

Anaesthetic Management For A Case Of Tracheotracheal Reconstruction

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Citation

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Abstract

This article sums up the anaesthetic management of a patient with subglottic stenosis undergoing resection followed by a tracheotracheal reconstruction. General anaesthesia with a flexometallic armored endotracheal tube was administered following induction through the tracheostomy tube in situ. Perioperatively a cuffed North nasal RAE ivory white tube was passed through the right nostril following resection of the stenosis. The trachea was then pulled up and sutures taken posteriorly. This nasally passed tube was then pulled from the incision site and tube cuff passed beyond the suture lines. All precautions to provide adequate oxygenation and carbondioxide during tracheal resection were taken.

INTRODUCTION

The indications for tracheal resections are patients who have a tracheal obstruction due to a prior tracheal trauma (stenosis), primary tracheal tumor (majority are carcinomas), congenital anomalies and vascular lesions. Preoperative delineation of the site and degree of obstruction, intraoperative communication between surgeon and anaesthesiologist, meticulous anesthetic management techniques and good postoperative care overcome the limitations of tracheal surgery. The main aim is to provide adequate ventilation throughout the perioperative period. The results of this very complicated surgery depend on location and method of resection but still a worthwhile survival rate can be achieved in most patients. This article discusses the successful management of a patient undergoing a high tracheal resection followed by tracheotracheal reconstruction.

CASE REPORT

An 18 year old young man with history of accidental strangulation by wire underwent an emergency tracheostomy with number 8 portex tube inserted due to inability to phonate and presence of stridor. Multiple attempts to decannulate failed. On Indirect laryngoscopy bilateral adducted vocal cord with minimum movement was seen. On bronchoscopy retrograde scarring with complete stenosis approximately 1.5cm beyond vocal cord was seen. This was confirmed by virtual bronchoscopy.

Computerized Axial Tomography was carried out and it showed that there was a diffuse thickening of paralaryngeal space causing narrowing of supraglottic larynx. There was narrowing of proximal trachea for up to 1.5cm and almost complete obstruction of trachea at the level of thyroid gland. In fact, the completely stenosed segment was up to 2.5cm. A tracheostomy defect was noted in the middle part of trachea and rest of the visualized trachea and bronchi were unremarkable.

The presence of pre-operative lung disease that is severe enough to indicate a need for postoperative ventilatory support which is a relative contraindication to tracheal resection was ruled out during pre-operative anaesthetic evaluation by history, hemogram, baseline arterial blood gases and x-ray chest.

Anaesthesia was induced with propofol and pancuronium through the tracheostomy tube (presently 6 number tube) in situ and then by gentle airway instrumentation this was replaced with a cuffed 24 French flexometallic armored endotracheal tube. The airway leak was obliterated by minimal inflation of the cuff. Maintenance of anaesthesia was done with gas, oxygen and (0.5 to 1%) intermittent halothane. Also, a propofol infusion was maintained at the rate of 2mg/kg/hr. All vital parameters were well maintained intraoperatively including pulse oximetry monitoring. A cuffed 7 number North nasal RAE ivory white tube was passed through the right nostril and positioned just above the glottic opening.

Following surgical exposure of the trachea 2.5cm of the stenosed trachea was resected. Then posterior wall and lateral wall defect was repaired by pulling the trachea up along with the flexometallic tube. On the anterior wall two lateral and one central stay sutures were placed loosely including the tracheostomy site after refashioning. The nasally passed RAE ivory white tube was then pulled from the incision site and tube cuff passed beyond the suture lines with immediate inflation of the tube cuff and simultaneous removal of the flexometallic armored tube.

Now the nasally passed tube was connected to the anaesthesia circuit and the re-anastomosis was completed by sutures taking care as to avoid inclusion of endotracheal tube in the sutures. The cuff of the nasally passed tube was inflated to prevent airway leaks. All precautions to provide adequate oxygenation and carbondioxide elimination during tracheal tube advancement were taken. There was 350 ml of blood loss that was adequately replaced. Intraoral low suction was resorted to only when required.

Postoperatively the patient was kept in a position of head flexion by taking a mentum stitch to the sternum so as to reduce tension on the suture line. The patient was not extubated immediately in the post operative period but kept on a 'T' piece with oxygen at 4 litres/minute for four hours after which the oxygen was discontinued based on arterial blood gas report. The nasally passed tube was kept in situ with good spontaneous attempts by patient with adequate tidal volume. Chest physiotherapy, antibiotic, analgesic and steroid therapy, endotracheal suctioning and nebulisation were carried out regularly. The patient was successfully extubated on the seventh postoperative day so as to allow adequate healing of the sutured trachea.

Figure 1

Figure 1: North nasal RAE ivory white tube; Anaesthesia circuit connected to the armored tube through the tracheostomy defect.



Figure 2

Figure 2: Nasal tube is pulled from the incision site.

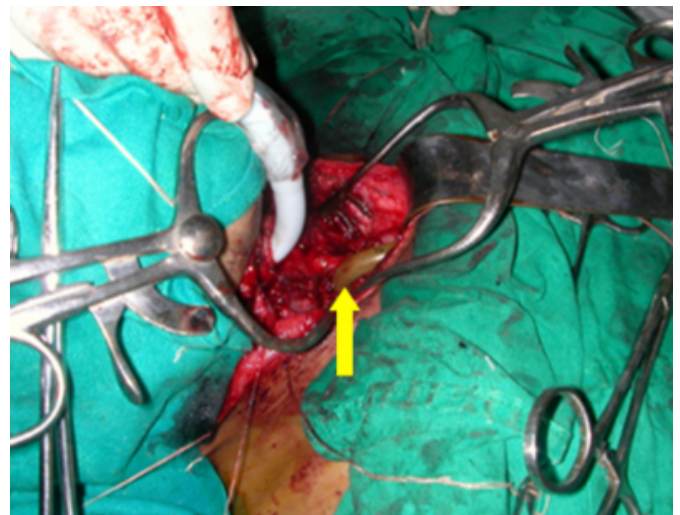


Figure 3

Figure 3: Armored tube is disconnected and RAE tube

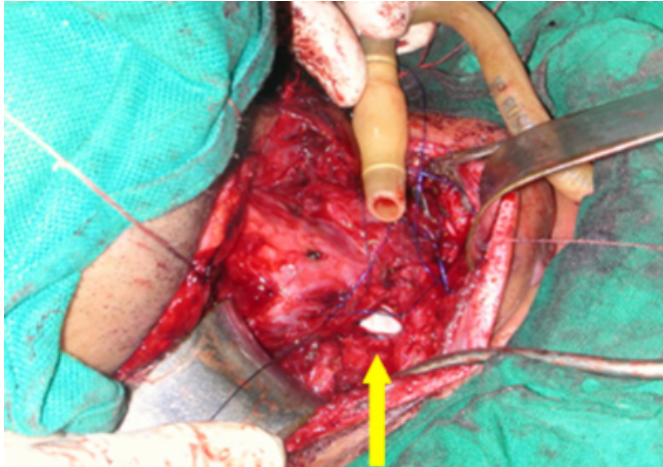


Figure 4

Figure 4: Mentum stitch taken in position of head flexion.



DISCUSSION

Technical limitations to the performance of tracheal surgery can now be overcome by careful preoperative delineation of the site and degree of obstruction^{1,2}, close intraoperative communication amongst the anaesthesiologist and surgeon, improved anaesthetic management techniques and meticulous postoperative care. A variety of methods to provide adequate oxygenation and carbon dioxide elimination during tracheal resection have been described. These can be divided into five approaches:

- Standard orotracheal intubation³.
- Insertion of a tube into the opened trachea distal to the area of resection^{3,4,5}.
- High frequency jet ventilation through the stenotic

area^{6,7}.

- High frequency positive pressure ventilation^{8,9}.
- Cardiopulmonary bypass¹⁰.

Beyer and Wilson³ reported on various combinations of right thoracotomy, cervical incision and median sternotomy approach using the orotracheal tube technique. Boyan and Privitera⁴ preferred median sternotomy technique but used a cuffed endotracheal tube into distal tracheal stump while Neville et al⁵ preferred using endobronchial tubes. It is apparent that the conventional techniques of airway management for tracheal resection are fraught with hazards.

High frequency ventilation^{6,7,8,9} would be preferred in children. Cardiopulmonary bypass¹⁰ is usually resorted to in airway management approaches for tracheal resection techniques in neonates.

During operation a slight head down tilt helps to minimize aspiration of blood and secretions. Intermittent sighs help prevent bronchiolar obstruction and atelectasis^{3,4}. A high FIO₂ is used, as oxygen filled functional residual capacity permits a few extra minutes to correct relatively common episodes of airway obstruction and/or tube displacement. Ventilation is continuously monitored by pulse oximetry, capnography, auscultation and observation of chest and arterial blood gas determinations. Several different sizes of endotracheal tubes must be available for use throughout the procedure^{7,8}. If ventilatory support is necessary postoperatively, the endotracheal tube must be positioned so that the cuff does not rest on any suture line.

In our case we resorted to initial passage of an endotracheal tube through the tracheostomy site distal to the area of resection and this was followed by nasotracheal passage of another endotracheal tube. Utmost care was taken to prevent aspiration of blood and secretions. In conclusion, our experience with this patient suggests that successful outcome is possible with safe and efficient intraoperative measures along with good postoperative therapy. However patients need intensive monitoring in the intraoperative and postoperative period.

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References

1. Classification of laryngotracheal stenosis. *Laryngoscope* 1992; 102:1335-40.
2. Chronic laryngeal stenosis. *Annals of Otolaryngology & Laryngology* 1985; 94:108-113.
3. Beyer PY, Wilson RS. Anesthetic management of tracheal resection and reconstruction. *Journal Cardiol Anesth* 1988; 2:821.
4. Boyan PC, Privitera PA. Resection of stenotic trachea, a case presentation. *Anesthesia Analgesia* 1976; 55:191.
5. Neville WE, Blanowski PJP, Kotis GG. Clinical experience with the silicone trachea prosthesis. *J Thorac Cardiovasc Surg* 1990; 99: 604.
6. Ellis RH, Hinds CJ, Gadd LT. Management of anaesthesia during tracheal resection. *Anaesthesia* 1976; 31:1076.
7. Baraka A. Oxygen jet ventilation during tracheal reconstruction in patients with tracheal stenosis. *Anesthesia Analgesia* 1977; 56:429.
8. El-Baz N, Holinger L et al. High frequency positive pressure ventilation for tracheal reconstruction by tracheal T-tube. *Anesthesia Analgesia* 1982; 61:796.
9. 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.
10. Benca JF, Hickey PR, Dornbusch JN et al. Ventilatory management assisted by cardiopulmonary bypass for distal tracheal reconstruction. *Anesthesiology* 1988; 68:270.

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