



Contents lists available at ScienceDirect

Auris Nasus Larynx

journal homepage: www.elsevier.com/locate/anl



The usefulness of the transcricothyroid injection laryngoplasty via contralateral paramedian approach

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ARTICLE INFO

Article history:

Received 16 March 2016

Accepted 13 May 2016

Available online xxx

Keywords:

Vocal cord palsy

Injection laryngoplasty

Office-based

Cricothyroid approach

ABSTRACT

Objective: Several laryngeal injection techniques are technically difficult and have limitations. In this study, we modified a transcricothyroid approach for injections to enhance needle visualization during procedures. The objective of this study was to investigate the efficacy of this alternative injection technique.

Methods: We performed a retrospective analysis of 51 patients who had undergone injection laryngoplasty for unilateral vocal paralysis between March 2014 and February 2015. In total, 17 patients underwent a transcricothyroid injection laryngoplasty via the contralateral paramedian approach (ILC) and 34 patients underwent transcricothyroid injection laryngoplasty via the conventional approach (ipsilateral approach, ILI). Acoustic analyses, aerodynamic analyses, voice handicap index (VHI), and GRBAS scale were assessed pre-operatively and at 2 weeks and 3 months postoperatively.

Results: From our acoustic and aerodynamic analyses, jitter, shimmer, noise-to-harmonic ratio (NHR), maximum phonation time (MPT), and mean flow rate (MFR) were all significantly improved in both groups after injection. VHI and GRBAS scales also improved postoperation. There were no significant differences between the pre-operative and postoperative subjective and objective parameters between both groups. The total injection volume used on the ILI group was larger than the volume given to the ILC group.

Conclusion: The transcricothyroid injection laryngoplasty via the contralateral paramedian approach is potentially more beneficial to performing injection laryngoplasty under local anesthesia. One important advantage of this approach to conventional approaches is its enhanced visualization of the needle during procedures.

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<http://dx.doi.org/10.1016/j.anl.2016.05.012>

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1. Introduction

Patients with unilateral vocal fold paralysis (UVFP) often suffer reduced quality of life because of voice and swallowing difficulties. Unless there is severe swallowing impairment, treatments are focused on improving voice quality [1]. Treatment options include observation, voice therapy, and surgery.

Several techniques have been utilized to treat vocal fold paralysis. Injection laryngoplasty, one such a treatment, has become an increasingly popular technique for individuals with VFP. This technique is easier and less invasive than conventional medialization thyroplasty techniques.

Being a non-invasive procedure, injection laryngoplasty has several advantages including low anesthetic requirements, cost, and morbidity [2]. There are four common approaches for injection laryngoplasty in patients not under anesthetics: transoral, transthyroid, transcartilagenous, and transcricothyroid [3].

The transcricothyroid approach typically uses a submucosal path, which involves a 25 g needle inserted into the cricothyroid membrane 3–7 mm lateral to the midline and subsequently passed superiorly and laterally. Applying pressure medially transmits motion to the vocal fold, allowing the surgeon to confirm the submucosal location of the needle and preventing perforation of the mucosa [3]. For these reasons, this approach does not allow “direct” visualization of the needle because of the subglottic space below the vocal fold, or through the paraglottic space. As a result, it is difficult to exactly place the needle and can require a significant level of experience [4].

To address the technical difficulty associated with this approach, we developed a new injection technique, contralateral paramedian transcricothyroid injection laryngoplasty, which is easy to use and increases visualization of the needle. The aim of this study was to demonstrate the feasibility of this new technique and compare its advantages to the conventional transcricothyroid approach.

2. Materials and methods

2.1. Patients

This was a retrospective review of 61 patients diagnosed with UVFP and who underwent injection laryngoplasty (IL) between March 2014 and February 2015 within the Department of Otolaryngology/Head and Neck Surgery at the Catholic University of Korea. Ten patients recovered the vocal fold movement during the study, and these patients were excluded in the study. Therefore, in total, 51 patients were enrolled in the study. All subjects underwent fiberoptic laryngoscopy, videostroboscopy, perceptual voice analysis, and computerized acoustic analysis pre-operatively and at 2 weeks and 3 months postoperatively. The Institutional Review Board of the Office of Human Research Protection at the Catholic Medical Center in Seoul, Republic of Korea approved this study.

2.2. Transcricothyroid injection laryngoplasty via the contralateral paramedian approach

All procedures were performed under local anesthesia by the same surgeon. Prior to the procedure, patients inhaled a 4% (w/v) lidocaine nebulizer for 10–15 min. 4% (w/v) lidocaine was sprayed into the nasal passage to anesthetize the nasal cavity. To anesthetize the larynx, 4% (w/v) lidocaine was dripped onto the base of the tongue, epiglottis, arytenoids, and vocal folds while the patient phonated. A 25-gauge needle was

passed through the cricothyroid membrane, 5–7 mm contralateral to the midline, and subsequently passed superiorly and medially (Fig. 1). The injection material that we used was polymethylmethacrylate (Artesense; Canderm Pharma Inc., Canada). The needle was inserted into the midline of the infraglottis and then moved intraluminally to the opposite site of the vocal fold (Fig. 2). The process was monitored using a transnasal flexible fiberscope (rhino-laryngovideoscope type ENF-VQ; Olympus, Tokyo, Japan). The gel was slowly injected into the vocalis muscle anterior to the vocal process and injection was continued until a slight overcorrection was evident.

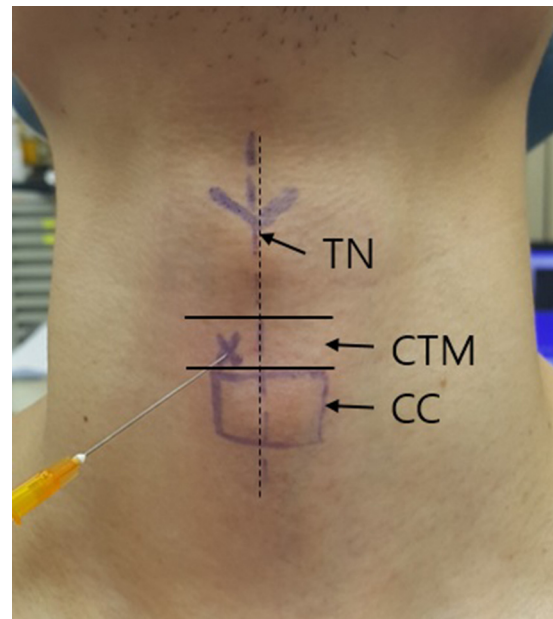


Fig. 1. Contralateral to midline injection site on the skin. The patient had left vocal fold paralysis. A dotted line indicated the midline of neck. TN: thyroid notch, CTM: cricothyroid membrane, CC: cricoid cartilage.

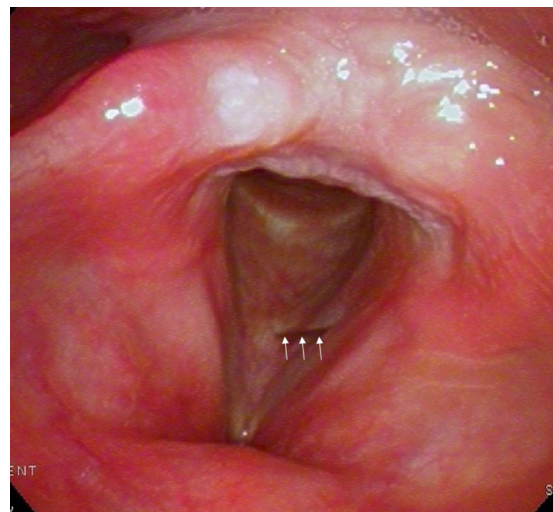


Fig. 2. Laryngoscopic image showing intraluminal needle insertion into the larynx (white arrow).

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