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Respiratory Medicine Case Reports

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Case report

Right upper lobectomy for lung cancer with a displaced right bronchus: Two case reports

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ARTICLE INFO

Keywords:

Lung cancer

Displaced bronchus

ABSTRACT

Case 1 describe a 73-year-old man with an abnormal opacity in the upper lobe of the right lung on chest computed tomography (CT), which was done during the postoperative follow-up for bile duct cancer. The chest CT scan showed a ground glass nodule (GGN) measuring 1.0 cm and another one measuring 0.6 cm of the right lung. Case 2 involved a 79-year-old woman with an abnormal opacity in the upper lobe of the right lung on a chest CT that was obtained after she fell down the stairs. The CT scan showed a solid mass measuring 3.0 cm in the right upper lung. Both the patients underwent bronchoscopy before surgery and showed bronchial branching abnormalities. The surgical procedures could be performed accurately since sufficient information had been acquired pre-operatively and they diagnosed lung cancer. Both the patients were able to undergo radical surgery for lung cancer and are currently doing well with no postoperative complications or recurrence of lung cancer.

1. Introduction

Congenital bronchial anomalies are considered relatively rare. Abnormally oriented blood vessels or fissure-less lobules may exist simultaneously and to ensure safety they must be accurately assessed prior to surgery. It is also necessary to determine the extent of lymph node involvement prior to resection. It is also necessary to examine the range of lymph node dissection, depending on the localization of the tumor. Herein, we report two cases of right upper lobectomy for right lung cancer with a displaced right bronchus.

2. Case presentations

2.1. Case 1

A 73-year-old man presented with an abnormal opacity in the upper lobe of the right lung on chest computed tomography (CT), which was performed during the postoperative follow-up for bile duct cancer. Chest CT showed a ground glass nodule (GGN) measuring 1.0 cm and another one measuring 0.6 cm in the S1 of the right lung (Fig. 1). Therefore, we performed bronchoscopy, which revealed a branching right B1 in the upper lobe and branching B2+3 from the lateral side of the middle lobar bronchus of the right truncus intermedius (Fig. 2). The nodules, however, could not be diagnosed. Fluorodeoxyglucose positron emission tomography (PET) revealed an abnormal accumulation, with a maximum standardized uptake value of 1.7 and 1.5 at the GGNs, and no metastases to other organs. We considered a probable diagnosis of Synchronous primary lung cancers with cT1aN0M0 stage IA1 (Fig. 1). Later, right

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<https://doi.org/10.1016/j.rmcr.2022.101689>

Received 20 December 2021; Received in revised form 29 April 2022; Accepted 20 June 2022

Available online 24 June 2022

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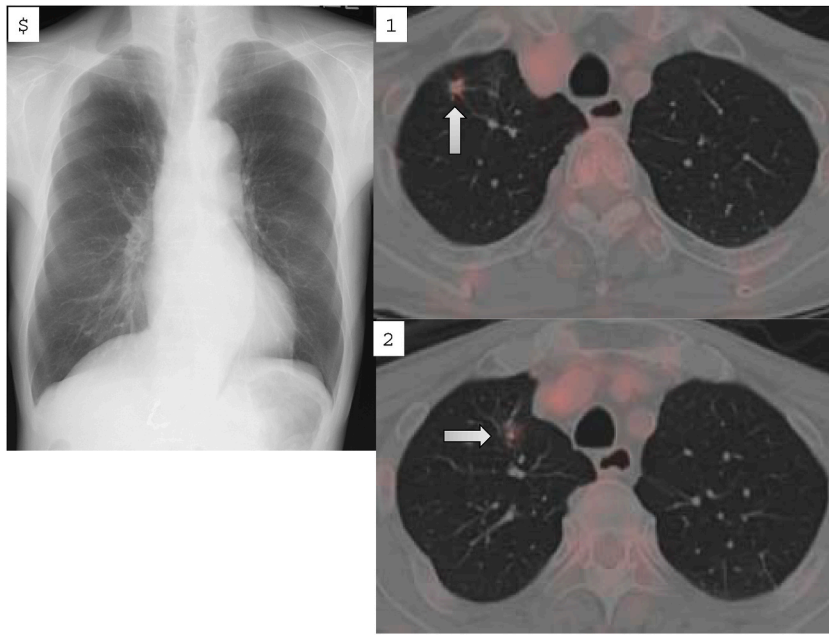


Fig. 1. PA chest radiograph was normal on initial presentation (A). Axial CT chest from PET-CT shows two FDG-avid ground glass nodules in the right upper lobe (B,C).

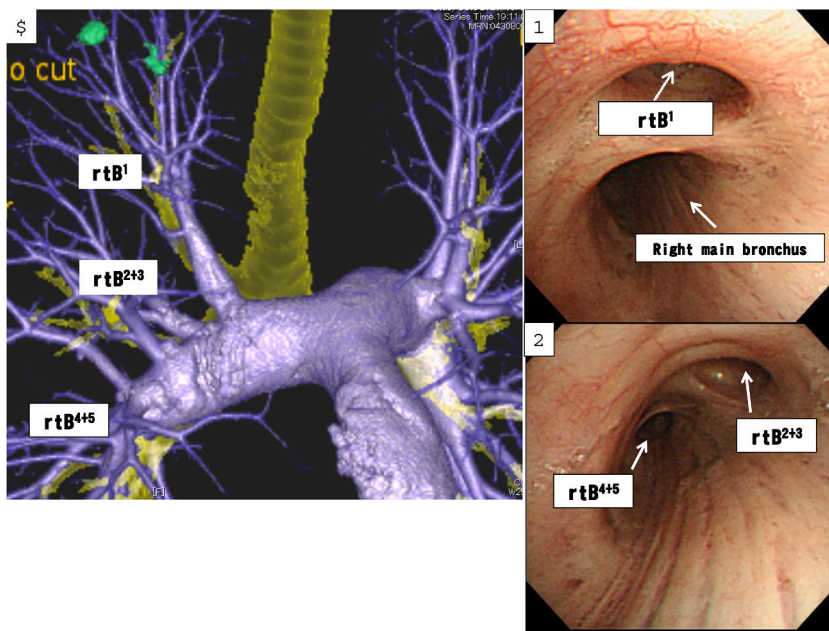


Fig. 2. Bronchial running as seen on 3D-CT (A). The bronchial running as demonstrated by bronchoscopy (B, C).

upper lobectomy and mediastinal lymph node dissection (ND2a-1) were performed. Pathological examination revealed both nodules to be adenocarcinoma (minimally invasive adenocarcinoma: pT1miNOM0 and invasive adenocarcinoma, acinar predominant: pT1aNOM0). The patient had a good postoperative course and was discharged 11 days after surgery. One year and four months have passed since then, and he is alive and without recurrence.

2.2. Case 2

A 79-year-old woman presented with an abnormal opacity in the upper lobe of the right lung on a chest CT that was obtained after she fell down the stairs. The chest CT scan showed a solid mass measuring 3.0 cm in the right upper lung (Fig. 3), and we performed

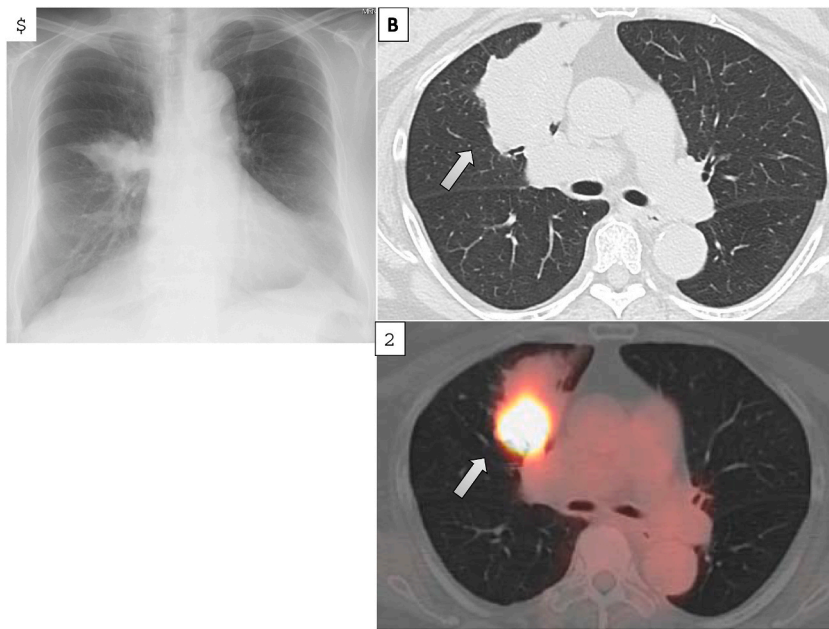


Fig. 3. PA chest radiograph on initial presentation depicts a irregular mass-like opacity in the central right midlung (A). Axial CT chest shows a large mass-like opacity in the right upper lobe (B). PET-CT depicts abnormal FDG-accumulation of a 3 cm right upper lobe mass (C) with presumed post-obstructive atelectasis.

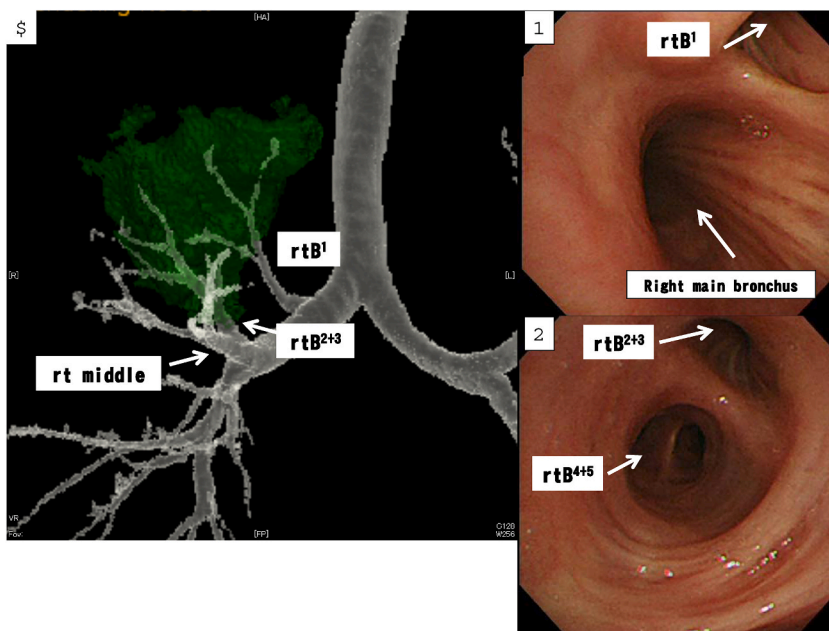


Fig. 4. Bronchial running as seen on 3D-CT (A). The bronchial running as demonstrated by bronchoscopy (B, C).

bronchoscopy, which revealed right B1+2 branching in the upper lobe and B3 branching from a common trunk with the right middle lobe branch (Fig. 4). A biopsy helped to diagnose the lung mass as squamous cell carcinoma. PET-CT revealed abnormal FDG-accumulation with a maximum standardized uptake value of 33.0 at the lung mass and 4.1 at the right hilar lymph node (Fig. 3). We considered the diagnosis of lung cancer as cT2aN1M0 stage IIB. The patient was a smoker and had an obstructive disorder with a forced expiratory volume of 1.06 L. Subsequently, right upper and middle lobectomy and mediastinal lymph node dissection (ND2a-2) were performed. The patient had a good postoperative course and was discharged nine days after surgery. Six months have passed since then, and she is alive and without recurrence.

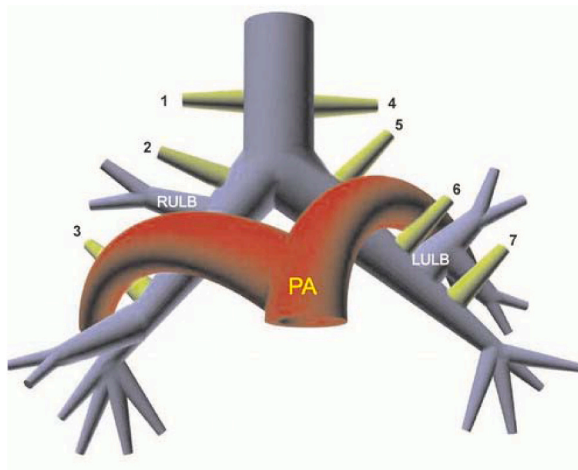


Fig. 5. Aberrant bronchi to the upper lobes. Schematic shows prearterial (true right tracheal) (1), preeparterial (right “tracheal”) (2), posteparterial (3), eparterial (true left tracheal) (4), eparterial (left “tracheal”) (5), prehyarterial (6), and posthyarterial (7) bronchi. LULB = left upper lobe bronchus, PA = pulmonary artery, RULB = right upper lobe bronchus.

3. Discussion

The frequency of bronchial bifurcation abnormalities is approximately 0.64%, of which 75% are related to the upper right lobe [1, 2]. Bifurcation abnormalities related to the upper right lobe are classified into “tracheal bronchus”, “right pre-eparterial bronchus”, and “post-eparterial bronchus” [3] (Fig. 5). Case 1 is considered to correspond to “right pre-eparterial bronchus” and case 2 is considered to correspond to “post-eparterial bronchus”.

Cases of bronchial bifurcation are often accompanied by pulmonary artery bifurcation abnormalities and lobular insufficiency [4, 5]; therefore, careful preoperative scrutiny is essential. In this case, bronchoscopy was performed preoperatively in both cases and bronchial branching abnormalities could, therefore, be determined accurately. In addition, it is considered that the construction of bronchial running by 3D-CT is useful for the examination of sufficient surgical technique.

Regarding the extent of lung resection and lymph node dissection, it is necessary to take measures for each individual case, depending on the localization of the tumor and the presence or absence of lymph node metastasis in the preoperative examination. In case 1 of this report, despite synchronous primary lung cancers, the tumor was mainly localized in S1, and the distance between the tumor and the resection edge was sufficient in the upper right lobectomy. In comparison, in case 2, the tumor was localized to the hilar region, the distance from the resection edge to the middle lobe was insufficient, and the resection of the right upper middle lobe was necessary.

Regarding the extent of lymph node dissection, in the case of B3 metastatic bronchi (“right pre-eparterial bronchus”), the basal lymph node is almost synchronous with the peri-middle lobe bronchial lymph node. Since the lymphatic flow around the metastatic bronchus has not been described, lymph node dissection up to the subtracheal lymph node and the # 11i lymph node is reportedly necessary [6,7]. Flexible surgical procedure selection and lymph node dissection range are required for each case.

In conclusion, when performing surgery for lung cancer with bronchial bifurcation abnormalities, it is necessary to accurately recognize the preoperative bronchial and vascular abnormalities, and to determine the extent of lung resection and lymph node dissection required, according to the location of the tumor and the status of lymph node metastasis.

Declaration of competing interest

None declared.

Acknowledgments

We are deeply grateful to Dr. Kohsi Nagano, Department of Thoracic Surgery, Bell-Land General Hospital, for providing helpful advice.

References

- [1] B. Ghaye, D. Szapiro, J.M. Franchamps, et al., Congenital bronchial abnormalities revisited, *Radiographics* 21 (1) (2001) 105–119.
- [2] S. Ohta, Y. Saito, K. Usuda, et al., Tracheobronchial anomalies: report of 71 cases, *J Jpn Soc Resp Endosc* 8 (1) (1986) 122–130.
- [3] G. Chassagnon, B. Morel, E. Carpentier, et al., Tracheobronchial branching abnormalities: lobe-based classification scheme, *Radiographics* 36 (2) (2016) 358–373.
- [4] K. Sakaguchi, H. Horio, Lung cancer in the right lobe with displaced anomalous bronchi: a report of two cases, *J Jpn Soc Respir Endosc* 35 (6) (2013) 666–670.

- [5] N. Momose, T. Takahashi, A. Sugimura, K. Sekihara, S. Nagasaka, Video-assisted thoracoscopic right upper lobectomy in a patient with a displaced bronchus and vascular abnormalities, *Asian J. Endosc. Surg.* 14 (1) (2021) 109–111. Jan.
- [6] N. Tanida, T. Uyama, K. Takahashi, et al., Two cases of lung cancer arising in lungs with anomalous bronchi, *J Jpn Soc Bronchol* 15 (1993) 89–94.
- [7] S. Muto, Y. Ozaki, T. Inoue, et al., Thoracoscopic right upper lobectomy for lung cancer with a displaced right B¹⁺³ bronchus, *J Jpn Soc Respir Endosc* 41 (2019) 293–297.