

Persistent Left Side Superior Vena Cava

Kevin Palmer MD MPH, Ryan Meyer MD, Tamir Bresler MD, Hunter King MD, Marissa De Freese MD
Department of Surgery, Los Robles Regional Medical Center

Introduction

- More than 5 million central venous catheters are inserted annually in the United States.
- Common sites for central venous access include the internal jugular, subclavian, and femoral veins.
- Knowledge of venous anatomy is integral to safe placement of centrally inserted venous catheters.
- Anomalous venous anatomy represents a challenge to central venous line placement.

Case Description

54 year old male with past medical history significant for heart failure with reduced ejection fraction, hypertension, hyperlipidemia, and new-onset atrial fibrillation who presented to our emergency department with a three day history of shortness of breath that was worse with exertion and orthopnea. The patient stated that when he misses his Lasix dose he has shortness of breath when climbing one flight of stairs or walking one block. He was found to have atrial fibrillation with rapid ventricular response and was admitted to the telemetry floor on an amiodarone drip. On hospital day two, the patient was found to be lethargic with profound hypoglycemia. An ABG was performed and the patient was found to have metabolic acidosis. Upon physical examination, he had mottled skin on his arms and legs up to his elbows and knees, respectively, with noted discoloration of ears and nose. The patient was transferred to the intensive care unit for higher level of care.

In the intensive care unit, the patient became hypotensive with systolic blood pressures dropping to 85 mmHg and mean arterial pressure as low as 55 mmHg. The decision was made to place a central venous catheter so that vasopressor support could be utilized to maintain mean arterial pressure above 66 mmHg.

A Seldinger technique was used to insert a 7 French triple lumen catheter into the left subclavian vein under direct ultrasound visualization. The procedure was undertaken without incident. All catheter ports were aspirated and flushed without resistance. A portable chest x-ray was ordered to confirm proper catheter placement (Figure 1A and Figure 1B). Given the chest x-ray findings, a blood gas was drawn from the left subclavian catheter (Figure 2) in order to confirm placement of catheter within venous circulation.



Figure 1. Portable chest x-ray following placement of left subclavian central venous catheter.

Panel - VENOUS BLOOD GAS, POC			
Collected Date/Time: 03/06/23 15:01			
		Units	Normal Range
PH	7.25 L		7.32-7.43
PCO2	36.0 L	mmHG	41.0-51.0 mmHG
PO2	23.9	mmHG	not established mmHG
HCO3	15.7 L	mmol/L	22.0-29.0 mmol/L
BE	-11.6 P*	mmol/L	(-2) - (+3) mmol/L
TOTAL CO2	15 L	mmol/L	23-30 mmol/L
SVO2 CALC	34.0	%	not established %
SAMPLE SITE	CENTRAL LINE		
DEVICE TYPE	CANNULA		
FIO2	44	%	%
RESP RATE SET	22	b/m	b/m
SAMPLE TYPE	VENOUS		

Figure 2. Blood gas study drawn from left subclavian central venous catheter.

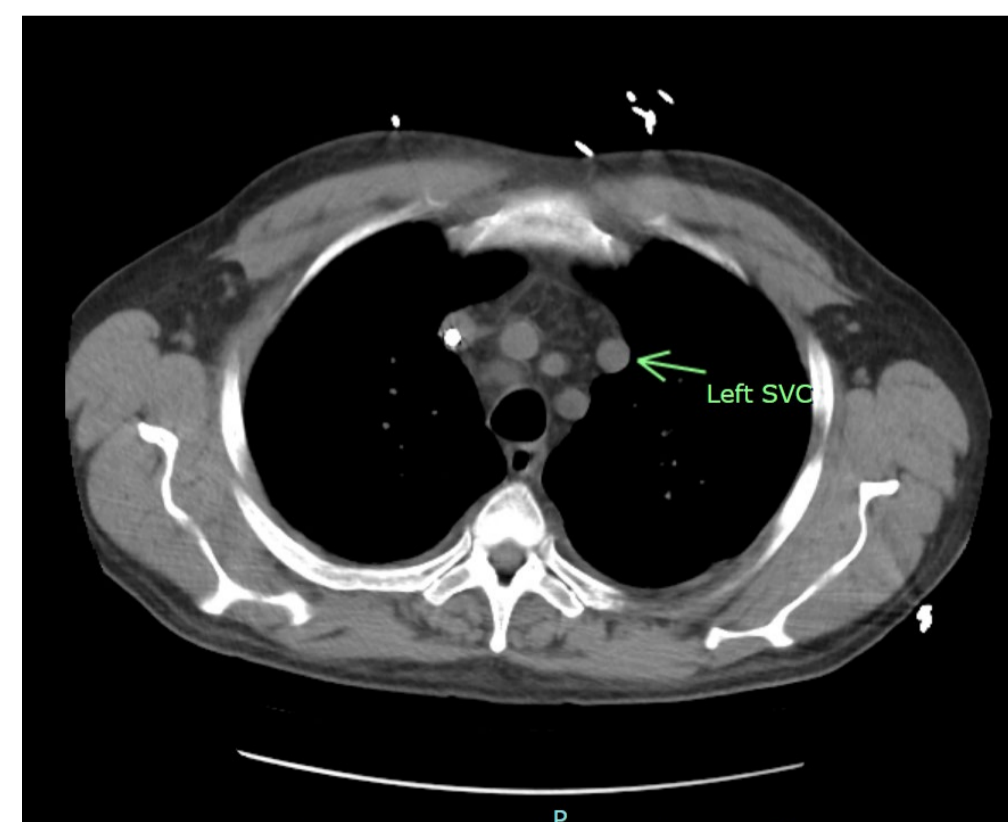


Figure 3. Computed tomography of chest illustrating duplicate left superior vena cava as well as normal superior vena cava in anatomical position with central venous catheter visualized within lumen.

Discussion

- Persistent left superior vena cava (PLSVC) forms from failure of embryologic regression of the left common cardinal vein and the caudal par of the left superior cardinal vein.
- PLSVC occurs in 0.3% to 0.5% of the general population.
- Up to 4.5% of patients with cardiac anomalies also have PLSVC.
- 82% of patients with PLSVC have anatomically normal right side SVC.
- Drainage of PLSVC
 - 90% drain to right atrium via the coronary sinuses
 - < 10% drain to left atrium via the left atrial appendage
 - < 1% drain to azygous vein
- Confirmation of PLSV can be achieved with any number of diagnostic tests, including CT venography, contrast enhanced x-ray venography, and contrast-enhanced echocardiography.
- In the majority of cases, PLSVC is asymptomatic and may be left untreated

Conclusion

- PLSVC is relatively rare in the general population, however, its occurrence is made more common by the frequency of central venous catheter placement.
- Understanding normal and aberrant venous anatomy is key to proper central venous catheter placement.

References

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