Injection laryngoplasty (IL) has been a cornerstone in the management of unilateral vocal fold paralysis (UVFP) since its first description.[1] During the majority of the last century, IL was commonly performed in the operating room (OR). However, with the advent of "chip-tip" endoscopes, refinements in the ability to deliver anesthesia to the larynx[2,3] and the development of numerous injectables,[4,5] there has been a move toward IL performed in the office.[6] Advantages of OBIL include markedly decreased cost, avoidance of the risks of general anesthesia, and the ability titrate injectate delivery for optimized voice outcomes, among others.[7]

As the population ages and grows and as some of the most common causes of UVFP increase,[8] including the number of thyroid cancers,[9] cervical spine surgeries,[10] lung cancer resections, and aortic valve replacements,[11] one may expect the incidence of UVFP to increase as well. As the paradigm of OBIL for UVFP continues to evolve, there are questions which remain to be answered.

The first involves the safety profile of both OBIL and the numerous injectables which are being used for the treatment. UVFP often occurs secondary to malignancy, complications from surgery, or both. As such, patients with UVFP often possess multiple morbidities including general health concerns, cardiopulomonary compromise, need for anticoagulation, among other medical and psychosocial concerns. With this in mind, it is critical to evaluate the safety of OBIL as has been done for other office-based laryngeal surgeries.[12,13] In an effort to avoid general anesthesia, another question to be answered is how often OBIL can actually be completed. Finally, there is an active discussion regarding the ultimate disposition of patients after injection.[14–16]

To answer these questions, a retrospective chart review was performed of all OBILs performed for UVFP over a 3-year period at an academic tertiary care institution.

## MATERIALS AND METHODS

After obtaining approval by the institutional review board, all OBILs attempted for UVFP by the senior author over 3 years (2007–2009) were identified from billing records. The age, gender, laterality, underlying disease process, route of injection, procedural success rate, amount and type of augmentation material used, complications, and patient disposition were recorded.

All procedures were performed in the otolaryngology clinic examination suite containing a powered examination chair, video tower with photodocumentation capability. Informed consent was obtained and a procedural "time-out" was performed before each procedure. Patient vital signs were collected before the visit; however, no cardiopulomonary monitoring was performed during the procedure. All injectates were directed toward the paraglottic space musculature. Approaches used were transoral,[17] transcricothyroid membrane,[18] transthyrohyoid membrane,[19] and transthyroid ala.

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For the transoral approach, the oral cavity is first anesthetized with topical lidocaine spray applied with an atomizer. The tonsillar pillars, base of tongue, and posterior pharyngeal wall are sprayed with lidocaine. The patient is asked to assume the "sniffing" position and directed to hold his tongue with gauze. Visualization of the laryngopharynx is obtained with a transoral rigid 70° angled telescope held by the surgeon. The view from the scope is transmitted to a screen on the video tower (Figure 1).

An Abraham cannula attached to a syringe with 4% lidocaine is placed along the patient's lingual sulcus and directed over the larynx. A "laryngeal gargle" is performed with 4% lidocaine dripping lidocaine to the endolarynx during sustained phonation. The surgeon then advances a syringe with injectate attached to an orotracheal injector needle (model # 1650030 and 1650050; Medtronic, Minneapolis, MN) along the patient's lingual sulcus and directs it to the larynx. The needle may be used to lateralize the patient's false vocal fold. The needle is inserted through the superior surface of the vocal fold into its body. Injectate is applied within the paraglottic space with approximately 20% overinjection to account for reabsorption.

The percutaneous techniques are performed with a surgeon and an assistant. The skin is anesthetized with 1% lidocaine. After the nasal cavity is anesthetized, a channeled flexible laryngoscope is advanced into laryngopharynx. A laryngeal gargle is performed by dripping 4% lidocaine to the endolarynx *via* the channel of the laryngoscope during sustained phonation. A 25 gauage 1.25-in needle is passed through the skin into the larynx by the surgeon and is directed into the vocal fold.

## RESULTS

Eighty-two OBILs were attempted on 57 patients. Patients injected were aged between 16 and 83 years, with a mean age of 60 years. Thirty-five males and 22 females were treated. UVFP occurred on the left side in 40 patients and on the right side in 17. Tables 1 and 2 list the etiology of paralysis and approach used for injection, respectively. No procedure had to be terminated early and all procedures were able to be performed to the intended completion point. On average, 0.64 mL of injectate was used in each setting. The augmentation material used is listed in Table 3.

Three complications (3.7%) were noted during or after OBIL. One patient had a hypersensitivity reaction to Restylane. One patient had calcium hydroxyapatite injected superficially requiring microdirect laryngoscopy and removal at a later date. One patient experienced vocal fold edema after injection and was observed in the office without incident.

Figure 2 details the disposition of patients after OBIL.

**FIGURE 1.** Surgeon and patient positioning for transoral vocal fold injection.

**TABLE 1.**
**Etiology of UVFP**

| Etiology | Percentage of Patients |
|---|---|
| Thoracic | 36 |
| Idiopathic | 30 |
| Cervical | 21 |
| Cerebral | 10 |
| Intubation | 3 |

## DISCUSSION

UVFP is an entity often encountered by otolaryngologists-head and neck surgeons. Management options include voice therapy, OBIL, and injection laryngoplasty performed under general anesthesia in the OR, reinnervation, thyroplasty, and arytenoid repositioning maneuvers. Definitive treatment typically is deferred for the first 9 months after onset and during that time, patients' options are observation, voice therapy, or IL.

IL has an important role in the management of glottal insufficiency. It provides immediate treatment of symptoms related to voice and cough. OBIL offers some advantages over IL performed in the OR. OBIL permits an unobstructed view of the vocal folds, allowing the surgeon to clearly visualize the change in configuration during injection.[7] There is room for immediate analysis of results permitting simultaneous modification if necessary.[20] Performing the procedure under local anesthesia not only reduces the risks associated with general anesthesia but also allows patients to return to normal activities immediately, preventing lost time from work.

Another advantage of OBIL is cost savings. Grant et al estimated increased charges of $8250 for IL performed in the OR compared with the office.[21] Similarly, other authors have noted significant financial savings associated with performance of IL in office as opposed to the OR.[22,23]

Surgeon preference for performance of IL in the OR versus the office for management of UVFP varies tremendously. A recent multi-institution analysis reported equal numbers of IL performed in the OR and in the office.[6] Recent reports of UVFP management show IL performed entirely in the office[24,25] and entirely in the OR.[26] Rationale beyond surgeon preference drives the decision of where to perform IL, including

**TABLE 2.**
**Approach Used for OBIL**

| Approach | Number of Times (Percent of Total) |
|---|---|
| Transoral | 71 (86.6) |
| Transcricothyroid membrane | 8 (9.8) |
| Transthyrohyoid membrane | 2 (2.4) |
| Transthyroid ala | 1 (1.2) |