SURGICAL INNOVATIONS AND INSTRUMENTATION

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Medialization Thyroplasty Using a Pocket and Silicone Implant Technique

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ABSTRACT

Objective: To describe a new method of medialization thyroplasty using a modified preformed nasal silicone implant.

Methods:

Design: Surgical Innovation

Setting: Tertiary Private Hospital

Participants: Four patients underwent medialization thyroplasty using a pocket and nasal implant technique performed by the senior co-author. The indication for medialization thyroplasty for these patients was hoarseness secondary to unilateral vocal fold paralysis of more than 6 months duration, and documented by flexible fiberoptic laryngoscopy. The outcomes were described with comparison of pre- and post-operative subjective voice assessment.

Results: Operative time was 15–30 minutes. Postoperative subjective improvement of voice quality was evident. Scars were minimal and aesthetically acceptable. The procedure could be done on an outpatient basis.

Conclusion: Medialization thyroplasty via a pocket and silicone implant technique is initially effective and may be a worthwhile alternative to the usual window technique.

Keywords: *unilateral vocal cord paralysis; medialization thyroplasty; Isshiki thyroplasty; silicone implant*

It is generally accepted that "laryngeal framework surgery is the current gold standard treatment for unilateral vocal fold paralysis. It provides a permanent solution to glottic insufficiency caused by injury to the recurrent laryngeal nerve."[1]

A common technique of medialization thyroplasty involves the creation of a window on the thyroid lamina, the superior aspect of which is at the vocal fold level, incising and removing the outer perichondrium and cartilage window, dissecting the inner perichondrium off the surrounding cartilage, and placing a prosthesis in the most effective position to push the paralyzed vocal fold medially. This carries a risk for perforation of the endolaryngeal mucosa, wound infection, chondritis, implant migration or extrusion, and airway obstruction.

With written informed consent, we performed a technique that did away with this window, instead utilizing a pocket created at the same level, with insertion of a modified silicone nasal implant of appropriate size under direct visualization of VC medialization using a flexible nasolaryngoscope. We report our preliminary experience.

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METHODS

Surgical Technique

After an acceptable period of observation that has deemed the vocal cord paralysis to be permanent (usually around 6 months to 1 year), medialization thyroplasty may be recommended for a patient with unilateral vocal cord paralysis.

Documentation of vocal cord paralysis via videolaryngostroboscopy is done. Voice quality is also assessed preoperatively for comparison during the postoperative period.

The procedure starts after general anesthesia has been induced using a laryngeal mask airway (LMA) to will enable unobstructed visualization of the vocal folds as needed.

The level of the vocal fold is determined by palpating the thyroid notch and inferior border of the thyroid ala anteriorly. Surgical markings are placed and 2% lidocaine HCl with epinephrine (1:100,000) is infiltrated at the incision site. *(Figure 1)* A three cm incision is made over the area of the inferior thyroid ala on the side of the paralyzed cord. Blunt and sharp dissection with mosquito forceps is performed until the inferior border of the thyroid cartilage is reached. *(Figure 2)*

A pocket is created by incising perichondrium at the inferior border of the thyroid cartilage with a blade No. 15 and freeing the inferior surface of the thyroid cartilage from the perichondrium using a Freer elevator. *(Figure 3)*

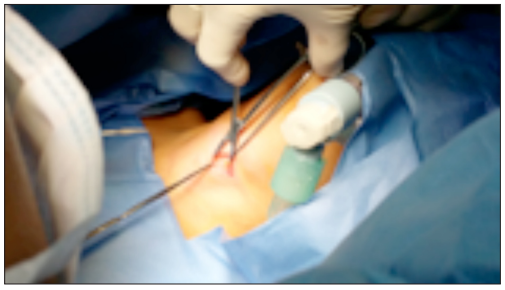
A flexible fiberoptic laryngoscope is inserted transnasally at this point and the laryngeal inlet viewed while creating the pocket taking care not to puncture the perichondrium. *(Figure 4)*

The silicone nasal implant is prepared by measuring the blunted dorsal part and trimming it to fit the pocket created. *(Figure 5)*

Under endoscopic visualization, the silicone implant is inserted in the pocket and pushed in until the posterior glottis is apposed with slight over-correction to account for deterioration in voice quality after intraoperative edema has resolved. *(Figure 6)*

The pocket is closed by suturing the perichondrium to the cartilage using silk 5-0 sutures. The incision is closed in layers using polyglactin 910 (Vicryl 4-0, Ethicon, Johnson & Johnson, NJ, USA) sutures for the muscle and silk 5-0 sutures for the skin. *(Figure 7)* The procedure usually lasts for 15-30 minutes.

Figure 1. Marking on the ipsilateral inferior thyroid ala and infiltration with 2% Lidocaine HCl + epinephrine (1:100,000)



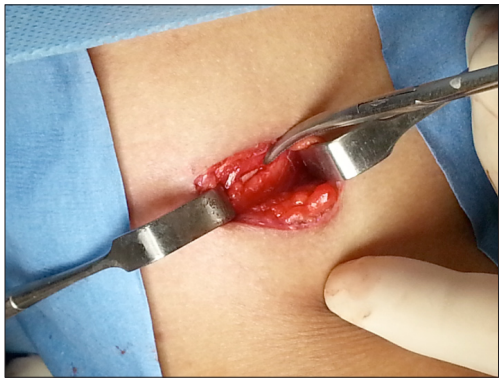


Figure 2. Blunt and sharp dissection until inferior border of ipsilateral thyroid cartilage is reached

RESULTS

Case 1

An 18-year-old man diagnosed with left congenital vocal cord paralysis presented to the clinic with hoarseness since birth and shortness of breath upon exertion. On laryngoscopic examination, the left vocal cord was noted to be immobile. He underwent medialization thyroplasty under general anesthesia after cardiopulmonary clearance. Operative time was 22 minutes. The postoperative course was unremarkable and he was discharged on the same day. He had improved voice quality and less episodes of shortness of breath on the first month of follow-up.

Case 2

A 62-year-old man was referred to our service from Internal Medicine with 3 years of progressive hoarseness. Flexible fiberoptic laryngoscopy showed a paralyzed vocal cord on the left. Since there was no history of previous surgery to the neck, a CT scan was ordered, revealing an aortic aneurysm. He underwent medialization thyroplasty under sedation after cardiopulmonary clearance. Operative time was 18 minutes. His voice quality improved postoperatively.

Case 3

A 49-year-old woman was referred to our service after she had hoarseness following a total thyroidectomy. Flexible fiberoptic laryngoscopy showed a paralyzed left vocal fold. She was advised to undergo medialization thyroplasty on the first year anniversary of her thyroid surgery if symptoms did not improve. She underwent the procedure one year later. Operative time was 30 minutes with satisfactory results.

Case 4

A 69-year-old man who had also undergone total thyroidectomy for papillary thyroid carcinoma had hoarseness post operatively. Flexible fiberoptic laryngoscopy showed a paralyzed left vocal fold. He was advised to undergo medialization thyroplasty after 1 year if his voice did not return to normal. He underwent the procedure at the prescribed time. Operative time was 28 minutes. He was satisfied with his voice post operatively.

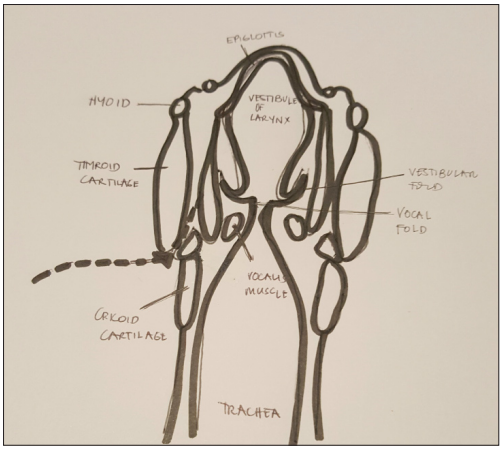
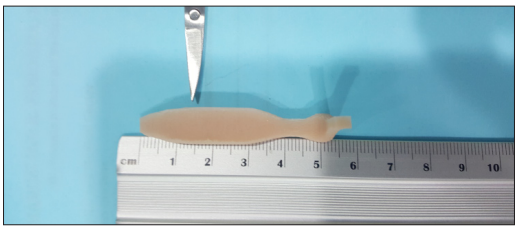


Figure 3. Broken Arrow and line show pocket created where modified silicone implant is to be placed

Figure 4. Creation of pocket under endoscope guidance



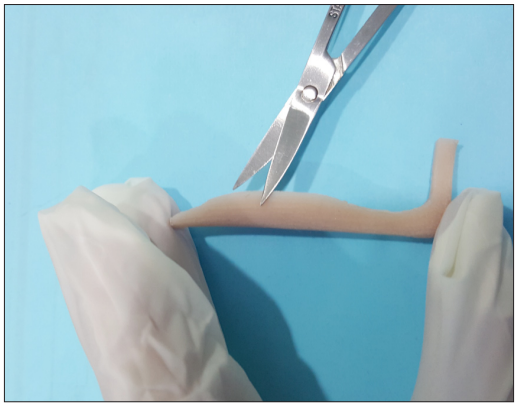
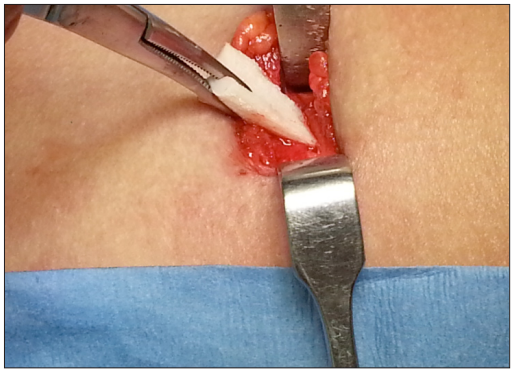


Figure 5. Nasal implant modified, dorsal part measured, tip discarded



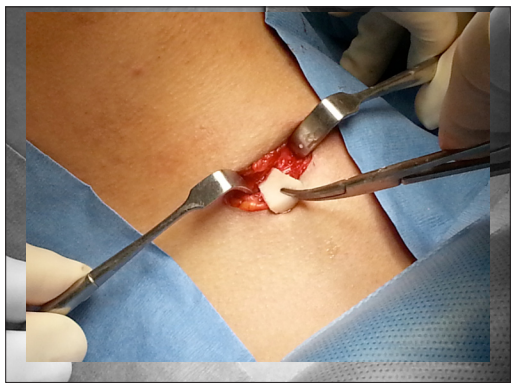


Figure 6. Placement of implant into created pocket under endoscope guidance

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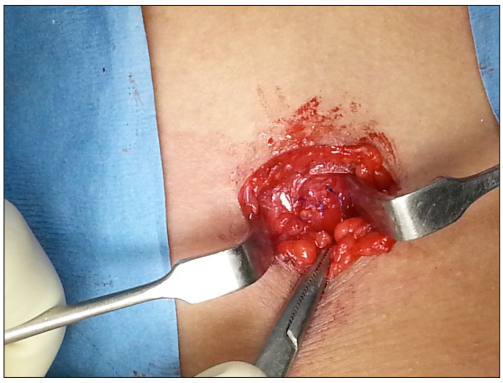

Figure 7. Closure by suturing the perichondrium to the cartilage using silk 5-O. Incision is closed in layers, using vicryl 4-0 reinforced with histoacryl glue for the muscle and silk 5-0 for the skin.

DISCUSSION

The important functions of the human larynx are protection of the lower airways, phonation and respiration. Unilateral vocal cord paralysis is one of the most common neurogenic disorders affecting the larynx and can be a complication of thyroid surgery when there is damage to the recurrent laryngeal nerve.[2] It can also be caused by any lesion affecting or impinging on the path of the nerve. When this happens, it can be distressing to the patient. Aside from dysphonia, aspiration episodes and shortness of breath with exertion can ensue.

Unilateral laryngeal paralyses can evolve in 3 ways through spontaneous recovery of mobility with no recovery but with compensation by the contralateral vocal cord or with no recovery or compensation and flaccid paralysis.[2] The probability of recovery depends greatly on the etiology, there is a good prognosis for recurrent idiopathic paralysis or when the cause is surgical injury.[3]

Several techniques have been advocated to achieve medialization of the paralyzed vocal folds. Isshiki and associates and Koufman[4] have reported their experiences with medialization and tensioning procedures for the management of vocal fold bowing and dysphonia resulting from sulcus vocalis and soft tissue deficits Fahkry, Flint, and associates[4] prefer injection laryngoplasty via a lateral, percutaneous approach through the thyroid ala at the level of vocal fold determined by palpation of the thyroid notch and inferior border of the thyroid ala anteriorly. Transoral injection and laryngoscopic injection have also been mentioned for specific groups of patients.

Medialization thyroplasty is the procedure of choice for management of unilateral vocal cord paralysis.[1] Carved Silastic® implants, prefabricated Silastic® implants, and dense hydroxyapatite implants, as well as Gore-Tex® strips have also been used with success.[5] This procedure makes static changes to the laryngeal framework and its lack of effect on vocal fold muscle mass, innervation, and vocal fold motility is its inherent limitation.[4] Other disadvantages include subjecting the patient to an open procedure, limited closure of the posterior glottis, and technical difficulty.[4] Factors affecting outcome include size and shape of the implant position of the implant, maintaining proper position of the implant, and limiting the duration of the surgical procedure.[4]

A study by Chrobok, *et al.* evaluating the use of customized silicone implant in medialization thyroplasty concluded that successful and safe medialization thyroplasty using a silicone implant is possible based on improvement of maximum vocal sound pressure level, phonation time, and jitter and shimmer reduction.[6] A review of MEDLINE (PubMed), EMBASE and HERDIN using the keywords "*unilateral vocal cord paralysis; medialization thyroplasty; Isshiki thyroplasty; silicone implant*" did not reveal a technique similar to our pocket and silicone implant method.

In this series, all our patients presented with hoarseness of more than 6 months duration with documented unilateral vocal fold paralysis. They underwent the medialization technique described with positive results. The technique we propose is a cross between the traditional open method and injection laryngoplasty. The incision and extent of surgery is such that exposure of a larger area is not necessary. Endoscopic guidance also ensures that we are in the right position. The short operative time and comparatively less-invasive nature of this technique makes it worth considering. The authors suggest further studies with more subjects and a more objective way of assessing voice quality pre- and post- operatively, as well as long-term follow up of these patients.

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