

## CASE REPORT

# Revision in “Shiann Yann Lee” Technique: End of the Road?

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## ABSTRACT

In India, majority of patients of laryngotracheal stenosis come with a typical history of prolonged intubation, which in many is preceded by organophosphorus poisoning. Shiann Yaan Lee's technique of T-tube insertion is one of the many tested modalities to manage even complex cases of laryngotracheal stenosis. Though it may be successful in establishing a patent airway, it does not address the possibilities of future complications and their management options in our opinion.

We would like to share our experience regarding a case of life-threatening recurrent laryngotracheal stenosis following initial management by this technique, so that the readers can keep in mind the future prospects in case of recurrence of the stenosis, before attempting this technique in their patients.

Revision airway surgery following Shiann Yaan Lee's technique is rightly labeled as “end of the road” according to us.

**Keywords:** Airway, Stridor, Subglottic stenosis.

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## INTRODUCTION

Laryngotracheal stenosis is one of the preventable airway pathologies. In the past, majority of these cases were following trauma; however, in recent times, this has changed. Now, majority of the cases we come across are related to prolonged intubation, mostly due to organophosphorus poisoning.

Management depends on the age of patient, site, and nature of stenosis, etiology, and general condition of

patient. Endoscopic dilatations or granulation removal is preferable in selected early cases and do not offer a permanent cure in most of the delayed ones. Open surgical techniques like resection of stenotic segment with end-to-end anastomosis or laryngotracheal reconstruction with a stent provide a better option than conservative ones.

In our hospital, majority of these cases are managed by the Shiann Yann Lee's technique. Laryngotracheal reconstruction by this technique with T-tube stenting includes creation of a tracheal trough by splitting the anterior wall of trachea and lateralization of tracheal wall followed by insertion of T-tube in the trough which is then covered by skin anteriorly.

Though this technique has given good results, we have experienced complications associated with it too. One of these in particular is described in detail in this article.

## CASE REPORT

A 48-year-old male patient presented to our tertiary care center with complaints of respiratory difficulty.

- Following organophosphorus poisoning, patient was kept intubated for 15 days at a hospital in his native place in September 2009.
- An elective tracheostomy was done with an 8.5 number portex cuffed tracheostomy tube, following which the patient stabilized gradually and was decannulated after 10 days of the tracheostomy and discharged.
- He again developed respiratory distress and presented to our center with stridor in January 2010. Patient was subsequently diagnosed with subglottic stenosis and a T-tube insertion was done by Shiann Yaan Lee's technique.
- Patient was comfortable with the T-tube for a year until decannulation was attempted in March 2011, which he could not tolerate. Airway assessment showed visible granulation tissue at the lower end of the T-tube, which was treated with diode laser.
- T-tube was reinserted and patient was again comfortable for more than a year, after which he came to us and was decannulated in 2013.
- He was comfortable for a few months, but again developed difficulty in breathing which progressed over a period of 2 years to Frank stridor in 2015.

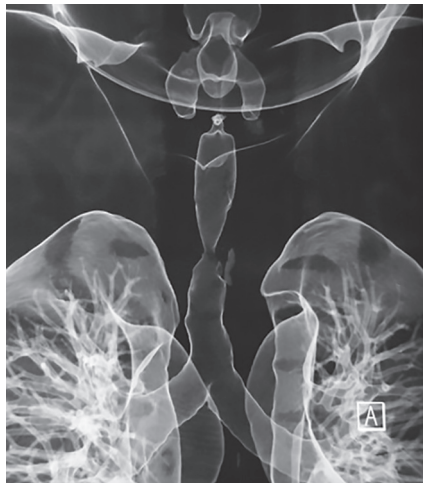
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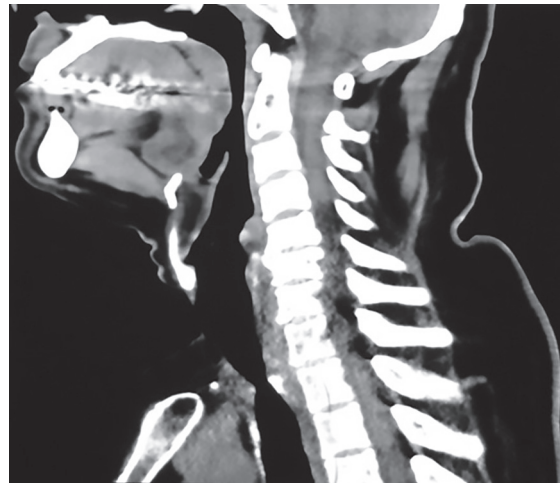
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**Fig. 1:** The CT neck with thorax coronal view (volume rendering) showing the retromanubrial stenosis



**Fig. 2:** The CT neck with upper thorax sagittal view showing the retromanubrial stenosis

- Patient was admitted after an informed high-risk consent, and an urgent computed tomography (CT) of the neck along with thorax was done to evaluate the airway.

The scan revealed high-grade tracheal stenosis at the level of thoracic vertebra D2, just behind the superior border of the manubrium sternum. The stenosis was 2.5 cm in length, 5.6 and 5.2 mm in anteroposterior and transverse dimensions respectively. This level of maximal stenosis was 6.6 cm above the carina. The great vessels were 8 mm anteroinferior to this tracheal stenosis. The airway above this stenosis had no cartilaginous rings in the anterior wall and was distorted due to previous surgeries. The trachea below the level of stenosis was normal but of a very short length (Figs 1 and 2).

Patient was stabilized temporarily with intravenous steroids and nebulization. Before a definitive plan of management could be formed, the patient deteriorated. He had to be kept on continuous positive airway pressure in order to buy time.

The cardiothoracic team was called in and an emergency tracheostomy through the retromanubrial stenosis was performed. A horizontal incision was made at the level of the sternal notch, and a mastoid retractor was applied. Dissection was done in the fatty tissue behind the manubrium meticulously remaining in the midline. Trachea could be identified in the lower part which was opened with a long scissor and the stenotic segment was cut open.

Suctioning was done; a lot of purulent secretion had collected below the stenosis over so many months, leading to features of pneumonia in the chest. Patient was allowed to breathe and the saturation was allowed to improve over a few minutes, following which a 7 number tracheostomy tube was inserted through the cut open stenotic segment. This was secured in place and patient was medically stabilized in the intensive care unit.

The patient was then discharged with a permanent tracheostomy tube, sitting at an unusually low position in the neck.

## DISCUSSION

In recent years, the awareness of laryngotracheal stenosis as a treatable condition has increased. Though prolonged intubation is a major cause, the other known causes of stenosis include airway trauma, inhalation burns, and irradiation. More rare causes are tracheal infections including bacterial tracheitis, tuberculosis, histoplasmosis, and diphtheria, and collagen vascular diseases including Wegener's granulomatosis, relapsing polychondritis, polyarteritis, and scleroderma.<sup>1</sup>

According to us, a protocol-based standardized management of these cases is essential. The dictum, "The right time for a tracheostomy is when you think of it," needs to be changed. When patients of stenosis come in stridor, an airway assessment with a zero-degree endoscope in the operating room is the essential first step. A planned tracheostomy preferably through the stenotic segment or just below it can be done if required in emergency.

Once the tracheostomy is performed, we recommend taking a tracheal swab for culture sensitivity (c/s) and starting antibiotic management according to it, until definitive surgery is performed. This is important for successful outcome of open surgical techniques.

Imaging by a CT virtual bronchoscopy helps in assessing the length of the stenosis, its site, the diameter, and also the rest of the lower airway. Radiological assessment of the lower airway is the only option when visualization is not possible by the endoscopes beyond the stenotic segment. However, it cannot assess the mucosal condition and the dynamic nature of the airway pathology like a real-time endoscopy. Once the assessment is complete

and the nature of the pathology is understood in detail, a definitive surgical procedure can be attempted.

As per the literature, single-staged laryngotracheal resection with primary end-to-end anastomosis has proved to offer the best option of cure, allowing definitive and stable high success rate. There are reports of good-to-excellent outcome in more than 90% of patients at long term with perioperative mortality under 1 to 2%.<sup>2</sup> Major surgical morbidity is generally limited, with restenosis rates ranging between 0 and 11%, anastomotic dehiscence rates of 0 to 5%, and reoperation rate of 0 to 6%.<sup>2</sup> Resection and end-to-end anastomosis is a challenging surgery; it has its own learning curve and requires training along with a tertiary set-up.

On the contrary, Montgomery T-tube insertion via the Shiann Yann Lee's technique is relatively a simpler surgical technique. Kelkar et al<sup>3</sup> have reported a success rate of 89% among the 30 cases of laryngotracheal stenosis treated by the Shiann Yann Lee technique. T-tube insertion is not only an easier surgical option but also has many advantages like preservation of speech, better tolerance, and maintenance of nasal respiration, which humidifies lower airway. The tube is socially acceptable and its daily care is easy. This technique is practiced in our institution for most of the cases of laryngotracheal stenosis, but after some experience, we recommend it only when surgical reconstruction cannot be accomplished and dilatation provides inadequate relief.

We have faced complications associated with T-tube in the form of restenosis at the level of the lower end of the tube, after decannulation. We would like to bring to light that resection of the stenosis and anastomosis is not an option after the Shiann Yann Lee's technique, due to severe fibrosis around the neo-trachea and a relatively inadequate trachea below the level of the stenosis.

In cases of recurrence following this technique, the anatomy of the airway is greatly distorted and finding the trachea for establishing airway in emergency is difficult at the hands of a new surgeon.

The only options for revision after Shiann Yann Lee technique, in cases of recurrence, are balloon or bougie

dilatations and open procedure in the form of the same technique again, at a lower segment.

## CONCLUSION

Prevention of laryngotracheal stenosis may be possible by:

- Early tracheostomy in cases of prolonged intubation—maximum 5 days intubation.
- Cuff pressure at: 15 to 25 mm Hg, inflated cuff only when needed.
- Use of lasers with extreme care—diode laser to be avoided in airway.
- Planned tracheostomy as far as possible, through the stenosis or just below it.
- Tracheostomy site swab for c/s.

Airway assessment must be done by experienced surgeon and anesthetist at tertiary center. Resection-anastomosis to remove scarred segment altogether may be the preferred technique. Close follow-up by the operating surgeons and management of granulations at stitch site as early as possible are advisable.

Though Shiann Yann Lee's technique is quick and easy, with reported good results, one must keep in mind the future aspect of closing all doors for the resection-anastomosis option, if required in cases of recurrence. In laryngotracheal stenosis, first attempt is the best chance.

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