

# Endoscopic vocal fold injection using a 25-gauge butterfly needle

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## Abstract

**Objective:** To describe a useful technique for infiltrating a bulking agent using a butterfly needle, as part of a transoral endoscopic vocal fold medialisation procedure.

**Methods:** This paper describes the procedure of grasping the needle with phonosurgery forceps and administering the injectate to the vocal fold through careful application of the syringe plunger via a length of rubber tubing from outside the mouth.

**Results:** This procedure is performed routinely in our institution without complication. The advantages of this technique are discussed.

**Conclusion:** This is a safe and easy method of injecting into a vocal fold.

**Key words:** Medialization Laryngoplasty; Endoscopy; Needle

## Introduction

Vocal fold medialisation using agents to bulk the vocal fold is often performed in the office setting, either by percutaneous or transnasal approaches, in cases of dysphonia and breathlessness, or for those experiencing difficulties in swallowing with chronic aspiration, secondary to vocal fold atrophy or impaired glottic mobility.<sup>1–7</sup> A bulking material is injected immediately lateral to the vocal fold, on the medial surface of vocalis and the mid-membranous and posterior vocal fold, to avoid damage to the lamina propria. This enables the contralateral, functioning vocal fold to meet the paralysed fold in or near the midline, to improve glottic function (i.e. voice quality and alleviation of aspiration). If the injection is too superficial (in Reinke's space), damage to the voice may ensue. By performing this technique in the office, the amount of injected material required can be ascertained through intra-operative phonatory feedback.

For those patients who do not tolerate this procedure, despite adequate topical local anaesthesia, general anaesthesia is required to enable transoral or, more rarely, percutaneous injection of the vocal fold using suspension laryngoscopy. This can be undertaken with microscopic or endoscopic guidance, and offers greater injection accuracy and patient comfort,<sup>8,9</sup> and fewer complications than injection laryngoplasty performed in an office setting.<sup>10</sup> Over-injection of material can occur under general anaesthesia, risking airway compromise on extubation.

The first description of an injectate was by Wilhelm Brunings in 1911, with the use of paraffin paste. This was used until the 1970s, but declined in popularity thereafter because of its tendency to cause granulomas through foreign body giant cell reaction. This material was superseded by polytetrafluoroethylene (Teflon<sup>®</sup>), again with the

risk of granuloma formation. The disadvantage of using Teflon is that it is an irreversible procedure, as highlighted by a study demonstrating persistent dysphonia despite corrective procedures using laser vaporisation.<sup>11</sup> Other permanent materials include the facial fillers polyacrylamide gel (Aquamid<sup>®</sup>) and polydimethylsiloxane gel (Vox<sup>®</sup> or Bioplastique<sup>®</sup>), both of which afford good long-term voice outcomes.<sup>12,13</sup>

Some injectates are resorbed, so the effects on vocal fold function are temporary. Temporising agents include absorbable gelatine (Gelfoam<sup>®</sup>), bovine or porcine collagen, fat, calcium hydroxylapatite, calcium phosphate, and hyaluronic acid (Restylane Perlane<sup>®</sup>). Gelfoam is rarely used as its length of action is only four to six weeks,<sup>14</sup> whereas the effects of collagen can last up to six months.<sup>15</sup> Autologous fat has an unpredictable rate of absorption, with effects lasting from two months to several years.<sup>16</sup> Fat injection does result in good phonatory outcome, with comparable results to external laryngeal framework thyroplasty in terms of shimmer, jitter and noise-to-harmonics ratio.<sup>17</sup> The effects of calcium hydroxylapatite, calcium phosphate and hyaluronic acid can last for up to 12 months, with good long-term voice results.<sup>18–20</sup>

From a patient's perspective, the ideal injectate would be biologically compatible with surrounding recipient tissues, non-carcinogenic, inert, and not extrude or change shape over time. From a surgeon's perspective, the material should be easy to prepare and deliver to the required site.

In the transoral route, a caulking gun containing a syringe of the injectate is used by the surgeon to inject the vocal fold. The limitations of this approach are in part a result of the bulky nature of the gun, meaning that it can be more problematic to inject the fold easily, whilst negotiating the shaft

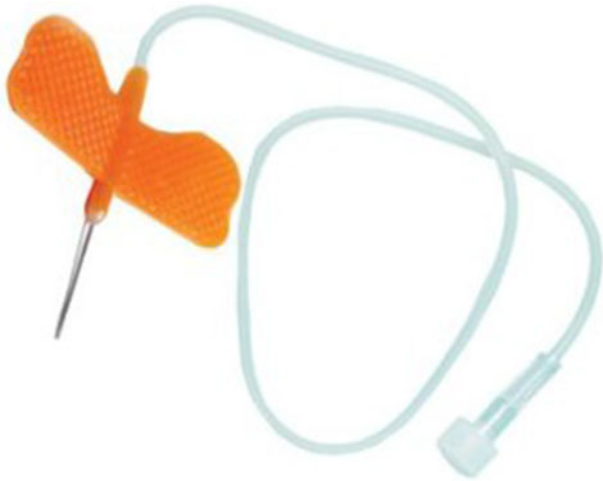


FIG. 1  
A 25-gauge butterfly needle (Venisystems™).

of the gun past the endoscope. The pressure applied to the gun handle whilst injecting is translated into needle movement, with resulting navigation difficulties and imprecise needle placement. The larger gauge of needle can cause unnecessary trauma to the vocal fold. This may disrupt or lacerate the delicate mucosal lining, causing a haematoma in the paraglottic space, with ensuing scarring and damage to the superficial lamina propria. In addition, the needle can create too large a hole in the superior vocal fold surface, which then causes extrusion of the injectate.

### Materials and methods

We have developed an alternative means of injecting hyaluronic acid in our institution.

We use a 1 ml syringe of hyaluronic acid (Restylane®; Q-Med, Uppsala, Sweden) attached to a 30 cm length of rubber tubing, which is already connected to a 25-gauge butterfly needle (Venisystems™) (Figure 1). The butterfly needle, with its attached tubing, is commercially

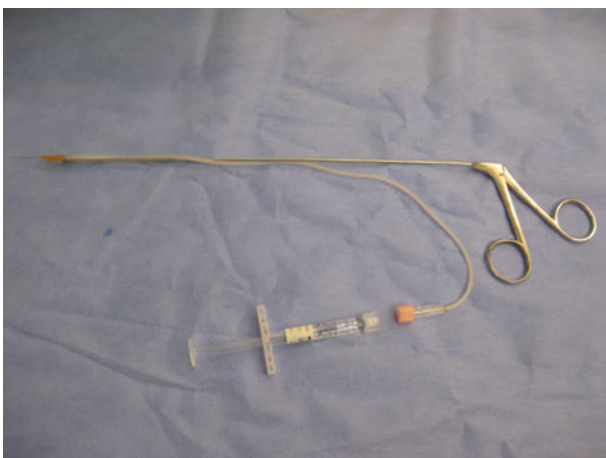


FIG. 2

The 25-gauge butterfly needle is attached to a 30 cm length of rubber tubing, to which the syringe of hyaluronic acid is connected, and the needle is mounted between the jaws of phonosurgery forceps.



FIG. 3

The surgeon holds both the phonosurgery forceps and endoscope, whilst the scrub nurse injects the material through the tubing.

available, having been well tested for venepuncture and subcutaneous injections, and is attached safely to the syringe via a Luer lock connector.

The tubing is primed with injectate, prior to mounting the folded wings of the butterfly needle between the jaws of phonosurgery forceps (Figure 2).

Using direct suspension laryngoscopy with an anterior commissure scope, the surgeon uses one hand to hold the phonosurgery forceps and pass the butterfly needle into the vocal fold, and the other to hold the 0-degree endoscope, under televisual guidance. The scrub nurse is then able to apply the plunger of the syringe slowly in a controlled fashion, to pass the injectate through the tubing (Figure 3), so that it enters the vocal fold via the butterfly needle (Figure 4). All pressure to the plunger occurs outside the laryngoscope, and in a setup that ensures there is no untoward movement of the needle as it enters the vocal fold.

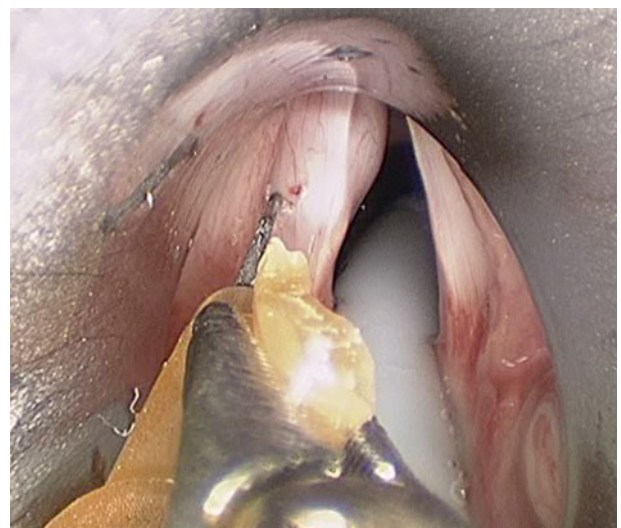


FIG. 4

Infiltration of injectate to the left vocal fold using the 25-gauge butterfly needle held by phonosurgery forceps, under endoscopic guidance.

## Results

We routinely perform all vocal fold medialisation injection procedures using this butterfly needle technique under general anaesthetic, and obtain adequate closure of the glottic chink. No complications have resulted.

## Discussion

The method we use for transoral injection of the vocal fold has significant advantages over the traditional technique of injection using a caulking gun. Butterfly needles are ubiquitous and inexpensive. Being small, they can be positioned effortlessly within the jaws of phonosurgery forceps, and the forceps themselves can easily be passed alongside an endoscope. The needle can then be manipulated smoothly to penetrate the vocal fold.

The plunger on the syringe can be depressed more easily and with finer dexterity than squeezing the handles of the caulking gun. There is subsequently no movement of the needle when the scrub nurse applies pressure on the syringe to pass the injectate.

The view of the glottis provided by a smaller needle held on phonosurgery forceps is superior to that experienced with a more bulky caulking gun and its larger bore needle. There is less potential for movement of the butterfly needle in the vocal fold, and the improved view results in more accurate placement and assessment of injectate volume to be passed into the paraglottic space.

Additionally, the injection can be performed through a small calibre laryngoscope, typically an anterior commissure scope, causing the least amount of distortion to the laryngeal framework. The endoscopic technique and the small calibre needle allow precise injection into the paraglottic space.

The needle makes a very small hole within the mucosa, causing little collateral damage, laceration or potential for bleeding. The Restylane Perlane<sup>®</sup> we inject is not too viscous, so the small hole made by the needle prevents early extrusion of the injectate.

## Conclusion

Based on our extensive experience, and for the reasons outlined above, we advocate the routine use of a butterfly needle when medialising vocal folds by transoral injection.

## References

- 1 Chang J, Courey MS, Al-Jurf SA, Schneider SL, Yung KC. Transnasal endoscopic steroid injection: a practical and effective alternative treatment for benign vocal fold disorders. *Laryngoscope* 2013;**123**:1464–8
- 2 Verma SP, Dailey SH. Office-based injection laryngoplasty for the management of unilateral vocal fold paralysis. *J Voice* 2014;**28**:382–6
- 3 Upton DC, Johnson M, Zelazny SK, Dailey SH. Prospective evaluation of office-based injection laryngoplasty with hyaluronic acid gel. *Ann Otol Rhinol Laryngol* 2013;**122**:541–6
- 4 Sung CK, Tsao GJ. Single-operator flexible nasolaryngoscopy-guided transthyroid vocal fold injections. *Ann Otol Rhinol Laryngol* 2013;**122**:9–14
- 5 Tirado Y, Lewin JS, Hutcheson KA, Kupferman ME. Office-based injection laryngoplasty in the irradiated larynx. *Laryngoscope* 2010;**120**:703–6

- 6 Lau DP, Lee GA, Wong SM, Lim VP, Chan YH, Tan NG *et al*. Injection laryngoplasty with hyaluronic acid for unilateral vocal cord paralysis. Randomized controlled trial comparing two different particle sizes. *J Voice* 2010;**24**:113–18
- 7 Pratap R, Mehta P, Blagnys B, Montgomery PQ. Early results for treatment of unilateral vocal fold palsy with injection medialisation under local anaesthetic. *J Laryngol Otol* 2009;**123**:873–6
- 8 Song PC, Sung CK, Franco RA. Voice outcomes after endoscopic injection laryngoplasty with hyaluronic acid stabilized gel. *Laryngoscope* 2010;**120**(suppl 4):S199
- 9 Sulica L, Rosen CA, Postma GN, Simpson B, Amin M, Courey M *et al*. Current practice in injection augmentation of the vocal folds: indications, treatment principles, techniques, and complications. *Laryngoscope* 2010;**120**:319–25
- 10 Mathison CC, Villari CR, Klein AM, Johns MM. Comparison of outcomes and complications between awake and asleep injection laryngoplasty: a case-control study. *Laryngoscope* 2009;**119**:1417–23
- 11 Varvares MA, Montgomery WW, Hillman RE. Teflon granuloma of the larynx: etiology, pathophysiology, and management. *Ann Otol Rhinol Laryngol* 1995;**104**:511–15
- 12 Bergamini G, Alicandri-Ciuffelli M, Molteni G, Villari D, Luppi MP, Genovese E *et al*. Therapy of unilateral vocal fold paralysis with polydimethylsiloxane injection laryngoplasty: our experience. *J Voice* 2010;**24**:119–25
- 13 Lee SW, Son YI, Kim CH, Lee JY, Kim SC, Koh YW. Voice outcomes of polyacrylamide hydrogel injection laryngoplasty. *Laryngoscope* 2009;**119**:827–31
- 14 Schramm VL, May M, Lavorato AS. Gelfoam paste injection for vocal cord paralysis: temporary rehabilitation of glottis incompetence. *Laryngoscope* 1978;**88**:1268–73
- 15 Wen MH, Cheng PW, Liao LJ, Chou HW, Wang CT. Treatment outcomes of injection laryngoplasty using cross-linked porcine collagen and hyaluronic acid. *Otolaryngol Head Neck Surg* 2013;**149**:900–6
- 16 Brandenburg JH, Unger JM, Koschke D. Vocal cord injection with autogenous fat: a long-term magnetic resonance imaging evaluation. *Laryngoscope* 1996;**106**:174–80
- 17 Hartl DM, Hans S, Crevier-Buchman L, Vaissiere J, Brasnu DF. Long-term acoustic comparison of thyroplasty versus autologous fat injection. *Ann Otol Rhinol Laryngol* 2009;**118**:827–32
- 18 Rosen CA, Gartner-Schmidt J, Casiano R, Anderson TD, Johnson F, Remacle M *et al*. Vocal fold augmentation with calcium hydroxylapatite: twelve-month report. *Laryngoscope* 2009;**119**:1033–41
- 19 Shiotani A, Okubo K, Saito K, Fujimine T, Tomifuji M, Ikeda A *et al*. Injection laryngoplasty with calcium phosphate cement. *Otolaryngol Head Neck Surg* 2009;**140**:816–21
- 20 Reiter R, Brosch S. Laryngoplasty with hyaluronic acid in patients with unilateral vocal fold paralysis. *J Voice* 2012;**26**:785–91

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