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Main Article

New silicone tube placement therapy for patients with an anterior glottic web

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Abstract

An anterior glottic web in adults comprises a bridge of scar tissue commonly formed as a result of iatrogenic laryngeal injury. Traditionally, procedures such as transcervical midline thyrotomy and keel placement have been used to repair this condition. However, we recently repaired an anterior glottic web using a new surgical procedure involving a silicone tube instead of a keel. We herein report this case, in which we placed a silicone tube at the anterior commissure after resection of an anterior glottic web, under endolaryngeal microsurgery, without performing a tracheostomy.

Key words: Anterior Glottic Web; Silicone Tube; Keel; Endolaryngeal Microsurgery

Introduction

An anterior glottic web in adults comprises a bridge of scar tissue between the vocal folds, which is covered by epithelium and involves the anterior commissure. Anterior glottic stenosis commonly occurs secondary to laryngeal injury resulting from laryngeal surgery.[1] The presence of an anterior glottic web induces severe dysphonia caused by disturbance of vocal vibration. Traditionally, repair has been achieved with procedures such as a transcervical midline thyrotomy and resection of the scar band, with reconstruction of a linear vocal fold edge and anterior commissure involving keel placement. In this procedure, patients are not able to speak during keel placement.

We accomplished an anterior glottic web repair using a new surgical procedure involving a silicone tube instead of a keel. We herein report this case, in which silicone tube placement was effectively utilised at the anterior commissure after resection of the anterior web, under endolaryngeal microsurgery. The patient was able to speak with good phonation during silicone tube placement after the minimally invasive surgery. After removal of the silicone tube, the anterior glottic web was completely cured.

Case report

A 32-year-old woman underwent a laryngo-microsurgical CO_2 laser resection for recurrent laryngeal papilloma of the anterior commissure and the anterior part of the bilateral vocal folds. Severe dysphonia developed three months after the operation. Figure 1 shows the laryngeal findings at fibrescopy. An anterior glottic web was observed extending to the whole membranous portion of the right vocal fold, and to more than half the membranous portion of the left vocal fold.

Endolaryngeal microsurgery was performed on the anterior glottic web, without a tracheostomy. The right hand edge of the web was incised using a scalpel. The left side of the web was incised using micro-scissors while grasping the web with a grasper.

After removal of the web, both free edges of each vocal fold were sutured with 7–0 nylon thread to provide sufficient coverage. Thereafter, a 4 cm, transverse incision was made at the midpoint of the thyroid cartilage on the anterior neck, and the anterior portion of the thyroid cartilage was exposed. An 18 G disposable needle was then inserted into the upper and lower points of the anterior commissure through the upper and lower edge of the midpoint of the thyroid cartilage. Both ends of a 3–0 nylon suture were threaded through a 0-sized, 10 mm length of silicone tube which was then inserted into the upper and lower holes of 19 G disposal needles to fix the silicone tube at the anterior commissure. In addition, both ends of the 3-0 nylon thread were sutured at the subcutaneous anterior portion of the thyroid cartilage. The patient was thereafter able to speak with a good voice during silicone tube placement.

Figure 2 shows the laryngeal findings three months after silicone plate placement. The 0-sized silicone tube was fixed at the anterior commissure and there was no anterior glottic web.

The silicone tube fixed at the anterior commissure was removed under endolaryngeal microsurgery five

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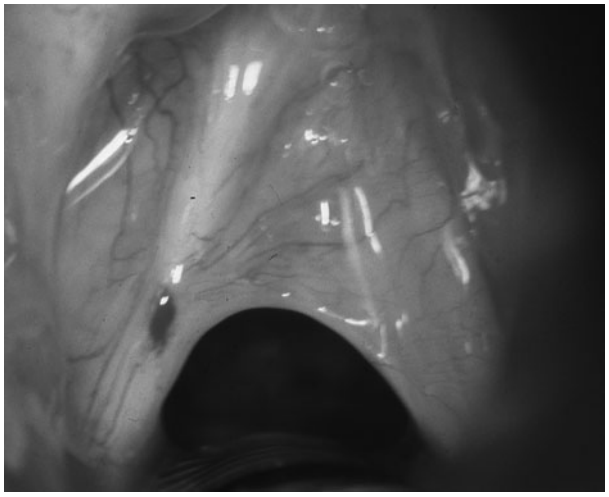

FIG. 1

Laryngoscopic view showing initial laryngeal findings. An anterior glottic web extended to the whole membranous portion of the right vocal fold, and to more than half the membranous portion of the left vocal fold.

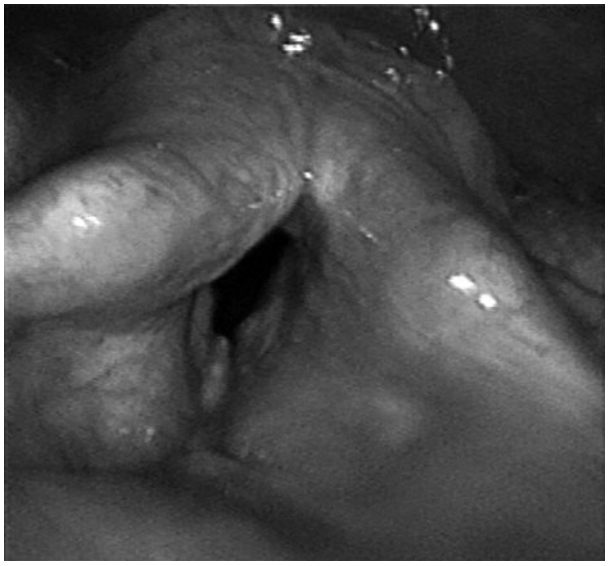

FIG. 2

Laryngoscopic view showing laryngeal findings three months after silicone plate placement. The 0-sized silicone tube was fixed at the anterior commissure, and there was no anterior glottic web.

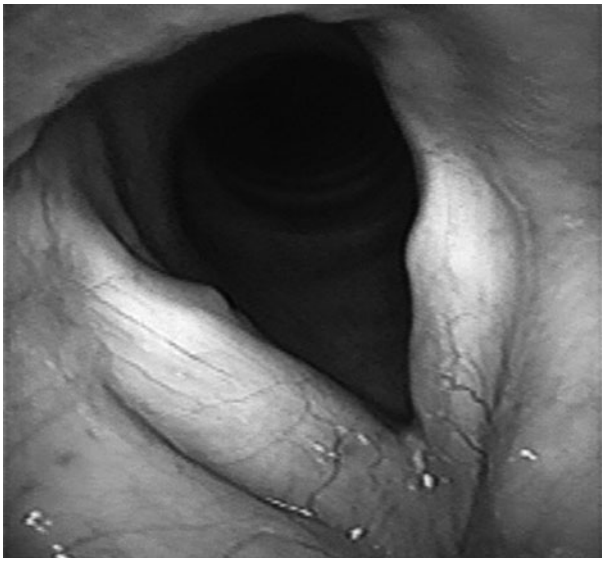

FIG. 3

Laryngoscopic findings two months after silicone tube removal. There was no anterior glottic web.

months after the initial surgery, because the patient had requested that removal be delayed. Figure 3 shows the laryngeal findings two months after silicone tube removal. There was no anterior glottic web.

The patient's vocal function before and after surgery was examined, using the following parameters: (1) maximum phonation time (in seconds); (2) mean airflow rate during phonation over a comfortable duration (in ml/second); (3) pitch perturbation quotient (in per cent); (4) amplitude perturbation quotient (in per cent); and (5) normalised noise energy for 0 to 4 kHz. The first two parameters are designed to reflect the degree of glottic incompetence, while the remaining three reflected acoustic aspects of vocal quality. The vocal functions were evaluated four times: at the first recurrence of the laryngeal papilloma, when the anterior glottic web was first observed, at the time of silicone tube placement, and two months after silicone tube removal.

The results of these vocal examinations are shown in Table I. All parameters were within the normal range at the first vocal examination. However, when the anterior glottic web was discovered, all parameters were found to be abnormal. At the stage of

TABLE I

VOCAL EXAMINATION RESULTS

Parameter	Time point			
	Papilloma recurrence	AGW diagnosis	Silicone tube placement	2 mths after tube removal
MPT (sec)	12.7	7.9	14.9	16.9
MFR (ml/sec)	163	351	146	158
PPQ (%)	0.12	0.69	0.26	0.32
APQ (%)	0.61	1.92	0.85	1.07
NNEa (dB)	−23.2	−10.3	−17.6	−15.5

AGW = anterior glottic web; MPT = maximum phonation time; MFR = mean airflow rate during phonation over a comfortable duration; PPQ = pitch perturbation quotient; APQ = amplitude perturbation quotient; NNEa = normalised noise energy for 0 to 4 kHz

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silicone tube placement, and also after removal of the silicone tube, only the normalised noise energy was found to abnormal (being slightly elevated). These vocal function results supported the efficacy of silicone tube fixation therapy at the anterior commissure after resection of an anterior glottic web under endolaryngeal microsurgery.

Discussion

The rationale for a less complicated, endoscopic approach to anterior glottic web repair (and one involving less morbidity) is based on the original 1924 work of Haslinger, who described a technique of web excision followed by placement of a silver plate between the vocal folds in the anterior glottis.[2] The plate was held by a wire that was passed through the thyroid cartilage, above and below the vocal fold level, and anchored on the skin surface externally. In Haslinger's first case, the thyroid cartilage was cut because of too much tension between the skin and wire, and the plate therefore had to be removed from beneath the skin through a small external incision. Since then, many authors have modified the Haslinger technique of transoral, endoscopic placement of a laryngeal keel.[3–6] Dedo developed the technique using a 26-gauge wire puller and a series of triangular keels.[5] Recently, Lichtenberger and Toohil and Roy *et al.* reported that transoral placement of a glottic keel is safe and does not significantly interfere with respiration.[7,8] However, one disadvantage of using keel placement therapy to repair an anterior glottic web is that the patient is unable to speak during the procedure.

Our new surgical procedure for anterior glottic web repair, using a silicone tube instead of a keel, allows the patient to speak during the placement procedure, without dysphonia; the need for a tracheotomy is also avoided. The success of this procedure may have resulted from the suturing of the bilateral free edges of the vocal folds with a 7–0 nylon thread to provide sufficient coverage. Nevertheless, placement of a silicone tube at the anterior commissure, after resection of the anterior glottic web, under endolaryngeal microsurgery, appears to be an effective and minimally invasive procedure, compared with keel placement therapy.

Conclusion

We developed a new surgical procedure for anterior glottic web repair, using a silicone tube instead of a keel. The patient was able to speak during placement of the silicone tube. This procedure appears to be effective, and is also minimally invasive compared with keel placement therapy.

Acknowledgement

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References

1 Roh JL, Yoon TH. Prevention of anterior glottic stenosis after bilateral vocal fold stripping with mitomycin C. *Arch Otolaryngol Head Neck Surg* 2005;**131**:690–5
2 Haslinger F. A case report of membrane formation in the larynx. A new method of treatment [in German]. *Manatschr Ohrenheilk* 1924; **58**:174
3 Alonso JM, Regules JE. Treatment of innate membranes and synechiens in the anterior commissure of the larynx [in German]. *Z Laryngol Rhinol* 1956;**35**:53
4 Pennington CL. The treatment of anterior glottic webs: a reevaluation of Haslinger's technique. *Laryngoscope* 1968; **78**:728–41
5 Dedo HH. Endoscopic teflon keel for anterior glottic web. *Ann Otol Rhinol Laryngol* 1979;**88**:467–73
6 Mouney DF, Lyons GD. Fixation of laryngeal stents. *Laryngoscope* 1985;**95**:905–7
7 Lichtenberger G, Toohil RJ. New keel fixing technique for endoscopic repair of anterior commissure webs. *Laryngoscope* 1994;**104**:771–4
8 Edwards J, Tanna N, Bielamowicz SA. Endoscopic lysis of anterior glottic webs and silicone keel placement. *An Otol Rhinol Laryngol* 2007;**116**:211–6

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Dr H. Umeno takes responsibility for the integrity of the content of the paper.
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