# Botulinum Toxin Injections Into the Lateral Cricoarytenoid Muscles for Vocal Process Granuloma

*Q. Pham, †R. Campbell, *J. Mattioni, and ‡R. Sataloff, *‡Philadelphia, Pennsylvania, and †Ottawa, Canada

**Summary: Objective.** Contact granulomas are benign, exophytic inflammatory lesions of the larynx that typically arise on or near the vocal process of the arytenoid cartilage. The most common management options include voice therapy and antireflux pharmacotherapy, intralesional steroid injections, botulinum toxin injections, and surgical excision. In-office Botox injection into the lateral cricoarytenoid (LCA) muscle can be effective even for recurrent granulomas.
**Study Design.** This is a retrospective chart review and literature review.
**Method.** We reviewed more than 400 charts and included two patients, who underwent in-office injection with botulinum toxin A into LCA muscles bilaterally, after previously failing both conservative and surgical management.
**Results.** Both cases showed significant improvement of the laryngeal granulomas after 6 months and a single botulinum toxin injection. Both cases were initially grade III granuloma that improved to grade I.
**Conclusions.** In-office injection of botulinum toxin A targeting the LCA muscle appears to be a safe and effective treatment modality in refractory laryngeal granuloma.
**Key Words:** Granuloma–Botox–Botulinum toxin–Lateral cricoarytenoid muscle–Laryngeal.

## INTRODUCTION

Granulomas are benign exophytic, inflammatory lesions of the larynx that typically arise on or near the vocal process of the arytenoid cartilage.[1] Granulomas may be unilateral or bilateral, can impair voice quality, and in severe cases they may impinge on the glottic airway. Their etiology remains incompletely understood, but they are known to result from vocal abuse and chronic throat clearing, laryngopharyngeal reflux, traumatic endotracheal intubation, or they may be idiopathic.[2] The initial management involves relative voice rest, voice therapy, and antireflux pharmacotherapy, as appropriate; intralesional corticosteroid injection may also be considered. Injection of botulinum toxin type A, first described in 1995 by Nasri et al, is another treatment option, when more conservative measures fail.[3] Microlaryngoscopy and surgical excision of the area may be necessary in cases when the airway is compromised or if symptoms remain after nonsurgical treatments have failed.

Vocal process granulomas have a high tendency for persistence and recurrence despite many treatment options. In a systematic review of the treatment of vocal process granulomas, Karkos et al identified 19 studies and described permutations of six different treatments (single or combined) with recurrence rates varying from 0% to 87%.[4]

In this article, we present our experience with two patients with refractory vocal process granuloma using intralaryngeal botulinum toxin A injection. To our knowledge, Botox injection specifically targeting the lateral cricoarytenoid (LCA) muscle in isolation, without concurrent thyroarytenoid (TA) injection, has not been well described in the literature besides one of the author's (RS) previous texts.[5]

## METHOD

A retrospective chart review of more than 403 patients was performed of patients with history of laryngeal lesions, granuloma, or both. Using the International Classification of Diseases, Tenth Edition, diagnosis code "J38.3" and diagnosis "vocal fold granuloma," 403 patients were identified. We included in the study patients who were diagnosed with "vocal fold granuloma," received treatment(s), and had at least three follow-up visits with videostroboscopy evaluation. This yielded 14 patients, of whom 10 are male and four are female. All 14 patients received maximum acid reflux management with proton pump inhibitors and ranitidine. Three of 14 received intralesional steroid injection while undergoing excision of vocal process granuloma. Two of the three patients who underwent excision of granuloma presented with recurrence of the granuloma.

We included only patients who had failed treatments with surgical excision, voice therapy, and medical therapy consisting of steroids and antireflux management with proton pump inhibitors and histamine H2 antagonists (Table 1). We identified two patients who met these strict inclusion criteria and had substantial improvement of the granuloma with botulinum toxin injection. The patients were seen in a tertiary care outpatient setting. Both patients had no history of intubation. They complained of persistent difficulty with voice projection, hoarseness, and throat irritation.

Strobovideolaryngoscopy was performed before and after injection treatment using a KayPentax (3 Paragon Dr Montvale, New Jersey) 70-degree rigid endoscope. All patients received in-office percutaneous injection of botulinum toxin A into the LCA muscles. The LCA muscle is identified with electromyography-guided localization. The injection needle is inserted through the skin and through the cricothyroid membrane, about 0.5 cm from midline, and advanced posterolaterally and slight inferiorly from the TA muscle. The patient is asked to phonate /i/ to confirm proper position of the needle tip in the muscle bed with increased EMG activity. To verify LCA position, there will be a

Accepted for publication June 13, 2017.
From the *Philadelphia College of Osteopathic Medicine, Department of Otolaryngology—Head & Neck Surgery, Rowland Hall-Graduate Medical Education, Philadelphia, Pennsylvania; †University of Ottawa, Department of Otolaryngology—Head & Neck Surgery, Ottawa, Ontario, Canada; and the ‡Drexel University College Of Medicine, Department of Otolaryngology—Head & Neck Surgery, Philadelphia, Pennsylvania.
Address correspondence and reprint requests to Quang Pham, Philadelphia College Of Osteopathic Medicine, Dept. of Otolaryngology—Head & Neck Surgery, Rowland Hall-Graduate Medical Education, 4190 City Avenue, Philadelphia, PA 19131. E-mail: Quangph@pcom.edu
Journal of Voice, Vol. ■■, No. ■■, pp. ■■-■■
0892-1997

http://dx.doi.org/10.1016/j.jvoice.2017.06.006

**TABLE 1.**
**Patients and Previous Treatments**

| Pt | Surgical Excision (n) | PPI | H2A | Speech Therapy | Other |
|---|---|---|---|---|---|
| 1 | 2 | Omeprazole 80 mg | Ranitidine 300 mg | Yes | Intralesional steroid injection |
| 2 | 1 | Omeprazole 80 mg | Ranitidine 300 mg | Yes | |

**TABLE 2.**
**Patients and Botox Treatment**

| Pt | Age/Sex | Etiology | Site | Grade (Pre Injection) | Grade (Post Injection) | Injection(n) | Dose and Site | Follow-up (mo) |
|---|---|---|---|---|---|---|---|---|
| 1 | 63 M | Voice abuse, reflux, LCA-dominant closure | R | 3B | 1A | 1 | 3.75 Bilateral LCA | 6 |
| 2 | 44 M | Voice abuse, reflux, LCA-dominant closure | L | 3A | 1A | 1 | 3.75 Bilateral LCA | 3 |

high initial electrical activity on EMG during adduction, with immediate drop-off confirming placement in the LCA rather than in the TA, which usually exhibits sustained discharge. Then, 3.75 units are injected into each LCA muscle (Table 2). Patients subsequently continued with the same voice therapy and acid reflux regimen as they had before injection, which had been insufficient to resolve their lesions.

## RESULTS

Both patients were followed up at 3 and 6 months after botulinum toxin injection, and experienced substantial improvement of their granulomas (Figures 1 and 2). Both cases were initially grade III granuloma that improved to grade I (Table 3). Each patient developed mild breathiness for an average of 5 days, without complications of aspiration pneumonia or dysphagia. After the acute period of breathiness associated with laryngeal botulinum toxin injection, the patients noted stronger voice and substantially improved hoarseness. No granuloma recurrence was seen at the patients' 3- and 6-month follow-up visits.

**TABLE 3.**
**Grade System for Vocal Process Granuloma[6]**

| Grade | Endoscopic Appearance |
|---|---|
| 1 | Limited to vocal process, no ulceration, sessile |
| 2 | Limited to vocal process, ulcerated or pedunculated |
| 3 | Extending beyond vocal process, not crossing midline of fully abducted vocal fold |
| 4 | Extending beyond vocal process, over midline of fully abducted vocal fold |

## DISCUSSION

The pathophysiology of vocal process granuloma is uncertain and probably is likely multifactorial. Granuloma formation is associated with frequent throat clearing, vocal abuse or misuse, and laryngopharyngeal reflux, as well as trauma such as intubation. Granulomas appear to result from repetitive, traumatic contact between the vocal processes, which causes injury to the mucosa

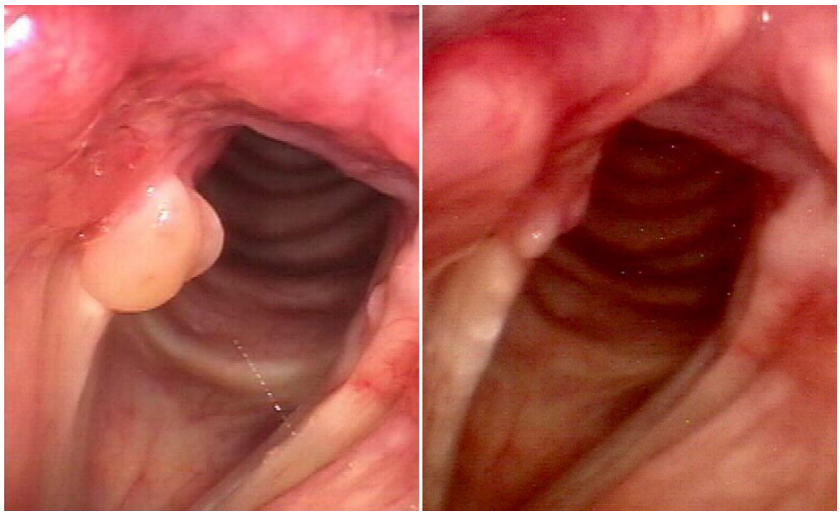

**FIGURE 1.** Patient 1. Right vocal process granuloma before (*left*) and after Botox injection (*right*).