



Anaesthetic Management of Adult Tracheal Stenosis

KEYWORDS

Tracheal stenosis, Tracheoplasty, Sternotomy, Pericardial flap

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ABSTRACT *The causes of adult tracheal stenosis are trauma, chronic inflammatory diseases, benign and malignant neoplasm and collagen vascular diseases. We report here a case report of difficult intubation in adult tracheal stenosis. A 32 year female was admitted to CTVS department of SMS Medical collage with h/o homicidal cut throat injury requiring emergency surgery with tracheostomy 6 months back. She was presented with history of progressive breathlessness for four weeks. She was posted for elective tracheoplasty. Patient was operated by sternotomy and tracheoplasty was done after relieving stenosis by using pedicle pericardial flap. Patient was initially intubated with 5.5 mm ID cuffed tube. After releasing of stenosis 5.5 mm ID tube was replaced with 7.5 mm ID cuffed tube. Surgery was uneventful. Close monitoring was done. At the end of surgery patient was extubated with complete recovery and finally discharged on 8th post operative day.*

INTRODUCTION

The most common aetiology for acquired benign tracheal stenosis is tracheal intubation or tracheostomy.(1,2) The population incidence of adult post-intubation laryngotracheal stenosis which is the commonest benign sub-type of this condition is approximately 1 in 200,000 adults per year.(3) Tracheal stenosis affects 4-13 % of adults and occurs in 1-8 % of neonates after prolonged intubation in United States.(4) The causes of adult tracheal stenosis include trauma, chronic inflammatory diseases, benign neoplasm, malignant neoplasm and collagen vascular diseases. The most common cause of tracheal stenosis continues to be trauma, which can be internal (prolonged endotracheal intubation, tracheostomy, flame burn injury) or external (blunt or penetrating neck trauma). (5) Approximately 90 % of all cases of acquired chronic subglottic stenosis in children and adults result from endotracheal intubation or tracheostomy.(4)

The management of benign tracheal stenosis varies with the type and extent of the disease and depends upon the age and co-morbidities of the patient. (6) The treatment of tracheal stenosis involves surgery or bronchoscopy. Endoscopy is popular to treat obstructive lesions in stenosis of the central airway. (7) Surgery is the most effective treatment, although the procedure is challenging to the anaesthesiologists. Mainstay of treatment for symptomatic lesions is surgical. Various surgical methods have been described including anterior cricotracheal splitting, laryngofissure creation with anterior lumen augmentation, resection of stenosed segment and end-to-end anastomosis (8-10), but they are not without risks. Tracheal reconstruction requires major surgery, with a mortality of about 3% (1,11). Rigid bronchoscopy with tracheal dilatation and stenting has been described.

We present a case report of a patient of homicidal cut throat injury requiring emergency surgery with tracheostomy 6 months back. She was presented with history of progressive breathlessness for four weeks. Diagnosed as tracheal stenosis taken for elective tracheoplasty.

CASE REPORT

A 32-yr-old female admitted to CTVS department in November 2013. She had a history of homicidal cut thorat 6 month back and operated for primary repair. She had h/o temporary tracheostomy at that time. After that she had starting complain of difficulty in breathing and hoarseness of voice. She had no family history of disease or any notable medical conditions. On physical examination, the mobility of both vocal folds was found to be intact; however, we observed upper tracheal stenosis. The patient's airway was severely compromised with less than 30% of the normal function due to the stenosis. A neck computed tomography (CT) scan showed a cocentric thickening of wall of trachea in subglottic region with narrowing of tracheal airway. Subglottic stenosis was extending 15 mm below the level of glottis. The narrowest diameter of the trachea was about 0.8 cm and below the stenosis diameter was about 1.5 cm and length of stenosed segment was 1.5 cm. Slight enhancement was also visible on the stenotic lesion, which most likely due to granulation tissue. Cricoid cartilage was absent.



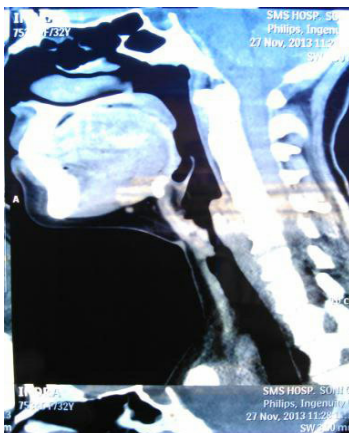
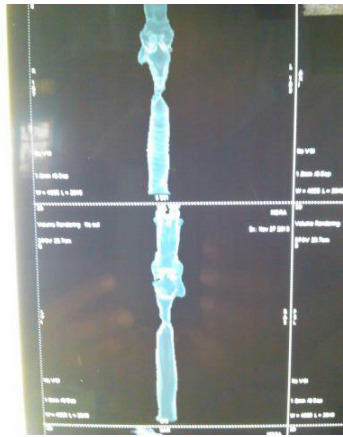


Fig 1, Fig 2, Fig 3

She was planned for elective tracheoplasty by using pedicle pericardial flap. So day before surgery pre anaesthetic evaluation was done thoroughly to find out any associated problems. Complete hemogram, chest X-ray, pulmonary function test and arterial blood gas analysis to exclude any other lung diseases.

On the day of surgery patient was taken in operation theatre after confirmation of fasting and taking written informed consent. The monitoring of the patient included SpO₂, invasive BP by an left radial artery cannulation, ECG and ETCO₂ monitoring. Two wide bore peripheral lines were secured. Difficult airway cart was kept ready. Small size cuffed tubes up to 5 mm ID were arranged.

The patient was premedicated with inj. Glycopyrrolate (0.2mg) inj., Midazolam (1 mg), and inj. Fentanyl(100 µg) in OT The patient was preoxygenated before induction Patient was induced with inj. Thiopentone sodium (300 mg). Short acting muscle relaxant inj succinylcholine 100 mg given. IPPV was given for 30 sec. Direct laryngoscopy was attempted and intubation was tried with cuffed tube 7.0 mm ID but was failed then immediately patient was intubated cuffed tube 5.5 mm ID. Cuff was inflated to prevent any gas leakage and tube secured at 20 cm mark. There was significant resistance in breathing bag. So patient was ventilated by decreasing tidal volume and increasing rate for keeping EtcO₂ between 30-35. Anaesthesia was maintained with Oxygen and Isoflurane with inj. Atracurium intermittently.

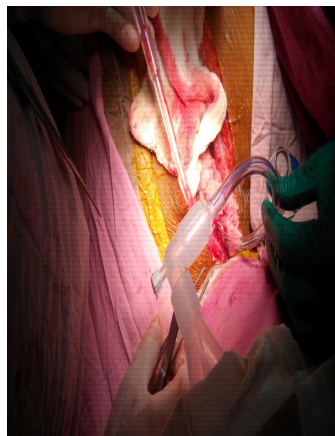


Fig 4, Fig 5

Mid sternotomy was done and the stenosed segment was opened, a second cuffed ETT of 7.0 mm ID was passed through the distal tracheal segment. The circuit was disconnected from the first endotracheal tube and new sterile ventilator tubing connected to second endotracheal tube to continue ventilation. B/L air entry confirmed, tube was secured by suture applied by surgeons and the cuff inflated to minimize the air leakage and the patient was ventilated. Then surgeon was took pericardial pedicle flap and tracheoplasty was done by using pericardial flap. After completing half tracheoplasty distal ETT was removed and first ETT 5.5 mm ID was replaced with another ETT of 7.5 mm ID. Cuff was inflated to prevent gas leak. B/L equal entry was checked. Surgery was kept continue. After completion of surgery and appearance of adequate respiratory efforts, inj. Glycopyrrolate (0.4 mg) and inj. Neostigmine (2.5 mg) were given for reversal, and patient shifted to ICU with endotracheal tube in situ on spontaneous respiration. Patient was extubated when she became awake and conscious after 2 hours.

DISCUSSION

Acquired tracheal stenosis is a fibroproliferative disorder. Surgical resection and end-to-end anastomosis is still considered to be the optimal treatment for a young patient presenting with symptomatic tracheal stenosis. To minimize complications, curative surgery is proposed only for selected patients in good neurological, cardiovascular, and respiratory condition. Accurate preoperative work-up of coexisting conditions and anatomical features of the stenosis is essential.

There are many challenges faced by anaesthetist during tracheal surgery. The biggest challenge for the anaesthetist is the management of airway and adequate ventilation of (12) Airway management can be divided into three phases, management of the stenosed airway, management of resected airway and management of repaired airway.

Stenosed airway can be managed by passing small size E.T.

tube through the stenosed segment, keeping the lower end of E.T. tube above the stenosis or using LMA. Problems with small sized tube are frequent blockade of the tube due to secretions, blood or kinking, high pressure is required for effective ventilation, length of the tube may be too small to negotiate the stenosis and inadequate emptying of the lungs during exhalation phase. Use of LMA may be a risky procedure as the lungs may not be ventilated. Therefore we decided to manage the airway by inserting an E.T. tube and keeping its lower end above the stenosed area. Although probability of the blockade of stenosed segment by secretions are there in this technique but due to fast dissection of the trachea by the surgeon we didn't face this problem.

The incidence of post intubation stenosis after prolong intubation of ETT and tracheostomy can be reduced by use of large-volume, low-pressure cuffs, careful placement of the stoma, avoidance of large apertures, elimination of heavy ventilatory connecting equipment, and meticulous care of the tracheostomy. Although tracheal stenosis often are very

easy to cure, the treatment of laryngotracheal stenosis is difficult, particularly when the laryngeal defects are large and when previous surgical attempts have failed.

The pericardial patch tracheoplasty is performed through a median sternotomy. The trachea is opened anteriorly the entire extent of the stenosis and then patched open with autologous pericardium. The patch is stented with an endotracheal tube for 10-14 days at which time the patient is extubated. (Bando et al 1996, Cotter et al 1999)

Conclusion

The main aim during tracheal stenosis surgery is to provide adequate 'ventilation throughout the perioperative period. A careful preoperative evaluation of the patient to delineate the site and degree of obstruction, meticulous anaesthetic management technique, intraoperative communication between surgeon and anaesthesiologist and good postoperative care can overcome the limitations of tracheal surgery.

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