

An Improved Method of Medialization Laryngoplasty Using a Three-sided Thyroplasty Window

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INTRODUCTION

Beginning in 1974, Isshiki, *et al.*^{1,2} popularized the medialization thyroplasty as a treatment for glottal insufficiency. Initially, four thyroplasty procedures were described. A type I thyroplasty provides lateral compression to the paralyzed cord, a type II thyroplasty creates a lateral expansion of the glottis, a type III thyroplasty shortens and relaxes the vocal folds, and a type IV thyroplasty lengthens and stretches the vocal folds. Isshiki³ recommended using a type I thyroplasty for a unilateral recurrent laryngeal nerve (RLN) paralysis and a combined type I and type IV thyroplasty for patients with both a unilateral superior laryngeal nerve and RLN paralysis. Subsequently, other authors have reported successful treatment of glottal insufficiency with a type I thyroplasty.⁴⁻⁶ Some authors have modified the Isshiki thyroplasty by removing or drilling away the cartilage window.⁷ This modification was devised to overcome the observed difficulty in maintaining the geometric orientation of a four-sided, free-floating cartilage window. However, Isshiki has advised against removing the cartilage window because of potential intrusion of the Silastic® block (personal communication, June 1992).

In our initial series of type I thyroplasty patients, we created a four-sided cartilage window as described by Isshiki.³ However, in a number of these patients notching developed at the anterior vocal fold region corresponding to the anterior margin of the thyroplasty window. Notching of the vocal fold occurred when the free-floating segment of cartilage was inadvertently medialized more anteriorly than posteriorly. This

abnormality resulted in persistent dysphonia requiring a revision thyroplasty. In addition, some authors have encountered difficulties with intrusion and extrusion of the Silastic implant when using a four-sided cartilage window.⁸ To avoid these problems, we modified the procedure by creating a three-sided, anteriorly based thyroplasty window. In addition, we devised a wedge-shaped Silastic block that fits securely within the thyroplasty window. Since these modifications were introduced, no patients have developed anterior vocal fold notching or Silastic block extrusion or intrusion in over 300 thyroplasties that have been performed at the UCLA Medical Center.

TECHNIQUE

The three-sided thyroplasty window is based anteriorly at the midline of the thyroid cartilage. The superior horizontal cartilage cut is made parallel to the anterior inferior rim of the thyroid cartilage, half the distance from the midline thyroid notch to the inferior thyroid cartilage margin (Fig. 1). The inferior horizontal thyroid cartilage incision is made parallel to the superior cartilage incision, as low as possible without jeopardizing the integrity of the inferior thyroid cartilage rim. The posterior vertical cartilage incision is placed at the midpoint of the inferior thyroid cartilage tubercle. The thyroid cartilage window is then medialized with a freer elevator. In this technique the cartilage window is not removed and remains hinged to the midline of the thyroid cartilage. In calcified cartilage the anterior margin of the thyroplasty window must be scored prior to medialization. Since the anterior aspect of the thyroid cartilage is considerably thinner than the lateral portion of the thyroid cartilage ala, care must be taken to avoid tearing the anterior hinge of the thyroplasty window when medializing the cartilage with the freer elevator. In addition, the inner perichondrium of the posterior thyroid ala is elevated to create a pocket for the Silastic implant.

A Silastic implant is carved to fit the thyroplasty

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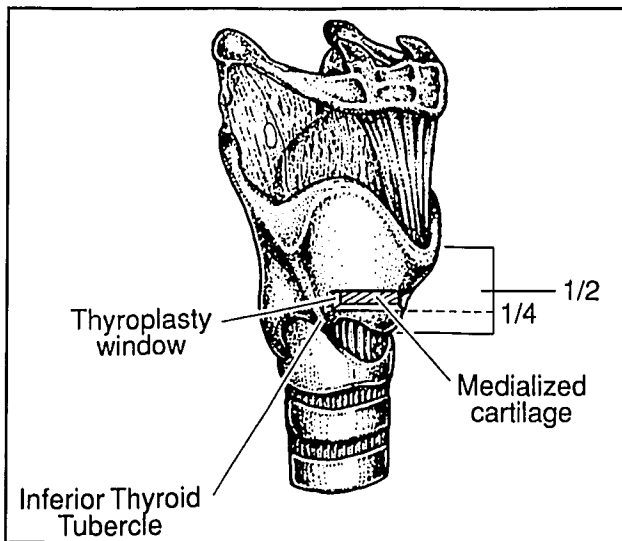


Fig. 1. Anatomic guidelines for creation of a three-sided, anteriorly based thyroplasty window.

window. A three-sided triangular wedge is carved such that the posterior angle is approximately 30 degrees, the anterior medial angle is 90 degrees, and the anterior lateral angle is approximately 60 degrees (Fig. 2). The width of the Silastic wedge is cut to fit within the vertical dimension of the cartilage window. An inferiorly based flange is created on the Silastic wedge to assist in retention of the Silastic implant. The wedge is inserted into the cartilage window deep to the posterior thyroid cartilage and superficial to the inner perichondrium of the thyroid ala such that the 30-degree angle medializes the vocal process of the arytenoid (Fig. 3). Placement of the Silastic wedge between the inner perichondrium and thyroid cartilage prevents intralaryngeal migration of the prosthesis. Once the Silastic implant is inserted, the anterior portion of the cartilage window bends slightly upon itself such that the Silastic wedge is further secured within the thyroplasty window. The excess Silastic material lateral to the surface of the thyroid cartilage is then removed (Fig. 3). The inferior flange of the Silastic wedge is placed medial to the inferior thyroid cartilage rim to prevent extrusion of the implant. The Silastic wedge is further secured by placing one or two 4-0 Prolene® sutures through the Silastic wedge and the thyroid cartilage outer perichondrium.

DISCUSSION

By creating a three-sided, anteriorly based thyroplasty window instead of the four-sided window described by Isshiki, *et al.*,¹⁻³ we have avoided problems with Silastic block extrusion or intrusion and notching of the anterior vocal fold. With a three-sided window and a wedge-shaped Silastic block, we have been able to reliably create a straight, medialized vocal fold from the anterior commissure to the vocal process of the arytenoid. We have used this technique in over 300 pa-

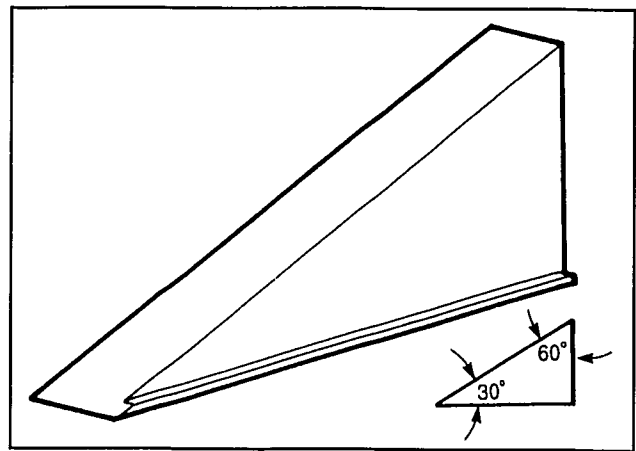


Fig. 2. View of the inferior surface of the triangle-shaped Silastic® implant. The inset demonstrates the posterior angle (approximately 30 degrees) and lateral angle (approximately 60 degrees).

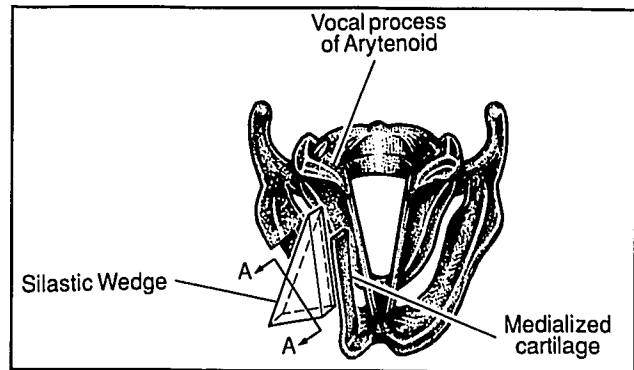


Fig. 3. Placement of the Silastic® wedge into the anteriorly based thyroplasty window. The slight buckling of the anterior aspect of the thyroplasty window and the medialization of the vocal process of the arytenoid by the posterior portion of the Silastic® wedge are evident. The region indicated by the letter A is removed at the conclusion of the procedure.

tients with glottal insufficiency without complication. Extrusion is prevented by the effective "locking" of the anterior portion of the Silastic wedge by the anteriorly based cartilage window. Extrusion is further prevented by placement of the inferior flange of the Silastic wedge medial to the inferior margin of the thyroid cartilage. In addition, both extrusion and intrusion of the Silastic implant are prevented by the permanent sutures that are placed through the Silastic implant and outer perichondrium of the thyroid cartilage.

Although the vocal process of the arytenoid is medialized by the apex of the Silastic wedge, we are unable to correct a wide posterior glottal chink with a type I thyroplasty. In such cases we perform an arytenoid adduction. Thyroplasty does not provide sufficient correction of all cases of glottal insufficiency; however, thyroplasty has replaced Teflon® injection as the standard for vocal fold medialization. With a type I thyroplasty, the complications of Teflon injection are

avoided, including granuloma formation and Teflon migration, as well as the complications of arytenoid adduction, including airway obstruction resulting from overmedialization and edema.

Intrinsic difficulties with the Isshiki four-sided thyroplasty window and Silastic blocks have prompted several centers to experiment with preformed implants made of varying materials.⁷ The high degree of anatomic variability of patients requiring medialization laryngoplasty makes the ultimate utility of pre-

formed blocks doubtful. The three-sided thyroplasty technique can be adapted to both young and old patients with either soft or calcified cartilage. Good results can be obtained in most patients, and the procedure can be easily learned by residents in training. Thyroplasty is a safe, expedient procedure that can be performed with the use of local anesthesia in patients of all ages with predictable results when an anteriorly based thyroid cartilage window and a wedge-shaped Silastic implant are used.

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