CASE REPORT

INCIDENTAL DETECTION OF PERSISTENT LEFT SUPERIOR VENA CAVA DURING PERMCATH INSERTION: A CASE REPORT

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ABSTRACT

Persistent left superior vena cava (PLSVC) is an uncommon congenital venous anomaly that is often diagnosed incidentally during procedures involving central venous access, such as pacemaker or permcath insertion. We present the case of a 60-year-old male with end-stage renal disease who had an incidental finding of PLSVC during permcath placement for hemodialysis. Recognition of this venous anomaly enabled successful procedural completion despite the unexpected anatomy. This case underscores the importance of considering congenital venous abnormalities as potential causes when technical difficulties arise during central catheterization procedures.
Key Words: Persistent left superior vena cava, venous anomalies, central venous catheterization, permcath, complications.

Introduction

Congenital anomalies of systemic venous drainage are uncommon yet important findings that clinicians performing procedures involving central venous access should be aware of. A persistent left superior vena cava (PLSVC) is one such venous developmental abnormality that results from failure of normal regression of the left anterior cardinal vein during embryologic development in the 8th-10th weeks of gestation.[1] PLSVC has an estimated prevalence of 0.3-0.5% in the general population.[2] Due to its rarity, it often goes undiagnosed unless incidentally detected on imaging.

While typically asymptomatic, the presence of PLSVC has critical implications if complications arise during procedures requiring central catheterization like pacemaker implantation, cardiopulmonary bypass, or hemodialysis catheter placements.[3] Technical difficulties such as inability to advance catheters from the right side should raise clinical suspicion for anomalous anatomy. Failure to recognize PLSVC can lead to significant morbidities from vascular and cardiac perforation, arrhythmias, catheter knotting, thrombosis or stenotic lesions of the coronary sinus.[4] Therefore, awareness of PLSVC and its potential procedural implications is imperative for clinicians performing central venous catheterizations.

We present a case where PLSVC was discovered unexpectedly during permcath insertion for hemodialysis in a patient with end-stage renal disease. This case highlights the need to actively consider developmental venous anomalies in the differential when technical challenges arise during attempted central line placement. Early imaging elucidated the aberrant anatomy, allowing successful procedural completion by guiding adaptations to technique.

Case Presentation

A 36-year-old male with end-stage renal disease on long-term hemodialysis presented for permcath

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placement due to recent thrombosis of his arteriovenous fistula, rendering it non-functional for dialysis access. During attempted permcath insertion, technical difficulties were encountered. Imaging then revealed stenosis of bilateral internal jugular and right subclavian veins along with presence of an anomalous left superior vena cava draining into the coronary sinus (Fig.1&2). Taking care to accommodate the unexpected venous anatomy, the permcath was successfully placed via the persistent left superior vena cava with the tip positioned in the coronary sinus.

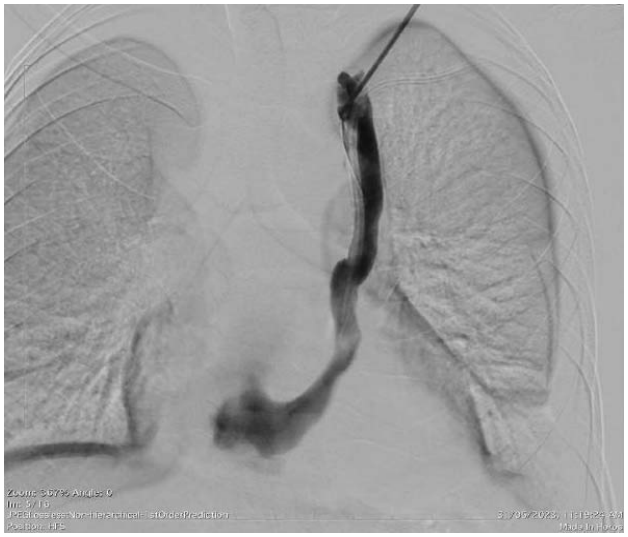

Figure 1: Venogram performed from the sheath placed in the left jugular vein which outlined persistent left superior vena cava draining via the coronary sinus into the right atrium. Contrast does not opacify the left brachiocephalic vein and superior vena cava.

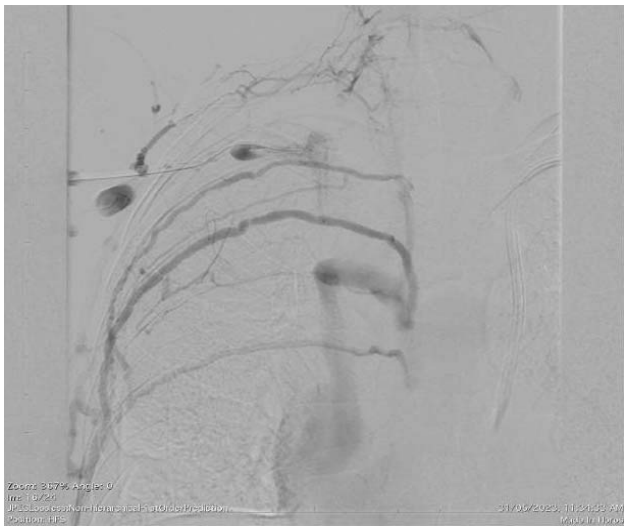

Figure 2: Venogram performed from the right subclavian vein which opacified intercoastal veins which are draining into the right atrium. Right sided IVC is not opacified.

Discussion

In normal fetal cardiovascular development, the left anterior cardinal vein typically undergoes regression as the left innominate vein forms, usually during the eighth to tenth weeks of gestation.[1] Failed regression results in persistent patency of the left anterior cardinal vein, known as persistent left superior vena cava (PLSVC). This congenital venous anomaly has an estimated prevalence between 0.3-0.5% in the general population based on autopsy studies and imaging reviews.[2] An absent right superior vena cava co-occurring with PLSVC is very rare, estimated to be seen in only 0.07-0.13% of those with PLSVC.[5]

The anomalous PLSVC characteristically drains into the right atrium through the coronary sinus.[4] While the majority of cases are asymptomatic, PLSVC has critical implications if undiagnosed before procedures requiring central venous access. Technical difficulties during catheter placements, implantations and cannulations should prompt consideration of abnormal systemic venous anatomy. Lack of awareness of PLSVC leads to increased procedural complications like vascular or cardiac perforation, arrhythmias, catheter knotting and displacement, coronary sinus stenosis or thrombosis.[4] Therefore, recognition of this venous anomaly is imperative to anticipate risks and guide modifications to technique.

Diagnostic imaging enables definitive identification of PLSVC. Chest x-ray can reveal an abnormal catheter course along the left cardiac border. Contrast-enhanced CT provides clear delineation of the aberrant venous anatomy.[6] Once diagnosed, procedures requiring central access can be adapted by approaches like right internal jugular cannulation, left subclavian insertion, or cautious retention of existing catheters with added vigilance.[7] With appropriate procedural modifications, central catheterizations can often be successfully completed despite PLSVC. However, due to the abnormal anatomy, care must be taken with manipulation of lines and re-imaging to confirm proper positioning.

Our instructive case illustrates the incidental discovery of PLSVC during challenging permcath insertion for hemodialysis in a patient with end-stage renal disease. Recognition of this rare venous anomaly was key to enabling the procedure to be completed successfully.

This case underscores the critical need for clinicians to actively consider developmental venous abnormalities as potential etiologies when technical difficulties arise during central venous catheterization procedures.

Conclusion

PLSVC is a rare yet important venous anomaly that may be detected incidentally during procedures like permcath or pacemaker insertion. Awareness of PLSVC can guide adaptations to technique when catheter advancement difficulties signal anomalous anatomy. Diagnostic imaging confirms the diagnosis to inform management. With appropriate modifications, procedures involving central access can often be successfully completed despite PLSVC. However, added vigilance with existing lines is warranted given the unusual anatomy.

Conflict of Interest: Not declared.

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