Research Thaysig	Research Paper	Medical Science
	Anaesthetic Management of Post Traumatic Tracheal Stenosis	
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ABSTRACT We hereby present a case of 26 year old male who came with history of progressive breathlessness for 3 weeks following neck trauma in road traffic accident .He was diagnosed as stenosis of mid trachea and now planned for elective tracheal resection and anastomosis under general anaesthesia.This case was done in cardiothoracic operation theater in SMS hospital jaipur(Raj.). A cuffed ET tube was administered orally following induction and Intraoperatively an another cuffed ET tube was passed through the distal segment following resection of stenosed part.After suturing of posterior wall the distal tube pulled back and the proximal one inserted until cuff of this tube cross the suture line of anastomotic site.Accidentally cuff of this tube punctured during suturing of anterior wall.This tube had been exchanged by another cuffed ET tube via suction catheter 14G which one used as a tube exchanger.All precautios to provide adequate oxygenation during surgery were taken.

KEYWORDS: tracheal stenosis, reconstruction, tube exchanger, venturi

INTRODUCTION

Tracheal stenosis is rare but life threatening condition. It frequently has insidious onset and gives a time for patient evalution and elective airway managment. Tracheal stenosis can be caused by congenital problems, post intubation injury, trauma, tracheal tumour and compression of trachea by tumour.

An incidence of 4.5 case per million per year is estimated for post intubation tracheal stenosis.stenosis commonly occurs at the cuff of the tube (intrathorasic trachea)or at the level of tracheostomystoma(extrathorasic trachea).

Management of airway during tracheal surgery is the biggest challenge for the anesthetic.There are various methods to provide adequate oxygenation and carbondioxide elimination during tracheal resection just as Standard orotracheal intubation^{(1),}LMA(Laryngeal mask airway),HFJV(High frequency jet ventilation)^(2,3,4,5) and Cardiopulmonary bypass⁽⁶⁾.

In this case scenario we present a patient of road traffic accident presented with history of progressive breathlessness for three weeks diagnosed as tracheal stenosis taken for elective tracheal resection and anastomosis.

CASE REPORT

A 26 year old male was admitted with history of progressive breathlessness for 3 weeks .Patient had history of road traffic accident 1 month back .At that time his CT report revealed subcutaneaous surgical emphysema along musculofascial plane of neck which was managed conservatively . His recent CT(fig.1and2) revealed narrowing of mid 1/3 trachea with diameter and length of involved segment 6 mm and1.8 cm respectively.These findings were confirmed by virtual bronchoscopy. He was scheduled for elective tracheal resection and anastomosis .This case was done in cardiothorasic operation theater in SMS hospital jaipur(Raj.)



Fig.1



Fig.2

A thorough pre-operative anaesthetic evaluation by history, hemogram, baseline arterial blood gases, x-ray chest and Pulmonary Function Test was done to exclude pre existing lung disease.

The monitoring of the patient included SpO2, invasive BP by an left radial arteryl cannulation, ECG and ETCO₂ monitoring. The right femoral vein was cannulated for central line in addition to a peripheral line.

The patient was premedicated with inj. Glycopyrrolate (0.2mg)inj., Midazolam (1 mg), and inj. Fentanyl(100 μ g) in OT.the patient was preoxygenated before induction with incremental doses of inj. propofol (150 mg). Fearing a possibility of failed intubation, no muscle relaxant was given. After adequate ventilation, direct laryngoscopy was attempted and intubation done with an ETT of ID=8.0 mm to prevent any gas leakage and tube secured at 21 cm mark. Anesthesia was maintained with with Oxygen and Isofluarne with inj. Atracurium intermittently .

Mid sternotomy was done and the stenosed segment was resected ., a second cuffed ETT of ID=7.0 mm was passed through the distal tracheal segment. The circuit was disconnected from the first endotracheal tube and connected to second tube. B/L air entry confirmed and the cuff inflated to minimize the air leakage and the patient was ventilated. However , the second tube was removed intermittently for providing surgical field to the surgeons and during that period the patient was ventilated by jet ventilation via a venturi device (Fig. 3 and 4). Whenever ETCO2 became high and SPO2 low , the second ETT tube was again inserted and started ventilation .After anastomosis of posterior line, to facilitate anastomosis of the anterior line, the second tube was removed and the proximal oral tube was passed distally enough to cross the anastomotic segment gently, and the patient was ventilated.



While suturing the anterior line, the surgeon punctured the cuff accidently causing excessive leakage of air during ventilation, and then decided to change the tube .To facilitate intubation in the absence of bougie, suction catheter of 14 G was passed through the insitu tube which was then removed and an another ETT of ID=8.5 mm was threaded over the suction catheter and only when the cuff crossed the suture line, it was inflated to prevent dehiscence of suture line, B/L air

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entry checked, tube secured and the surgery was restarted. The anastomosis was completed, skin closed and the chin of the patient sutured to manubrium sternii, so that the neck remains in flexion.

On appearance of adequate respiratory efforts, Glycopyrrolate (0.4 mg) and Neostigmine (2.5 mg) were given for reversal, and patient shifted to ICU with endotracheal tube in situ. Patient was extubated when he became awake and conscious after 4 hours.





DISCUSSION

Tracheal stenosis is defined as cicatricial narrowing of endotracheal lumen. Common site of stenosis is subglottic area⁽⁷⁾, the site of ETT and stoma of tracheostomy tube.

The most common cause of tracheal stenosis is trauma2. About 95 % of tracheal stenosis are due to trauma⁽⁸⁾. Trauma can be internal (prolonged endotracheal intubations, tracheostomy, endotracheal burns, irradiation) or external (blunt or penetrating).

Other causes of tracheal stenosis are tumors, inflammatory process, recurrent goitre, foreign body,vascular malformations and congenital abnormalities.⁽⁹⁾

Prolonged endotracheal intubations remains the most common cause of tracheal stenosis. Duration of intubation, pressure at the site and friction are the most important factors affecting on the stenosis. Capillaery pressure of the tracheal mucosa is about 25 cm of H₂O and cuff pressure exceeding 25 cm of H₂O decreases blood flow at the particular site leading to mucosal necrosis and subsequently stenosis due to fibrosis.

Patients with acquired stenosis are diagnosed on the basis of history and clinical presentation from a few days to 10 years or more following initial injury. The majority of cases are diagnosed within a year.

Symptoms include dyspnea (may be on exertion or on the rest), stridor, hoarseness, barassy cough, recurrent penumonitis and cyanosis, depending on severity of the stenosis.

Bronchoscopy is the gold standard for diagnosis of tracheal stenosis however computerized tomography (CT) scan and magnetic resonance imaging (MRI) are very useful in delineating length and extent of the stenosed segment. The therapeutic options for tracheal stenosis include tracheal resection and reconstruction, laser reconstruction, electrocautery excision of the tissue, tracheal dilatation and stenting. ⁽¹⁰⁾ However tracheal resection with end-to-end anastomosis is gold standard technique for short-segment tracheal stenosis^(7,11,12,13,14,15,16,17). 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.18 Airway management can be devided into three phases, management of the stenosed airway, management of resected airway and management of repaired airway.

Stenosed airway can be anaged 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 ay 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 It's 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.

Then after dissection of the trachea the management of the resected airway has to be done. This was managed by passing an E.T. tube of 7 mm diameter distal to resected part and attached to breathing circuit, position of the tube was checked to ensure bilateral air entry .As the E.T. tube was obscuring surgical field while suturing the distal tube was removed intermittently and ventilation was continued by high frequency jet ventilation till the ETCO, was within limit.

When stenotic part has been resected and posterior anastomosis completed the tube above the previous stenosed segment is now pushed beyond the repaired segment so that the cuff of the tube lies below the repaired site to avoid distruption or ischaemic necrosis. A high FIO2 was used throughout as O2 filled functional residual capacity permits a few extra minute to correct relatively common episode of airway obstruction or the tube displacement. Ventilation is continuously monitored by pulse oximetry, capnography, auscultation and observation of chest, and arterial blood gas determinations. During operation a slight head down tilt helps to minimize aspiration of blood and secretions. As neck has to be kept flexed postoperatively chin to chest suture are placed. Patient was extubated after full recovery from anaesthesia after four hours.

Conclusion

1. Beyer PY, Wilson RS. Anesthetic management of tracheal resection and reconstruction. Journal Cardiol Anesth 1988; 2:821. | 2. Ellis RH, Hinds

The main aim during tracheal stenosis surgery is to provide adequate ventilation throughout the perioperative period.

A carefull 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.

REFERENCES

CJ, Gadd LT. Management of anaesthesia during tracheal resection. Anaesthesia 1976; 31:1076. | 3. Baraka A. Oxygen jet ventilation during tracheal reconstruction in patients with tracheal stenosis. Anesthesia Analgesia 1977; 56:429. | 4. El-Baz N, Holinger L et al. High frequency positive pressure ventilation for tracheal reconstruction by tracheal T-tube. Anesthesia Analgesia 1982; 61:796. | 5. Eriksson I, Nilsson LG et al. High frequency positive pressure ventilation during transthoracic resection of tracheal stenosis and during perioperative bronchoscopic examination. Acta Anaesthesiol Scand 1975; 19:113. | 6. Benca JF, Hickey PR, Dornbusch bill ventilatory management assisted by cardiopulmonary bypass for distal tracheal reconstruction in a neonate. Anaesthesiology 68:270,1988 | 7. Hadi U, Hamdan AL. Diagnosis and management of tracheal stenosis. J Med Liban. 2004 Jul- Sep;52(3)131-5 | 8. Sarper A, Ayten A, Eser I, Ozbukak O, Demircan A. Tracheal Stenosis Aftertracheostomy or intubation:review with special regard to cause and management. Tex Heart Inst J. 2005;32(2)154-8. | 9. Chen PT, Chang WK, Hsu WH, Sung CS, Chan KH, TsaiSK. Anesthetic management of a patient undergoing segmental resection of trachea with an endotracheal neurofibroma and nearly total occlusion of trachea. Acta Anaesthesiol Taiwan. 2004 Dec;42(4)233-6. | 10.Geffin B,Bland T,Grillo HC:Anaesthetic management of tracheal resection and reconstruction. Anesth Analg 1969;48:884-890 | 11. Theman TE, Kerr JH, Nelems JM et al: Carinal resection. A report of two cases and a description of the anaesthetic technique. J Thorac Cardiovasc Surg 71:314, 1976 | 12. Beyer PY, Wilson RS: Anaesthetic management of tracheal resection and reconstruction. J Cardiol Anesth 2:821,1988 | 13. El-Baz N, Jensik R, Feber P. One-lung high frequency. ventilation for tracheoplasty and bronchoplasty: a new technique. Ann Thorac Surg 34:564,1982. || 14. Woods F, Neptune W, Palatchi A: Resection of carina and mainstem bronchi with extracorporeal circulation. N Engl J Med 264-492,1961 | 15. Benca JF, Hickey PR, Dornbusch JN: Ventilatory management assisted by cardiopulmonary bypass for distal tracheal reconstruction in a neonate. Anaesthesiology 68:270,1988 | 16. Coles JC, Doctor A, Lefcoe M: A method of anaesthesia for imminent tracheal obstruction. Surgey. 80:379, 1976. | 17. Baraka A, Mansour R, Laoude CA et al: Entrainment of oxygen and halothane during jet ventilation in patients undergoing excision of tracheal and | bronchial tumours. Anaesth Analg 65:191,1986. | 18. Hamid M, Khan FH, Omar ZM. Anesthetic management of lower tracheal reconstruction. J Coll Physicians Surg Pak. 2003 Dec; 13(12)715-6. ||