Case Report

Key role of anaesthesiologist- in fiberoptic tracheal dilatation in a case of severe tracheal stenosis

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Abstract

Prolonged tracheal intubation is a common cause of tracheal stenosis. The patients may present with respiratory insufficiency and stridor of insidious onset and progressive nature. Tracheal dilatation and stenting are newer modalities of treatment for tracheal stenosis. Safe conduct of anesthesia for such crucial airway procedure require complete knowledge of procedure, communication with interventionist and anesthesiologist expert skills and experience. Here we represent a case of successful management of tracheal balloon dilatation with severe tracheal stenosis in 15 years female patient with fiberoptic bronchoscope.

Keywords: Tracheal Stenosis, Anaesthesia, Fiberoptic Dilatation.

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INTRODUCTION

Tracheal stenosis is chronic inflammatory process that can occur as a result of several possible etiologies, most commonly as a complication of prolonged intubation. This pathology poses the management dilemma, especially surgical versus endoscopic.[1] Traditionally, open procedure such as tracheal reconstruction is offered. The morbidity and mortality of surgical procedure is significant in terms of patient dissatisfaction and surgical complication. The most common complication is dehiscence of anastomosis. Endoscopic management was popularized in the 1970 with the introduction of CO2 laser for medical applications[2,3,4]. On the other hand, tracheal dilatation and stenting is relatively new procedure for treatment of tracheal stenosis. It includes radial incision of stenotic airway segment, dilatation and treatment with steroid or mitomycin-c[5]. Currently stents are only licensed for malignant conditions, so in our case we did only tracheal balloon dilatation. Flexible bronchoscopic balloon dilatation was not described until 1991[6] Since then relatively small number of reports have described[7,8,9]. Sharing airway with interventionist and maintenance of respiration using fiber optic bronchoscope is challenging task. Here we report a case of tracheal stenosis for which balloon dilatation using fiberoptic bronchoscopy was done.

CASE REPORT

A 15 years female patient presented with complaints of difficulty in breathing and stridor since 5-6 days. Patient had road traffic accident 2 months back and had diffuse axonal injury for which she had undergone mechanical ventilation and tracheostomy was done and kept for 15 days. Patient was weaned off and tracheostomy decannulation done. One month later, she developed difficulty in breathing and stridor of progressive nature. Chest x-ray was normal, indirect laryngoscopy was normal. Chest physician advised Pulmonary function test. The patient failed to attempt it. So fiberoptic bronchoscopy under local anesthesia was done. It showed tracheal web 7cm below glottis, probably at the site where tracheostomy cuff coincides causing severe

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luminal stenosis approximately 2.5-3 cm. at D1-D2 level. On general examination, patient was conscious, cooperative, mild tachypnoeic with audible stridor, with pulse rate of 78/min, Respiratory rate of 26/min, blood pressure-110/70 mm of Hg. SPO2---97%on room air. Blood investigations and chest x-ray were normal. She had right upper and lower extremity weakness because of her neural injury in road traffic accident. She was posted for tracheal web cauterization and balloon dilatation with fiberoptic bronchoscopy. Written, informed, valid consent was taken and confirmed. Antiaspiration prophylaxis was given with Inj. ondansetron 4mg and Inj. pantaprozol 40 mg. Nebulisation with budecortandsalbutamolrespules given in ward. Procedure was done in endoscopy suite. The position given was supine with 20 degree head up. Monitoring included NIBP, ECG and Pulse oxymetry. Lignocaine 4% nebulisation immediately before the procedure was given. 100 % preoxygenation through mask for 15 min was done. Inj. hydrocort 100mg was given as prophylaxis for bronchospasm and airway edema. Inj. midazolam 0.5 mg and inj. glycopyrolate 0.2 mg iv was administered. IV Sedation was given with bolus dose of Inj. dexmeditomidane 0.5 micr./kg over 15 min., Inj. fentanyl 30 microgram, Inj. ketamine 20 mg, Inj. propofol 20 mg were given. Once patient had adequate level of sedation, alongwith the maintainance of spontaneous respiration and SPO_2 of 99-100%, transtracheal Inj. of 4% lignocaine 2 ml was injected in trachea. Fiberopticbronchoscope was introduced through oral cavity after local infiltration of 10% lignocaine spray. Oxygen was supplemented through face mask which had in built bite block through which insertion of fiberoptic bronchoscope was done. . Stenosed tracheal portion was identified and web cauterization was done at three sites to facilitate balloon dilatation with the cautery. The cautery was introduced through biopsy port of fiberoptic bronchoscope.Cauteriasation could be painful; so level of anesthesia was deepened with incremental doses of Inj. propofol and Inj. ketamine and infusion of Inj. dexmeditomidate 0.5 mic/kg/hr. After web cauterization, balloon was introduced through same channel and fluoroscopy guided balloon positioning was done. It was inflated with pressure of---for 30 sec. This was the time when patient went in complete airway obstruction and apnea. This present patient tolerated this phase with saturation maintaining above 92%.Three time balloon dilatation was done for 30 sec each. This was uneventful. As soon as dilatation was over, her stridor got relieved. There was no wheeze and added conducted sounds. She slowly came out of sedation effect. Post procedure, patient was comfortable with respiratory rate of 16 / min. She was shifted to recoveryroom with stable vitals.

DISCUSSION

Tracheal stenosis is central airway obstruction. It can be caused by benign strictures due to prolonged intubation, inhalational injury or idiopathic. Malignancy, vascular anamoly, intratrachealtumours, foreign body, tracheal wall abnormality like tracheomalacia, stricture, Wegenersgranulomatosis, amyloidosis and relapsing polychondritis cause organic tracheal obstruction. Therapeutic options for tracheal stenosis may include surgical reconstruction, laserreconstruction, electrocautery excision of tissues or noninvasive procedures like balloon dilatation and stenting[10]. For safe conduct of anesthesia, it is imperative to understand the procedure of tracheal dilatation and stenting in order to realize the time periods when the compromised airway needs to be shared with the interventionist and the limitations imposed because of the compromised airway[11].

Procedure

1. Identification of stenosed segment of trachea
2. Placement of guidewire across the stenotic segment under fluoroscopy guidance.
3. Placement of balloon dilator over guide wire across stenotic segment.
4. Dilatation of the stenosed segment at appropriate pressure for specified time with fluoro guidance
5. Removal of balloon dilator
6. Placement of stent and its release [not done in this case].

Limitations

1. Compromised airway is central such that tracheal ventilation, tracheostomy or similar surgical airway would not relieve the obstruction.
2. During procedure, coughing or airway instrumentation can precipitate complete airway obstruction that can be catastrophic.[topicalisation of airway with local anesthetic is recommended after deep level of anesthesia].
3. The catastopic situation of central airway obstruction is “can intubate but can’tventilate”in contrast to “can’t intubate and can’t ventilate”

Goalsofanesthesia in such cases are as following-

1. Avoideloss of airway control
2. Maintenance of spontaneous respirationwith adequate depth of anesthesia.
3. Maintenance of oxygenation

From the above discussion, it is obvious that central airway obstruction can compromise the safety of the patient. In our case, we preferred to maintain anesthesia with total intravenous drugs maintaining spontaneous respiration and good oxygenation with fiberoptic bronchoscopy. Conacher *et al*[12] recommend practicing

rigid bronchoscopy for safety of patient. Ventilation can be controlled in several ways including manual ventilation, jet ventilation[13,14], high frequency jet ventilation [15]distal tracheal intubation and ventilation and cardio pulmonary bypass[16,17]. LMA also can be used for placement of guide wire and maintaining ventilation especially when lesion just below vocal cords[18]. LMA offers fiberoptic bronchoscopy also[19] Care should be taken while negotiating as guide wire can cause irritation and coughing. ECG disturbances can be there when electrocautery was used for web resection. Patient with arrhythmias, pacemaker should be placed with special precautions because of these complications and haemodyanamic instability[20]. Balloon dilatation offers crucial situation of complete central obstruction which patient should tolerate during spontaneous respiration. Proper depth of anesthesia with incremental doses of fentanyl, propofol or ketamine is recommended before this step. Inhalation agents like halothane, sevoflurane can be used[21].

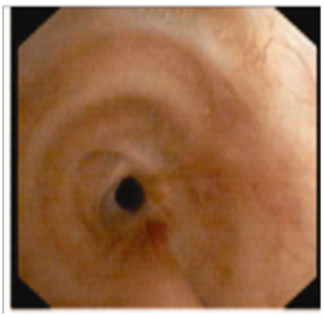

Figure 1:

Figure 2:

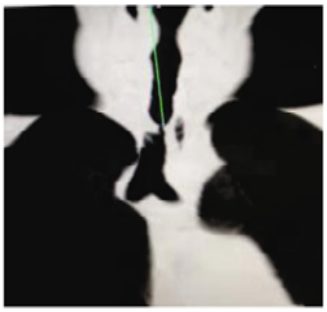

Figure 3:

Figure 4:

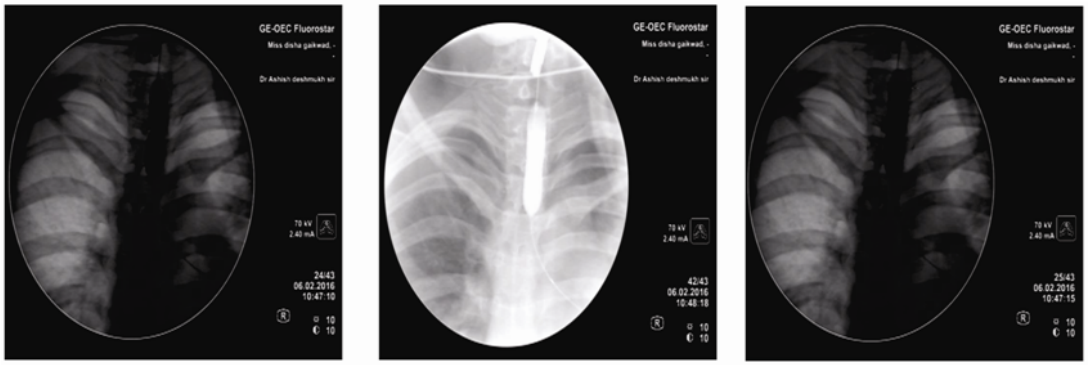

Figure 5:

Legend

Figure 1: Procedure; **Figure 2:** Post procedure; **Figure 3:** CT Image; **Figure 4:** Chest X-ray; **Figure 5:** Balloon dilatation flouroguided images

CONCLUSION

Tracheal stenosis secondary to prolongedintubationcan present with stridor and respiratory insufficiency. Patient's distress and lack of time for optimization of comorbid conditions results in inadequate preparation of any type of anesthesia and surgical intervention. Rigid bronchoscopy is supposed to be safe for such intervention. The presentcase shows that fiberoptic bronchoscopy done under total IV sedation and topical local anesthesia can lead to successful outcome in such challenging situations. Anesthesiologist's perfection to manage the spontaneous respiration with adequate depth of anesthesia and preparedness for catastrophic situations achieves the patient's safety with intact airway reflexes at the end of procedure.

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