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Short Communication

Cordectomy: a solution to Teflon granuloma of the vocal fold

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Abstract

Teflon injection has been widely used for the treatment of unilateral vocal fold paralysis. Complications are few and infrequent. Overinjection and Teflon granuloma are the two commonest problems encountered. Treating such complications and restoring vocal quality is widely regarded as difficult. Endoscopic transmucosal excision of the excess Teflon and/or granuloma has not been successful in improving phonatory quality. Cordectomy is proposed as an alternative surgical approach for managing both the convex vocal fold and Teflon granuloma after injection.

Key words: Vocal fold paralysis; Polytetra fluoroethylene; Larynx, surgery, cordectomy

Introduction

Arnold (1962) first described the intracordial injection of Teflon paste for the relief of dysphonia associated with unilateral recurrent nerve paralysis. He demonstrated that Teflon could be injected safely into the vocal fold. Since then Teflon injection has been the standard treatment for vocal fold paralysis for over 30 years. The procedure is quick, cost effective and easy to perform under local and general anaesthesia. Many authors have reported excellent results with minimal complications, (Dedo *et al.*, 1973; Maran *et al.*, 1986; Sadek *et al.*, 1987). The complications, however, while infrequent are nonetheless very serious. The three most significant problems are airway obstruction, overinjection, and Teflon granuloma. All three may be attributed to faulty injection technique (Tucker, 1983). Horn and Dedo (1980) reported a two per cent incidence of overinjection.

Teflon should be deposited in the most lateral aspect of the thyroarytenoid muscle to produce an en masse shift of the muscle medially with minimal infiltration of the oscillating portion of the fold itself (Rubin, 1965). Overinjection and Teflon granuloma occur more frequently when carried out by the occasional operator.

The surgical management of these problems has varied over the last 17 years, from stripping of the fold, to submucosal excision of the Teflon using a cupped forceps or a laser. Horn and Dedo (1980) described promising results using a transmucosal superior fold approach. Crumley (1990), on the other hand, reported only minimal improvements in phonatory quality using a similar approach. Our experience has also been disappointing. Cordectomy through an external approach is proposed as an alternative method for treating overinjection and Teflon granuloma. This report describes our management of a patient with a large granuloma. The rationale for our surgical approach and the operative technique are discussed.

Case report

A 55-year-old lady complained of persistent dysphonia following a right thyroid lobectomy for benign disease. A laryngological examination revealed a right vocal fold palsy. She failed to improve and Teflon was injected into the right vocal fold. Some improvement in phonatory quality did occur, but this was only transitory. Six months later her voice was weak and breathy. A videostroboscopy recording demonstrated severe irregularity and convexity of the right vocal fold, (Figure 1), with disruption of the mucosal wave of the left vocal fold due to a Teflon granuloma. A Visispeech analysis (two weeks pre-operatively) showed an average voice frequency of 115 Hz, with a median of 121 Hz, and a mode of 129 Hz. Her percentage voicing time was 31 per cent. She described her voice as 'husky' and 'gravelly'. After discussing all the possible treatment options available with her, she ageed to have a cordectomy.

Surgical approach

After performing a tracheostomy, the larynx was opened via a laryngofissure approach. A right perichondrial flap was elevated and preserved. The large granuloma was found to be confined to the fold. The fold was then excised preserving the arytenoid cartilage. The mucosa lining the ventricle and the ventricular fold were then mobilized and sutured to that of the subglottis closing the defect. The anterior two-thirds of the thyroid ala was excised and a bipedicled muscle flap (sternohyoid) swung medially to provide bulk and to medialize the reconstructed hemilarynx (Figure 2). The perichondrium was then closed over the muscle.

Result of the cordectomy

The patient was decannulated on the third day after surgery. At this time the voice was strong and clear and there were no swallowing or aspiration difficulties. Histology of the resected fold was consistent with Teflon granuloma (Figure 3), demonstrating granulomas in the stroma showing multinucleated foreign body giant cells containing irregular refractive material. Videostroboscopy recordings at one and three months post-surgery demonstrated a smooth apposing surface (Figure 4). A normal

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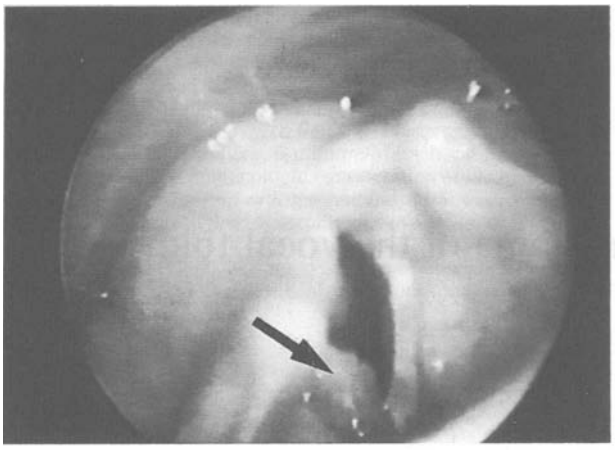

FIG. 1
Teflon granuloma of the right vocal fold (arrowed).

mucosal wave was now seen on the non-operated side and glottic closure was complete. A Visispeech recording taken two weeks post-operatively demonstrated an average voicing frequency of 149 Hz with a median of 197 Hz and a mode of 204 Hz. Her percentage voicing time was 36 per cent and she described her voice as 'clear', 'quiet' and 'feminine'.

Discussion

The intrafold injection of Polytef (Teflon) – glycerine suspension has proved to be an effective treatment of unilateral recurrent nerve paralysis (Rubin, 1975). The technique is quick, cost effective and easy to perform. Complications are infrequent (Dedo *et al.*, 1973), and are usually due either to poor injection technique or poor patient selection (Rubin, 1965). Overinjection and Teflon granuloma are the two most common problems and both have proved difficult to reverse.

Teflon despite being well tolerated by the tissues is still a foreign material, and can cause considerable chronic inflammation at the site of the injection. The Teflon mass is generally not encapsulated but is distributed in variably-sized deposits, surrounded by fibroblasts, collagen fibres, plasma cells, occasional lymphocytes and prominent foreign body giant cells with incorporated Teflon particles (Toomey and Brown, 1967; Pohris and Kleinsasser, 1987).

The above histological features demonstrate how securely embedded the Teflon becomes within the thyroarytenoid muscle. Normal fold tissue will therefore have to be excised in order to remove the granuloma and this should lead to further scarring with a laterally placed fold and poor vocal quality.

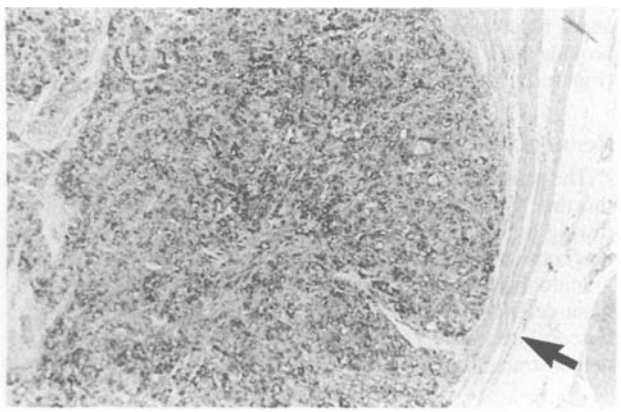

FIG. 3
Photomicrograph of excised granuloma within the thyroarytenoid muscle (arrowed).

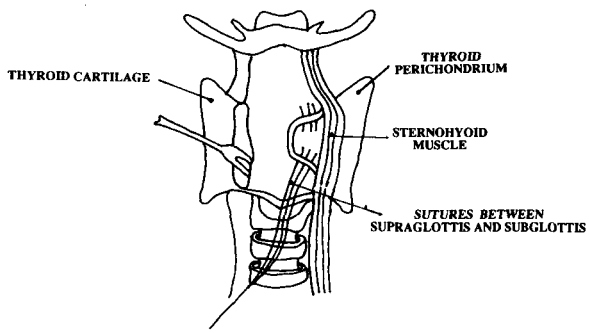

FIG. 2
Schematic illustration of reconstruction of the hemilarynx with bipedicled muscle (sternohyoid) flap.

Rubin (1965) stated that the implantation of Teflon was permanent. He believed that removal of the granulomatous reaction could only be achieved by also removing normal fold tissue making it unlikely that the voice could be returned to the pre-injection state.

Horn and Dedo (1980) proposed vocal fold stripping as a solution but found it was unsatisfactory as it led to exposed Teflon particles and chronic granulation tissue formation at the free edge of the vocal fold. They revised their approach to the transmucosal superior fold approach. This involved making a superior fold incision and debulking the fold of Teflon and preserving the overlying mucosa on the free edge of the fold. They reported satisfactory results in 12 patients. Koch *et al.* (1987) reported the use of the CO_2 laser for removing unwanted implant, but found Teflon to be inflammable, especially when it had been *in situ* less than seven weeks. Dedo (1988) stated that the KTP 532 laser was a safer tool for the removal of Teflon, because it had a safety shutter that closed and eliminated the intense light given off when the carbon in the teflon was vaporized.

Crumley (1990) described poor phonatory results in patients who had excess Teflon removed via the transmucosal approach. Our experience with this method has also been disappointing. It is difficult to understand how surgical removal of Teflon with a laser or with forceps could improve the voice. The debulking of the fold should lateralize it to the pre-operative position or even further away from the midline. The result should therefore be a patient with a much poorer phonatory quality. Our belief is that a cordectomy through an external approach provides an alternative to the transmucosal technique. Although it seems a radical option for a benign disorder it nonetheless offers two main advantages over the endoscopic approach. Firstly it allows com-

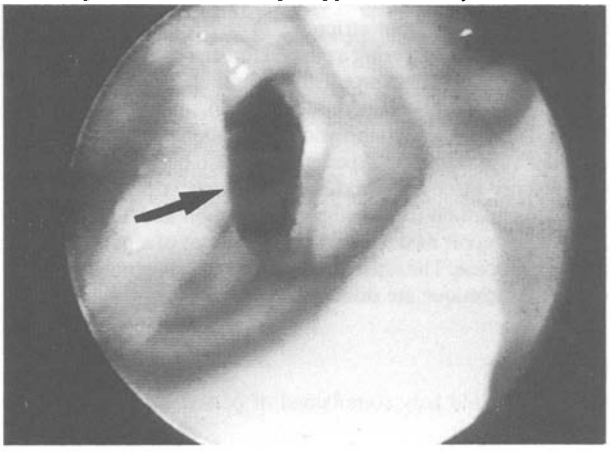

FIG. 4
Photograph of larynx post-operatively with reconstructed hemilarynx (arrowed).

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plete removal of all the granuloma and secondly a new apposing surface can be reconstructed in the midline. The main disadvantages of this technique are: (1) the necessity for a temporary tracheostomy; (2) the potential complications associated with a hemilaryngectomy; and (3) the longer hospital stay.

Our patient made an excellent post-operative recovery, and her vocal quality returned to its normal state. It would be unwise, however, to propose this technique for all Teflon granulomas based on one successful case. Our experience is certainly encouraging and we would suggest cordectomy as an option, especially in patients who had had an endoscopic removal of a Teflon granuloma with poor phonatory results.

This case report highlights the infrequent but serious complication of Teflon injection, namely Teflon granuloma. It illustrates the irreversibility of the technique and emphasizes the need to use alternative medialization procedures in the young patient and in those with benign disease.

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