



A Novel Keel for Treatment of Anterior Glottic Webs

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Abstract

We reviewed our clinical experience of placing endoscopically self-made polyester keels to prevent re-formation of Anterior Glottic Webs (AGWs) in adults. Seven patients were identified for inclusion, ages ranging from 24 years to 78 years. All patients were performed lysis of the AGWs by laser or cold apparatus and placement of keels under general anesthesia. The keels were made of polyester cardiovascular patches. The keels were removed after 2 to 3 weeks. No patients needed tracheotomy, and the keels didn't influence patients' normal diets during implantation. Our experience for AGWs showed very encouraging results, both morphologically and functionally. Follow-up for 2 years to 4 years, no webs were recurrence. The keels of new material had good tissue compatibility and flexibility over silicone elastomer, and should be considered to treat or prevent AGWs.

Introduction

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Anterior Glottic Webs (AGWs) are not common disorders, but represent a challenge to laryngologists. Whatever the reason, to prevent the re-formation of webs is the most difficult and important question. Because the surfaces of anterior commissure are with proximity and keep contact state, unepithelized edges in this region are easy to produce the intervening regrowth and varying extent adhesions. The recurrence of webs is common and often requires repeated corrections. The raw mucosal surfaces must be kept apart until healing has occurred. Keels were well established in the treatment of webs. Various materials were used as keels for the treatment of glottis webs with varying success, including metal, rubber, polyethylene and silicon. We described a novel material as keel, placed endoscopically, with percutaneous fastened, after lysis of AGWs.

Patients and techniques

Between 2015 and 2018, seven patients with AGWs were identified for inclusion, ranging in age from 48 years to 78 years and including 5 men and 2 women. The webs of all patients resulted from surgical disruption.

Surgical Techniques

The endoscopic surgery was performed under general anesthesia. Suspension laryngoscopy was performed to assess the airway and the extent of webs (Figure 1). The thin webs were cut with micro scissors, and the thick webs were vaporized by a CO₂ micro point laser. Meanwhile, the anterior neck was antiseptically prepared by an assistant. The keels were made of polyester cardiovascular patches (Knitted type) (thickness: 0.25 mm) and fashioned out of 1 cm × 1 cm rectangle. A 2.0 polyester suture was weaved through the midline of the rectangle through the superior and inferior edge of the fashioned keel, which enabled the keel to fold along this line.

A straight needle was used as a conduit to pass through a guide line of 3.0 nylon suture. The first wire was passed through the thyrohyoid space just above the notch. To secure the keel, the guide line was pulled out from the laryngoscope and tied with fixed line of fashioned keel, and made to exit through thyrohyoid membrane and skin, where it could be seen endoscopically. A second needle was made to exit through cricothyroid membrane and skin. The surgeon guides the keel into its correct position, once the keel was placed into the proper position endoscopically; the suture was tied knot over a plastic pipe of 2 cm length. The keel was anchored externally on the neck.

The patients returned to the ward to monitor respiratory status after operations, and confirmed the position of keels by laryngoscope on the next day (Figure 2). Daily activities did not lead to change the position of the keels. Average stay was usually 5 days. The webs were removed after 2 to 3 weeks under general anesthesia, and laryngoscopes were reviewed one month later (Figure 3).

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Figure 1: Suspension laryngoscopy was performed to assess the airway and the extent of webs.



Figure 2: The patients returned to the ward to monitor respiratory status after operations, and confirmed the position of keels by laryngoscope on the next day.



Figure 3: The webs were removed after 2-3 weeks under general anesthesia, and laryngoscopes were reviewed one month later.

Results

In this group, 6 patients achieved satisfactory results; only 1 patient demanded removing the keel because of serious cough in the first week after operation and web recurrence. One patient showed a slight granulation hyperplasia in the neck and anterior commissure. The granulation gradually subsided after the keel was taken out. Our patients had good tolerance, which also had reasonable speech and no dysphagia was observed during its insertion. In addition, no tracheostomy was required. Follow-up for 2 years to 4 years, no webs were recurrence.

Discussion

Common causes of glottic webs include congenital webs, trauma, and surgery. Surgery is one of the main causes of vocal cord adhesion. The causes of glottic webs in our 7 patients were surgery. Six patients have at least once suspension laryngoscope surgery history because vocal cord leukoplakia or cancer. One patient was diagnosed as laryngeal cancer (T₂N₀M₀) and underwent three-quarters laryngectomy and tracheotomy 11 years ago. The patient required removal of tracheal tube for cold weather.

The placement of keels could gain the time for wound epithelialization of vocal cord so as to achieve the purpose of preventing re-webbing at the anterior commissure. The ideal keels for treatment of anterior glottic webs would have good biocompatibility and toughness. In 1924 Haslinger chose a silver plate as keel, too much tension between the skin and wire cut the thyroid cartilage. The metal sheet didn't fit securely and more easily lead to pressure necrosis [1]. Taking into account this shortcoming, Dedoreplaced metal sheet with a triangular-shaped Teflon keelin 1979 [2]. Shortly thereafter, several reports introduced the experiences of silica sheet [3-5]. Although such material has very good flexibility, but our experience has found silica sheet easy to be cut by fixed wire and fall off into the airway. We tried to use polyester cardiovascular patches keel. Our experience for AGW showed very encouraging results, both morphologically and functionally. The result showed polyester cardiovascular patch had good biocompatibility and uneasily cut. The material is simple and readily available. The procedure don't need special instrument other than laser equipment. In addition, a tracheostomy was not required.

Conclusion

The web resection and placement of web with transoral endoscopic is fit for glottis membranous stenosis. We recommend polyester cardiovascular patch as a novel keel, which had good biocompatibility and its flexibility, avoiding pressure necrosis.

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