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Post-Lobectomy Tracheal Metastasis of Stage Ib Lung Cancer

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ABSTRACT

Background: Endotracheal/endobronchial metastases represent an extremely rare category of diseases, lacking population-based incidence studies. These metastases are generally classified into two types: pulmonary and nonpulmonary. Pulmonary metastases are considerably rarer than their nonpulmonary counterparts.

Case Report: We present a rare case of tracheal metastasis, diagnosed during a follow-up two years after the anatomical resection of early-stage lung cancer. This case was successfully treated.

Conclusion: Tracheal metastases after lung cancer surgery are exceedingly rare. Patients often exhibit radiological findings before becoming symptomatic. Therefore, bronchoscopic evaluation is recommended when radiological and clinical suspicions arise.

Keywords: Cryotherapy, lung cancer, tracheal metastasis, tracheal tumor, surgical treatment.

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INTRODUCTION

Endobronchial/endotracheal metastases (EEMs) are bronchoscopically visible tumors in segmental or more central airways, exhibiting histopathological characteristics identical to the primary cancer. EEMs, which are quite rare, result from either pulmonary or nonpulmonary malignancies.[1]

Metastases of pulmonary origin are less common. In contrast, nonpulmonary metastases occur in 2–50% of breast, colon, and kidney cancer cases. Literature on EEMs following primary lung cancer surgery primarily consists of case reports.[2]

Due to the limited number of patients and studies, there is insufficient information regarding the clinical management, optimal treatment options, treatment outcomes, and survival rates of these patients.

CASE REPORT

A 61-year-old Asian male with no known prior diseases presented to our clinic with hemoptysis. He had a 30 pack-year smoking history. Chest tomography revealed a 1.5 cm mass with endobronchial

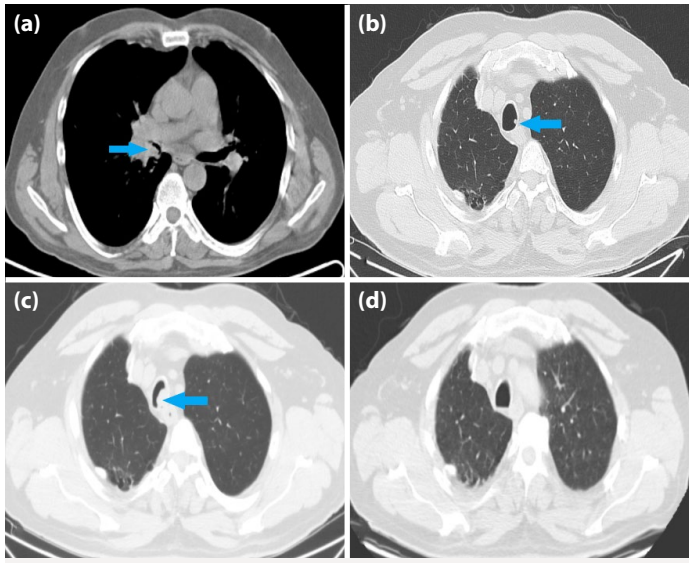

Figure 1. (a) Chest tomography showing a lesion at initial admission. **(b)** A lesion approximately 2 mm in diameter observed in the postoperative 1-year follow-up. **(c)** Tracheal metastasis observed in the 2-year follow-up chest tomography. **(d)** Chest CT image post-cryotherapy.

extension at the junction between the right lower and middle lobes (Fig. 1a). Rigid bronchoscopy identified a lesion originating from the apical segment of the right lower lobe, extending to the right main bronchus. The patient underwent mechanical tumor resection (MTR) with argon plasma coagulation (APC) at a power setting of 60 W in the same session. The procedure was completed without complications. Pathology reported the lesion as squamous cell carcinoma, and the patient was scheduled for surgery. A Positron Emission Tomography-Computed Tomography (PET-CT) showed no involvement except for the 1.5 cm lesion at the same anatomical location (Maximum Standardized Uptake Value (SUV_{max}): 9.54). A right thoracotomy with inferior bilobectomy and systematic lymph node dissection was performed. No additional chemoradiotherapy was planned, as the final surgical staging was stage Ib. The patient's follow-up period was three months. The initial controls included bronchoscopy and chest tomography imaging, where the stump location and trachea were evaluated as normal.

At the 1-year follow-up, the patient, who had no complaints during this interval, underwent chest tomography. The imaging revealed an appearance with a 2 mm diameter, consistent with secretion in the lower third of the trachea (Fig. 1b). The 2-year follow-up chest tomography showed a lesion approximately 2 cm in diameter, obstructing half of the tracheal cross-sectional area at the location previously thought to be secretion (Fig. 1c). This lesion, originating from the right lateral trachea, was visualized

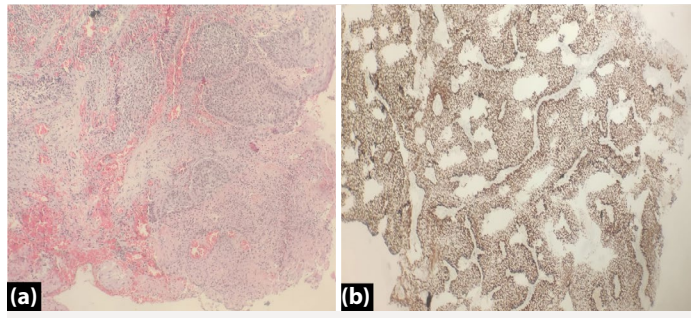

Figure 2. (a) Squamous cell carcinoma in the inferior bilobectomy material. **(b)** Squamous cell carcinoma in the tracheal lesion cryobiopsy material.

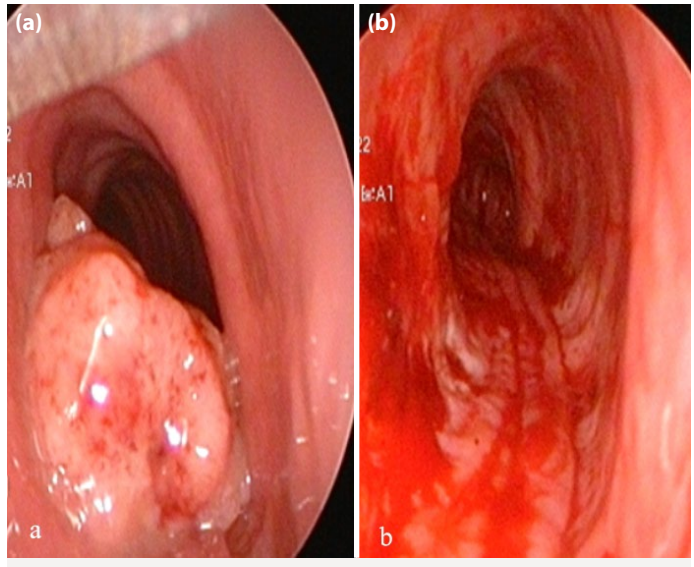

Figure 3. (a) Bronchoscopic view of the tracheal metastasis. **(b)** Bronchoscopic view post-cryotherapy.

by flexible bronchoscopy (FOB), and biopsy samples were taken (Fig. 1d). The pathology result confirmed squamous cell lung cancer (Fig. 2a, b). The patient was referred to the interventional pulmonology clinic. The endotracheal lesion was completely excised during the intervention, which was performed after the patient was evaluated and found eligible for cryotherapy (Fig. 3a). No complications were observed following the procedure.

The patient was referred to the radiation oncology department and evaluated as suitable for radiotherapy. He received intensity-modulated radiation therapy (IMRT) at a dose of 200 cGy per fraction, totaling 5,000 cGy in 25 fractions.

The 3-month post-treatment PET-CT scan revealed no residual tracheal lesion, no involvement of mediastinal lymph nodes, and no signs of metastasis (Fig. 3b). Additionally, no endo-

bronchial lesion was visualized in the patient when assessed with FOB. Consequently, tracheal segment resection or any additional intervention was not deemed necessary. The patient, now in the third year of follow-up, remains alive and continues to be monitored every six months.

DISCUSSION

There is only one population-based incidence study of primary tracheal tumors in the literature, reporting a rate of 2.6 per 1,000,000 people, but no studies exist on EEMs.[3] EEMs are classified into two categories: pulmonary and nonpulmonary metastases, with pulmonary metastases being significantly rarer. The number of patients with EEMs who undergo anatomical resection for lung cancer is even lower, with the largest series in the literature comprising only six patients.[1]

Nonpulmonary EEMs are observed in 2–50% of breast, colon, and kidney cancer cases. Only one study reported an EEM incidence of 0.44 in patients with resected lung cancer. Notably, our patient represents a rare case of EEM following stage I lung cancer surgery.[1] This raises the question of whether tracheal metastases are independent of the cancer stage.

It is hypothesized that EEMs can develop in four distinct modes: Type I, direct metastasis to the bronchus; Type II, bronchial invasion by a parenchymal lesion; Type III, bronchial invasion by mediastinal or hilar lymph node metastasis; and Type IV, a peripheral lesion extending along the proximal bronchus. We believe that the patient in our case report corresponds to Type I.[4]

The clinical course of tracheal metastases varies depending on their location and the extent of obstruction. While cough, dyspnea, and hemoptysis are the main clinical symptoms, 20% of cases can be asymptomatic, as was observed in our patient.[5]

Chest X-rays and chest CT scans are basic radiological diagnostic approaches. Endotracheal nodules are often mistaken for endotracheal sputum (phlegm), referred to as mucoid pseudotumor.[6] This can lead to confusion, as it did in the case of our patient. Consequently, Chong et al.[1] have defined criteria that can aid in radiological differentiation. In such cases, bronchoscopy is considered the gold standard for diagnosis, and its use should not be hesitated to confirm the condition.

Salud et al.[7] suggested that primary tracheal tumors cannot be histopathologically differentiated from metastases. Although challenging and costly, certain techniques are currently employed for diagnosing this condition. In one case documented in the literature, genetic sequencing was used to confirm metastasis, revealing mutations in the Kirsten Rat Sarcoma Viral Oncogene Homolog (KRAS) and the Epidermal Growth Factor Receptor (EGFR) genes in both the primary and secondary lesions. In our patient's case, sequencing was not performed due to the associated costs.

The recurrence interval for EEMs in nonpulmonary cancers is reported to be 50.4–65.3 months, whereas it is 25.8 months in pulmonary cancers.[4,7,8] We share Chong et al.'s[1] view regarding the relatively shorter recurrence interval in pulmonary cancers. We believe this is due to the more frequent follow-up of pulmonary cancers, given their aggressive nature. In fact, our patient was diagnosed before becoming symptomatic.

There are various treatment options for EEMs, including tracheal resection and reconstruction, debulking surgery, cryotherapy, radiotherapy, and chemotherapy, as utilized in our patient's case.[9] Each technique has its own advantages and disadvantages. For patients who have previously undergone surgery for lung cancer, making individualized assessments appears to be the most appropriate approach.

CONCLUSION

In conclusion, careful follow-up is essential after lung cancer surgery. Since tracheal metastases are very rare, they may be overlooked in patient assessments. When evaluating airways, radiological images that could be misinterpreted as secretion should always be confirmed with bronchoscopy. Importantly, patients with EEMs can often be diagnosed radiologically long before they exhibit symptoms.

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