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Repeated tracheal resection for endotracheal metastasis after sleeve pneumonectomy for squamous cell lung cancer

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ABSTRACT

The incidence of endotracheal and endobronchial metastases of both pulmonary and non-pulmonary primary malignancies is very rare. However, endotracheal metastasis may occur either as a result of recurrent lung cancer or of non-pulmonary originated neoplasia. Furthermore, reoperation on the trachea is a rare and challenging procedure. We here report a case of endotracheal metastasis from a squamous cell lung carcinoma, after previous tracheal sleeve pneumonectomy, which was resected via a "T" neck incision. The thorough observation of the trachea and bronchial tree over a long follow-up period is crucial for the early detection of endobronchial or endotracheal metastatic disease. Also, reoperation on the trachea can be carried out successfully by experienced surgeons.

Key Words: *Lung cancer; sleeve pneumonectomy; tracheal surgery; endotracheal metastasis*

INTRODUCTION

Endotracheal or endobronchial metastasis is a rare and potentially life-threatening entity and only few cases have been reported in the existing literature [1-3]. It may occur as a result of recurrent lung cancer or as distant metastasis of non-pulmonary neoplasia. Even up to 26% of endotracheal or endobronchial metastases may be due to colorectal cancer [4,5]. In contrast to the non-pulmonary endobronchial metastases, whose frequency has been clearly stated, lung originated tracheal metastasis has not been adequately studied due to its rarity. We report a case of endotracheal metastasis from a T4 No Mo squamous cell lung carcinoma, which had been treated by right sleeve pneumonectomy.

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CASE REPORT

A 53-year-old male patient was admitted to our hospital after a two weeks' history of persistent cough and mild

haemoptysis, and a history of previous thoracotomy for lung carcinoma. He had been diagnosed with squamous cell lung carcinoma and had undergone surgical treatment with right tracheal sleeve pneumonectomy, without post-operative chemotherapy. The initial tumour was located in the right upper lobe and extended to the right main bronchus omitted in less than 1,5 cm from the carina. Typical carinal resection along with right pneumonectomy was performed, with proper mediastinal lymphadenectomy of all paratracheal and subcarinal nodes, was accomplished. The size of the tumour was 3 x 2,7 x 1,7 cm, and no lymph nodes or remote metastases were detected. Resection was R0 and according to the final histology report, the stage of the disease was, despite the relatively small tumour size, T4N0M0. Following a straight forward postoperative recovery, he remained asymptomatic until he developed persistent cough, haemoptysis and respiratory distress nine months after surgery. Computed tomography (CT) scanning and rigid bronchoscopy were performed (Figures 1, 2). A nodule of maximum diameter of 0,8 cm was found in the middle-lower part of the trachea. Biopsies of the lesion were obtained through bronchoscopy. The histopathological results were compatible with squamous cell carcinoma and the nodule was therefore related to the primary squamous lung cancer and considered as a tracheal metastasis. The patient underwent additional tracheal resection, via a neck "T" incision with an upper sternotomy until the manubrium, and two cricoid cartilages of the middle-distal trachea were removed, followed by an end-to-end anastomosis, using single 4-0 vicryl stitches (Figure 3, 4). Frozen section showed free resection margins and histopathology revealed a region of 5 mm maximal diameter with high-grade dysplasia of squamous cell epithelium and disruption of the respiratory epithelial lining. The patient had an uneventful recovery and remained free of disease for the subsequent nine months. Routine postoperative evaluation revealed contralateral lung recurrence and supraclavicular and cervical lymph node dissemination. He was subsequently treated as a N3 stage patient with external radiation and chemotherapy (12 cycles of paclitaxel/carboplatin and 12 cycles of gemcitabine/vinorelbine). The patient had a moderate response to the treatment and died three years later.

FIGURE 1. Sagittal plane of the computed tomography showing the endotracheal metastasis (arrow).

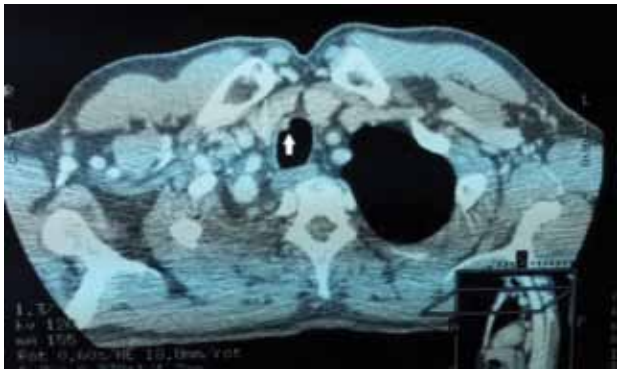

FIGURE 2. Transversal plane of the computed tomography showing the endotracheal metastasis (arrow).

DISCUSSION

Endotracheal or endobronchial metastatic disease can be a result of pulmonary or non-pulmonary neoplasias. The first report of endobronchial/endotracheal metastasis was published in 1971 by Schonbaum et al [6]. The incidence of metastases of non-pulmonary primary malignancies is 2-50% [4-8]. Carcinomas of the breast, kidneys, colon, uterus, the skin and sarcomas are the main primary tumours causing tracheobronchial metastases [8-11]. Trachea is involved in 0.5% of all the tumours of the tracheobronchial tree. There are only few cases of primary lung cancer endotracheal metastases reported in the current literature [1-3, 11-14], and only six reports as case series [2]. The majority of those cases were due to squamous cell carcinoma and nine cases of central type. Most of them have been traditionally treated with radiation therapy, chemotherapy, cryotherapy, brachytherapy and simple endoscopic resection, due to the coexistence of multiple synchronous metastases (lung parenchyma or

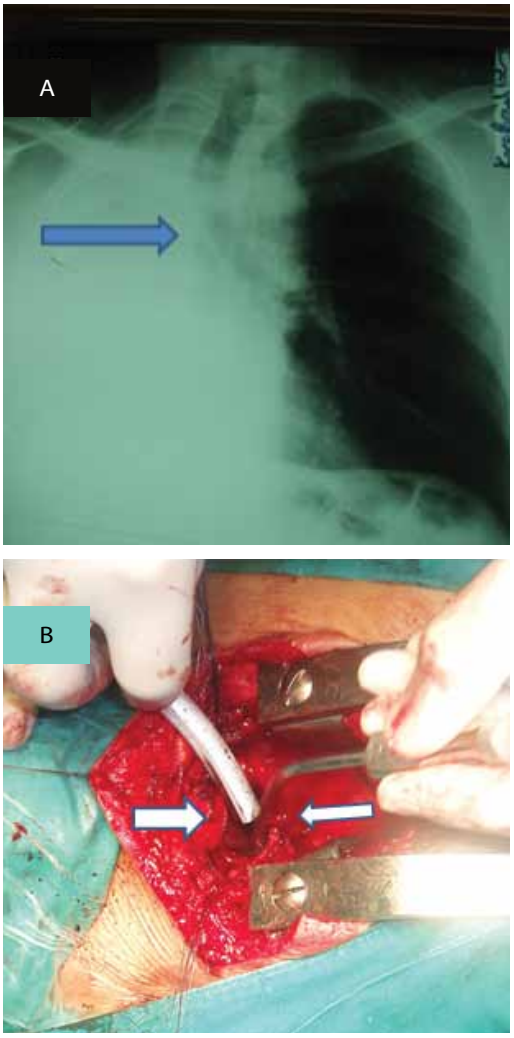

FIGURE 3. (A) Preoperative Chest X-ray after right sleeve pneumonectomy. Note the shift of mediastinum and the tracheal to left main bronchus anastomosis (arrow) made with 4-0 single vicryl stitches. (B) Operative illustration showing the tracheal edges after removal of the tumour (arrows). The two stumps were approximated with 4-0 vicryl stitches.

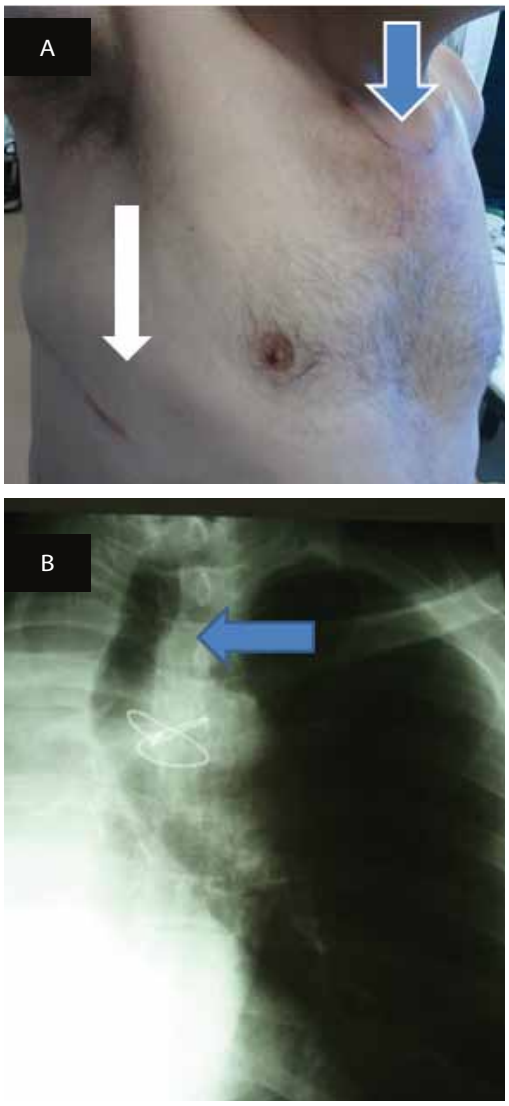

FIGURE 4. (A) Photo of the patient 3 weeks after second surgery, illustrating the two different incisions, thoracotomy for sleeve pneumonectomy (weight arrow) and "T" neck incision with partial upper minor sternotomy for resection of the endotracheal tumour (Blue arrow). (B) Chest radiography showing the tracheal anastomosis after tumour resection (arrow). Note the sternal figure of "8" wire for the approximation of the upper part of the sternum.

lymph node dissemination). Three of them were treated with tracheal resection and reconstruction with a recurrence interval of 8-52 months (mean 24,5 months). All cases were histopathologically identified as recurrences of known primary lung disease, except for 2 cases, where the tracheal metastasis revealed the disease [2]. A case of case of repeated endobronchial metastases of primary lung adenocarcinoma occurring 20 years after radical resection has also been reported [7]. The importance of the presence of lymphatic invasion in the primary tumour is also worth mentioning. In cases with negative lymph node metastasis, the time to recurrence is considered to be significantly longer compared to the positive cases [15]. Such patients with a history of lymphatic invasion present significantly higher recurrence rates than those without [1]. The prognosis of patients with endobronchial/endotracheal metastasis is generally considered poor [16]. Our case is to our knowledge the first documented case of tracheal sleeve pneumonectomy with tracheal recurrence, treated with additional tracheal resection and reconstruction, with the history of primary squamous lung cancer.

Cough, respiratory distress and haemoptysis are the most common symptoms of endotracheal metastases regardless of their primary origin [11]. CT scanning often reveals the presence of an endotracheal nodule or an

eccentric thickening of the tracheal wall. Additionally, virtual bronchoscopy with CT scanning of trachea can be a valuable diagnostic option for evaluation of tracheal tumours [17,18]. Fluorodeoxyglucose positron emission tomography (FDG-PET) has been suggested for the diagnosis of tracheal metastases and restaging of the disease [2,3]. Bronchoscopy performed by an experienced specialist could reveal the presence of small lesions. There are not any large series and long term results for none of the reported cases. Chong et al reported 6 cases of non-small cell lung cancer recurrence in the trachea. Five of those patients were treated with chemotherapy and radiation and only one with tracheal resection and end-to-end anastomosis [2]. All patients showed recurrence without exception. Radiation and chemotherapy resulted in a partial response slowing of the disease progression. There is no proven benefit of chemotherapy or radiation therapy over the surgical approach [2,16].

CONCLUSION

In conclusion, the incidence of endotracheal metastasis should always be considered in the differential diagnosis of respiratory symptoms in any patient with a positive history for malignancy, even after a long period after surgical treatment. Endoscopy and CT scanning can verify the diagnosis. Surgical approach is recommended and may improve survival for selected patients. Finally, as it was shown in our case, despite a previous carinal resection, reoperation on the trachea with additional cartilage removal can be safely performed by experienced surgeons. In all cases, a thorough and careful follow up is always recommended.

Ethical standards declaration: *Consent form: Was obtained from the patient for publication of this case report.*

Conflict of interest: *Authors report no conflict of interests.*

REFERENCES

1. Maki Y, Kimizuka Y, Sasaki H, Yamamoto T, Watanabe C, Sano T, et al. Lung adenocarcinoma with repetitive endotracheal/endobronchial metastasis 20 years after surgery: A case report. Thorac Cancer. 2021 Jan;12(1):133-6.
2. Chong S, Kim TS, Han J. Tracheal metastasis of lung cancer: CT findings in six patients. AJR Am J Roentgenol 2006 Jan;186(1):220-4.
3. Zhang Z, Mao Y, Chen H, Dong J, Yang L, Zhang L, et al. Endotracheal and endobronchial metastases in a patient with stage I lung adenocarcinoma. Ann Thorac Surg 2014 May; 97(5): e135-7.
4. Rosado Dawid NZ, Villegas Fernández FR, Rodríguez Cruz Mdel M, Ramos Meca A. Endobronchial metastases of colorectal cancer. Rev Esp Enferm Dig. 2016 Apr;108(4):232-3.
5. Serbanescu GL, Anghel RM. Can endobronchial or endotracheal metastases appear from rectal adenocarcinoma? J Med Life. 2017 Jan-Mar;10(1):66-9.
6. Schoenbaum S, Viamonte M. Subepithelial endobronchial metastases. Radiology 1971 Oct;101(1):63-9.
7. Rusca A, Carbognani P, Cattelani L, Spaggiari L, Solli P, Bobbio P. An uncommon indication for tracheal resection. J Cardiovasc Surg (Torino). 1996 Feb;37(1):89-91.
8. Marchioni A, Lasagni A, Busca A, Cavazza A, Agostini L, Migaldi M, et al. Endobronchial metastasis: An epidemiologic and clinicopathologic study of 174 consecutive cases. Lung Cancer 2014 Jun;84(3):222-8.
9. Kawahara K, Shiraishi T, Okabayashi K, Iwasaki A, Yoshinaga Y, Hayashi K, et al. Carinal resection and reconstruction for recurrent lung cancer. Surg Today 1997;27(2):163-5.
10. Oura S, Sakurai T, Yoshimura G, Tamaki T, Umemura T, Kokawa Y. Recurrent squamous-cell lung cancer treated with bronchial-arterial infusion of docetaxel-case report. Gan To Kagaku Ryoho. 1998 Nov;25(13):2109-13.
11. Kiryu T, Hoshi H, Matsui E, Iwata H, Kokubo M, Shimokawa K, et al. Endotracheal/endobronchial metastases: Clinicopathologic study with special reference to developmental modes. Chest. 2001 Mar; 119(3):768-75.
12. Ishiyama T, Aoyama T, Hirahara H, Iwashima A, Tsukada H, Souma T. Successful resection of endotracheal metastatic lung cancer using percutaneous cardiopulmonary support system: A case report. Kyobu Geka. 2001 Jan; 54(1):19-23.
13. De S. Tracheal metastasis of small cell lung cancer. Lung India 2009 Oct;26(4):162-4.
14. Tan CG, Shen L, Garske L, Tran K. Concurrent acute endobronchial and endotracheal tumor embolism. Thorax. 2010 Apr;65(5):464.
15. Mimae T, Tsutani Y, Miyata Y. Role of lymphatic invasion in the prognosis of patients with clinical node-negative and pathologic node-positive lung adenocarcinoma. J Thorac Cardiovasc Surg. 2014 Jun;147(6):1820-6.
16. Lu M, Zhu X, Cao B, Shen N. Investigation and Analysis of Primary Lung Cancer with Endotracheal and Endobronchial Metastases. Zhongguo Fei Ai Za Zhi. 2020 Mar;23(3):162-7.
17. Koletsis EN, Kalogeropoulou C, Prodromaki E, Kagadis GC, Katsanos K, Spiropoulos K, et al. Tumoral and non-tumoral trachea stenoses: evaluation with three-dimensional CT and virtual bronchoscopy. J Cardiothorac Surg. 2007 Apr;2:18.
18. Kagadis GC, Patrinou V, Kalogeropoulou CP, Karnabatidis D, Petsas T, Nikiforidis GC, et al. Virtual endoscopy in the diagnosis of an adult double tracheal bronchi case. Eur J Radiol. 2001 Oct;40(1):50-3.