

## CASE REPORT

# A Rare Vascular Anomaly during Central Venous Catheterization: A Persistent Left-Sided Superior Vena Cava

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## Abstract

A persistent left-sided superior vena cava (PLSVC) is the most frequent abnormality of the venous system; however, it is not a very well-known variation among physicians. Herein we report the case of a patient with a PLSVC who was diagnosed after central venous catheterization (CVC). An 80-year-old man was admitted to the emergency room with cardiopulmonary arrest. After the return of spontaneous circulation, CVC was blindly performed from the left jugular vein without any complications. However, routine chest X-ray after catheterization revealed that the catheter was moving down directly to the left heart. Thoracic computed tomography showed the right brachiocephalic vein draining into the left brachiocephalic vein and forming the left superior vena cava in front of the aortic arch. The left superior vena cava merged into the right atrium after crossing the left pulmonary artery. CVC is widely used in clinical practice, and therefore clinicians should be aware of possible variations in central veins, particularly during blind catheterization.

**KEYWORDS:** Central vein catheterization, vascular anomaly, left sided superior vena cava

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## INTRODUCTION

A persistent left-sided superior vena cava (PLSVC) is an abnormality of the venous system, with prevalence of 0.1-0.5% in the general population [1]. It is usually diagnosed as an incidental finding during cardiovascular imaging or surgery [2]. Herein we report the case of a patient with a PLSVC who was diagnosed after central venous catheterization (CVC) was performed.

## CASE PRESENTATION

Written informed consent was taken from patient's relatives for publication. An 80-year-old man with a history of ischemic coronary artery disease and chronic obstructive pulmonary disease was admitted to the emergency room with cardiopulmonary arrest. After 6 minutes of cardiopulmonary resuscitation, the return of spontaneous circulation was achieved. The patient was intubated and then admitted to the intensive care unit (ICU). After his vital parameters were stabilized, left internal jugular vein catheterization was attempted, which was uneventful. A chest X-ray (CXR) scan revealed that the catheter was moving down to the left margin of the mediastinum and then into the heart (Figure 1). A thoracic computed tomography (CT) scan that was performed in the emergency room after stabilization showed the right brachiocephalic vein draining into the left and forming the left superior vena cava in front of the aortic arch (Figures 2 and 3, arrows). After descending to the level of the atria, the left superior vena cava drained into the right atrium after crossing the left pulmonary artery (Figures 2 and 3, arrows).

## DISCUSSION

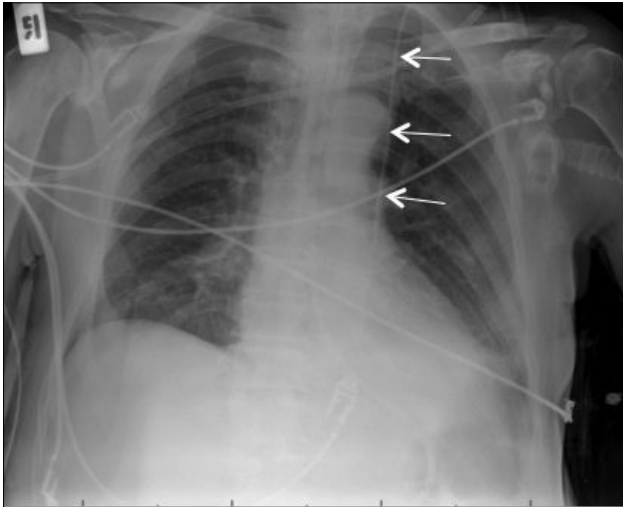
A PLSVC is a remnant of the proximal segment of the left anterior cardinal vein. The vessel generally drains into the coronary sinus [3]. When isolated, a PLSVC usually has no clinical significance; however, it has been reported to occur in isolation in only 9% of cases. It is more often seen in association with other anomalies [3].

The presence of a PLSVC can be challenging during catheterization of left subclavian vein which is a common site of access utilized when placing pacemakers and Swan-Ganz catheters. In 80-90% of cases, a PLSVC drains into the right atrium through the coronary sinus. In the remaining cases, it may drain into the left atrium, resulting in a right-to-left-sided shunt [2].

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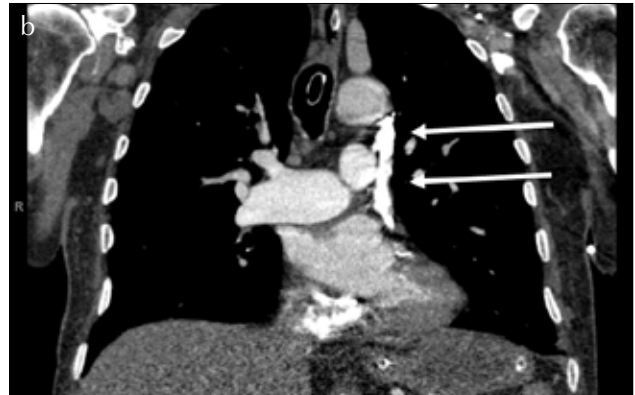
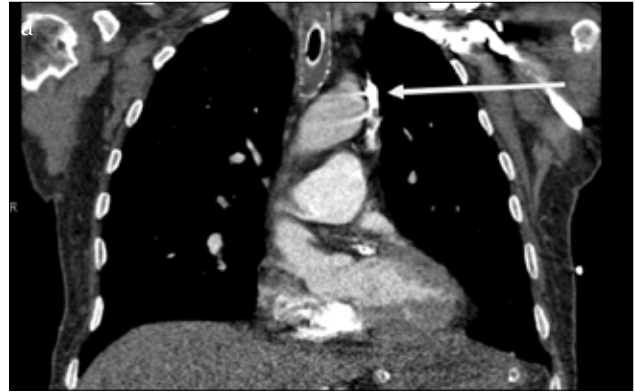
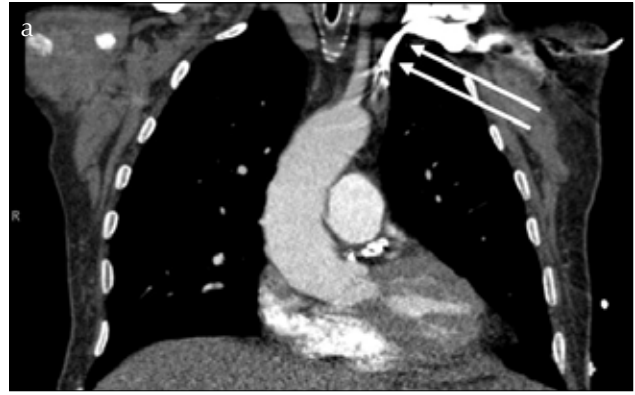
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**Figure 1.** Control chest X-ray after catheterization



**Figure 2. a-c.** Transverse computed tomography scans showing the persistent left-sided superior vena cava (arrows)



**Figure 3. a-d.** Coronal computed tomography scans showing the persistent left-sided superior vena cava (arrows)

Central venous catheterization is an important part of the treatment of patients in various settings. The internal jugular, subclavian, and femoral veins are the most commonly involved vessels. For reducing the rates of mechanical complications associated with CVC, ultrasound has a pivotal role,

and it has been shown that ultrasound improves success rates [4]. Further, there is evidence that ultrasound is useful in conditions such as available poor surface landmarks in obese patients, previous complications, and uncorrected coagulopathy [5]. Although ultrasound guidance is recommended as a safer approach, it is not widely available in many ICUs worldwide. In the absence of an ultrasonographic evaluation, physicians who perform blind CVC should be aware of possible vascular anomalies. Another point to consider is the importance of a control CXR scan. Although ultrasonography is helpful for determining the percutaneous entry into the vessel, it has limited value for the course of the catheter inside the vessel. Therefore, after blind CVC into the jugular and subclavian veins, a CXR scan is an important step that provides information about the course of catheters within vessels.

In conclusion, CVC is an important part of the management of patients in various settings. Clinicians should be aware of possible variations in central veins, particularly during blind catheterization. Whenever possible, ultrasound plays a pivotal role in reducing the rates of mechanical complications associated with CVC.

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**Informed Consent:** Written informed consent was obtained from patient's relatives who participated in this case.

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