Original Article

# Tracheal Reconstruction Surgery --- Our Experience

**Safika Zaman[1], Soumitra Ghosh[2], Amitabha Roychoudhury[3], Ushirin Bose[4]**

**Abstract :**

Airway surgery for tracheal stenosis is available in only a few hospitals in India. The Department of ENT Head Neck surgery at the Ramakrishna Mission Seva Pratishthan, Vivekananda Institute of Medical Sciences, has recently introduced these procedures. The authors discuss their initial experience.

**Introduction :**

Tracheal stenosis is a consequence of injury in the subglottic part of trachea. Tracheal stenosis can be either congenital or acquired. Acquired tracheal stenosis develops mostly due to accidental trauma or as a result of post-intubation trauma. Infections like tuberculosis may rarely lead to the development of tracheal stenosis.

Patients usually present with stridor, change of voice or gradual onset respiratory distress with a past history suggestive of insult to trachea. If we are suspecting tracheal stenosis in a patient, and the patient is in respiratory distress, the immediate management is to perform a tracheostomy to secure the airway, if the patient is relatively stable, and we are suspecting tracheal stenosis, performing an endoscopic examination of the upper respiratory tract under general anaesthesia provides valuable information.

Once tracheostomy is done the person becomes tracheostomy dependent for lifetime, with loss of speech and some swallowing issues. In a young patient, a tracheostomy compromises quality of life and livelihood; with loss of speech patients lose part of their identity. Functioning optimally at the workplace becomes almost impossible.

We investigate such patients by performing endoscopic examination of the trachea under general anaesthesia, and obtaining a high resolution CT scan of the thorax and larynx with 3 dimensional reconstruction to detect multilevel stenosis (Fig 1).

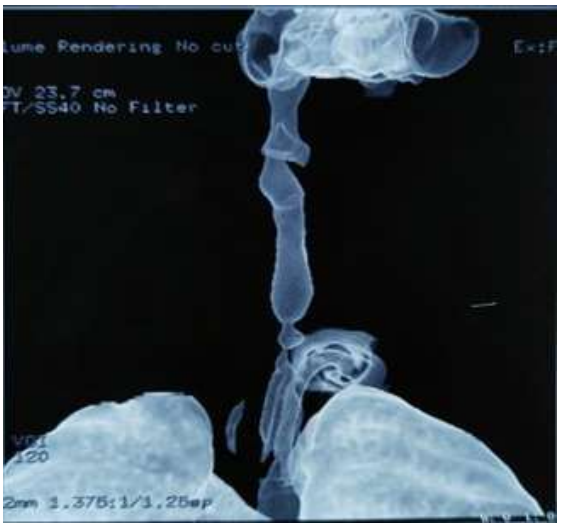


**Fig 1: CT Appearance of Multilevel Stenosis**

If the stenosis is either Grade 1 or Grade 2, endoscopy guided balloon dilatation or LASER excision of the lesion is the treatment of choice.

Once diagnosed with Grade 3 and in Grade 4 stenosis we need to shift to an open surgical approach, such as tracheal resection and anastomosis, or partial crico-tracheal resection anastomosis, depending on the level of stenosis.

[1]Senior Resident, [2]Associate Professor, [3]Professor, [4]Assistant Professor, Department of ENT Head Neck Surgery, RKMSP, VIMS

The Mayer Cotton grading system of stenosis is the most accepted staging system for quantification of the percentage of area obstructed (Fig 2)

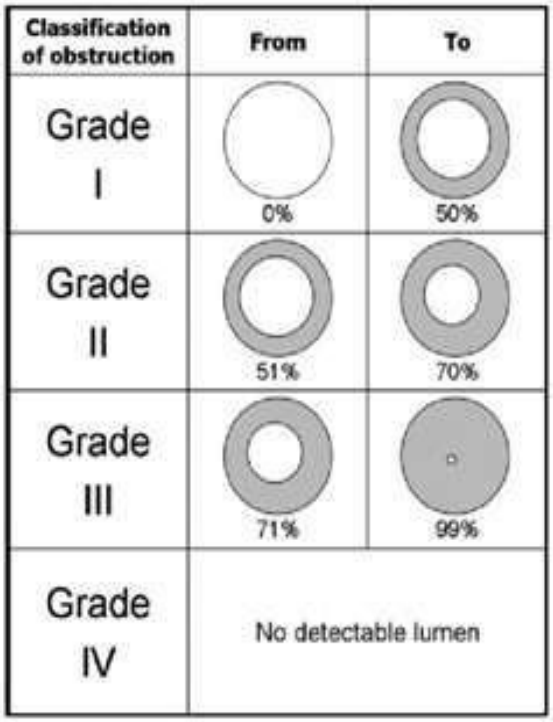


**Fig 2 : Mayer Cotton Grading**

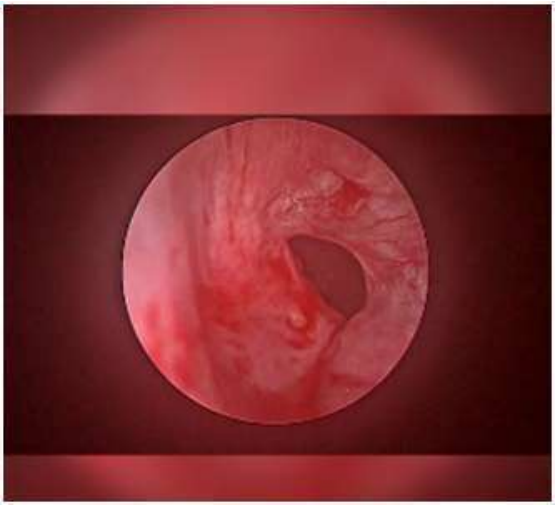

**Fig 3 : Grade 3 Stenosis**

The principle of the open surgical approach is to expose the stenosed segment(s) of trachea, release them from the surrounding muscle attachments, then excise the stenosed part. Once trachea is resected, and the larynx is free of muscular attachment, thyrohyoid membrane is partially resected, the larynx with trachea pulled down and the lower part of trachea pulled up. Upper and lower parts are then anastomosed with 1-0 prolene suture.

In our tertiary care hospital a total of 4 patients under went tracheal reconstruction surgery. A brief summary of the cases follows:

Case 1 - a 25 year old male patient developed subglottic stenosis secondary to intubation. The patient was living with tracheostomy for almost 18 months, before he came to our hospital. He underwent a staged procedure; the first surgery was a partial crico-tracheal resection anastomosis and the second procedure was closure of tracheostoma. The patient recovered without any complication.

Case 2 - a 28 year old male patient with poly-trauma followed by prolonged intubation developed multi-level subglottic stenosis. He underwent tracheostomy outside, and presented to us 2 months after this had been done. He first underwent balloon dilation and excision for the Grade 2 stenosis. He next underwent tracheal resection and anastomosis for the Grade 4 stenosis, with closure of tracheostoma in the same setting.

Case 3 - a 30 year old male patient who developed subglottic stenosis secondary to intubation, underwent tracheal resection and anastomosis and closure of tracheostoma in a single setting. On post operative day 3 the patient developed subcutaneous emphysema of the face, neck and arm, which gradually subsided.

Case 4 – an 18 year old male patient was involved in a road traffic accident and developed Grade 4 subglottic stenosis. Three months after the incident he underwent partial resection and anastomosis of trachea. Unfortunately, he developed wound dehiscence on the 4th post-operative day and died on the 11th post-operative day from sepsis and multi organ failure.

| Case | Age / Sex | Aetiology | Presentation | Procedure | Recovery |
|---|---|---|---|---|---|
| 1. | 25 years Male | Prolonged intubation | After 3 months with respiratory distress and voice change | 1. Crico- tracheal resection anastomosis<br>2. tracheostoma closure | Uneventful |
| 2. | 28 years Male | Poly trauma and prolonged intubation | After 2 months with severe respiratory distress | 1. Ballon dilation + endoscopic release of band + Local injection of triamcinolone | Uneventful |
| 3. | 30 years Male | Prolonged intubation with dengue fever | After 1 month with sudden respiratory distress | Tracheal resection and anastomosis with tracheostoma closure | Subcutaneous emphysema |
| 4. | 18 years Male | Poly trauma with prolonged intubation | Gradual onset respiratory distress over a period of 3 months | Tracheal resection and anastomosis with tracheostoma closure | Died on 12th post op day |

**Table 1 : Summary of Experience**

Post operative care of patients :

There is some specific post operative advice which needs to be followed in such cases apart from regular post surgical care. These are :

- Nasogastric tube feeding
- Maintaining head in flexed position for 8 to 10 days, to avoid any tension on the suture line due to head extension. This is commonly achieved by placing a non absorbable suture between submental skin and skin over the xiphisternum.
- Swallowing therapy

- Speech therapy
- Endoscopic evaluation of the tracheal lumen and suture site

Appropriate endoscopic assessment to evaluate the length and grade of stenosis is of great importance to plan the surgery and determine the final outcome (Fig 4). The whole approach is a team work consisting of ENT surgeon, anaesthesiologist, intensivists, speech and swallowing therapist and paramedical staff.

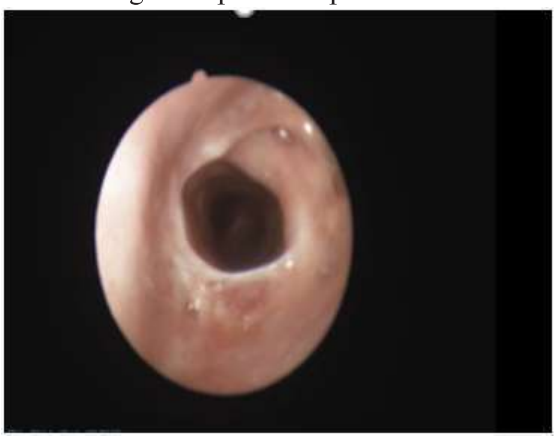

**Fig 4 : Endoscopic appearance of tracheal lumen after 3 months**

In India there are only a few dedicated hospitals which perform airway surgery, but the incidence of tracheal stenosis is increasing. Many patients were intubated due to the Covid pandemic, and also with better availability of care facility patients with poly trauma are surviving. The surgery is critical because it involves the airway; both anaesthesiologist and surgeon working in the same area, so at any stage of surgery things might get complicated from either side. Complications can be minor like emphysema or partial restenosis, but major complications like wound dehiscence or injury to great vessels of neck may cause death. Meticulous follow up, prompt detection of complications and timely intervention will ensure a better outcome.

The ultimate goal is a tracheostomy free life with normal voice and normal swallowing.

**References :**


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