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Clinical Image

Hemodialysis Catheter Dysfunction Associated with Persistent Left Superior Vena Cava

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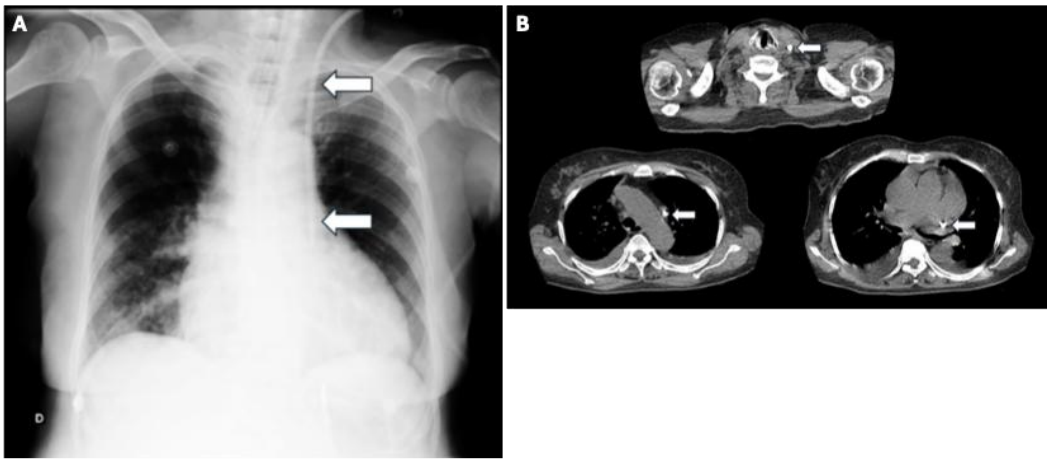

Figure 1: A. X-ray showing a hemodialysis catheter on topography of a persistent left superior vena cava. B. Computed tomography (axial sections) showing a hemodialysis catheter in a persistent left superior vena cava (arrows).

A 67-year-old female patient with diabetes mellitus, systemic arterial hypertension, and chronic kidney disease on chronic renal replacement therapy by hemodialysis was admitted with acute respiratory failure due to acute pulmonary edema related to poor adherence to renal replacement therapy. She had an arteriovenous fistula with acute thrombosis, making this vascular access unusable. Therefore, due to the urgent need for dialysis, placement of a short-term catheter was required. Insertion of a catheter into the left internal jugular vein was chosen because bedside ultrasound demonstrated stenosis of the right internal jugular vein. The puncture was performed under real-time ultrasound guidance without complications. The patient was referred to for dialysis and, at the beginning of the session, the catheter showed unsatisfactory blood flow (maximum 200 mL/min), although dialysis could be completed and the congestive condition improved.

Due to vascular access dysfunction, a chest X-ray was performed, showing a catheter inserted in the topography of the left internal jugular vein, coursing through the left hemithorax along the hemiclavicular line, with the distal tip positioned at the superior border of the cardiac silhouette (Figure 1). Because of the anomalous catheter position, computed tomography was requested, which demonstrated the presence of both superior vena cavae, with the hemodialysis catheter located in a small-caliber left superior vena cava and its distal tip still within the lumen of the persistent left superior vena cava (Figure 2). As the catheter had not shown satisfactory flow, it was removed and a new catheter was inserted into the right subclavian vein, with its distal tip positioned at the junction of the right superior vena cava and the right atrium.

The left superior vena cava (LSVC) results from failure of degeneration of the left anterior cardinal vein around the 8th week of gestation. It is a rare anatomical variation found in 0.3–0.5% of individuals without cardiac abnormalities and in about 4.5% of those with congenital heart disease [1,2]. Four categories have been described according to the embryologic origin of the superior vena cavae: I) normal; II) persistent left superior vena cava with the same diameter as the right superior vena cava; III) partially persistent left superior vena cava (reduced diameter); IV) persistent left superior vena cava with obliteration of the right superior vena cava [2].

In most cases, both superior vena cavae (left and right) are present, and the LSVC drains into the right atrium through the coronary sinus; in about 10% of cases, it may drain directly into the left atrium [3]. It is usually asymptomatic but has been associated with arrhythmias due to alterations in the atrioventricular node and bundle of His, thromboembolic events, difficulty in pulmonary artery catheterization, and potential impairment of central venous access placement [3]. Diagnosis is often incidental, making the prevalence of this anatomical variation likely underestimated, and when identified, it requires investigation for other associated congenital cardiac anomalies [1–3].

Although asymptomatic in most cases, it may interfere with evaluation of central venous catheter positioning, and its manipulation may lead to angina, arrhythmias, or coronary sinus thrombosis, particularly when the catheter tip is located within the coronary sinus. Once a catheter is positioned in the LSVC, it may remain in place provided that the distal tip is located cranially to the junction with the coronary sinus, to avoid sinus thrombosis [4]. As this is the most common congenital thoracic venous anomaly, awareness of this condition is important. In this case, vascular access flow dysfunction was also observed, and an association with the presence of a small-caliber persistent left superior vena cava cannot be excluded.

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Conflicts of Interest: None.

Supplementary Materials: None.

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