

HOW I DO IT

In-Office Transnasal Botulinum Toxin Injections for Retrograde Cricopharyngeal Dysfunction

Jérôme R. Lechien^{1,2,3,4}  | Stéphane Hans⁴ | Marie Mailly⁴

¹Department of Surgery, Faculty of Medicine, UMONS Research Institute for Health Sciences and Technology, University of Mons (UMons), Mons, Belgium | ²Division of Laryngology and Broncho-Esophagology, Department of Otolaryngology-Head and Neck Surgery, EpiCURA Hospital, Baudour, Belgium | ³Department of Otorhinolaryngology and Head and Neck Surgery, CHU Saint-Pierre, Brussels, Belgium | ⁴Department of Otolaryngology-Head & Neck Surgery, Foch Hospital, Paris Saclay University, Paris, France

Correspondence: Jérôme R. Lechien (jerome.lechien@umons.ac.be)

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1 | Introduction

Retrograde cricopharyngeus dysfunction (R-CPD) can be defined as a disorder with absent or incomplete upper esophageal sphincter (UES) relaxation in response to abrupt esophageal distention by gastroesophageal gas reflux [1]. R-CPD is an emerging condition with the first case series published in 2019 by Bastian and Smithson [1]. The gaseous esophageal distension related to R-CPD is associated with significant disabling symptoms, including inability to belch, chest pain, gurgling noise, bloating, and excessive flatulence [2]. Regarding the absent UES relaxation, the treatment consists of botulinum toxin injection (BTI) in the cricopharyngeal sphincter, which is commonly performed in the operating room (injection under direct esophagoscopy) or in-office under electromyography (EMG) control [2]. The operating room approach is associated with a high effectiveness rate but is associated with significant costs related to the operating room surgery [2]. The in-office EMG injection is a cost-effective approach, but it is associated with a lower effectiveness rate than the operating room one and requires training in EMG practice [2, 3].

In this paper, an in-office, cost-effective, transnasal BTI approach is described.

2 | Methods

2.1 | Preoperative Consideration and Patient Selection

The preoperative evaluation consisted of a confirmation of the diagnosis (typical abelching), the visualization of the retrocricoid region through the nasofibroscopy examination (Figure 1A), and the assessment of the opening anatomical region between the posterior pharyngeal wall and the retrocricoid through a patient's Valsalva maneuver. In most cases, a tunnel sign is visualized, consisting of the view of the esophageal dilation during the patient's swallowing process (Figure 1B,C). Only patients with a substantial space between the retrocricoid and posterior pharyngeal wall can be candidates for the in-office transnasal injection of botulinum toxin.

2.2 | Botulinum Toxin Preparation

The Botulinum Toxin preparation consisted of the dilution of 100 IU in 2 mL saline solution and the preparation of 3 syringes: 2 with 50 IU of diluted Botulinum Toxin each, and one with physiological solution, which would be used after the two BTIs to purge the operative channel of the botulinum toxin.

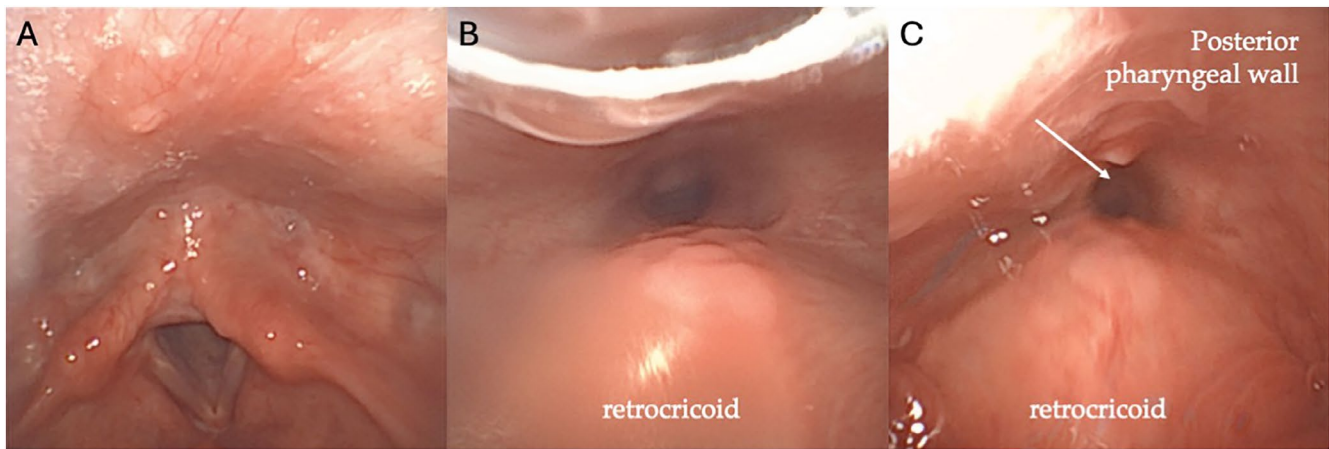
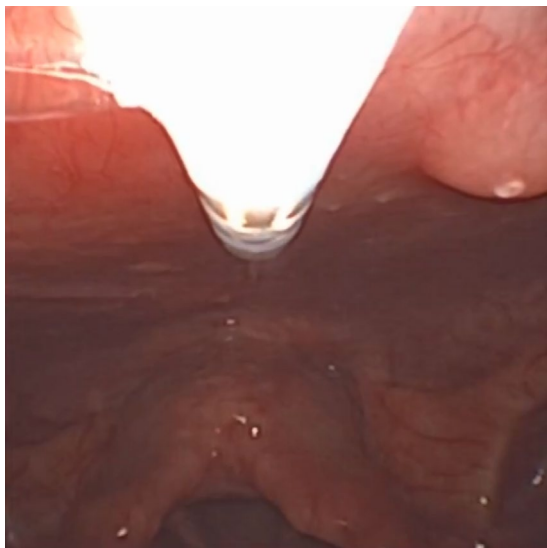


FIGURE 1 | Baseline evaluation and anesthesia. The fiberoptic examination investigates the retrocricoid anatomy before proposing the transnasal injection (A). A tunnel sign est visualized in many patients, exhibiting the esophageal dilatation related to the disease, especially during the local anesthesia with lidocaine 2% (B) or during swallowing (C, arrow).



VIDEO 1 | Injection steps. The transnasal injection of cricopharyngeal sphincter. Video content can be viewed at <https://onlinelibrary.wiley.com/doi/10.1002/lary.32336>

2.3 | Local Anesthesia and Surgical Procedures

The surgical technique is described in Video 1 and Figure 2. The procedure is performed under local laryngeal anesthesia (lidocaine, 2%) using nasofibroscope with an operative channel (Video Gastroscope EV-NC, Xion; Berlin, Germany). A flexible 21G needle (NA-401D-1321 SMOOTHSHOT, length 13 mm, Olympus Belgium; Brussels) was placed in the operative channel, and the patient was invited to tilt their head downward and to perform a Valsalva maneuver to open the retrocricoid space (Video 1, Figure 2), while the nose and operative channel were blocked to maintain the Valsalva effect for a few seconds. The needle was deployed by the assistant, and the BTI was performed in the posterior part of the esophageal inlet. Depending on the anatomy of the patient, one BTI or two BTIs (10 o'clock and 2 o'clock positions) can be performed (Video 1, Figure 2). It is important to complete the one-point or two-point procedure by injecting 1 mL of saline

solution through the operative channel to purge the botulinum toxin from the channel.

3 | Results

A 17-year-old female with abelchia, gurgling noises, chest pain, abdominal distension, and pain consulted in the Division of Laryngology at EpiCURA Hospital (Baudour, Belgium). She reported never being able to burp, which was confirmed by her parents. According to the Bastian and Smithson criteria [1], the patient met the 4 cardinal symptoms of R-CPD, supporting the diagnosis. Her medical history included severe gastroesophageal reflux disease in childhood. During nasofibrosopic examination, a tunnel sign was observed (Figure 1B,C). An in-office transnasal BTI was proposed, and the patient provided consent. The in-office transnasal BTI was carried out without immediate complications. She reported dysphagia only during the first 48 h after injection. The patient reported having burps 2 days after the injection, which was associated with a significant decrease in symptoms. The benefit of transnasal BTI remained stable 4 months post-injection.

4 | Video

The several steps are described in the video.

5 | Discussion

This technical note describes a novel, cost-effective, and easy procedure, providing an additional approach to the management of R-CPD. The description of this procedure is timely, as recognition of the condition and its treatment options only emerged in 2019 [1], leading to a potential increase in consultations with laryngologists for this specific complaint. Patient selection is important. From an anatomical standpoint, this technique can be proposed for patients without severe posterior commissure or retrocricoid edema, where the Valsalva maneuver allows sufficient posterior space for botulinum toxin injection. The

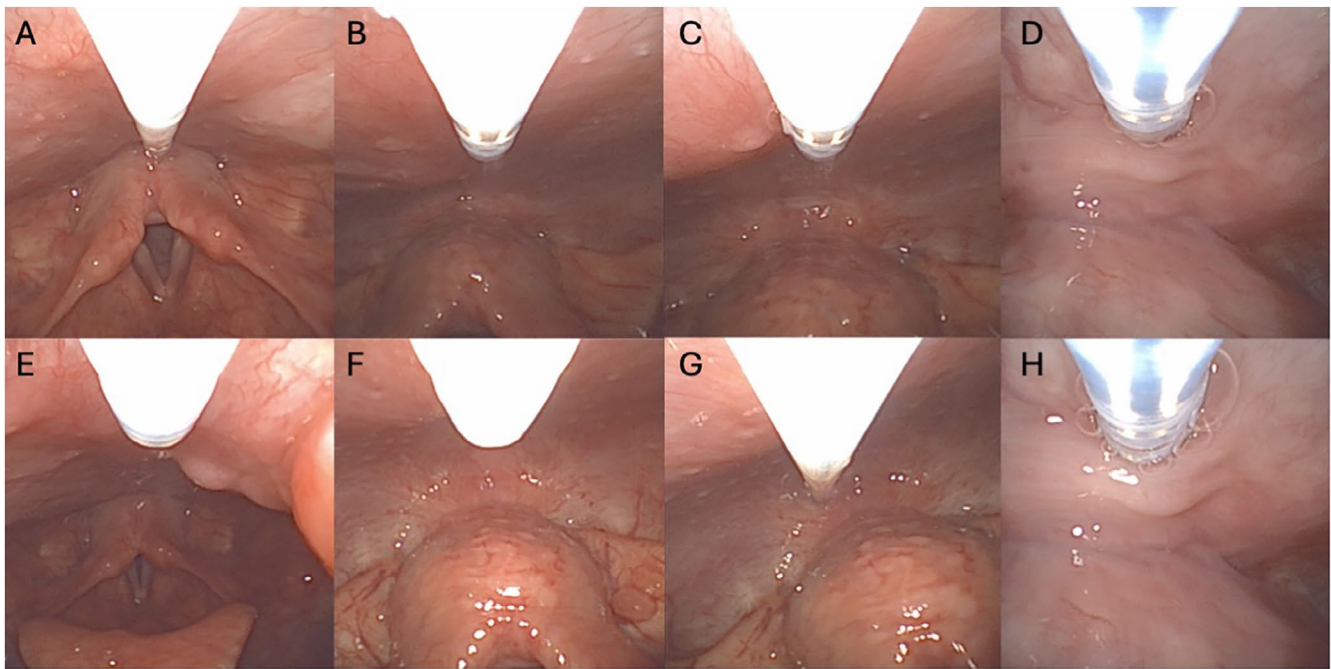


FIGURE 2 | Injection steps. After the lidocaine 2% injection, the flexible 1.5-cm-length 21G needle is introduced through the operating channel and deployed (A, B). The assistant connects the syringe containing 50 IU of botulinum toxin to the needle. The patient was invited to tilt their head downward and to perform a Valsalva maneuver to open the retrocricoid space (B, C). The opening of this space leads to the injection of the botulinum toxin (first syringe-1 mL, D). The needle is retracted (E), while preparing the second syringe containing botulinum toxin (1 mL) and the saline solution syringe (1 mL) for flushing the operating channel. The contents of the second and third syringes are injected during a subsequent Valsalva maneuver (F, G, H).

use of a 1.5 cm needle is a significant technical consideration, as it enables access to the thickest portion of the cricopharyngeal muscle, which is located approximately 1–3 cm below the upper border of the cricoid cartilage when measured from the esophageal inlet [4]. To date, there is no consensus regarding the optimal dose and number of BTIs to perform. Depending on the patient's tolerance of the procedure, a two-point BTI technique can be considered instead of a single injection.

Although no studies have evaluated the technical duration and costs of alternative procedures, particularly in-operating room BTI, the transnasal approach may represent a faster procedure in selected patients. This technique eliminates costs and duration associated with general anesthesia and avoids the need for EMG-guided BTI training [5]. Injecting botulinum toxin into the hypopharyngeal-esophageal posterior wall represents a critical technical consideration for protecting patients against vocal fold paralysis. Visualization of the injection site through nasofibroscopy offers a theoretical advantage over the EMG-guided transcervical approach, which carries a potentially higher risk of vocal fold paralysis. A systematic review of BTI in retrograde cricopharyngeal dysfunction (R-CPD) revealed instances of vocal fold paralysis with EMG-guided procedures but not with those performed in the operating room [2]. Furthermore, the transnasal BTI technique is less invasive than the EMG-guided approach. The primary limitation of the transnasal method remains the necessity of adequately visualizing the retrocricoid space to ensure safe injection. Patient selection must carefully consider this critical factor. Transnasal BTI may be contraindicated in patients with posterior commissure and retrocricoid hypertrophy resulting from obesity, laryngopharyngeal reflux

disease, or other anatomical variations. Large prospective studies are needed to evaluate the efficacy of transnasal BTI in selected patients with R-CPD.

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Conflicts of Interest

The authors declare no conflicts of interest.

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