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Case Report
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Tracheal Mucoepidermoid Carcinoma Surgery Using Percutaneous Cardiopulmonary Support

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Abstract

We present tracheal mucoepidermoid carcinoma surgery using percutaneous cardiopulmonary support.

A 20-year-old female presented with a three-year history of wheezing and dyspnea attacks that progressively worsened. Initially diagnosed as having asthma, the patient responded poorly to bronchodilators and systemic corticosteroids. Computed tomography revealed a tracheal tumor obstructing approximately 90% of the trachea at the level of the sternal notch and subcutaneous emphysema. As dyspnea worsened after hospitalization, we performed emergency surgery. Percutaneous cardiopulmonary support was established before collar incision of the neck for airway management. The patient underwent open partial tracheal resection and reconstruction under bronchoscopy guidance. The tumor was diagnosed as mucoepidermoid carcinoma of the trachea. Although the surgical margin was negative, adjuvant radiation therapy was provided. Eight-year post-resection surveillance bronchoscopy demonstrated no recurrence of the tumor. Primary salivary-gland tumors of the trachea are extremely rare. Percutaneous cardiopulmonary support enables an uneventful and successful operation.

Keywords: Mucoepidermoid carcinoma; Percutaneous cardiopulmonary support; Tracheal carcinoma

Introduction

Primary carcinoma of the trachea is an extremely rare disease [1-3]. Most patients with primary carcinoma of the trachea have a several-year treatment history for bronchial asthma and often present with significant airway obstruction at the time of diagnosis, thus requiring immediate medical treatment. Percutaneous Cardiopulmonary Support (PCPS) is used as an emergency procedure for acute respiratory insufficiency [4]. The device for PCPS is smaller than a conventional cardiopulmonary bypass pump used for open heart surgery, and is easy to insert.

Case Presentation

A 20-year-old female was referred to our institution for dyspnea on exertion. The patient had been undergoing treatment for bronchial asthma. She responded poorly to bronchodilators and systemic corticosteroid use for three years. She was admitted for significant dyspnea and wheezing. She had no history of smoking. Physical examination revealed the following: she was alert and oriented; respiratory rate, 18 per minute; heart rate, 110 beats per minute and regular; blood pressure, 120/70 mmHg; temperature, 37.1°C; and arterial oxygen saturation, 97% (indoor). Subcutaneous emphysema was identified from the neck to the chest. Blood gas analysis demonstrated a pH of 7.369, PO2 of 66.5 torr, and PCO2 of 55.5 torr, which confirmed hypercapnia.

Chest radiography revealed significant subcutaneous emphysema (Figure 1). An 18-mm tracheal tumor at the level of the sternal notch was observed on chest CT (Figure 2). The tumor occupied approximately 90% of the tracheal lumen, and there was no obvious tumor invasion outside the trachea. Significant mediastinal emphysema and subcutaneous emphysema were observed. The fixed upper airway obstruction pattern was noted on the flow-volume loop one year before surgery (Figure 3). Based on the CT observation of advanced airway obstruction, bronchoscopy was not performed given the risk of asphyxiation due to bleeding. A localized tracheal tumor was diagnosed, and surgery as a radical treatment was performed. First, cannulation of the femoral artery and vein was carried out in the right groin area, and the PCPS was prepared under local anesthesia. General anesthesia was induced, and a 5-cm cervical collar incision was made while the patient was in the supine position. We found no spreading of the tracheal tumor into surrounding areas. After the

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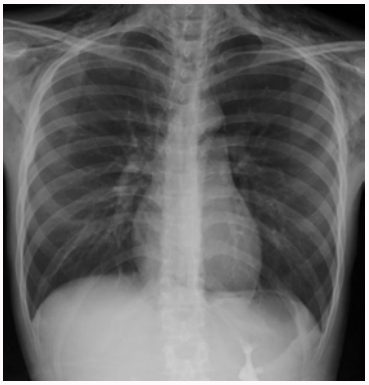

Figure 1: Chest radiograph showed subcutaneous emphysema.

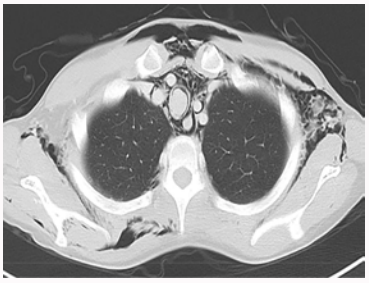

Figure 2a: Chest computed tomography showed an obstructive tumor in the trachea.

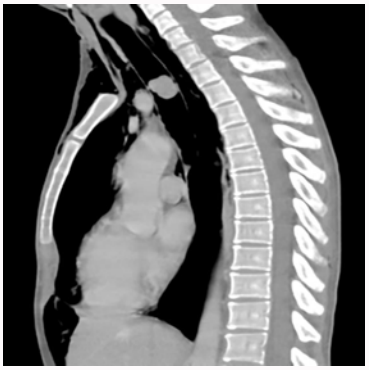

Figure 2b: Tracheal tumor at the level of the sternal notch was observed on chest computed tomography.

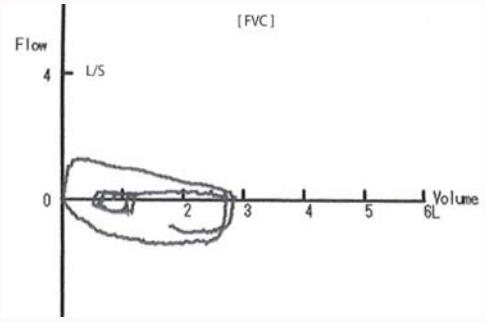

Figure 3: The flow-volume loop showed the fixed upper airway obstruction pattern one year before surgery.

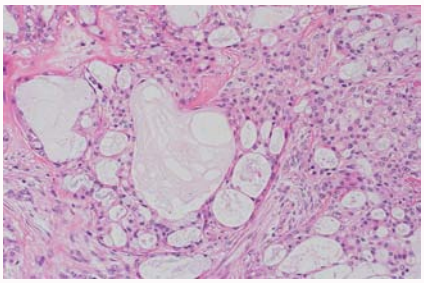

Figure 4a: Hematoxylin and eosin staining (x10) revealed mucus-producing cells alternating with islands of squamous cells.

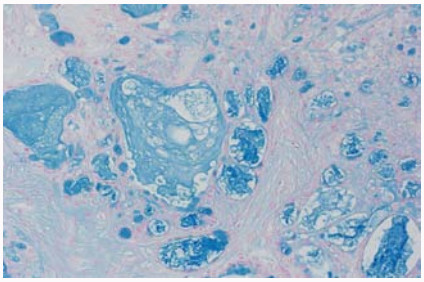

Figure 4b: Alcian Blue staining (x10) were focally positive in areas of glandular differentiation.

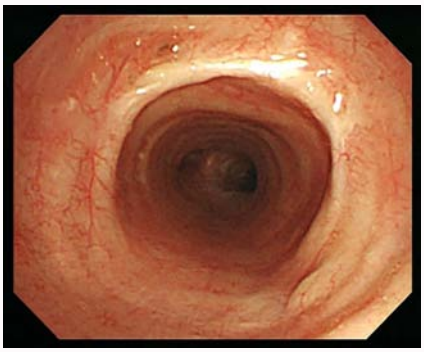

Figure 5: Bronchoscopy findings showed no recurrence of the tumor eight year after surgery.

periphery was incised, cannulation of the trachea was performed from the operative field. However, as cause-unknown hypoxemia occurred, we performed PCPS auxiliary circulation by removing blood from the femoral vein and routing it to the femoral artery. The patient immediately recovered from hypoxemia, and after we finished the tracheal tubular resection, the ends were anastomosed with 3-0 absorbable, monofilament sutures. As there was no lymph node swelling noted during the operation, lymph node dissection was not performed. The resected portion of the trachea measured 1.8 cm, with three cartilaginous rings. The surgical time was 130 min and the estimated intraoperative blood loss was 118 g.

The pathological findings were as follows: Hematoxylin and eosin staining revealed mucus-producing cells alternating with islands of squamous cells. Alcian Blue staining were focally positive in areas of glandular differentiation (Figure 4). The tumor was diagnosed as mucoepidermoid carcinoma of the trachea. The patient's subsequent course was favorable, and they were discharged on postoperative day 7. Eight-year post-resection surveillance bronchoscopy demonstrated no recurrence of the tumor (Figure 5).

Discussion

Primary carcinoma of the trachea is not common. Most primary

cervical tracheal tumors are malignant: adenoid cystic carcinoma (3% to 55%), squamous cell carcinoma (18% to 33%), and adenocarcinoma (4% to 10%) [5-7]. Mucoepidermoid carcinoma of the trachea is extremely rare. Mucoepidermoid tumors originate from the serous and mucous glands of the upper airways or salivary glands. These tumors are rare and generally discovered in the young population. In general, these tumors produce symptoms of upper respiratory tract obstruction such as dyspnea, cough, and wheezing, Asthma may be mistakenly diagnosed in young patients and in older patients with chronic pulmonary obstructive disease [8,9]. The clinical course of MEC correlates with the histological grade. The five-year survival rate among individuals diagnosed with high-grade malignancy is 31%. Low-grade malignancies present localized growth, rarely affect the lymph nodes, and are easily resected. Complete resection is the treatment of choice for mucoepidermoid carcinoma, and the five-year survival after resection can be as high as 80% [10]. The roles played by radiotherapy and chemotherapy, before or after surgery, have yet to be established [11].

Surgical resection is the first choice of treatment for tracheal tumors. Maintenance of proper oxygenation during surgery on the upper airway is of the utmost importance. In the present case, we performed PCPS given the risk of airway obstruction due to even slight retroflexion of the neck. PCPS can be inserted within a few minutes, and is a highly efficient extracorporeal circulation system. With PCPS, venous blood is drained via the subcutaneous insertion of a cannula from the femoral vein to the right atrium, gas exchange is performed using a membrane oxygenator, and blood is delivered to the arterial system via an inflow cannula. PCPS is associated with a risk of hemorrhage as it requires systemic heparinization. However, intraoperative bleeding rarely becomes an issue as it is minor during typical tracheoplasty. In the present case, most of the bleeding occurred when removing the PCPS cannula from the femoral artery and vein. The surgical approach for the tumor was determined based on the location of the tumor. As it was limited to the sternum notch, we decided that surgery via cervical collar incision alone was appropriate for this case. We had also planned to convert to median sternotomy if the surgical procedure became difficult via the cervical collar.

Patients with tracheal tumors are often diagnosed with bronchial asthma. Spirograms are used to evaluate the degree of asthma. The presence of carcinoma of the trachea should be suspected when a fixed upper airway obstruction pattern is observed in the flow-volume loop on a spirogram. However, the fixed upper airway obstruction pattern may not be apparent when patients do not have high-grade stenosis. For early detection of tracheal tumors, CT should be performed when a patient presents with treatment-resistant asthma.

Conclusion

In conclusion, we presented the case of a very rare tracheal mucoepidermoid carcinoma. Surgery was performed safely with the use of PCPS. Tracheal tumors are difficult to diagnose with chest X-ray; thus, CT should be performed for patients who are resistant to treatment. It is also important to detect the fixed upper airway obstruction pattern in the flow-volume loop.

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