



Case Report

Incidental discovery of a partial anomalous pulmonary venous connection in the surgical critical care unit ☆,☆☆,★



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Abstract Routine chest roentgenogram to confirm catheter placement in a postsurgical patient showed a left-sided internal jugular central venous catheter that did not appear to cross the midline. Arterial blood gas samples showed greater oxygenation from the central catheter as compared with the peripheral arterial sample. However, a transduced waveform showed a venous tracing and pressure. Computed tomographic scan of the thorax without intravenous contrast showed a partial anomalous pulmonary venous connection with drainage of the left upper lobe pulmonary vein into the innominate vein.

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1. Introduction

Central venous catheter placement and management is an essential part of the practice of critical care medicine. The

learning curve is steep, but with the advent of ultrasound guidance and real-time imaging methods the incidence of inadvertent anatomical misplacements and procedure related complications has decreased significantly. The common anatomical misplacements are either inadvertent arterial cannulation or placement of the central venous catheter into one of the large ipsilateral or contralateral vena caval draining veins [1]. Ultrasound-guided imaging as an aid to catheter placement renders the risk of anatomical misplacement to 1% [1–3].

Rarely, anatomical vascular malformations or unusual patterns of the vascular tree may lead to catheter placement in a very different location. The most common is the persistent left superior vena cava (SVC). This has an incidence of 4.5% and 0.3%–0.5% with and without a related congenital cardiac anomaly, respectively [4–6]. Partial anomalous pulmonary venous connection (PAPVC) is an anatomical

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★ Consent and IRB approval: No patient identifiers were used in preparation of this case report. Every attempt was made to contact the patient and the family concerned for consent prior to preparation of this manuscript. Local IRB determined that since this report did not use any patient identifiers and maintained patient confidentiality, it was approved for possible publication without informed patient consent.

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variant wherein part of the pulmonary venous system drains into the right atrium [RA; via the innominate vein, the SVC, or the inferior vena cava (IVC)] instead of the left atrium (LA).

2. Case report

A 65 year old man underwent a laparoscopic abdomino-perineal resection for a rectal malignancy. His past medical history was significant for coronary artery disease with percutaneous coronary intervention, valvular heart disease, and recent admission to the medical intensive care unit (ICU) with a hypertensive emergency. He had an indwelling right subclavian Mediport (Bard Access Systems, Inc., Salt Lake City, UT, USA) for infusion of chemotherapeutic agents. In the operating room, the anesthesiologist placed a left-sided internal jugular triple-lumen central venous catheter (Arrow multi-lumen central venous catheter, REF ML-00703; Arrow International, Inc., Reading, PA, USA). Catheter insertion was done using ultrasound guidance and it proceeded without any obvious complications during or after the procedure.

Postoperatively, the patient was admitted to the surgical ICU for management of intractable hypertension. Routine chest roentgenogram to confirm catheter placement showed a left-sided internal jugular central venous catheter that did not appear to cross the midline (Fig. 1). A simultaneously drawn arterial blood gas (ABG) sample from the catheter showed a PaO₂ (140 mmHg) greater than what was drawn from the radial ABG sample (102 mmHg). This finding raised suspicion of an inadvertent carotid cannulation. However, a transduced waveform showed a venous tracing with a pressure of 12 - 16 mmHg. To further elucidate the diagnosis, a computed tomographic (CT) scan of the thorax without intravenous (IV) contrast (as a renal protective measure) showed a left-sided internal jugular catheter

coursing anterior and to the left of the arch of the aorta. A PAPVC with drainage of the left upper lobe pulmonary vein into the innominate vein was also seen. The tip of the left central venous catheter was seen in this draining left upper lobe pulmonary vein (Fig. 2A, B). The catheter was used for IV access and fluid infusion for the next 48 hours without any complications. Subsequently, it was removed and the patient remained asymptomatic with stable hemodynamic indices during this period.

3. Discussion

Misplacement of a central venous catheter is a common complication. Misplacement may be extravascular or intravascular and it may occur with normal venous anatomy or aberrant venous anatomy [4–8].

Ruesch et al, in an extensive review, reported a significantly lower incidence of catheter malposition with the jugular access than with the subclavian access route [5.3% vs 9.3%; RR 0.66 (95% CI, 0.44 - 0.99)] [9]. Ultrasound guidance may help detect some of the aberrant venous anatomy and prevent misplacement; however, this might not always hold true, especially for detection of final intra-thoracic placement of central venous catheters [10]. Most central venous catheter misplacement, regardless of the cause, is almost always discovered on a routine postprocedural radiograph to check placement [11]. However, the chest radiograph is two-dimensional in nature and could be used only as a screening tool in this case, with final confirmation of misplaced catheters requiring more sophisticated three-dimensional imaging modalities.

Misplaced central venous catheters are of limited utility in the ICU. This is especially true when they are in a smaller caliber vein, which increases the risk of thrombus formation and limits use (in the case of hemodialysis catheters) for

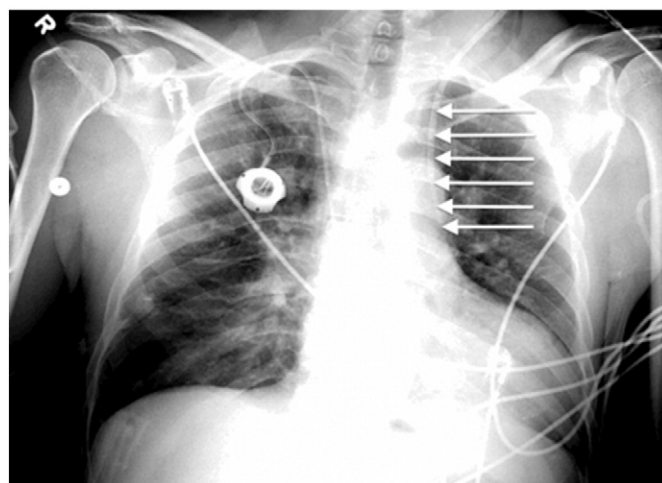


Fig. 1 Routine chest radiograph showing a left-sided central venous catheter (arrows) that is not crossing the midline. A right subclavian Mediport (Bard Access Systems, Inc., Salt Lake City, UT, USA) is also seen.

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