

## Case Report

# Persistent left superior vena cava identified by transesophageal echocardiography

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A 70-year-old female with severe aortic stenosis presented for aortic valve replacement and underwent routine preoperative Swan-Ganz catheter placement. Transesophageal echocardiography demonstrated a dilated coronary sinus with a catheter present. A high suspicion of venous anomaly prompted an agitated saline study. Flow through the coronary sinus into the right atrium was observed, confirming the presence of a persistent left superior vena cava. Although the persistent left superior vena cava has a low prevalence in the general population, it is one of the most common thoracic venous anomalies. During central venous cannulation, the presence of venous anomalies increases procedural complication rates. Fortunately, our patient remained asymptomatic both before and after catheter insertion. Awareness of this anomaly could help clinicians avoid complications.

## Keywords

Superior vena cava; transesophageal echocardiography; coronary sinus

## 1. Introduction

Persistent left superior vena cava (PLSVC) has an estimated prevalence of 0.3% in the general population (Buirski et al., 1986). It is a persistent part of a remnant vessel that appears during early embryological development, usually disappearing by full embryologic development (Sarodia and Stoller, 2000). Familiarity with this anomaly can help clinicians avoid complications with the placement of central lines, Swan-Ganz catheters, peripherally inserted central catheters, dialysis catheters, and implantable electronic devices. Complications are common for these interventions and may be mechanical in nature (pneumothorax, arrhythmia, bleeding), thrombotic, or infectious. The presence of venous anatomic variants such as PLSVC may raise the risk of complications. Thus, recognizing different anatomic venous variants is of utmost importance to improving patient safety (Fares et al., 2001).

## 2. Case Report

A 70-year-old female with symptomatic severe aortic stenosis presented for aortic valve replacement. With ultrasound guidance a right internal jugular vein Swan-Ganz catheter was placed preoperatively without technical difficulty. Shortly after anesthesia induction, routine transesophageal echocardiography was performed which demonstrated a dilated coronary sinus (Fig. 1). The suspicion of a PLSVC was discussed with the cardiovascular surgeon, and an agitated saline study was carried out. An intravenous catheter was placed in the left antecubital vein and agitated saline was injected, demonstrating flow through the coronary sinus into the right atrium (Video1). Although PLSVC was confirmed, the planned surgical intervention was not altered. Postoperatively, a portable chest X-ray was performed, which demonstrated a right sided central venous catheter crossing the midline (Fig. 2).

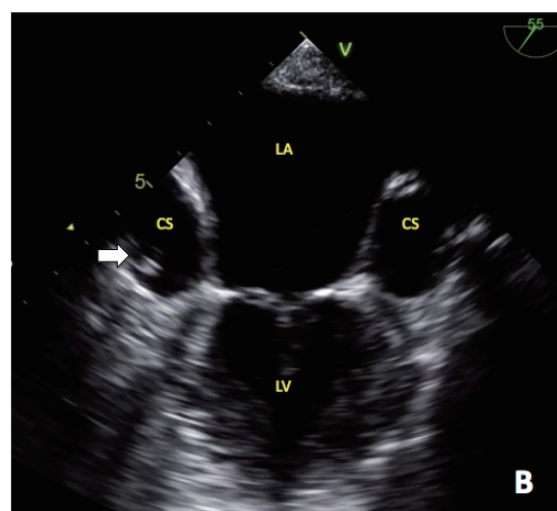


Figure 1. Transesophageal echocardiogram with the catheter noted within the coronary sinus. White arrow demonstrates catheter. LA: Left Atrium, CS: Coronary Sinus, LV: Left Ventricle.

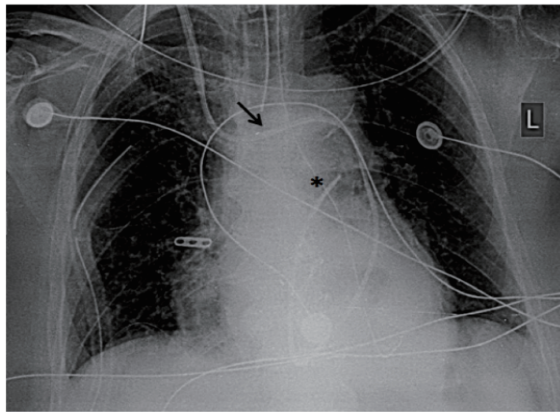
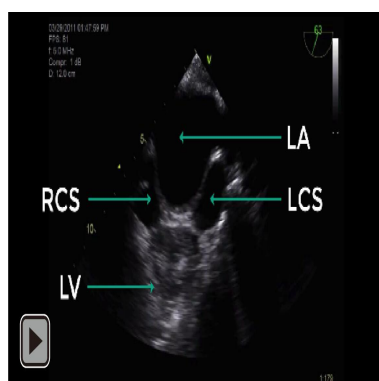


Figure 2. Chest X-Ray demonstrating Swan-Ganz catheter crossing midline. Black arrow notes a catheter crossing through a bridging vein, asterisk points at the tip of the catheter ending in the left pulmonary artery.

### 3. Discussion

PLSVC is the most common thoracic venous anomaly (Sarodia and Stoller, 2000). A predominant associated concern for the clinician is mechanical vascular damage by forceful manipulation, thrombosis, or cardiac arrest secondary to coronary sinus irritation (Zhou et al., 2016). Because PLSVC is largely asymptomatic, it is usually diagnosed incidentally. It can be diagnosed by the characteristic appearance of a catheter crossing the midline from the right internal jugular vein, as seen in our patient (Sarodia and Stoller, 2000). It can also be observed by transesophageal echocardiography with a dilated coronary sinus and a catheter in the lumen. Injection of agitated saline via the left arm may confirm its drainage either through the coronary sinus into the right atrium (as seen in our patient), or directly into the left atrium (as occurs in 8-10% of cases) (Lee et al., 2011). Fortunately, our patient remained asymptomatic before and after Swan-Ganz catheter placement, PLSVC not interfering with the surgical procedure. Yet, due to the high volume of central venous access procedures performed, it is important for the clinician to be aware of this condition and its potential complications.



Video 1. Transesophageal echocardiogram performed with agitated bubble study. LA: Left Atrium, LV: Left Ventricle, RCS: Right Coronary Sinus, LCS: Left Coronary Sinus.

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### Conflict of Interest

The authors declare no competing interest.

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