World Journal of Otorhinolaryngology-Head and Neck Surgery (2018) xx, 1–4

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journal homepage: www.keaipublishing.com/WJOHNS; www.wjent.org

Research Paper

# Injection medialization laryngoplasty improves dysphagia in patients with unilateral vocal fold immobility

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Received 13 April 2018; accepted 11 May 2018

**KEYWORDS**
Unilateral vocal fold immobility;
Glottic insufficiency;
Dysphagia;
Eating assessment tool;
Injection medialization laryngoplasty

**Abstract** *Objective:* To assess patient reported swallowing outcomes before and after injection medialization laryngoplasty in patients with unilateral vocal fold immobility (UVFI).
*Methods:* Case series with chart review of patients with UVFI who underwent injection medialization laryngoplasty at a community laryngology practice by a single clinician between October 2015 and December 2017. Patient-reported validated surveys of swallowing impairment, Eating Assessment Tool (EAT-10), demographics, etiology and duration of symptoms were recorded before and after injection. A paired *t* test was done on EAT-10 surveys before and after IML to assess for statistical significance.
*Results:* Twenty-one patients with UVFI and glottic insufficiency underwent IML between October 2015 and December 2017. Nineteen of 21 patients (90%) presented with dysphagia (EAT-10 $\geq$ 3). 76% of patients with dysphagia reported improvement in swallowing function after IML. The EAT-10 scores of UVFI patients with dysphagia before and after IML were 17.0 $\pm$ 14.0 and 4.2 $\pm$ 9.6, respectively ($p = 0.004$).
*Conclusions:* Nearly all patients with UVFI and glottic insufficiency report associated dysphagia. Three fourths of these patients perceive improvement in their swallowing function after injection medialization laryngoplasty. Patients with idiopathic UVFI may have a more sustained improvement and those with severe preop dysphagia may not benefit. Further research is necessary to refine patient selection and to assess duration of improved swallowing function.

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Peer review under responsibility of Chinese Medical Association.

Production and Hosting by Elsevier on behalf of KeAi

https://doi.org/10.1016/j.wjorl.2018.05.003

## Introduction

Unilateral vocal fold immobility (UVFI) is the most common neurologic disorder affecting the larynx.[1,2] Etiologies of UVFI include iatrogenic recurrent laryngeal nerve (RLN) injury, tumors compressing or infiltrating the RLN along its course, mediastinal processes that stretch or compress the RLN, infections, neuromuscular diseases, as well asidiopathic causes. Idiopathic cases comprise about 24% of patients affected by UVFI.[3]

UVFI is a common cause of incomplete glottal closure.[4] Glottal insufficiency impairs swallowing, respiration and phonation.[5,6] Symptoms of glottal insufficiency include a breathy weak voice, reduced cough strength, dysphagia and dyspnea.[4] The detrimental effect of UVFI on phonation has been thoroughly studied whereas the prevalence of dysphagia in patients with UVFI has been addressed less systematically.[4,5,7] Dysphagia has been reported by 60% of patients with UVFI, with 23%—53% of these patients demonstrating aspiration on videofluoroscopy.[1,8]

Both injection medialization laryngoplasty (IML) and type 1 thyroplasty have been shown to be equally efficacious in reducing aspiration with short-term follow up.[2] IML, one of the oldest methods for repositioning of the vocal fold after UVFI, is much simpler and faster.[9] Introduced by Bruennings in 1911, the technique was initially plagued by complications related to the filler material.[9,10] With the development of better fillers and increased clinical experience, IML has gained wide adoption.[11] Awake IML offers the advantages of avoiding general anesthesia and providing the surgeon with direct feedback on glottic closure and voice quality.[7,12,13] The success of IML in repositioning the immobile vocal fold and reestablishing glottic valvular competency has been reported to be over 97% with different injection fillers.[4] The aim of this study is to evaluate the effect of IML on self-reported dysphagia in patients suffering from UVFI with glottic insufficiency in a community laryngology practice.

## Patients and methods

### Patients

After Institutional Review Board approval, a retrospective chart review was performed of all patients with UVFI and glottic insufficiency who underwent injection medialization laryngoplasty by the senior author between October 2015 and December 2017. Patients who did not follow up after IML were excluded. Impairment of swallowing and voice was determined using the validated EAT-10 and Voice-Related Quality of Life (V-RQOL) survey scores respectively, reported by patients preoperatively and on each successive visit.[14,15] Self-reported dysphagia was defined as an EAT-10 score $\geq$3.[14] Patient demographics, etiology of UVFI, type and amount of filler-material injected, duration of symptoms before IML, and duration between IML and last follow-up were recorded for each patient.

Patients were counselled that the principle goal of injection medialization laryngoplasty was to improve their voice but that their swallowing may also improve. Patients underwent either awake transoral IML or IML under general anesthesia if the awake procedure was not tolerated. Awake transoral IML was performed under indirect magnified laryngoscopy using a 70-degree telescope as previously described.[7,12] IML under general anesthesia was performed after suspension microlaryngoscopy. Injectable filler materials used were carboxymethyl cellulose (CMC) or calcium hydroxyapatite (CaHA) [Merz Neurosciences, Raleigh, NC]. The choice of filler material used was influenced by the duration of vocal fold immobility, the patient's ability to withstand additional IML or transcervical medialization procedures due to medical comorbidities, and patient preference. The amount of filler material injected was commensurate with the glottic gap seen with phonation.

### Statistical analysis

The main outcome measure was change in the self-reported EAT-10 score. The secondary outcome measure was the difference in the self-reported V-RQOL score. Paired Student's *t* test was used to analyze the scores from the EAT-10 and V-RQOL surveys, completed by patients before and after intervention. Statistical significance was determined a priori as $p < 0.05$.

## Results

Twenty-one patients with UVFI and glottic insufficiency who underwent IML were identified. The average age was 68 years (range 56—80 years). Ten patients were female (48%). All patients reported characteristic symptoms of UVFI and glottic insufficiency at onset including a breathy weak voice, weak cough, and choking with thin liquids. Nineteen patients (90%) had an EAT-10 score $\geq$3. The etiology of UVFI was idiopathic in 11 patients (52%), iatrogenic in 7 patients (33%) and malignancy in 3 patients (15%). The median time from onset of symptoms to treatment was 4 months (range 1—600 months). For 71% of the patients, the mean time from symptom onset to treatment was 3.7 months. The shortest time between symptom onset and treatment was 1 month for a patient who immediately presented to the hospital within couple of weeks of symptoms. The longest time to treatment was 50 years for a patient who underwent a carotid body tumor removal in 1967.

Twenty patients (95%) underwent awake transoral IML. The injected filler material was CaHA in 10 patients (48%)

Please cite this article in press as: Anis MM, Memon Z, Injection medialization laryngoplasty improves dysphagia in patients with unilateral vocal fold immobility, World Journal of Otorhinolaryngology-Head and Neck Surgery (2018), https://doi.org/10.1016/j.wjorl.2018.05.003