

Airway Management of a Case of Severe Upper Tracheal Stenosis- An Arduous Task Well Accomplished

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ABSTRACT

Introduction: Tracheal stenosis is rare but a fatal condition. Tracheal resection and reconstruction, although a rare procedure, but because of the fact that it is lifesaving. It is important to know the etiology, characteristic and exact location of tracheal lesion and a thorough preoperative evaluation of the patient.

Case report: A 23 years male, present with previous H/O tracheotomy after traumatic head surgery, complained of progressive dyspnoea and stridor which aggravated on lying down. A successful tracheal resection and anastomosis performed.

Conclusion: We conclude that the key to the successful management in such patients is that appropriate method of a safe and efficient gas exchange should be established. Any respiratory distress should always be approached with caution. Proper extubation should be our primary goal because mechanical ventilation postoperatively may be associated with anastomotic dehiscence.

Keywords: Airway Management, Severe Upper Tracheal Stenosis, Arduous Task

INTRODUCTION

Tracheal stenosis is known to be rare, but one of the grievous and fatal condition which can compromise patient's life. The leading cause of tracheal stenosis is trauma, followed by prolonged tracheal intubation or tracheostomy. Other but rare causes could be tracheal tumors, chronic inflammatory diseases and collagen vascular diseases. All these conditions results in narrowing of tracheal diameter, which further compromise oxygenation and ventilation of the patient. Tracheal resection and reconstruction is the treatment of choice for most patients with tracheal stenosis.¹⁻⁵

Airway management in such cases is a challenge to the anaesthetist as well as the surgeon. Perioperative risk increases with the severity and the site of the stenosis. The sharing of an abnormal airway as well as securing for maintenance of oxygenation and ventilation throughout the procedure is an arduous task. Tracheal resection and reconstruction, although a rare procedure, but because of the fact that it is lifesaving, the importance of anticipating the course of surgery and designing an approved anesthetic plan cannot be overruled. It is important to know the etiology, characteristic and exact location of tracheal lesion and a thorough preoperative evaluation of the patient. We report a successful emergency anaesthetic management of case presenting with critical upper tracheal stenosis post tracheostomy.

CASE REPORT

A 23 years old male, present with previous H/O tracheotomy after traumatic head surgery and following which patient was kept on a ventilator in ICU for 7 days. Decannulation was done on 10th day post tracheostomy. The patient was discharged home from ICU. Fifteen day post-decannulation patient presented with complaint of progressive dyspnoea and stridor which aggravated on lying down. On examination patient was tachypneic with a respiratory rate of 24/minute, bilateral wheeze was present and the patient was using his accessory muscles of respiration. Room air SpO₂ was 92%. The immediate ABG report showed a PO₂ 76mm Hg and PCO₂ of 84 mm Hg.

Computed tomography (CT) scan showed a short segment (approx. 1.2 cm) having 80% stenosis with lumen diameter 5-6 mm, at D1 vertebral level. Bronchoscopy was done and revealed severe tracheal stenosis at the level of third and fourth tracheal ring. Emergency surgery for tracheal resection with end to end anastomosis was planned. The patient was shifted in the operation theatre, all monitors including NIBP, ECG, and pulse oximetry was attached. An 18 G cannula was secured.

We assessed the patient for ventilation by administering 20 mg of propofol prior to induction. We were able to ventilate the patient and proceeded for induction. Fentanyl 100mcg and 0.2 mg of glycopyrrrolate was given. Induction was done using injection propofol (2 mg kg⁻¹), the patient was reassessed for ventilation, and after successful ventilation injection suxamethonium 50 mg given for relaxation. Anaesthesia was further maintained with N₂O and sevoflurane in O₂ and IPPV started. Anticipating a critical tracheal stenosis and with the aim of securing the airway with the largest diameter of endotracheal tube, we started with 5mm (ID) micro laryngeal surgery (MLS) tube (extra-long tube, with the aim of securing the tip beyond the lesion), but was not successful. MLS tube 4 mm was tried as a next step,

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but encountered a resistance with it also. We planned to remove the cuff of 4 mm MLS tube, and finally we were successful in negotiating the tube beyond the stenotic lesion with slight difficulty. A confirmation with fiberscope was done to rule out major trauma. IPPV begun, but ventilator pressures were very high. After adequate tracheal resection, a sterile flexo-metallic ETT with ID, 7mm, was passed distal to the tracheal lesion. Ventilation commenced with separate sterile bairns circuit. The distal endotracheal tube was taken care of to prevent endobronchial migration or inadequate oxygenation and ventilation. After a successful anastomosis was achieved, the patient was re-intubated orally with 7 mm ID ETT, distal tube was removed and oral tube gradually secured in position, pass the tracheal anastomotic sutures. Guardian sutures from chin to chest were placed to maintain the flexion of the head. The patient was extubated fully awake, but cooperative and counselled about the posture and sutures. Rest of postoperative period was uneventful and the patient was shifted back to ward on second postop day.

DISCUSSION

Surgery and airway management in a patient with tracheal stenosis is an extremely challenging job. Surgeon and anaesthetist both share common airway for tracheal reconstruction, hence it is considered as complex and complicated surgery.⁶ If stenosis exceeds 75%, it is labeled as critical stenosis and with increasing stenosis, surgery and airway management both become difficult.² Our patient was also in the category of critical stenosis. Besides the degree of tracheal stenosis, the position of stenosis is also important for anaesthesia.⁴ But prior to taking such patients for surgery, they should be thoroughly pre-evaluated and proper anaesthetic plan should be formulated. Heavy sedation should be avoided in these patients. Anaesthesia team should be prepared with emergency airway cart. If the lesion is encountered near to the carina, arrangement of double anesthesia machine should be done prior to carinal resection for separate ventilation of two lungs.⁶

The priority in all tracheal surgeries is ensuring adequate ventilation and oxygenation without disturbing surgical field. Various methods of ventilation described are HFJV (High frequency jet ventilation), HFO, crossfield ventilation via distal tracheal tube, interim apneic oxygenation and finally cardiopulmonary bypass. When everything fails, extracorporeal gas exchange or tracheal resection under local anesthesia while the patient breathes spontaneously have been described. We were prepared with all possible measure, including ECMO for over patient.^{7,8}

Meticulous monitoring should be an integral part in such patients. We placed femoral artery catheter as a precautionary measure for urgent need if required to go on cardiopulmonary bypass.

Various airway management modalities have been recommended in the literature depending upon degree and level of stenosis. Severely obstructed patients with critical stenosis are at risk of complete respiratory failure. The conventional anesthetic technique would be catastrophic in

such patients, as attempts to insert a small ETT may cause complete obstruction of the airway. In these patients, the anatomy allows ventilation when breathing spontaneously.^{5,6,9} We were successful in inserting 4.0 mm ID MLS tube beyond the stenosis and were able to ventilate the patient but with resistance.

Proper arrangement for ventilatory support and ICU monitoring should be done in post operative period. If ETI is to kept for post-operative period than it must be positioned so that the cuff does not rest on any suture line.^{3,6} Our patient was extubated on operation table but was shifted to ICU for further monitoring and observation.

CONCLUSION

We conclude that the key to the successful management in such patients is that appropriate method of a safe and efficient gas exchange should be established. Any respiratory distress should always be approached with caution. The periods of hypoxia and apnea should be avoided. Proper extubation should be our primary goal because mechanical ventilation postoperatively may be associated with anastomotic dehiscence. We finally recommend constant vigilance of tenuous inflammatory airway, throughout the perioperative period for a better outcome.

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