

Critical tracheal stenosis-an anaesthesiologist's nightmare

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Abstract: We report the case of an 18-year-old male patient who developed airway obstruction during tracheostomy in patient of two level tracheal-stenosis. This was the complication of previous intubation & tracheotomy for OP poisoning with a past h/o 15 day admission in ICU. Patient developed airway obstruction during tracheostomy creating can- not ventilate can- not incubate situation. We will discuss the difficulties faced during management of such case.

Keywords: Anaesthesia, Emphysem, Pneumothorax, Tracheal Stenosis, Tracheostomy.

INTRODUCTION

Due to recent advances in critical care management, many patients who are on ventilator support following prolonged intubation or tracheostomy successfully recover from illness and later on presents with tracheal stenosis. Incidence of tracheal stenosis following tracheostomy and tracheal intubation ranges from 0.6 to 21% and 6 to 21% respectively[6,7,8]. This article will discuss the anaesthetic management of a patient of two level tracheal- stenosis.

CASE REPORT

An 18 years old male was admitted in ENT ward with complaints of difficulty in breathing. He had history of accidental Organo-Phosphorus poisoning one month back. At that time he was kept on mechanical ventilatory support after tracheal intubation followed by tracheostomy. Patient was weaned from ventilator and discharged after tracheostomy closure. After four days of discharge, patient developed respiratory distress for which fibre optic bronchoscopy was done. Patient was diagnosed to have two level tracheal- stenosis. One 4 cm below the vocal cords and another 4 cm above the carina (proximal lumen was of 10 mm in diameter and distal one of 6 mm in diameter). [Figure: 1].

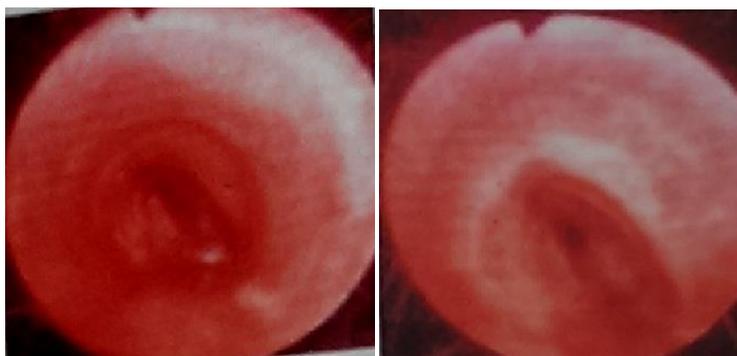


Fig 1: Fibre optic view of tracheal stenosis

On clinical examination, the patient was fairly built with a body weight of 45 kg. Heart rate was 78/min, blood pressure 126/76 mmHg, respiratory rate was 24/min and oxygen saturation was 98% on room air. On respiratory system examination air entry was present in both the lungs, bilateral ronchi and wheeze

were present. Cardiovascular and neurological examinations were normal. Routine laboratory investigations, chest X-ray and ECG were within normal limits. CT scan confirmed the findings of fibre optic bronchoscopy. [Figure: 2]

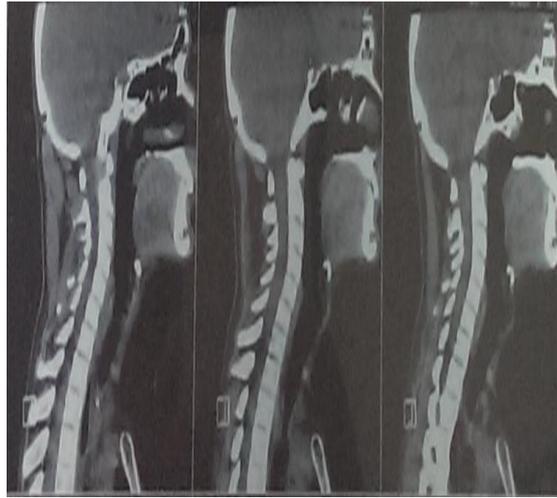


Fig 2: CT scan showing lower level tracheal stenosis

The patient was taken to the operating room under ASA status-III. Routine anaesthetic monitoring was applied. Arterial blood pressure and heart rate were 114/86 mmHg and 110 /min respectively. Injection Glycopyrrolate 0.2 mg IV, injection Ondansetron 4 mg IV, injection Dexamethasone 8mg IV and injection Hydrocortisone 200mg IV were given as premedication. Patient was pre oxygenated with 100% oxygen through bain's circuit for 5 minutes. Induction was done by inj. Propofol 100 mg IV along with inhalation of sevoflurane and oxygen with face mask ventilation. Face mask ventilation checked and was possible. Inj. Succinylcholine 60 mg IV was given. DL-scopsy showed critical subglottic stenosis. Surgeon decided to do tracheostomy. During procedure anaesthesia was maintained with inhalation of sevoflurane and oxygen using face mask ventilation and

intermittent ketamine 10 mg IV preserving spontaneous breathing. With great difficulty 7.0mm tracheostomy tube was inserted due to previous bad scar at tracheostomy site. But there was no movement on reservoir bag and ETCO₂ showed zero value inspite of having tracheostomy tube in trachea. Multiple attempts of smaller tracheostomy tubes/ET tubes insertion were made but failed to achieve any movement in reservoir bag creating CANNOT VENTILATE CANNOT INTUBATE (CVCI) situation. Meanwhile oxygen saturation started falling (60-70%) Jet ventilation was also tried. SpO₂ dropped to 35%, H.R. to 45/min. (inj. atropine 0.6mg IV given). Patient developed subcutaneous emphysema on face and chest. There was no air entry in bilateral chest. Suspecting pneumothorax, bilateral intercostal drains were placed. [Figure: 3].



Fig 3: Patient having subcutaneous emphysema and ICD in situ

ET tube of 5 mm ID reinforced over a bougie was inserted through tracheostomy site after which, ventilation was possible. For fixation of ET tube, tracheostomy tube of 7 mm ID was railroaded over it. [Figure: 4] Ventilation with 100% O₂ continued. Patient was conscious with HR-86/min, BP- 160/94 mmHg and SpO₂ increased to 98%. Auscultation of the lung revealed bilateral inspiratory rales. Chest radiograph showed a bilateral lung collapse. [Figure: 5] Patient was shifted on T-piece with oxygen flow 6L/min to ICU for observation. Four days later patient was taken to operating room to assess the lower airway under GA. Anesthesia was maintained under TIVA using propofol and ketamine intermittently. Under endoscopic guidance right main bronchus crusts and blood clots were removed and tracheostomy tube (7.0 mm ID cuffed) was placed with great difficulty after removing flap obstructing tracheal lumen. Postoperatively patient was conscious following verbal command. HR-78/min NIBP-140/80 mm Hg, Spo₂-99.



Fig 4: tracheostomy tube railroaded over endotracheal tube

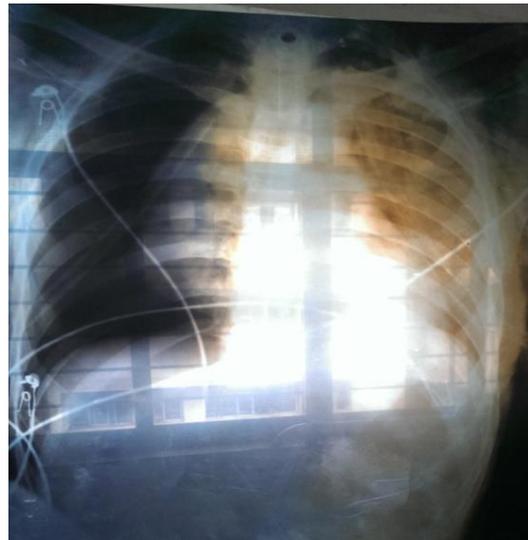


Fig 5: Chest x ray showing right sided lung collapse

DISCUSSION:

Tracheal stenosis defined as cicatricial narrowing of tracheal lumen. Most common cause is trauma (prolonged ET intubation, tracheostomy, endotracheal burns, irradiation) [5]. Other contributory factors are size of endotracheal tube, friction and frequency of movement of tube and traction on tube. It usually develops at site of cuff of ET tube and stoma of tracheostomy tube [4].

Long standing ischemia of tracheal mucosa can lead to ulceration and chondritis of tracheal cartilage followed by fibrotic healing, which leads to progressive tracheal stenosis [2]. Symptoms are usually distressing. Bronchoscopy remains the gold standard for diagnosis of tracheal stenosis however CT scan and MRI are very useful. MRI is more useful in delineating length and extent of the stenosed segment [4].

Treatment options include-For mild mid-level tracheal stenosis-small tracheal tube can be inserted past stenosis by help of fiberoptic scope. For short(<1cm) membranous stenosis without damage to cartilages-laser incision followed by gentle dilation. For severe mid-level tracheal stenosis-tracheal tube can be incubated rapidly above stenosis first and later small tracheal tube is placed in main bronchus by surgeon and single lung ventilation applied. For complex tracheal stenosis, longer with circumferential hour glass like contraction- Resection and end to end anastomosis is standard treatment [1].In extreme cases cardiopulmonary bypass through femoral route can allow gas exchange and good surgical access for tracheal surgery without aggravating hypoxia and CO₂ accumulation [1,9].

There is no ideal anaesthetic technique for management of cases of lower level tracheal stenosis. In the presented case, the stenosis was severe and at the level of lower trachea. The problem was how to

maintain an adequate airway and ensure optimal oxygenation and CO₂ removal during airway obstruction at the time of tracheostomy, creating CVCI situation. Critical lower level tracheal stenosis was the cause of airway obstruction and failure of ventilation via tracheostomy tube. Jet ventilation has the risk of barotraumas. Muscle relaxant was avoided as effective ventilation was doubtful. For most severely obstructed patient with critical tracheal stenosis conventional anaesthetic technique may result in complete obstruction. In many of these patients anatomy of stenosis is such that they can only ventilate when breathing spontaneously [1]. There is versatility in the types of tracheal stenosis, its presentation and its management techniques.

CONCLUSION

There is versatility in the types of tracheal stenosis, presentation and management. Tracheostomy is not a secure procedure in lower level of tracheal stenosis. Safe anaesthetic management depends on patient's general condition, presentation, urgency of treatment, expertise, resource availability and finally surgical requirements.

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