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How I Do It

Use of Bovine Pericardium for the Treatment of Anterior Iatrogenic Glottic Web

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INTRODUCTION

Treatment of anterior glottic web is challenging, but regardless of the surgical approach, the goal is to resect the web and prevent recurrence. The aim of this article was to introduce a new material, bovine pericardium (BP), for stenting the anterior commissure. BP has not yet been used in laryngeal surgery, although it has been widely employed as a patch in vascular, cardiac, thoracic, and urological surgery. Commercial patches are processed to make them acellular, thus preventing the transplantation of DNA.1

Herein we present four cases demonstrating our surgical method and highlighting the advantages of BP in the treatment of anterior glottic web. To achieve this objective, we performed pre- and postoperative laryngoscopy and voice evaluation. Voice outcomes were studied using the Grade, Roughness, Breathiness (GRB) scale and Voice Handicap Index (VHI).

METHODS

Patients

This study was a retrospective case series of four patients with anterior glottic web that occurred after bilateral transmuscular cordectomy; according to GRB scale, the only symptom was severe hoarseness. The operation had been performed at least 3 years prior in all the patients, and the glottic web had been diagnosed between 3 and 5 months after the surgical treatment. The preoperative examination included measuring the VHI and scoring the patients’ dysphonia, using the GRB scale; the same speech therapist scored all of the patients.

Patients were admitted overnight on the day of the surgery. Antibiotic therapy was subsequently prescribed.
Fig. 1. (a) Microlaryngoscopy in patient 2. (b) Incision of the glottic web. (c) Two 22-gauge needles were passed through the skin into the larynx. *A Montgomery prosthesis. (d) The bovine pericardium sheet was placed in the laryngeal lumen.

Fig. 2. (a) Pre- and (b) postlaryngoscopy of patient 2. *Montgomery prosthesis in the neoglottis.
for 7 days. After 3 weeks, the BP sheet was removed in the operating room. The postoperative VHI and GRB scale performances were then studied 6 months after the surgery. All of the procedures were approved by our institutional review board.

RESULTS

Pre- and postlaryngoscopy photographs of patients 1 and 2 are shown in Figures 2 and 3. The GRB scale and VHI scores were significantly improved after the surgery in all the cases (Table I). In every case, severe dysphonia improved to moderate dysphonia; the average preoperative VHI was 78.75 and the postoperative VHI was 35. Moreover, the glottic web significantly improved in all cases, and the BP sheet was well tolerated for 3 weeks, with normal breathing and swallowing function. Tracheotomy was not necessary in any case, and there were no complications such as dislocation of the BP sheet or infection. After 1 year, there were no cases of glottic web recurrence.

DISCUSSION

Both open and endolaryngeal techniques are frequently unsuccessful because of glottis web recurrence. Several devices and materials are available for treatment of this condition, as follows: 1) Laryngeal keels (Boston Medical Products, Shrewsbury, MA) cost €280 per piece and require a medial thyrotomy. Moreover, when the keel is removed, the anterior commissure is partially deepithelialized, and the new healing may create another glottic web. 2) Laryngeal anterior commissure stents (laryngeal anterior commissure stent; Boston Medical Products) cost €656 each and require the use of a set of surgical instruments not included in this price to place them. 3) Montgomery laryngeal stents (Boston Medical Products) are molded silicone prosthesis designed to fit the contour of the normal endolaryngeal surface; they cost €354 each, are designed for wide stenosis, and they require a tracheostomy.

Other materials that have been used for endolaryngeal stenting are not as soft and malleable as BP, which may mean that they do not perfectly adapt to the anterior commissure. BP sheets are thinner (0.5 mm) compared to silicone sheets (1.02 mm) and more malleable than Teflon; the BP sheet we used in this study measured 2 × 9 cm and cost €248.

Other benefits of BP are that it favors improved healing outcomes and that it helps avoid the need for long-term stenting, laryngofissure, and tracheotomy. BP is a highly malleable material that can be easily adapted according to the angle of the anterior commissure. In addition, it is soft and easy to suture: one stitch is required to hold the sheet on the anterior commissure and thus achieve perfect adaptation. Other biological materials, such as homograft and allograft aortic grafts, have been used in laryngeal and tracheal surgeries; however, although they are remarkably robust, unlike BP, they are not very malleable. BP is fixed in glutaraldehyde, which increases its strength and stability while simultaneously reducing antigenicity and the risk of infection, and this increased material strength is associated with increased long-term durability.

A mucosal flap covered in fibrin glue, in combination with placement of BP, is useful for preventing vocal fold scarring and avoiding web recurrence. Despite the frequent recurrence of this pathology, in our series there were no cases of such scarring. Therefore, preventive use of BP after cordectomy involving an anterior commissure could be useful, and thus, further study of this possibility is recommended.

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**TABLE I.**

| Grade, Roughness, Breathiness, and Voice Handicap Index Scores Were Significantly Improved in All Cases After Surgery. |
|---|---|---|---|---|
| Patient | VHI Pre | VHI Post | GRB Pre | GRB Post |
| 1 | 82 | 32 | G3R3B2 | G2R1B1 |
| 2 | 96 | 26 | G3R0B3 | G2R0B2 |
| 3 | 56 | 41 | G3R2B2 | G2R2B2 |
| 4 | 81 | 41 | G3R1B2 | G2R1B1 |

GRB = Grade, Roughness, Breathiness scale; VHI = Voice Handicap Index.
CONCLUSION
BP has proven useful as a laryngeal stent material; it is highly malleable, soft, and easy to suture and adapt to the anterior commissure. The benefits of BP for laryngeal surgery include improved healing outcomes and avoidance of the need for long-term stenting, laryngofissure, and tracheotomy. Thus, BP should be considered a useful alternative for treating glottic webs.

BIBLIOGRAPHY