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Short Communication

Trans-nasal injection of botulinum toxin

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Abstract

Introduction: Office-based laryngeal injection for the treatment of a variety of voice disorders is an established practice. Various methods of delivery to the vocal folds are in practice.

Aim: We present a simple and repeatable method of injecting botulinum toxin into the larynx.

Method: Botulinum toxin A (Botox®) was delivered into the larynx using a channelled fibre-optic laryngoscope under local anaesthetic, in an office setting.

Results: Seven patients received regular botulinum toxin injections, via our preferred method. The treatment intervals and dosage regime varied depending on patient requirements. The procedure was carried out in an office setting, with minimal discomfort and inconvenience to the patient.

Conclusion: We present a method of botulinum toxin delivery to the larynx which is simple, easily repeatable and simply learnt by the otolaryngologist familiar with fibre-optic laryngoscope usage. This method is also comfortable and convenient for the patient.

Key words: Spasmodic Dysphonia; Adductor; Botox; Botulinum Toxin; Drug Delivery Systems

Introduction

Botulinum toxin A is used to relieve the symptoms of a variety of voice disorders and has been widely accepted as an effective therapy, especially for controlling the symptoms of adductor spasmodic dysphonia.[1,2]

Various methods of applying botulinum toxin to the larynx have been described, in operating theatre or office based settings, and under local or general anaesthetic.[3–5] Such methods have used percutaneous,[6] trans-oral[4,7] and trans-nasal[8] approaches.

We present a simple and easily repeatable method of injecting botulinum toxin into the larynx in an office setting, using local anaesthetic and a channelled fibre-optic laryngoscope. This method has the advantage of direct visualisation, readily available instrumentation and precise control of injection. A fibre-optic laryngoscope is used, a routine part of the ENT armamentarium. The procedure is minimally invasive, time-efficient and comfortably conducted in the out-patient setting with minimal patient discomfort. However, the procedure requires two operators, one to position the fibre-optic laryngoscope and the other for the injection.

Patients and method

Seven patients with adductor spasmodic dysphonia received regular botulinum toxin injections in our voice clinic. The injection interval ranged from four to nine months, depending on patient requirements. Patients were treated with botulinum toxin A for periods of between two and nine years, receiving between two and 14 treatments each. Unilateral or bilateral injections were used. The amount of botulinum toxin injected was titrated according to patient response, and ranged from 1.5 to 15 units (Table I). Two to four units were routinely used; however, on rare occasions a single patient required 10–15 units.

Technique

We used a fibre-optic laryngoscope with a 2.2 mm diameter channel (Olympus ENF Type T3; Olympus, Tokyo, Japan). This was introduced trans-nasally under video screen visualisation. The injection device is an Olympus Injector Force™ (NM-201L-0525) with a 5mm 25 G needle. The working length was 165 cm (Figure 1).

The nose was prepared by a topical spray of co-phenylcaine. The larynx was then anaesthetised by 5 mls of topical xylocaine injected via the laryngoscope channel, using a 5 ml syringe with attached cannula. Attachment of the cannula facilitated injection of xylocaine directly into the lumen of the side channel, rather than at the opening. The injection needle is primed using 1.8 ml of Botox® (Allergan, Inc. Irvine, CA 92612, USA) at a dilution of 2.5 units per 0.1 ml to eliminate dead space in the injector force. The side channel was loaded with the Injector Force needle until 1 mm of the tip was visible beyond the end of the fibre-optic laryngoscope. After five minutes, the primary author (AH) performed fibre-optic laryngoscopy and positioned the laryngoscope for injection into the thyroarytenoid muscle. A mid-cordal injection site is preferred because the main bulk of the thyroarytenoid muscle lies there and the posterior part of the cord is cartilaginous. The assistant then passed the needle into the thyroarytenoid muscle under direct vision and injected an appropriate amount of Botox (Figures 2 and 3). The procedure could be repeated on the opposite side during the same setting if required.

This procedure was well tolerated, having a comparable level of tolerance to simple fibre-optic laryngoscopy. It

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TABLE I

PATIENT AND TREATMENT CHARACTERISTICS

Pt	Age (yrs)	Gender	Total injections (*n*)	Botox® injected (U)		Injection interval (mths)	Treatment duration (yrs)
				R	L		
1	45	F	12	5	5	6–9	9
2	80	F	9	2.5	1.5	4–6	5
3	73	M	14	4		4–6	6
4	41	F	8	10	5	4–6	5
5	42	M	8	2.5	1.25	4–6	4
6	42	F	5	2.5	3	6	2
7	68	F	14	15	10	6–9	9

Pt = patient; yrs = years; U = units; mths = months; F = female; M = male

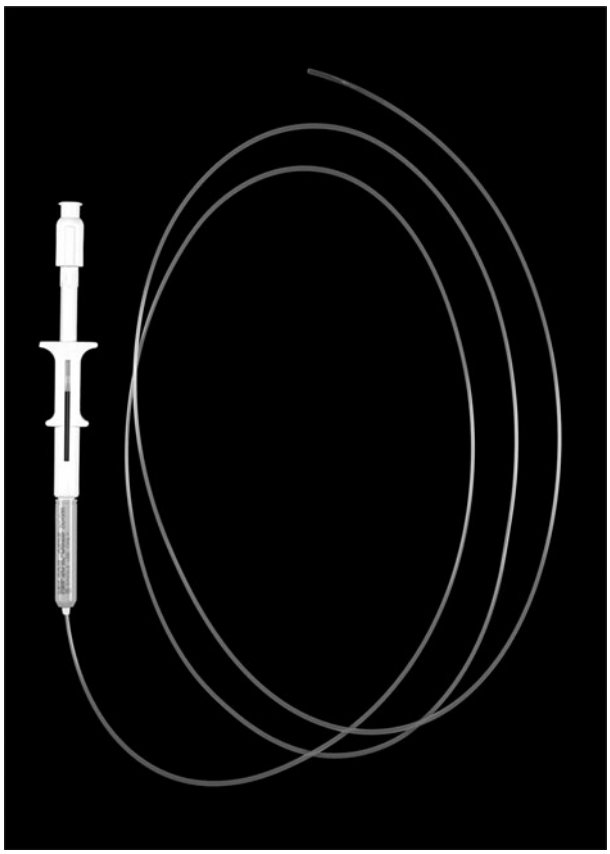

FIG. 1
Olympus disposable injector.

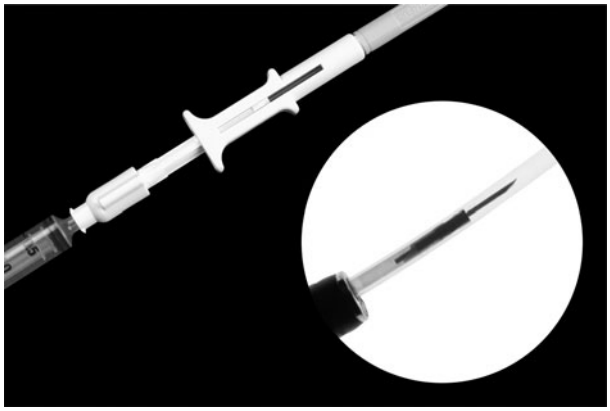

FIG. 2
Olympus disposable injector with needle retracted.

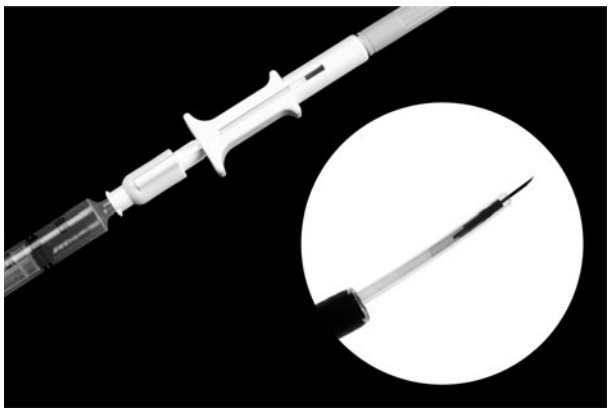

FIG. 3
Olympus disposable injector with needle projected.

took five minutes longer than simple laryngoscopy, representing the time required for the topical anaesthetic to become fully effective.

One patient was excluded from the study due to inability to tolerate fibre-optic laryngoscopy even with topical local anaesthetic; in this patient, a trans-cutaneous electromyography (EMG) guided injection technique was employed instead. All other patients tolerated the procedure without any significant discomfort. There were no absolute contraindications to this technique.

Discussion

Laryngeal injection of botulinum toxin is a widely accepted method of achieving symptomatic relief for various voice disorders, such as adductor spasmodic dysphonia. Different injection techniques have been employed, including percutaneous,[6] trans-oral[4,7] and trans-nasal[8] approaches.

Percutaneous injections are usually conducted under EMG guidance. The EMG injection needle is inserted through the cricothyroid membrane. A small amount of local anaesthetic may be required to minimise discomfort. Correct placement of the needle in the thyroarytenoid muscle is verified by EMG activity during phonation, before the injection is carried out.[9] Verification of needle placement can be problematic, as insertion of the electrode

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can be difficult and misleading. After trans-cutaneous, EMG-guided injection, visualisation of the larynx may be required in order to establish that no intralaryngeal haematoma has occurred (which could lead to airway compromise after discharge).

Trans-oral approaches use direct or indirect laryngoscopy to visualise the vocal folds and to direct the botulinum toxin injection. Indirect laryngoscopy can be uncomfortable for patients, who need to keep their mouth open with the tongue being held forward by the examiner or the patient. Direct laryngoscopy under general anaesthetic[5] would enable accurate injection;[10] however, this procedure is inconvenient for the patient and has significant cost implications for the healthcare provider, compared with an office-based procedure. In addition, the usual risks of general anaesthesia would apply.[5]

In our voice clinic, the trans-nasal technique is our preferred tool for delivering botulinum toxin to the larynx. This treatment is primarily used for adductor spasmodic dysphonia. We have also used the same technique for the treatment of paradoxical vocal fold movement. Fibre-optic laryngoscopy is a routine office practice which is familiar to nearly all otolaryngologists and simple to learn and to teach. Minimal patient discomfort is involved, further reduced by topical local anaesthetic. Vocal fold injection of botulinum toxin via the transnasal laryngoscope is cost-effective, efficient and convenient for the patient as it is carried out during routine voice clinic visits. Problems related to hospital admission and general anaesthesia are hence avoided.

We strongly recommend this technique for its simplicity and significant merit. While we believe our patients prefer this technique, patient satisfaction needs to be evaluated objectively. In the future, we plan to quantify patients' satisfaction with this technique in a prospective fashion, using established research tools.

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