Case Report

Use of Bronchial Blocker in Resection of Tracheal Tumor Through Right Thoracotomy Approach

Hemlata Kapoor[1], Priya Gupta[1], Mohan Terdal[1], Manish Jethani[2]

Department Of [1]Anaesthesiology; [2]Surgical Oncology, Kokilaben Dhirubhai Ambani Hospital and Research Institute, Mumbai, India

ABSTRACT

Background: Tracheal resection and anastomosis in adults is usually carried out for stenosis due to various pathologies or for neoplasms obstructing the tracheal lumen. Strategies for airway management during tracheal tumor resection vary depending on the nature, growth pattern and tumor location as well as the degree of airway obstruction and also the surgical approach.

Case Presentation: A 55 year old female presented with cough, expectoration and hemoptysis since 3 months. Computerized tomography of the thorax reported a small enhancing lesion measuring 7.4X5.3X7.6mm on the posterior aspect of the trachea at the level of Thoracic 3 vertebra. The surgical approach was through right posterolateral thoracotomy incision. Hence an EZ bronchial blocker was placed through an endotracheal tube for lung isolation. The distal end of the tube was placed proximal to the tumor and resection was done by providing intermittent apnea.

Conclusions: Anesthesia for tracheal resection and reconstruction is technically challenging. Every tracheal resection requires specific anesthesia and airway maintenance strategy.

Key Words: Airway management, Endotracheal anesthesia, Tracheal neoplasm.

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Corresponding Author: Hemlata Kapoor, MD; Department Of Anaesthesiology Kokilaben Dhirubhai Ambani Hospital and Research Institute Mumbai, India, **Tel.:** +9321313799, **E-mail:** h_sarinkapoor@hotmail.co.uk

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INTRODUCTION

Tracheal resection and anastomosis in adults is usually carried out for stenosis due to various pathologies or for neoplasms obstructing the tracheal lumen. Besides the preoperative diagnostic workup, extensive preoperative planning and close communication between the anesthesia and surgical team are essential for a smooth conduct of anesthesia and surgery. Endotracheal intubation, jet ventilation and cross-field ventilation are the most commonly used techniques for accessing airway for ventilation[1]. Supraglottic airway devices and extracorporeal membrane oxygenation (ECMO) are the newer techniques being used for these surgeries[2-5]. The primary aim of anesthesia in these patients is to maintain the airway, satisfactory gas exchange and ensure good surgical exposure of trachea.

Strategies for airway management during tracheal tumor resection vary depending on the nature, growth pattern and tumor location as well as the degree of airway obstruction and also the surgical approach. We report our experience with successful management of lower tracheal malignancy in which a bronchial blocker through the endotracheal tube (ETT) was used for lung isolation (Figure 1).

CASE PRESENTATION

A 55 year old female 72kg known case of Diabetes Mellitus presented with cough, expectoration and hemoptysis since 3 months.

Fibreoptic bronchoscopy reported a 2-3mm wide and 12-15mm long growth arising from membranous trachea on the left side of the lower part of trachea which bled slightly on touch. Computerized tomography of the thorax reported a small enhancing lesion measuring 7.4X5.3X7.6mm on the posterior aspect of the trachea at the level of Thoracic 3 vertebra. Rest of the trachea and the main bronchi were reported to be normal. Pulmonary function test reported early airway disease, forced vital capacity 84% and forced expiratory volume1 85%. Routine blood investigations, 2D Echocardiogram and the Chest *X*-Ray were normal.

In the operation theatre routine monitors including electrocardiograph, pulse oximeter and non-invasive blood pressure monitor were attached. Before induction of anesthesia, fibreoptic bronchoscopy was performed again to confirm the exact location and extent of the tumor. Anesthesia was induced with intravenous midazolam, fentanyl and propofol as per body weight. After confirming

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adequate face mask ventilation intravenous atracurium was given and tracheal intubation was carried out with a size 7.5 single lumen cuffed ETT. Anesthesia was maintained with oxygen + air + sevoflurane and atracurium and fentanyl infusions. Right radial artery was cannulated for invasive blood pressure monitoring. An EZ-blocker 7 Fr (RUSCH® EZ-Blocker™ 7F) which is a Y-shaped semi rigid endobronchial blocker was placed and positioned under guidance of flexible bronchoscope (AmbuR aScope™ 4 Broncho Slim 3.8/1.2) with the extensions in left and right main bronchus. Bronchial cuff inflation was confirmed by direct visualization via the flexible bronchoscope. Lung isolation was confirmed on auscultation. Placement of the distal end of the endotracheal tube was proximal to tumor mass which was also confirmed with the flexible bronchoscope. The patient was positoned in the left lateral decubitus and lung isolation was reconfirmed. The surgical approach was through right posterolateral thoracotomy incision with partial cut of serratus anterior muscle at the 4th Intercostal space. The blocker in the right main bronchus was inflated. One lung ventilation to left lobe was carried out. The patient tolerated one lung ventilation throughout the procedure and the pulse oximetry showed saturation between 96 to 100% throughout the procedure. Once the surgical dissection was done, fibreoptic bronchoscopy was repeated to mark the exact level for wedge resection. Wedge resection of the tumor and suturing was done under intermittent apnea. Air leak was checked by looking for bubbling from the resected site during hand ventilation. After hemostasis the bronchial blocker cuff was deflated and right lung ventilation was resumed. The patient was placed in supine position and the bronchial blocker was removed. Inspired and expired tidal volumes during volume control ventilation were compared to check for any air leak. After adequate reversal the trachea was extubated. The patient was comfortable post extubation and shifted to the intensive care unit for observation. All the vital parameters were stable throughout the procedure. Postoperative pain was managed by intercostal nerve block and fentanyl infusion.

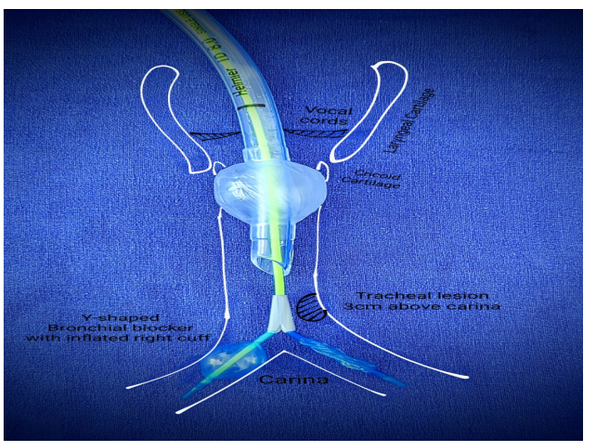

Fig. 1: Placement of bronchial blocker through the endotracheal tube.

DISCUSSION

Tracheal resection and reconstruction is a challenging operation for both the surgeon and the anesthetist. The three broad steps in this surgery are tracheal dissection, mobilization of the trachea and tracheal resection followed by anastomosis. Tracheal tumor resection is the best therapeutic method for the treatment of primary tracheal tumor.

Tracheal tumors frequently present with cough and occasionally hemoptysis[1]. Dyspnea at rest, wheezing and stridor appear only when the tracheal lumen is narrowed to 5-6mm in diameter[1]. Hence during pre-anesthetic evaluation, special attention should be paid to the airway and pulmonary systems. In these patients after induction of anesthesia, tracheal tumors can lead to severe tracheal obstruction due to the loss of muscle tone and repositioning of tumor mass in tracheal lumen. Hence it is important to consider possible complications and prepare airway management options based on specific individual conditions and tumor characteristics.

Tracheal resection and reconstruction for both pediatric and adult patients are carried out in our institute. Majority of these resections are through low transverse cervical incision and often involve suprahyoid release for providing sufficient length for tracheal anastomosis[1,6]. Occasionally upper midline sternotomy is required. In this patient right thoracotomy approach was planned since the lesion was close to the carina.

Preoperative sedation is avoided in patients with critical narrowing[1]. If the lesion does not compromise the tracheal lumen a standard ETT can be placed, else a smaller sized ETT has to be placed as per the size of the tracheal lumen. Since right thoracotomy approach was planned we used a bronchial blocker to provide collapse of the right lung for surgical approach. For thoracic surgeries, effective pulmonary collapse is required for good visualization and exposure. Another option was placement of a double lumen tube (DLT). DLTs are considered gold standard for one lung ventilation[7]. Placement of right sided DLT is more challenging due to potential early emergence of right upper lobe. A double lumen tube would have to be removed and repositioned repeatedly for tracheal resection and suture placement. Intraoperatively, under fibreoptic guidance it was observed that the tumor with adequate margin could be removed by wedge resection. Hence there was no need for removal of entire tracheal ring and therefore cross field ventilation was not required. Since the ETT was placed above the site of the lesion, the resection and anastomosis could be performed during intermittent apnea without removing the ETT periodically for resection and suture placement.

The use of supraglottic airway devices is on the rise in tracheal resections[2]. They have the advantage of less

mucosal trauma, reduced airway manipulation and less airway irritation on emergence from anesthesia. Use of extracorporeal membrane oxygenation (ECMO) has also been described in literature. However it has its own set of complications like hemorrhage, embolism, infection, etc. and should be used judiciously[2]. High frequency jet ventilation is also used effectively in tracheal resections especially in patient with narrowed tracheal lumen[8].

Unless contraindicated, extubation is carried out on table as ETT in the trachea and mechanical ventilation can lead to anastomotic failure[2]. Emergence and extubation are critical steps in these surgeries. Reversal should be complete and sufficient time should be provided for emergence from anesthesia. Patient should be well oxygenated with mask and coughing and straining should be avoided. If reintubation is required, it should be done with a smaller sized ETT and flexible bronchoscopy should be performed as early as possible to find the exact cause leading to reintubation[9]. Tracheostomy distal to the site of anastomosis is sometimes carried out as part of this procedure.

CONCLUSION

Anesthesia for tracheal resection and reconstruction is technically challenging. Every tracheal resection requires specific anesthesia and airway maintenance strategy. The surgical techniques and anesthesia modalities keep getting refined as newer techniques get incorporated. Newer techniques like supraglottic airway devices and ECMO have been reported which offer potential advantages. However a larger study group is required before accepting these in routine practice.

LIST OF ABBREVIATIONS

ECMO: Extracorporeal membrane oxygenation; **ETT:** Endotracheal tube; **DLT:** Double lumen tube.

CONFLICT OF INTERESTS

There are no conflicts of interest.

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