

Laryngotracheoplasty with T-tube Stenting by Modification of Shiann Yann Lee's Technique

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ABSTRACT

Background: Laryngotracheal stenosis is a challenging problem in laryngology which is often misdiagnosed and improperly treated. It is also on the rise due to increase in the number of accidental trauma, prolonged intubations or tracheostomy. Laryngotracheoplasty by Shiann Yann Lee's technique with T-tube stenting is a common accepted surgical procedure these days.

Materials and methods: Ours is a retrospective study of 14 cases of laryngotracheal stenosis over a period of 20 years from 1993 to 2014, who underwent laryngotracheoplasty with T-tube stenting by a modification of Shiann Yann Lee's technique.

Results: In our study of 14 patients, the incidence of laryngotracheal stenosis was found to be maximum in the age group of 21 to 30 years with a male preponderance. The commonest etiological factor was prolonged endotracheal intubation or cuffed tracheostomy. The commonest site of the stenosis in our study was cervical trachea. The average time for removal of T-tube was 18 months. All the 14 patients had an uneventful period between insertion and removal of T-tube without any complications. The success rate of our study was hence 100%.

Conclusion: Laryngotracheoplasty with T-tube stenting by our modification of Shiann Yann Lee's technique is an effective and successful method in the management of laryngotracheal stenosis with a success rate of 100%.

Keywords: Laryngotracheoplasty, T-tube, Laryngotracheal stenosis.

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INTRODUCTION

Laryngotracheal stenosis has become a common problem in laryngology which is often misdiagnosed and

improperly managed. It is also a challenging problem in laryngology as proper treatment is not available at all centers across the country. The etiology of acquired stenosis of larynx and trachea is due to accidental trauma, prolonged intubations or tracheostomy.¹ This can be attributed to the increased number of vehicles on the road and increasing use of mechanical ventilation in the intensive care unit, with or without tracheostomy.²

The traditional treatment for laryngotracheal stenosis has been laryngofissure and laryngotracheal reconstruction.³ Although, there are several treatment modalities described, no standard approach to laryngotracheal stenosis currently exists. Endoscopic dilatations or removal of granulations provide only temporary relief and not a permanent cure. Open surgical techniques like laryngotracheal reconstruction with stent, resection of stenotic segment with end to end anastomosis provide a better option than conservative ones.⁴ Choice of procedure depends upon age of patient, site of stenosis, nature of stenosis, etiology and general condition of patient.

Laryngotracheoplasty by Shiann Yann Lee's technique with T-tube stenting which includes creation of tracheal trough by splitting anterior wall of trachea, lateralization of tracheal wall followed by insertion of T-tube in tracheal trough which is covered by skin anteriorly, is effective and simpler and has less morbidity and higher success rate of decannulation. Our technique is a modification of Shiann Yann Lee's technique with a higher rate of success than the original technique devised by Siann Yann Lee.

MATERIALS AND METHODS

Ours is a retrospective study of 14 cases of laryngotracheal stenosis over a period of 20 years from 1993 to 2014, managed at Lakeside Hospital and Sapthagiri Institute of Medical Sciences, Bengaluru. All the 14 patients had laryngotracheal stenosis of varying etiology.

The criteria for selection of cases for Montgomery's T-tube insertion were as follows:

1. Patients with glottic, subglottic, cervical or thoracic tracheal stenosis (acquired stenosis).
2. Patients with good laryngeal function and pulmonary reserve.
3. Patient medically fit for general anesthesia.

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OPERATIVE TECHNIQUE

We are presenting our modification of Shiann Yann Lee's technique for laryngotracheoplasty. The procedure was done under general anesthesia through the tracheostomy tube. Rigid tracheoscopy was done initially to confirm the level of stenosis.

Midline vertical incision was taken from the level of upper border of cricoid cartilage to the superior border of stoma inferiorly. Subcutaneous tissues and strap muscles were divided in the midline (Fig. 1). Thyroid isthmus was separated from the trachea and retracted laterally. Anterior wall of trachea was exposed and incision was taken from upper border of tracheal stoma to cricoid cartilage. In case of subglottic stenosis, cricoid cartilage was divided and stenotic segment exposed. Accurate measurements of the stenotic area was taken. The granulations in the lumen of the stenotic area were removed and fibrous tissues released. The T-tube was cut to exact length, sharp edges were rounded, tracheostomy tube was removed, and the silastic T-tube was inserted in the stenosed segment with distal limb 1 cm above the carina and proximal limb just below the glottis (Fig. 2). Foley's catheter no. 14 was negotiated through the

proximal end of T-tube and balloon inflated to get an air tight seal for inhalational anesthesia.

In the original technique by Shiann Yann Lee, mucosa of the trachea was sutured to the subcutaneous tissues. But, because of the stenosis, the mucosal element is less and the grip of the stitch to the mucosa is weak. In our technique, we suture the mucosa, submucosa, tracheal wall and peritracheal fascia to the subcutaneous tissue of the skin flap. Skin is brought to the front, and the wound is closed in layers (Fig. 3).

RESULTS

The age and sex distribution of patients are shown in Figure 4.

There were nine males and five females in our study. Two male patients were in the 11 to 20 age group, six males and four females in the 21 to 30 age group and one each in the 31 to 40 age group.

The sites of stenosis of the patients were as follows: eight patients had cervical tracheal stenosis and the remaining six patients had stenosis at more than one site as in Figure 5.

The indications for endotracheal intubation/tracheostomy are shown in Figure 6.



Fig. 1: Vertical incision and dissection of soft tissues to expose the trachea

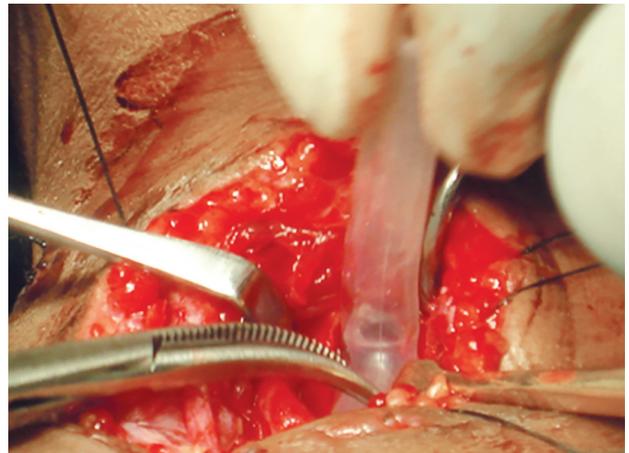


Fig. 2: Insertion of T-tube into the tracheal opening



Fig. 3: Postoperative patient with the T-tube *in situ*

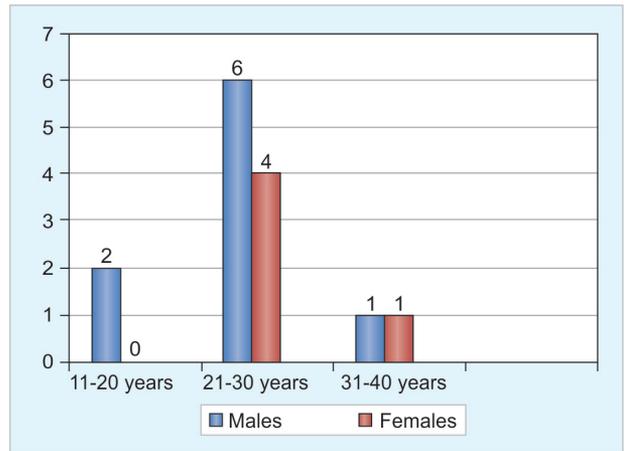


Fig. 4: Age and sex distribution

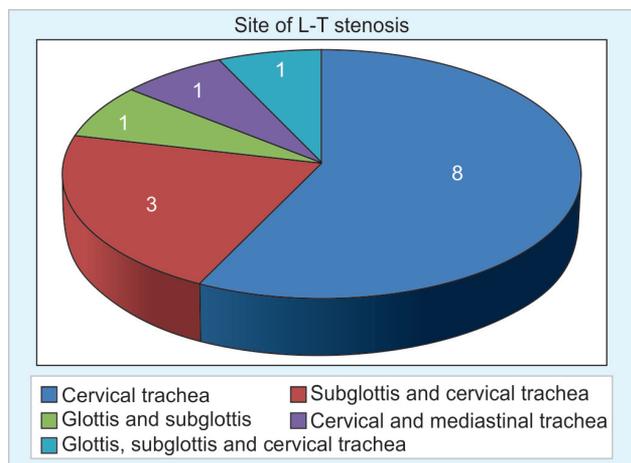


Fig. 5: Sites of stenosis

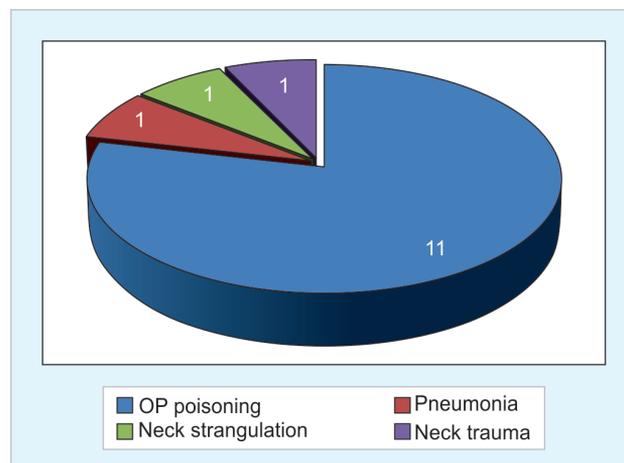


Fig. 6: The indications for endotracheal intubation/tracheostomy

In our study of 14 patients, the incidence of L-T stenosis was found to be maximum in the age group of 21 to 30 years with a male preponderance of 64.3% (Fig. 4). The common etiological factor was prolonged endotracheal intubation or cuffed tracheostomy. Of the 14 patients, 11 (78.5%) were intubated for organophosphorous poisoning, one for pneumonia, neck strangulation and penetrating neck trauma each.

Based on the site of stenosis commonest in our study was cervical trachea (57%) followed by subglottis with cervical trachea (21.4%). The T-tube was kept *in situ* for an average period of 18 months. The follow-up time of the patients ranged from 1 to 20 years post decannulation. All the patients had good results postoperatively.

All the 14 patients had an uneventful period between insertion and removal of T-tube without any complication. The success rate of our study was hence 100%.

DISCUSSION

The T-tube stenting is the preferred method in treatment of acquired laryngotracheal stenosis when surgical reconstruction cannot be accomplished.

The advantages of T-tube are: preservation of speech, better tolerance and maintenance of nasal respiration with humidifies lower airway, the tube is socially acceptable and is easy for daily care. Shiann Yann Lee technique converts the trachea into an open trough, anterior tracheal wall being formed by skin, thus reducing the chances of restenosis.

Our technique of suturing the mucosa, submucosa, tracheal wall with peritracheal fascia to the subcutaneous tissue of the skin flap provides more grip and prevents any chances of restenosis. The success rate of T-tube insertion according to our study is 100%.

Cooper et al have reported placement of T-tube through the vocal cord in 10 of 12 patients with subglottic

stenosis.⁵ In our series of 14 patients, the tube was placed above the vocal cords in all the patients.

Dumon⁶ recommends the tube to be kept for 6 to 12 months. Martinez-Ballarín et al⁷ reports stenting for 18 months. In our study, the T-tube was kept for 18 months.

In a study of 30 cases by Kelkar et al⁸, the T-tube was placed by Shiann Yann Lee's open trough technique, the success rate was 89%. However, the success rate of our study is 100% till date after.

CONCLUSION

Laryngotracheoplasty with T-tube stenting by our modification of Shiann Yann Lee's technique is an effective and successful method in the management of laryngotracheal stenosis with a success rate of 100%.

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