Case report: A wandering central line

Clinical History:

This patient was admitted to the Intensive Care Unit for treatment of septic shock, necessitating the placement of a central venous line (CVL). The line was introduced via the left internal jugular vein, under ultrasound guidance. A chest X-ray was performed to confirm correct placement of the CVL.

Imaging Findings:

The plain radiograph of the chest reveals that the tip of the line is not located within the superior vena cava (SVC), as intended. Radiologically, the line appears to pass into the left hemithorax (image 1).

The CT and MR images demonstrate the course of the central line from the left internal jugular vein, through the innominate vein, into an anomalous left-sided pulmonary vein (images 2-4).

Discussion:

A partial anomalous pulmonary venous connection (PAPVC) describes a congenital abnormality of the venous drainage of the lungs. It is a rare, often incidental finding, in which one or more of the pulmonary veins drains into the systemic venous circulation or the right atrium [1]. The results of two retrospective studies, where the condition was identified incidentally on CT imaging, indicate a prevalence of between 0.1-0.2% in the adult population [2, 3].

PAPVCs can be broadly categorised into four types, depending on the location of the connection. Where the anomalous pulmonary vein drains into the right SVC or a persistent left SVC, this is termed a supra-cardiac PAPVC. A cardiac PAPVC describes the presence of drainage into the right atrium or innominate vein, as was the case in this patient. An infra-cardiac PAPVC is a connection to the inferior vena cava (IVC) or portal vein. Finally, a mixed PAPVC describes a combination of any of the above [4].

The single most common type of PAPVC is an isolated vein connecting the right upper lobe to the SVC. It is not uncommon for these patients to have a sinus venosus type of atrial septal defect (ASD). The cardiac lesion is usually in the upper atrial septum, adjoining the SVC. An ASD in the lower atrial septum is typically seen in association with an infra-cardiac PAPVC of the right lower lobe, draining to the IVC. A study in a paediatric population found an associated ASD in 80% of patients with a PAPVC, the majority of whom had aberrant venous drainage from the right lung [1]. Indeed, individuals with a PAPVC from the left lung, commonly have structurally
normal hearts [5].

A left-sided PAPVC is typically identified in adulthood, whilst a right-sided PAPVC is more commonly detected in childhood. This may be because of the association between right-sided venous anomalies and cardiac abnormalities, leading to an earlier clinical presentation [3]. However, the cardiac lesion may be clinically insignificant and detected following the identification of the PAPVC [6].

This case highlights the importance of post-procedural imaging to ensure that a line is appropriately placed. Where a PAPVC is detected, the clinician must consider whether other cardiovascular anatomical abnormalities are present. **Differential Diagnosis List:** Isolated, left upper lobe PAPVC., Total anomalous pulmonary venous return, Left-sided SVC

**Final Diagnosis:** Isolated, left upper lobe PAPVC.

**References:**

Figure 1

Description: A plain radiograph of the chest demonstrating the tip of the CVL within the left hemi-thorax

Origin: Department of Radiology, King's College Hospital, London
Figure 2

Description: Axial CT imaging demonstrating the CVL within the left inominate vein (white arrow)

Origin: Department of Radiology, King's College Hospital, London
Description: Axial CT imaging showing the CVL within the pulmonary venous system in the left hemithorax (white arrow) Origin: Department of Radiology, King's College Hospital, London
Description: A sagittal MRI slice showing the CVL within the pulmonary venous system in the left hemithorax (asterisks)  
Origin: Department of Radiology, King’s College Hospital, London