

## CLINICAL IMAGE

**Partial Anomalous Pulmonary Venous Return Mimics Arterial Positioning After Central Line Placement for Plasmapheresis**Alex J. Griffith,<sup>1</sup> Victoria Ray, MD,<sup>2</sup> Joshua M. Glazer, MD,<sup>3</sup> William N. Rose, MD<sup>1</sup><sup>1</sup>Department of Pathology and Laboratory Medicine, University of Wisconsin Hospital, Madison, WI, USA<sup>2</sup>Department of Anesthesiology, University of Wisconsin Hospital, Madison, WI, USA<sup>3</sup>Department of Emergency Medicine, University of Wisconsin Hospital, Madison, WI, USA

Corresponding author: William N. Rose, MD (wrose@uwhealth.org)

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A 61-year-old male who was status post right single lung transplant complicated by grade three primary graft dysfunction was admitted and mechanically ventilated for hypoxic respiratory failure. Donor specific antibody testing to human leukocyte antigens was positive. The protocol for antibody-mediated transplant rejection was initiated. One aspect of the protocol was a series of plasmapheresis procedures. In advance of the first plasmapheresis, central line placement was attempted via the left internal jugular vein. A chest x-ray showed a line that terminated to the left of the midline and raised concern for arterial placement (Figure 1). Blood gases from the line were: pH 7.72, pCO<sub>2</sub> 21 mmHg, pO<sub>2</sub> 369 mmHg, bicarbonate 28.4 mmol/L.

Vascular surgery was consulted and recommended CT imaging of the chest and neck that showed that the line entered the left internal jugular vein, continued to brachiocephalic vein, and then entered an anomalous vein connecting with the left upper lobe pulmonary vein (Figure 2). This anomalous connection suggested that the patient had an anatomic variant, referred to as

partial anomalous pulmonary venous return (PAPVR). This anomalous connection explained the high pO<sub>2</sub> on the blood gas drawn from the line. The central line was removed. Interventional radiology successfully placed a new central line via right femoral vein access.

Usually, four main pulmonary veins drain oxygenated blood from the lungs into the left atrium of the heart. PAPVR refers to an anatomical variant where a pulmonary vein, instead of draining into the left atrium, *drains into a systemic vein*. The prevalence is 0.4-0.7% [1]. Left-sided PAPVR typically affects the venous drainage of the left upper lobe of the lung and is often an incidental (but potentially alarming) finding. It is often caused by an anomalous vertical vessel that branches off the upper left pulmonary vein and joins with the left brachiocephalic vein or coronary sinus. In right-sided PAPVR, an anomalous pulmonary vein drains into the superior vena cava, inferior vena cava, azygous vein, or coronary sinus [2].

Recognizing PAPVR is particularly important in critically ill patients, as a left-to-right shunt might become obvious only after

stopping mechanical ventilation [3]. About 10 case reports describe strategies of keeping the line, removing it, or repositioning it [4]. Finally, while plasmapheresis is a relatively low-risk intervention by itself, the common requirement of central line placement confers

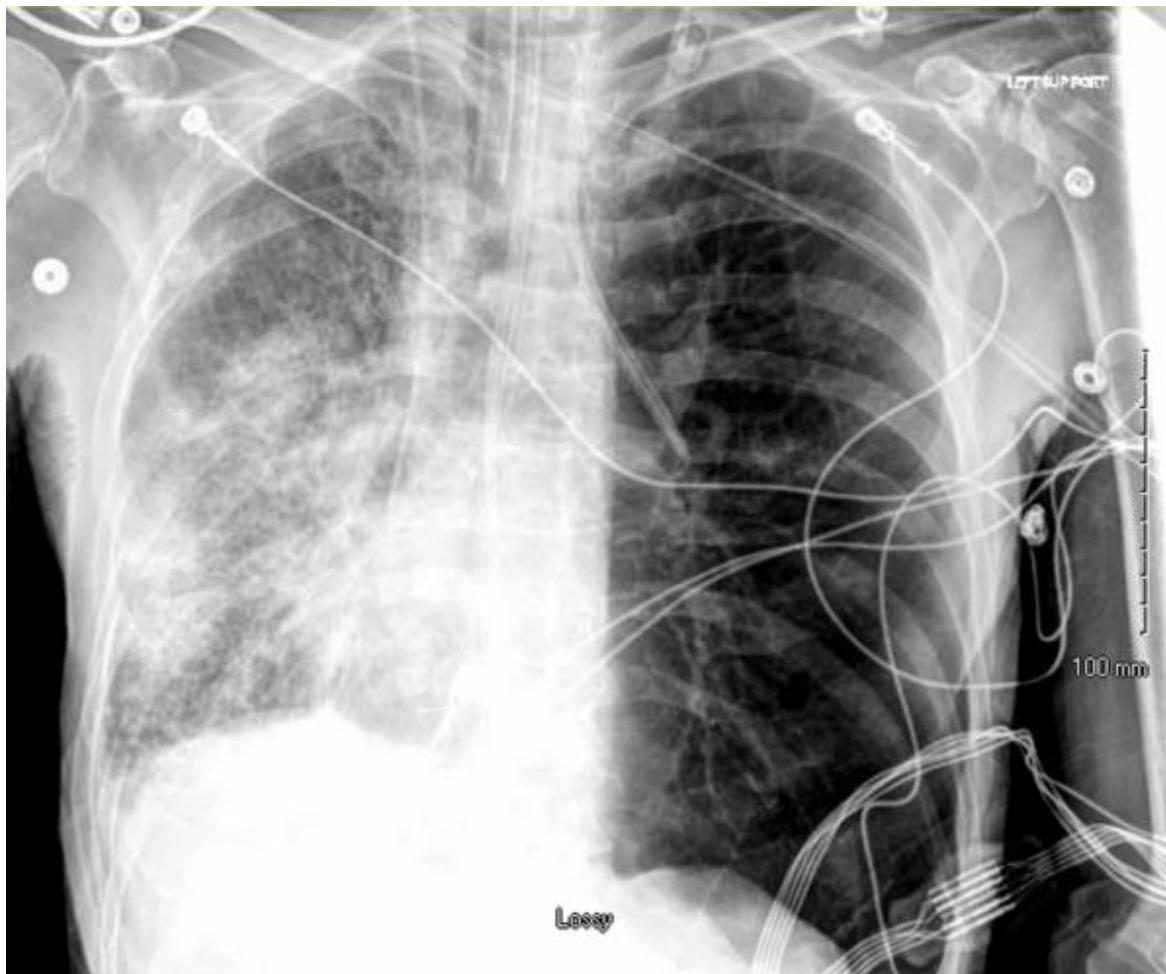
risks of bleeding, thrombosis, infection, and misplacement [5].

#### Notes

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**Figure 1:** Chest radiograph obtained after central line place via left internal jugular vein. The line terminates to the left of mid-line and raises concern for arterial placement versus anomalous venous anatomy.



**Figure 2:** Single coronal slice from CT chest obtained due to concern for arterial placement of left central line. CT imaging demonstrated the line enters the left internal jugular vein, continues to the brachiocephalic vein, and then enters an anomalous vein connecting with the left upper lobe pulmonary vein. This anomalous connection suggests PAPVR.

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