The Journal of Laryngology & Otology (2012), **126**, *328–330*.

doi:10.1017/S0022215111003318

CLINICAL RECORD

Use of bilateral suture lateralisation technique in severe paradoxical vocal fold movement, allowing removal of long-term tracheostomy: case report

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Abstract

Objective: We report a novel bilateral suture lateralisation technique that allowed permanent tracheostomy decannulation in a patient with severe paradoxical vocal fold movement.

Case report: A 45-year-old woman presented to the accident and emergency department with worsening shortness of breath. Flexible nasoendoscopy revealed limited vocal fold abduction and an emergency tracheostomy was sited; this was subsequently changed to a long-term Silver Negus tube. Her tracheostomy care was complicated by discomfort and dislodgement. The diagnosis of paradoxical vocal fold movement was only made when the patient presented to our department. Cognitive behaviour therapy and botulinum toxin injection were tried without success. A right vocal fold lateralisation procedure was performed, which enabled temporary tracheostomy decannulation. A left vocal fold lateralisation procedure was subsequently performed and the patient was successfully decannulated, with significant improvement in quality of life.

Conclusion: Paradoxical vocal fold movement is a rare condition that is most commonly managed by biofeedback sessions, relaxation manoeuvres or botulinum toxin injection. However, in cases similar to ours in which these treatments are unsuccessful, we suggest a 'last resort' technique to manage this rare condition.

Key words: Vocal Cord; Tracheostomy; Phonation Disorders; Otorhinolaryngological Surgical Procedures

Introduction

Paradoxical vocal fold movement is defined as an abnormal adduction of the vocal folds during inspiration, resulting in laryngeal obstruction and respiratory distress. It was first described in 1842 as 'hysterical croup',[1] and has a well-documented association with gastroesophageal reflux disease, asthma and psychiatric pathology. Paradoxical vocal fold movement has a female preponderance,[2] and can present as wheezing, cough, shortness of breath or stridor. Occasionally, it can present as severe respiratory distress requiring intubation and long-term tracheostomy.

Various treatment modalities have been used, including biofeedback sessions, relaxation manoeuvres and botulinum toxin injection, with limited success, and rarely permitting decannulation in patients with a long-term tracheostomy.

In this article, we describe a patient with paradoxical vocal fold movement who underwent a suture lateralisation technique of the vocal folds, allowing subsequent tracheostomy decannulation.

Case report

A 45-year-old women presented to the accident and emergency department with worsening stridor and a background of severe asthma. Flexible nasoendoscopy revealed restricted vocal fold movement with limited abduction. She was admitted to the intensive care unit, where an emergency tracheostomy was sited.

The patient's past medical history was remarkable for gastroesophageal reflux disease, arthritis, type two diabetes, hypertension, depression and asthma. Her tracheostomy tube was subsequently changed to a long-term Silver Negus tube with a speaking valve (Kapitex Healthcare, Wetherby, United Kingdom). Her tracheostomy care was complicated by recurrent tube discomfort and dislodgment of the speaking valve.

The diagnosis of paradoxical vocal fold movement was only made two years later, when the patient was referred to our unit. The patient was referred for cognitive behaviour therapy as a first-line treatment, but without much success. Subsequently, she had two botulinum toxin injection procedures with increased doses, resulting in minor and short-lived improvements in

Accepted for publication 26 July 2011 First published online 12 January 2012

breathing and voice quality. However, her paradoxical vocal fold movement persisted, and the improvement was not enough to warrant an attempted decannulation.

Over the next three years, the patient's psychological and emotional status deteriorated due to her continuous tracheostomy dependence and the failure of different treatments. The patient presented for a clinic consultation emotionally distressed by the tracheostomy, pleading for an alternative therapy and insisting that she would rather have no voice than live with a tracheostomy.

A right vocal fold lateralisation procedure was performed with a suture technique (Figure 1). The patient was decannulated and discharged home, only to return in three weeks with worsening shortness of breath. The tracheostomy tube was re-sited. A left vocal fold lateralisation procedure was undertaken.

At the same time, we performed laser reduction of the false vocal folds (Figure 2). The tracheostomy was capped on the ward and the patient subsequentially decannulated. She only suffered temporary swallowing difficulties, which improved quickly with swallowing therapy.

The patient's voice was initially weak and breathy, but improved gradually to a normal functional level. At three months (Figure 3), the patient was extremely pleased with the results, stating that her voice was 'fantastic', and that 'I can talk as well as anyone else'.

Procedure

The procedure was performed with total intravenous anaesthesia, suspension laryngoscopy and supraglottic jet ventilation. The laryngoscope (Dedo-Pilling, Pilling Co., Fort Washington, PA) was angled for the proposed lateralisation, to enable visualisation of the posterior vocal fold.

A 19-gauge injection needle was passed through the neck and the thyroid lamina to appear in the airway just below the vocal process of the arytenoid. A 2:0 Ethilon suture (Ethicon, Somerville, NJ) was passed through the needle and withdrawn out through the laryngoscope. The 19-gauge needle was removed and then reinserted through the same skin site, but to appear above the vocal process of the arytenoids in the larynx. Using micro-crocodile forceps, the end of the suture was fed back through this needle so that its two ends exited the neck skin through the same puncture site. The suture was tied, causing significant puckering of the skin and lateralisation of the vocal process of the arytenoid. The suture buried itself entirely under the skin after a few days.

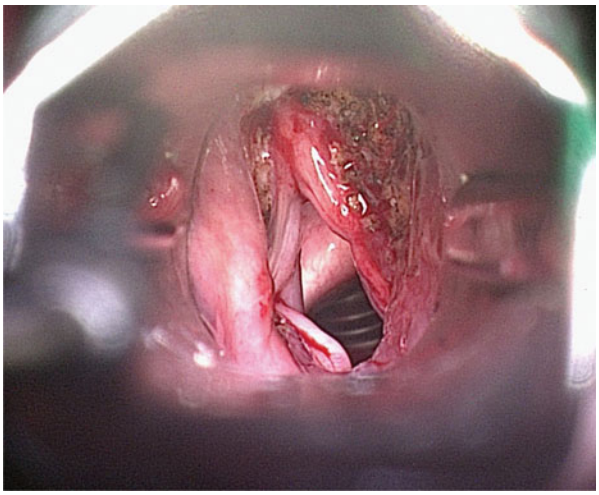

FIG. 2
Operating microscope view after lateralisation of the left vocal fold and laser reduction of the false vocal folds.

Discussion

Paradoxical vocal fold movement is thought to be associated with occupational exposure and severe

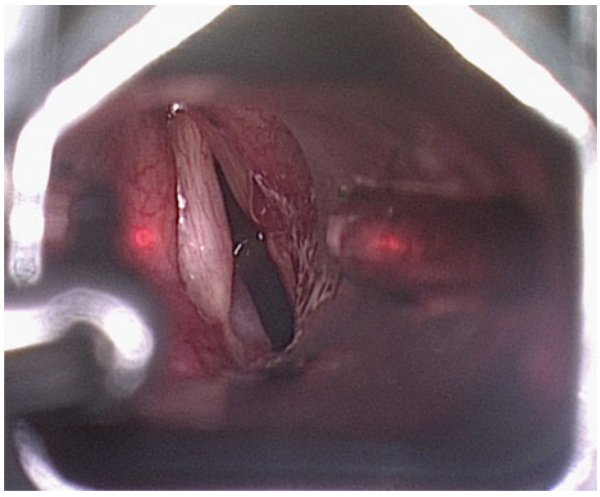

FIG. 1
Operating microscope view of the larynx, three weeks after lateralisation of the right vocal fold.

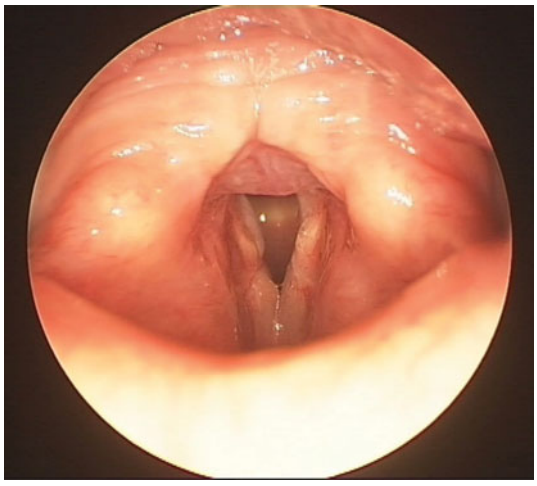

FIG. 3
Laryngoscopic view of the larynx three months post-operatively, showing lateralisation of both folds.

https://doi.org/10.1017/S0022215111003318 Published online by Cambridge University Press

psychosocial stressors, e.g. abandonment and psychiatric disturbances, including anxiety disorders.[2]

- **Paradoxical vocal fold movement is abnormal vocal fold adduction during inspiration, causing laryngeal obstruction and respiratory distress**
- **It presents as wheezing, cough, shortness of breath or stridor**
- **It is associated with occupational exposure and psychological stressors**
- **Botulinum injection therapy is well documented but has short-lived effects**
- **We describe a bilateral suture lateralisation technique in such a patient, which enabled decannulation and restored voice**

The true prevalence of paradoxical vocal fold movement is unknown, as cases are frequently misdiagnosed as refractory asthma due to symptom overlap. One study estimated that paradoxical vocal fold movement was the cause of, or contributed to the cause of, dyspnoea in 3–5 per cent of accident and emergency cases.[3] Presentation varies from wheeze, cough and dyspnoea to severe stridor.

The treatment modality is dependent on the severity of the case. Percutaneous injection of botulinum toxin type A is an established and well-tolerated therapy for paradoxical vocal fold movement; however, its effects are variable and short-lived. The effect lasted an average of 15.1 weeks according to one study.[4] Repeat procedures are therefore frequently required. Although botulinum toxin has few reported side effects, a long-term solution is obviously desirable.

Tracheostomy has been used as a long-term solution for severe cases of paradoxical vocal fold movement; however, this is not without its complications.

A suture lateralisation technique was first described by Lichtenberger, with relation to bilateral paralysis of the recurrent laryngeal nerve.[5] The literature reports successful application of this technique in various cases of recurrent laryngeal nerve palsy occurring following thyroid surgery, enabling decannulation.[6]

The use of suture lateralisation techniques has also been previously described in children with bilateral abductor vocal fold palsy. In one study, all 10 children treated with this method were subsequently decannulated.[7] There is only one report of the use of this technique to manage paradoxical vocal fold movement, leading to successful decannulation, although in that case unilateral lateralisation was performed.[8]

Our case suggests that suture lateralisation may be an important, novel treatment to enable decannulation of patients with treatment-resistant paradoxical vocal fold movement. The procedure carries the risk of aspiration and voice deterioration. Further cases are required to establish the relative risk–benefit ratio. We believe this technique could represent a 'last resort' to allow decannulation when all other treatments have failed.

Acknowledgement

We are very grateful to the patient in question, who kindly consented to her case being reported in this journal.

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Dr J van Griethuysen takes responsibility for the integrity of the content of the paper
Competing interests: None declared