

# Anomalous segmental pulmonary vein: additional V<sup>6</sup> behind the bronchus intermedius draining into the superior pulmonary vein

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## Abstract

Anatomical variations of pulmonary venous drainage have been widely described in the literature in order to perform safe thoracic surgical procedures. We report a case of anomalous vein from the superior segment of the right lower lobe running in the posterior mediastinum and draining into the superior pulmonary vein. As the patient showed a usual right inferior pulmonary vein, formed by the union of the superior segment right lower lobe vein (V<sup>6</sup>) and the common basal vein joining the left atrium, the uncommon segmental pulmonary vein described was named: additional V<sup>6</sup>. It was identified preoperatively and recognized intraoperatively during thora-

scopic right lower lobectomy and lymph node dissection performed for lung cancer treatment. Diagnostic imaging and careful surgical dissection are helpful tools to avoid intraoperative bleeding and other complications during thoracic surgical procedures due to unrecognized vascular anomalies.

## Introduction

Anatomical variations of pulmonary venous drainage have been reported by a wide variety of papers focused on surgical and radiologic anatomy [1-5]. Their knowledge, in the field of thoracic surgery, is mandatory in order to avoid complications such as severe lung edema, extension of planned lung resection or bleeding that may be difficult to manage, especially during minimally invasive procedures characterized by limited surgical view [6]. Here we report a case of anomalous vein from the superior segment of the right lower lobe running in the posterior mediastinum and draining into the superior pulmonary vein. It was clearly identified both preoperatively and intraoperatively.

## Case Report

A 60-year-old patient was referred to our department of thoracic surgery for treatment of primary lung cancer located in the right lower lobe and classified as clinical T2aN0M0 according to the 8<sup>th</sup> edition of the TNM classification for non-small cell lung cancer. After completing preoperative pulmonary and cardiovascular assessments, a thoracoscopic right lower lobectomy with systematic lymphadenectomy was planned. Preoperative contrast-enhanced computed tomography (CT) scan showed an anomalous vein from the superior segment of the right lower lobe running on the posterior side of the bronchus intermedius and draining into the superior pulmonary vein (Figure 1 A-C). The three-dimensional CT reconstruction demonstrated that the right inferior pulmonary vein was formed by the union of the superior segment right lower lobe vein (V<sup>6</sup>) and the common basal vein joining the left atrium (Figure 2A). The anomalous vein from the superior segment of the right lower lobe running in the posterior mediastinum and draining into the superior pulmonary vein was therefore a second V<sup>6</sup>. We named this anomalous segmental pulmonary vein: additional V<sup>6</sup>. It was easily recognized intraoperatively during the posterior mediastinal lymph node dissection (Figure 2B) and energy sealed, avoiding in this way unexpected bleeding. The patient's postoperative course was uneventful.

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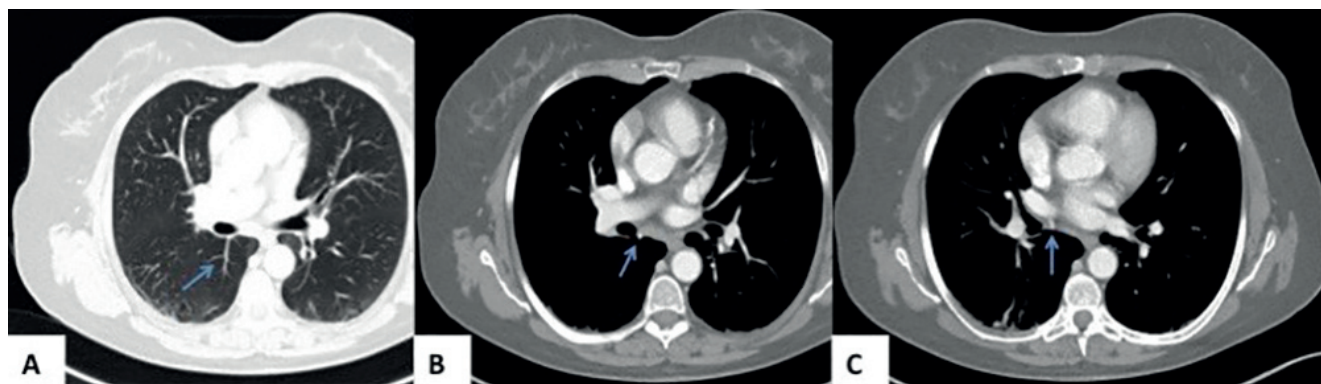


Figure 1. Preoperative chest computed tomography (CT) scans. A-C) Segmental pulmonary vein from the superior segment of the right lower lobe running behind the bronchus intermedius and joining the superior pulmonary vein (blue arrow).

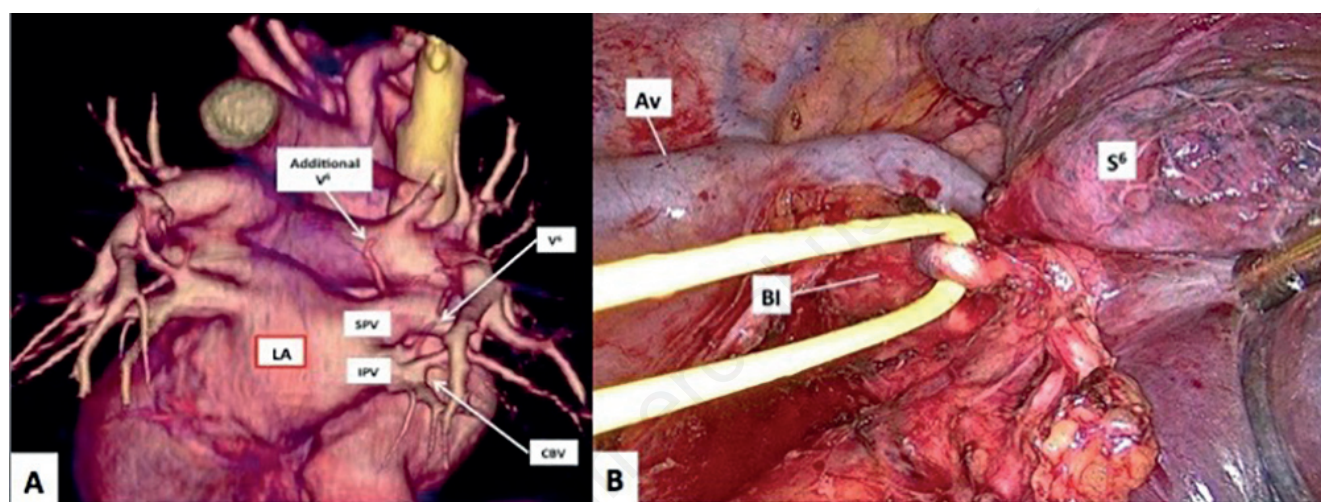


Figure 2. A) Oblique posterior three-dimensional reconstruction image shows the inferior pulmonary vein opening into the left atrium and an anomalous vessel (additional V<sup>6</sup>) draining into the superior pulmonary vein. B) Intraoperative view of anomalous vessel (encircled by loop) behind the bronchus intermedius, during dissection of the posterior mediastinum. Av, azygos vein; BI, bronchus intermedius; CBV, common basal vein; IPV, inferior pulmonary vein; LA, left atrium; SPV, superior pulmonary vein; S<sup>6</sup>, superior segment of the right lower lobe; V<sup>6</sup>, superior segment right lower lobe vein.

## Discussion

In the posterior mediastinum, dissection of subcarinal lymph nodes during major lung resections can lead to unexpected bleeding after injury of bronchial artery or anomalous-segmental pulmonary vein [7]. Over the years, pulmonary venous anomalies running in the posterior mediastinum, behind the bronchus intermedius, have been widely reported by thoracic surgeons. Among these, the right posterior pulmonary vein (V<sup>2</sup>) draining into the right superior pulmonary vein, right inferior pulmonary vein or directly into the left atrium has been the most common anatomic variation described [3,8-10]. Other anomalous segmental pulmonary veins running behind the bronchus intermedius have been reported in literature as the vein from the superior segment of the right lower lobe (V<sup>6</sup>) draining into the right superior or inferior pulmonary vein and an accessory right V<sup>6</sup> discovered during a video-assisted thoracic surgery right upper lobectomy [3,11,12].

In our case a second vein from the superior segment of the right lower lobe (additional V<sup>6</sup>) was identified behind the bronchus intermedius: it showed an anomalous drainage into the superior pulmonary vein. The identification of this anomalous segmental pulmonary vein preoperatively, with contrast-enhanced CT imaging, and intraoperatively, through a careful surgical dissection, allowed to avoid unexpected bleeding during mediastinal lymph node dissection.

## Conclusions

Diagnostic imaging plays a critical role in the preoperative identification of pulmonary venous anomalies and a careful surgical dissection during thoracoscopic major lung resections, allowing an optimal intraoperative assessment of vascular abnormalities, can reduce the risk of serious complications.

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