

## ORIGINAL ARTICLE

# Complications of Medialization Laryngoplasty (Thyroplasty Type-I)

<sup>1</sup>Kartha S, <sup>2</sup>Young K, <sup>3</sup>Mohan S

<sup>1</sup>Clinical Teaching Fellow in ENT, Specialist Voice Unit, Department of Head and Neck  
Royal Derby Hospitals (Teaching), Derby, United Kingdom

<sup>2</sup>Specialist Speech and Language Therapist in Voice/Head and Neck, Specialist Voice Unit, Department of Head and Neck  
Royal Derby Hospitals (Teaching), Derby, United Kingdom

<sup>3</sup>ENT Surgeon and Laryngologist, Specialist Voice Unit, Department of Head and Neck  
Royal Derby Hospitals (Teaching), Derby, United Kingdom

**Correspondence:** Sharat Mohan, Department of Head and Neck, Kings Treatment Center, Royal Derby Hospital, Uttoxeter Road, Derby DE223NE, United Kingdom, e-mail: sharat.mohan@derbyhospitals.nhs.uk

## ABSTRACT

**Objective:** Medialization laryngoplasty (formally type 1 thyroplasty) is an accepted treatment for unilateral vocal fold paralysis or paresis. The objective of this paper is to ascertain the complications following medialization laryngoplasty in patients with particular reference to implant extrusion.

**Study design:** The records of 85 patients who underwent medialization laryngoplasty were retrospectively reviewed from January 2001 to July 2009.

**Results:** There were 3 implant extrusions noted only in female patients with cartilage removal technique.

**Conclusions:** Implant extrusion rate following medialization laryngoplasty in our institution is comparable to published literature.

**Keywords:** Medialization laryngoplasty, Thyroplasty type I, Implant extrusion, Unilateral vocal fold paralysis.

## INTRODUCTION

Unilateral paralysis of the vocal folds results from damage/dysfunction of the recurrent laryngeal or the vagus nerve. Etiology includes damage to the nerve by primary or metastatic disease and iatrogenic trauma during surgery. Idiopathic vocal fold paralysis occurs when there is no discernible cause. It is often attributed to viral or inflammatory etiology.<sup>1</sup>

Patients with unilateral vocal fold paralysis commonly present with hoarseness, breathiness and short phrase length. Other complaints include dysphagia, aspiration and impaired respiratory functions. Several techniques exist for medialization of the paralyzed vocal fold. They include injection of Bioplastique, gel foam, autologous fat and thyroplasty with or without arytenoid adduction. Ishiki<sup>2</sup> was the first to describe and popularize medialization laryngoplasty. Since then several modifications have been described, in particular Neterville et al.<sup>3</sup>

Our department has been carrying out medialization laryngoplasty since 1998. The patients who underwent medialization laryngoplasty between 1998 and 2001 were not included in this study due to lack of data with regards to etiology, sex, age, etc. but we report that none of these patients had implant extrusions. In this paper we have primarily looked at the implant extrusion rate following medialization laryngoplasty, in patients operated from January 2001 to July 2009. We also describe other complications and their management noted in our experience.

## Methodology

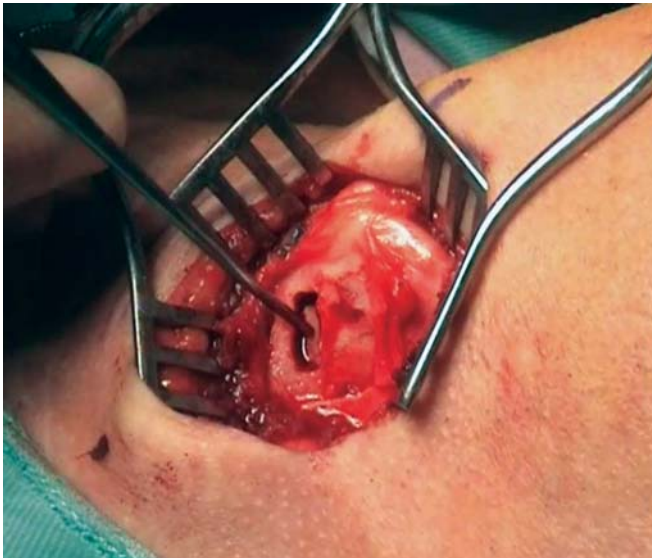
Case records of 85 patients who underwent type I medialization thyroplasty, by a single surgeon (3rd author) in the Voice Unit of the Royal Derby Hospitals were retrospectively reviewed from January 2001 to July 2009. Patient demographics, etiology of the vocal fold paralysis and complications, in particular the implant extrusion were analyzed.

## Operative Technique

Most procedures were performed under local anesthesia. Children and a small number of patients who were anxious or who had lumbosacral spinal and musculoskeletal pathology, which precluded them from lying supine for the duration of the operation, underwent general anesthesia.

A horizontal incision is placed over the lower half of the ipsilateral thyroid cartilage and the cartilage is exposed after retracting or dividing the strap muscles. A superiorly-based outer perichondrial flap is elevated. The cartilage window is fashioned in the ala of the thyroid cartilage, approximately 8 mm posterior to the anterior commissure level and at least 3 mm superior to the inferior border of the thyroid cartilage. This provides a sufficient strut of cartilage support for the implant. The correct placement of the thyroid cartilage window is aided by fiberoptic flexible laryngoscopy, intraoperatively.

Since 2004 the cartilage window is being preserved (Fig. 1), prior to this the cartilage window was removed. An appropriately sized implant is designed from a silastic block in



**Fig. 1:** Thyroplasty window with cartilage preserved shown with tip of suction cannula

such a way that the point of maximal medialization is at the level of vocal process with minimal medialization occurring at the anterior commissure. The implant is placed in the cartilage window and inserted into the window as a snug fit. The patient is then asked to phonate and the voice is assessed. If results are not satisfactory, then the implant is removed, refashioned and replaced. Care is taken to minimize trauma and reduce the time of undermining of the inner perichondrium and implant placement. This reduces the vocal interference due to intra-operative edema. In some cases it was necessary to thin the cartilage window with an otological burr before insertion of the implant.

The wound is then closed in layers and indwelling drain is secured in place. All patients receive intraoperative steroids (dexamethasone; 16 mg) and a broad spectrum antibiotic. Patients stay in the hospital overnight. The drain is removed the next day. Patients are advised 48 hours of total voice rest and receive broad spectrum antibiotics for 1 week post-operatively.

**Follow-up**

Patients receive a phone call from the speech and language pathologist one week postoperatively. Patients are seen in the voice clinic 3 weeks postoperatively and outcomes are assessed (video stroboscopy, maximum phonation time (MPT), and voice sample recording). They are subsequently seen at 3, 6, 12, 18 and 24 months, and then discharged. After this period patients are only seen if required, on patients’ request.

**RESULTS**

A total of 85 patients underwent medialization laryngoplasty from January 2001 to July 2009. All patients underwent medialization of paralyzed vocal fold using silastic implant. The mean age was 51 years (15-87). There were 54 males (63%) and 31 females (37%) in this study group (Table 1). The most

Gender	Total number
Males	54
Females	31
Total	85
Age (in years)	
Range	15-87
Mean	51

Etiology	Total number
<b>Postsurgical trauma</b>	
Total thyroidectomy (for thyroid cancers)	9
Thyroidectomy (for benign thyroid pathology)	3
Cardiac surgery	2
Cervical spinal surgery (anterior approach)	1
Pneumonectomy	1
Lung transplant	1
Neck dissection	1
Excision of paraganglioma (neck)	1
Carcinoma lung	21
Metastatic breast carcinoma	2
Multiple myeloma	1
Non-Hodgkin’s lymphoma	1
Mediastinoscopy and biopsy	1
Traumatic (Blunt/endotracheal intubation/tracheostomy)	3
Cerebrovascular accident (CVA)	5
Congenital	1
Idiopathic (postviral)	18
Unknown causes	9

common causes included vocal fold paralysis secondary to lung malignancies, idiopathic (postviral), postsurgical nerve damage following thyroid cancer surgery, cardiac surgery, anterior approach cervical spinal fixation surgery, pneumonectomy, neck dissection and paraganglioma excision. Five patients had paralysis as a result of cerebrovascular accident (CVA). Three patients had traumatic recurrent laryngeal nerve injury resulting from fall, endotracheal intubation, and following a difficult tracheostomy. Other causes included multiple myeloma, non Hodgkin’s lymphoma and congenital palsy of the vocal fold. In 9 cases the cause was not known (Table 2).

As described above most patients had medialization laryngoplasty under local anesthetic with controlled sedation (target controlled anesthesia–TCA) facilitating monitoring of the voice outcome intraoperatively. All patients prior to 2004 had removal of the thyroid cartilage window. Since 2004 cartilage window preservation technique had been adapted, except in some male patients with increased thickness of the thyroid cartilage and inner perichondrium.

All our patients had postoperative voice outcomes assessed in the voice clinic at regular intervals for 2 years and then discharged from care.

## Complications

There were 3 cases of implant extrusion—3.5%. Patient 1 had coughing bouts and coughed up her implant 2 months postoperatively. She subsequently underwent autologous fat augmentation. Patient 2 presented with throat discomfort 9 months postoperatively and implant was found partly extruding into the anterior commissure. The implant was removed by an external approach. This patient chose not to have any further procedures. Patient 3 had a chest infection with coughing bouts which resulted in implant extrusion into her left anterior glottis 4 months postoperatively. This was removed endoscopically (Fig. 2). She subsequently had Bioplastique vocal fold augmentation. All three cases were prior to 2004 when cartilage window was removed. All three patients who had implant extrusions were female. A plausible explanation could be thin laryngeal inner perichondrium commonly noted in females. Since cartilage preservation technique has been introduced in 2004, we have not had any implant extrusions. The other reasons postulated for implant extrusion include damage to the laryngeal ventricle, subsequent infection and extrusion, and rarely by erosion subglottically through the conus elasticus.<sup>3,9</sup> There have also been cases of implant migration, secondary to intubation trauma reported in the literature.

Two patients had postoperative wound infection and were successfully treated with antibiotics. One patient had airway compromise, was intubated and nursed in the ITU. The patient underwent tracheostomy on the same day and, was treated with intravenous steroids and made a complete recovery. The tracheostomy was successfully decannulated within 48 hours. This patient had a traumatic intubation which led to postoperative vocal fold edema and airway compromise. In this case, voice outcome and patient satisfaction was excellent (Table 3).

The complication rates observed in our study, particularly the implant extrusions and airway compromise compares very favorably with studies described in the literature (Table 4). Abraham et al<sup>4</sup> had an implant extrusion rate of 1.5% and airway compromise in 3.5% patients in their series of 194 patients. They included both groups of patients who had medialization

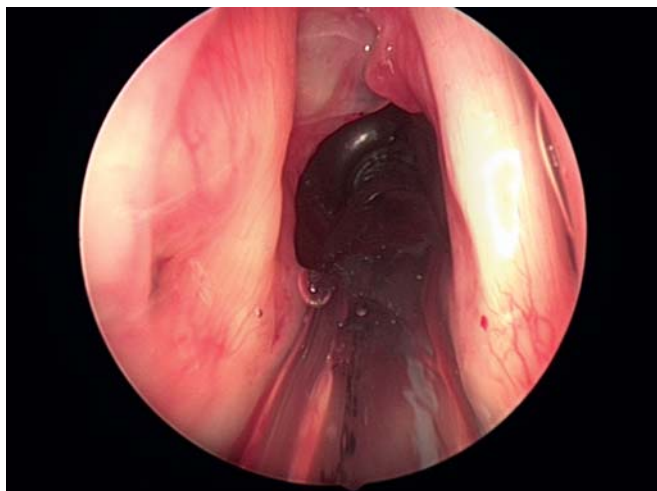


Fig. 2: Intralaryngeal implant extrusion

Table 3: Complications of thyroplasty

Complication	Total no.	Percentage
Implant extrusion	3	3.5
Wound infection	2	2.3
Airway compromise	1	1.1

Table 4: Comparison with other studies

Author	No. of cases	Implant extrusion	Wound infection	Airway compromise
Mohan et al (our series)	85	3.5%	2.3%	1.1%
Koufman et al <sup>6</sup> (1991)	56	3.3%	18.3%	3.3%
Tucker et al <sup>5</sup> (1993)	60	6.6%	10.0%	10.0%
Netterville et al <sup>3</sup> (1993)	141	0.0%	1.7%	3.5%
Cotter et al <sup>5</sup> (1995)	58	8.6%	0.0%	0.0%
Gorham et al <sup>8</sup> (1998)	50	6.0%	4.0%	0.0%
Woo <sup>9</sup> (2000)	53	1.9%	4.0%	1.0%
Abraham et al <sup>4</sup> (2001)	194	1.5%	4.6%	3.6%

alone and patients who had arytenoid adduction as an additional procedure. The second group were found to have more airway complications. Netterville et al described 116 medialization procedures but had no implant extrusion in their series.<sup>3</sup>

## CONCLUSION

Silastic medialization laryngoplasty is a safe and effective procedure for unilateral vocal fold palsy or paralysis, vocal fold bowing and issues with swallowing and aspiration. Appropriate technique, adequate perioperative care and understanding of the common problems faced, primarily airway compromise and implant extrusion, leads to successful outcome and mitigates significant comorbidities in this group of patients. In our current practice we routinely preserve the cartilage window and we have not observed any further implant extrusions.

## REFERENCES

- Samant S, Mohan S, Young K. Unilateral Vocal Cord Paralysis and its management. Evaluation of Results of type I Thyroplasty. Calicut Medical Journal 2005;3(4);e2.
- Ishiki N, Morita H, Okamura H, Hiramoto M. Thyroplasty as a new phonosurgical technique. Acta Otolaryngol (Stockh) 1974;78:451-57.
- Netterville JL, Stone RE, Luken ES, Civantos FS, Ossoff RH. Sialastic medialisation and arytenoid adduction: The Vanderbilt experience. Ann Otol Rhinol Laryngol (Stockh) 1993;413-24.
- Abraham MT, Gonen M, Kraus DH. Complications of Type I Thyroplasty and Arytenoid Adduction. Laryngoscope, 2001;111:1322-29.
- Tucker HM, Wanamaker J, Martin T, Douglas H. Complications of laryngeal framework surgery (phonosurgery). Laryngoscope, 1993;103:525-28.
- Koufman JA, Isaacson G. Laryngoplastic Phonosurgery. Otolaryngol Clin North Am 1991;24:1151-77.
- Cotter CS, Avidano MA, Crary MA, Cassini NJ, Gorham MM. Laryngeal Complications after Type I Thyroplasty. Otolaryngol Head Neck Surg 1995;113:671-73.
- Gorham MM, Avidano MA, Crary MA, Cotter CS, Cassisi NJ. Laryngeal Recovery following Type I Thyroplasty. Arch Otolaryngol Head Neck Surg 1998;124:739-42.
- Woo P. Arytenoid Adduction and Medialization Laryngoplasty. Otolaryngol Clin North Am 2000;33(4):817-39.