Case Report

Endoscopic Resection of Tracheal Tumor in an Elderly Woman Under Extracorporeal Membrane Oxygenation†

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1. Introduction

Primary tracheal tumors typically present during the sixth or seventh decade of life. Management of these tumors includes surgical resection, radiotherapy, and therapeutic bronchoscopy. Patients who undergo tracheal tumor resection often present with a considerable degree of airway obstruction making anesthetic management of these patients with difficult airway challenging. Herein, we report on our experience in using extracorporeal membrane oxygenation (ECMO) in a patient under general anesthesia during electrocautery resection for a large tracheal tumor with severe tracheal stenosis.

2. Case Report

A 71-year-old woman with a history of smoking 1 pack/d over 40 years and chronic cough presented to our hospital with a 6-month history of dyspnea, sleep deprivation, and weight loss. Lung function tests revealed chronic obstructive pulmonary disease (COPD). The patient was treated medically. At 3-month follow-up, however, she presented with inspiratory and expiratory stridors (COPD). The patient was treated medically. At 3-month follow-up, however, she presented with inspiratory and expiratory stridors and progressively worsening dyspnea. Chest computed tomography scan revealed a lobulated pedunculated tracheal mass measuring 16 mm × 15 mm × 35 mm (Fig. 1). The patient was admitted for further evaluation and treatment.

A bronchoscopic examination was performed with a fiberoptic bronchoscope with an external diameter of 6.0 mm and a 2.8 mm working channel (Olympus BF TYPE 1T260; BF-1T260, Olympus, Tokyo, Japan). The examination revealed a polyp-like tumor measuring approximately 4 cm in diameter located 2.5 cm below the vocal cord (Fig. 2). Although the patient had been premedicated with intravenous midazolam 5 mg and lidocaine spray before the examination, the patient tolerated the procedure poorly and further tumor manipulation was suspended. It was decided that the procedure should be performed with the patient under general anesthesia; however, because of the possibility of ventilation failure after the induction of anesthesia as well as the possibility of surgical bleeding, which could further obstruct the airway, the patient was placed on ECMO before the induction of anesthesia. A chest surgeon was informed and was available in a nearby operating room in case surgical resection of the tumor or tracheal intervention. Herein, we report on a 71-year-old woman with a large tracheal tumor occluding approximately 90% of the tracheal lumen. Extracorporeal membrane oxygenation under local anesthesia was used during electrocautery resection of the tumor because of the possibility of fatal airway collapse due to the degree of occlusion and location of the tumor. After the tumor had been successfully resected by means of bronchoscopy, an endotracheal tube was inserted, and the patient was weaned from extracorporeal membrane oxygenation.

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was administered. During fiberoptic bronchoscopic manipulation, the tumor tended to bleed on contact. Therefore, the tumor was debulked and a cuffed endotracheal tube (internal diameter, 5.0 mm) was inserted to prevent further blood aspiration. After the endotracheal tube had been placed and positive pressure ventilation had been achieved, the depth of anesthesia was deepened with volatile anesthetics. Tumor resection proceeded uneventfully. At the end of the operation, the endotracheal tube was changed to one with an internal diameter of 7.5 mm. The patient was then weaned successfully from ECMO and was transferred to the intensive care unit for postoperative care. The tumor was confirmed histopathologically to be squamous cell carcinoma.

3. Discussion

Although they account for only 0.1%–0.4% of all airway malignancies, the vast majority (90%) of primary tracheal tumors are malignant2. Primary tracheal squamous cell carcinoma has a male predominance and typically presents during the sixth and seventh decades of life1. Tracheal squamous cell carcinoma can spread throughout the trachea and has a tendency to metastasize distantly. The 5-year survival rate of patients with resected squamous cell tumors is 39%, whereas that of patients with unresected tumors is only 7%2. Although resection greatly improves prognosis, the anesthetic management of patients with tracheal tumors is challenging.

Patients with tracheal tumors typically present with symptoms and signs of airway obstruction such as cough, hemoptysis, dyspnea, wheezing, and stridor and are, therefore, usually misdiagnosed as having asthma or COPD. If symptoms of dyspnea and wheezing cannot be resolved with bronchodilators or other classic treatment of asthma or COPD, other etiologies should be considered.

When managing patients with tracheal tumors, the method of anesthesia depends on the degree of obstruction, the size, and the location of the tumor. Ovassapian3 reported that difficult airway should be managed initially with fiberoptic bronchoscopy. Chen et al.4 reported positioning an endotracheal tube under bronchoscopic guidance in a patient under mild sedation to manage severe airway obstruction resulting from tracheal neurofibroma; cardiopulmonary bypass (CPB) was on standby if needed.

CPB has been reported to be very effective during resection of tracheal tumors. Goyal et al.5 reported successfully treating a patient with a tracheal tumor occupying about 90% of the tracheal lumen by surgical excision under femoral-femoral CPB. Byrne et al.6 concluded that the planned use of CPB is safe for complete resection of thoracic malignancies and in the event of injury to vascular structures during tumor resection. In our patient, the tracheal lumen was almost totally occluded and there was a good possibility that active contact bleeding would be encountered. Therefore, CPB under local anesthesia was established before the surgery to ensure adequate oxygenation in the event that the airway could not be kept patent.

Anticipated difficult airway can also be managed with conventional means, including retrograde intubation, tracheostomy, and percutaneous transtracheal jet ventilation7. In our patient, however, tracheostomy and retrograde intubation were deemed to be too hazardous because of the size of the tumor and its location. Complete upper airway obstruction has been reported to be a contraindication for percutaneous transtracheal jet ventilation6,9. Distal dislodgement of tracheal tumor mass can happen anytime during mechanical ventilation and may compress the airway. Furthermore, barotrauma or pneumothorax can occur because of increased intrathoracic pressure8,9.

Many reports have indicated that the use of CPB with heparin can result in excessive intraoperative bleeding10,11. Partial heparinization and heparin-coated circuits have been reported to lessen the amount of bleeding12,13. The hemostatic problems associated with CPB also can be reduced with platelet inhibitors, protease inhibitors, or an anticoagulant with a very short half-life14.

4. Conclusion

A tracheal lumen that is almost totally occluded by a tumor can result in difficult airway and progress to severe respiratory distress or life-threatening conditions when intubation or surgical intervention
is attempted. Careful preoperative evaluation, aggressive monitoring, and advanced oxygenation support are essential. CPB should be established to ensure adequate oxygenation before the surgery. Even if traditional methods of managing the airway are used as a primary strategy, CPB should be on standby for an emergency.

References