


CASE REPORT

Open Access



# Aberrant mediastinal mediobasal segmental pulmonary artery in a patient with lung cancer undergoing right lower lobectomy: a case report

Kazuyuki Komori<sup>1\*</sup> , Hiroshi Hashimoto<sup>1</sup>, Kotaro Yoshikawa<sup>1</sup>, Koji Kameda<sup>1</sup>, Shinichi Taguchi<sup>1</sup> and Yuichi Ozeki<sup>2</sup>

## Abstract

**Background:** A mediastinal mediobasal segmental pulmonary artery (A7) from the right main pulmonary artery is extremely rare.

**Case presentation:** We report the case of a 71-year-old woman with an aberrant mediastinal A7 who underwent right lower lobectomy for lung cancer (cT1bN0M0, stage IA2). Preoperative three-dimensional computed tomography (CT) angiography revealed an aberrant mediastinal A7 in the right main pulmonary artery. Right lower lobectomy and mediastinal lymph node dissection were performed. Intraoperatively, A7 was observed between the superior and inferior pulmonary veins and in the front of the lower bronchus near the anterior hilum. The artery was carefully dissected from the caudal side after inferior pulmonary vein dissection. The lung parenchyma, which was within the fissure due to poor lobulation between the middle and lower lobes, was safely divided.

**Conclusions:** Thoracic surgeons need to carefully evaluate CT angiography or enhanced multidetector CT findings at preoperative conferences and always keep this anomaly in mind.

**Keywords:** Right aberrant mediastinal pulmonary artery, Lung cancer, Right lower lobectomy

## Background

The branching of the pulmonary artery, vein, and bronchus varies among individuals [1]. For thoracic surgeons, it is very important to preoperatively analyze the anatomic variations to perform safe lung resection. Here, we report an extremely rare case of a patient with lung cancer with a right mediastinal mediobasal pulmonary artery (A7) who underwent right lower lobectomy.

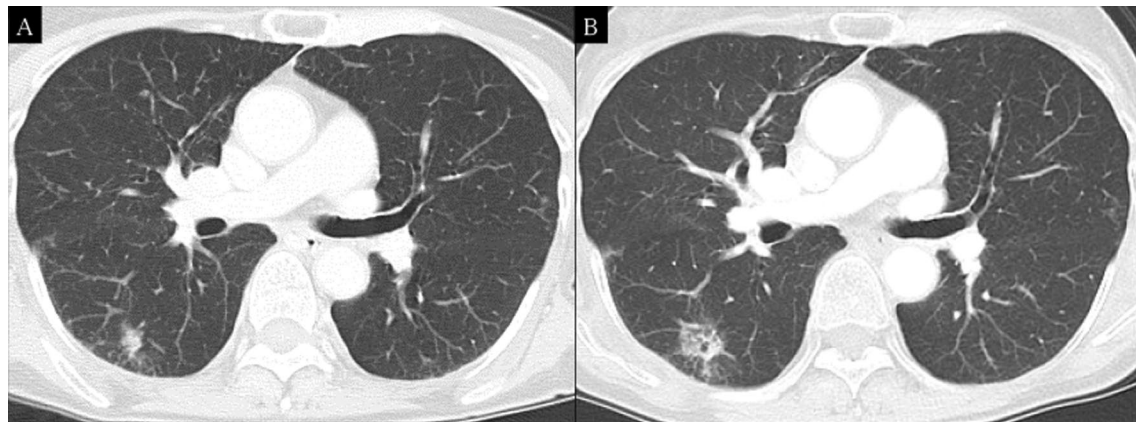
## Case presentation

A 71-year-old woman presented to our department with a slow-growing semi-solid ground-glass nodule in the right lower lobe (S6) (Fig. 1) identified on follow-up computed tomography (CT) for oropharyngeal cancer after chemoradiotherapy. No lymph nodes or distant metastases were detected on positron emission tomography/CT. Thus, she was suspected to have primary lung cancer (cT1bN0M0, stage IA2). Preoperative three-dimensional (3D) CT angiography revealed an aberrant mediastinal A7 arising directly from the right main pulmonary artery, running between the superior and inferior pulmonary veins and entering the right lower lobe (Fig. 2). Lung function tests

\*Correspondence: [kazoo019811227@msn.com](mailto:kazoo019811227@msn.com)

<sup>1</sup> Department of Thoracic Surgery, National Defense Medical College, 3-2, Namiki, Tokorozawa, Saitama 359-8513, Japan  
Full list of author information is available at the end of the article





**Fig. 1** Chest computed tomography. **A** Semi-solid ground-glass attenuation (GGA) in the right lower lobe, **B** a slow-growing GGA in 1.5 years

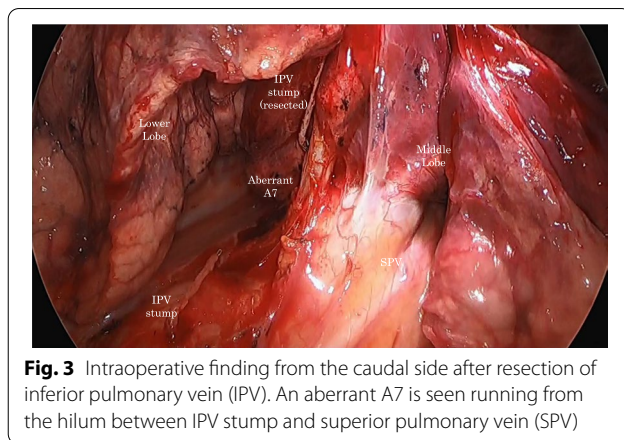
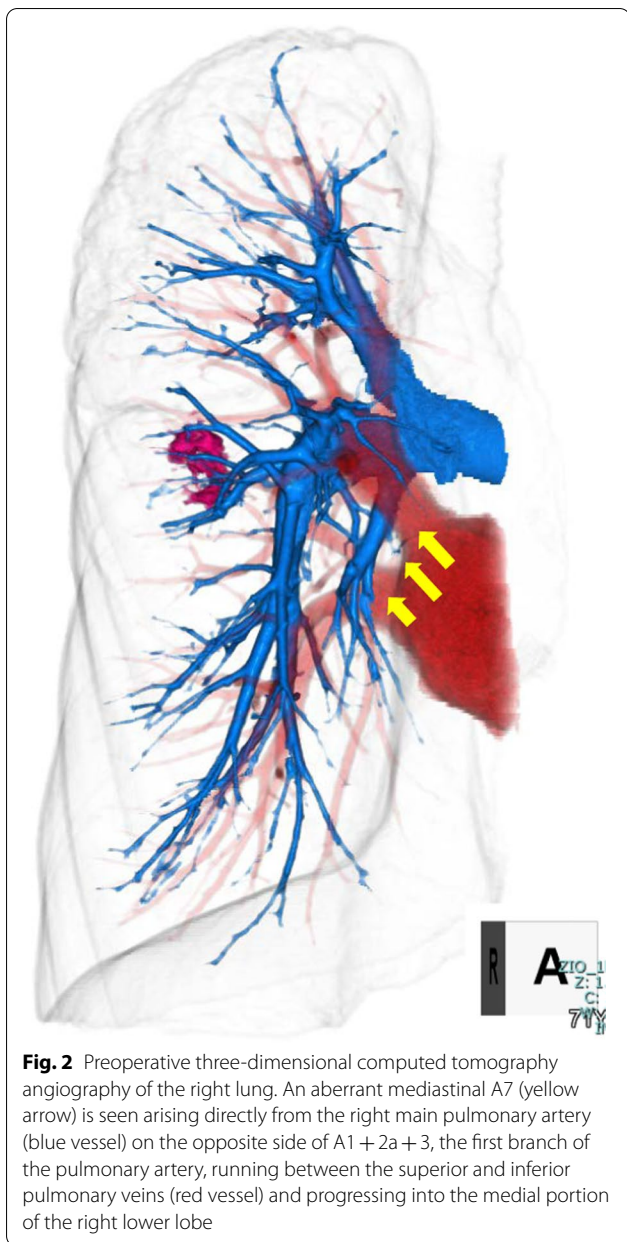
revealed a vital capacity of 2.80 L (115.2% predicted), a forced expiratory volume in 1 s (FEV<sub>1</sub>) of 2.25 L (113.6% predicted FEV<sub>1</sub>), and a diffusing capacity for carbon monoxide of 13.36 ml/min/mmHg (87.3% predicted). Video-assisted posterolateral fifth intercostal thoracotomy was performed with a small 8-cm incision. During surgery, the interlobular fissure between the middle and lower lobes was found to be incomplete, without effusion or adhesion. A hard, elastic tumor measuring 2 cm with slight pleural change was found on the interlobar side in S6a. Aspiration cytology of the tumor revealed a class V adenocarcinoma. As A7 was located at the anterior hilum on preoperative CT, the operative procedure was performed on the dorsal and caudal sides. First, the interlobular main pulmonary artery was exfoliated. Then, A6 and A8–10 were dissected with ligation and autosuture, respectively, after interlobular incision between the upper and lower lobes. Subsequently, the inferior pulmonary vein was dissected after the division of the pulmonary ligament. A7 was identified at the anterior hilum, running between the middle lobe pulmonary vein and the inferior bronchus (Fig. 3). Finally, an interlobar incision between the middle and lower lobes was safely made after A7 dissection with autosuture. The operative time was 153 min, and the total amount of blood loss was 25 g.

The patient received pleurodesis therapy with OK-432 for prolonged air leakage on postoperative day 8. The chest drain was removed on postoperative day 10, and the patient was discharged on postoperative day 13. The final pathological diagnosis was lung papillary adenocarcinoma, pT1b (invasive diameter, 12 mm) N0M0 pStage IA2. There was no evidence of recurrence 6 months postoperatively.

## Discussion and conclusions

Thoracic surgeons often encounter anomalies of the pulmonary arteries, veins, and bronchi. It is highly possible to experience unexpected bleeding from the abnormal pulmonary arteries. This commonly results from the left mediastinal lingular artery, which is the first branch of the left main pulmonary artery. Mediastinal lingular arteries, including the A4+5 type and A4 or A5 type, have been reported in 27.3% of cases [2]. In contrast, Hong et al. reported that the incidence of a mediastinal basal pulmonary artery was 0.05% on both sides [3]. Moreover, in other anatomical pulmonary artery studies, the A7a type (which branches off in front of the inferior pulmonary vein) was observed in 74.8% of cases, A7ab (which branches off on both sides) was in 14.8%, and A7b (which was behind it) was in 4.8% [2, 4]. However, the right mediastinal basal artery has not been reported.

To date, five cases of right mediastinal basal pulmonary artery (Table 1) have been reported in the English literature, all of which were reported in Japan due to the prominence and availability of high-resolution CT. There were two cases of aberrant A7 and one case each of A7a, A6–10, and A7–10. To the best of our knowledge, this is the first reported case of aberrant A7 that independently branched off during right lower lobectomy. Aberrant vessels were identified in all six cases, including our case, in which preoperative multidetector CT and 3D-CT angiography were performed. Intraoperative findings identified poor lobulation in all cases. Operative procedures can be classified depending on whether the interlobular incision between the middle and lower lobes or resection of an aberrant artery was first performed. In three of four cases in which the pulmonary artery in the lower lobe was resected, an interlobular incision was first performed. In our



case, we first transected the inferior pulmonary vein with autosuture from the dorsal side for better visualization of the hilum. Then, we exfoliated the aberrant A7 and transected it with autosuture. An interlobular incision was made safely, and the lower bronchus was transected. We encountered no complications during lymph node 7 dissection. After surgery, pleurodesis was required for prolonged air leakage (same as in case 2), but the postoperative course was otherwise uneventful. At present, the formation of a thrombus in the peripheral stump of the pulmonary artery has not been detected, as in other patients.

It is important to check vessel variation using 3D-CT angiography and discuss the safe operative procedure at the preoperative conference.

In summary, we reported a case of a patient with lung cancer and a mediobasal mediastinal pulmonary artery arising from the main pulmonary artery who underwent right lower lobectomy. Our report suggests that attention should be paid to these anomalies.

**Table 1** Reports of right mediastinal basal pulmonary artery: A review of literature

Case	Journal	Age	Sex	Diagnosis	Location	Size(mm)
1	GTCS/2011 [5]	72	M	Metastasis from rectal cancer	Rt. S7	7
2	Surg Case Rep/2016 [6]	67	M	Lung cancer	NR	NR
3	GTCS/2017 [7]	76	M	Squamous cell carcinoma	NR	65
4	ATS/2020 [8]	74	F	Invasive mucinous adenocarcinoma	Rt.S6-9	73
5	Surg Case Rep/2021 [9]	73	M	Combined small cell carcinoma	Rt. S9	18
6	Our case	71	F	Papillary adenocarcinoma	Rt. S6	25

Case	Preoperative exam	Aberrant	Operative procedure	Operation	Interlobular fissure
1	MDCT angiography	A7	Right basal segmentectomy	VATS	Incomplete
2	3D angiography	A7	Right middle lobectomy	VATS	Incomplete
3	MDCT	A7-10	Right lower lobectomy	VATS	Incomplete
4	Enhanced TSCT	A6-10	Right lower lobectomy	Small thoracotomy	Incomplete
5	CT angiography	A7a	Right basal segmentectomy	VATS	Incomplete
6	3D angiography	A7	Right lower lobectomy	Small thoracotomy	Incomplete

Case	Operative step ①	②	③
1	Interlobular incision	Aberrant A7	
2	Interlobular incision	Not resected aberrant	
3	Interlobular incision	Aberrant A7-10	
4	Interlobular incision	Aberrant A6-10	
5	Abasal + aberrant A7a	Bbasal + V7-10	Intersegmental incision
6	A6 + Abasal	IPV + aberrant A7	Interlobular incision

Case	Operation time (min)	Blood loss (ml)	Complication	Postoperative course
1	NR	NR	None	No rec. at 8POM
2	NR	NR	Air leak	No rec. at 7POM
3	NR	NR	None	NR
4	80	10	None	Adjuvant chemotherapy and no rec
5	144	30	None	No rec. at 1POY
6	153	25	Air leak	No rec. at 6POM

NR: not referred; MDCT: multi-dimension computed tomography; TSCT: thin-slice CT; VATS: video assisted thoracic surgery; IPV: inferior pulmonary vein; POM: postoperative month

### Abbreviations

3D: Three-dimensional; A7: Mediobasal pulmonary artery; CT: Computed tomography; FEV<sub>1</sub>: Forced expiratory volume in 1 s.

### Acknowledgements

We thank Editage (<https://www.editage.jp/>) for editing the draft of this manuscript.

### Author contributions

KK drafted the manuscript. All authors participated in the treatment, contributed to the development of the methodology. All authors read and approved the final manuscript.

### Funding

The authors declare no funding for this study.

### Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Declarations

#### Ethics approval and consent to participate

Not applicable.

#### Consent for publication

Informed consent of clinical detail and image publication was obtained from the patient.

#### Competing interests

The authors declare that they have no competing interests.

#### Author details

<sup>1</sup>Department of Thoracic Surgery, National Defense Medical College, 3-2, Namiki, Tokorozawa, Saitama 359-8513, Japan. <sup>2</sup>Department of Thoracic Surgery, Tokorozawa-Meisei Hospital, 5095, Yamaguchi, Tokorozawa, Saitama 359-1145, Japan.

Received: 20 September 2021 Accepted: 17 April 2022

Published online: 27 April 2022

## References

1. Nakamura A, Watanabe SI, Watanabe Y, Asakura K, Nakagawa K. En bloc upper and lower lobe trisegmentectomy facilitated by displaced segmental airway. *Ann Thorac Surg*. 2017;104:e447–9.
2. Yamashita H. *Roentgenologic Anatomy of the Lung*. New York: Inc. Tokyo: Igaku-Shoin Ltd. & Igaku-Shoin Medical Publishers; 1978. p. 70–90.
3. Hong JH, Kim HJ, Han DH, Sung SH, Ahn MI, Jung JI. Arteria praebronchialis found on MDCT: potentially dangerous aberrant artery supplying the left lower lobe. *Surg Radiol Anat*. 2015;37:1021–6.
4. Nagashima T, Shimizu K, Ohtaki Y, Obayashi K, Nakazawa S, Mogi A, et al. Analysis of variation in bronchovascular pattern of the right middle and lower lobes of the lung using three-dimensional CT angiography and bronchography. *Gen Thorac Cardiovasc Surg*. 2017;65:343–9.
5. Yamada S, Inoue Y, Suga A, Iwazaki M. Surgical risk of vessel injury: an unusual anatomical variant of the right medial basal segmental pulmonary artery. *Gen Thorac Cardiovasc Surg*. 2011;59:301–3.
6. Atari M, Nakajima Y, Fukuhara M, Iijima Y, Kinoshita H, Akiyama H, et al. Abnormal branch of right pulmonary artery (A7): a case report and literature review. *Surg Case Rep*. 2016;2:16.
7. Kawai N, Kawaguchi T, Yasukawa M, Tojo T. Lobectomy for a mediastinal basal pulmonary artery. *Gen Thorac Cardiovasc Surg*. 2017;65:422–4.
8. Nakamura A, Okumura Y, Hashimoto M, Kondo N, Shibata E, Kijima T, et al. Right lower lobectomy for an aberrant mediastinal inferior lobar artery. *Ann Thorac Surg*. 2020;109:e415–7.
9. Takase Y, Tsubochi H, Yamaki E, Kawashima O. An aberrant mediastinal medial basal segmental pulmonary artery (A7a) in a patient with lung cancer: a case report. *Surg Case Rep*. 2021;7:21.

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more [biomedcentral.com/submissions](https://biomedcentral.com/submissions)

