Journal of Geriatric Cardiology | JGC
LETTER TO THE EDITOR
J Geriatr Cardiol 2026; 23(4): 257–259

An unexpected finding during right heart catheterization: isolated persistent left superior vena cava

Yalcin Velibey[1,✉], Ilkhomzhon Kalandarov[2], Muhammed Bahadır Omar[2], Tolga Sinan Güvenc[3]

1. Siyami Ersek Thoracic and Cardiovascular Surgery Center, Training and Research Hospital, Department of Cardiology, Istanbul, Turkey; 2. Medical Park Pendik Hospital, Department of Cardiology, Istanbul, Turkey; 3. Istinye University, Faculty of Medicine, Department of Cardiology, Istanbul, Turkey

✉ Correspondence to: dr_yalchin_dr@yahoo.com.tr

https://doi.org/10.26599/1671-5411.2026.04.004

Although rare, persistent left superior vena cava (PLSVC) is the most common anomaly of the thoracic venous system, with a prevalence of 0.2%-3%. In most cases, it occurs simultaneously with a right superior vena cava (RSVC). However, this patient presented an isolated PLSVC, that is, without a RSVC, which is a particularly rare finding.[1] Despite most often being a benign incidental finding, an isolated PLSVC may pose difficulties with pacemaker implantation, central venous catheterization, and cardiac surgery.[2]

A 60-year-old man with a history of hypertension and ischemic cardiomyopathy with severely reduced left ventricular ejection fraction (20%) and advanced heart failure was referred to our department for right heart catheterization as part of a pre-heart transplantation evaluation. The patient had been receiving long-term guideline-directed medical therapy, including sacubitril/valsartan (49/51 mg twice daily), metoprolol (100 mg twice daily), eplerenone (50 mg once daily), empagliflozin (10 mg once daily), furosemide (160 mg once daily), clopidogrel (75 mg once daily), and atorvastatin (40 mg once daily). His functional capacity was classified as New York Heart Association class III [Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS) profile 6] and routine laboratory testing revealed normal electrolyte levels as well as preserved renal, hepatic, and thyroid function, with the exception of an elevated plasma pro-B-type natriuretic peptide level (3780 pg/mL; normal: < 125 pg/mL). A 7-French sheath was placed in the right internal jugular vein under ultrasonographic guidance using the Seldinger technique. Although the venipuncture and placement of the sheath were uneventful, slight resistance was encountered when the sheath was advanced approximately 5 centimeters below the puncture site. Venography was performed to assess the anatomy, revealing the absence of the RSVC and the innominate vein coursing from right to left to join a PLSVC (Figure 1A, Video 1). A Swan-Ganz catheter was advanced to the right atrium via the left superior vena cava (LSVC) and coronary sinus, but further advancement was not possible due to the limited flexibility of this catheter. The Swan-Ganz catheter was exchanged for a multipurpose catheter, and the procedure was completed using this catheter without any complications (Figure 1B, Video 2). A review of previous imaging findings revealed a PLSVC, and the absence of a RSVC was apparent on prior non-contrast computed tomographic images of the chest (Figure 1C & 1D). However, this finding had been overlooked and was not mentioned in the radiology reports.

To better contextualize this unexpected procedural finding, a brief overview of the relevant embryological background is warranted. Specifically, understanding the developmental basis of the superior caval venous system helps explain the anatomic configuration encountered during catheter advancement. During embryonic development, the primary atrium receives blood from paired superior caval veins, which are connected through the common cardinal vein. By the 12th week, the LSVC usually obliterates, leaving only the RSVC.[3] A PLSVC with an absent RSVC is a rare anomaly with an incidence of 0.07% to 0.13%,[3] and it commonly (90%) drains into the coronary sinus and right atrium,[4] but in a minority (10%) of cases, it may drain into the left atrium without any hemodynamic consequences. Unusually, the RSVC may involute with a PLSVC.[2] Left-sided venous return may be encountered in several conditi-

© 2026 JGC All rights reserved; www.jgc301.com

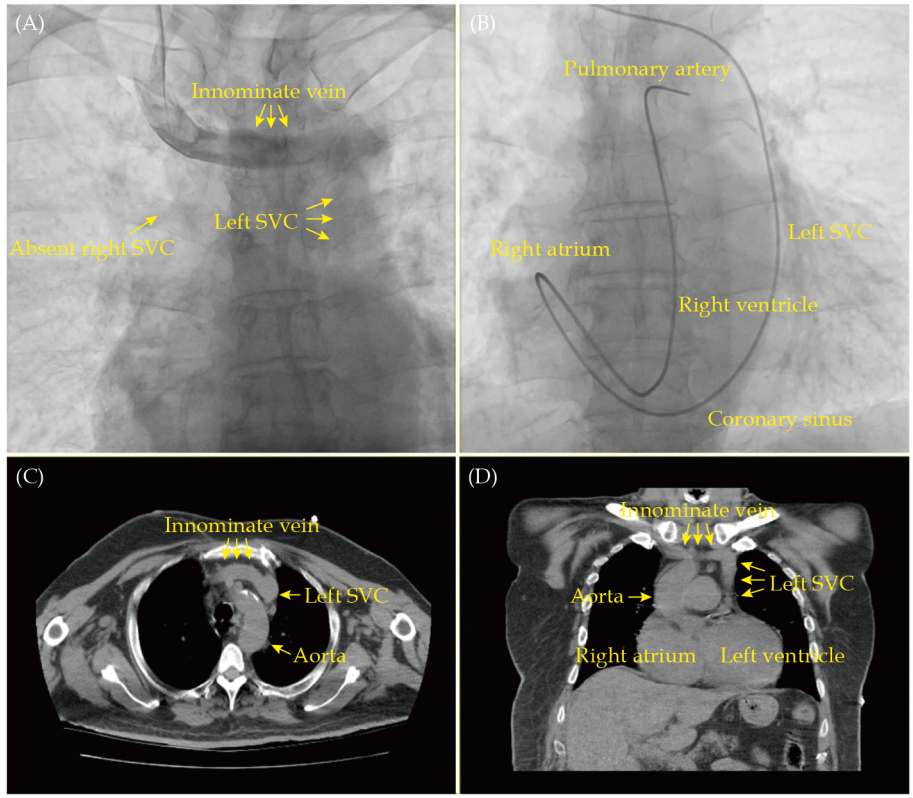


Figure 1 Venographic and non-contrast CT images of the patient. (A) A venography showing the absence of RSVC and the innominate vein coursing from right to left to join PLSVC; (B) intracardiac course of the Swan-Ganz catheter; and (C & D) non-contrast computed tomographic imaging of the chest showing the PLSVC and the absence of a RSVC. PLSVC: persistent left superior vena cava; RSVC: right superior vena cava.

ons such as unroofed coronary sinus, partial anomalous pulmonary venous return draining into the left innominate vein, left-sided inferior vena cava with azygos or hemiazygos continuation or venous collateral formation secondary to superior vena cava obstruction.[1,4] Recognition of these entities underscores the importance of careful anatomical assessment using multimodality imaging. Although isolated PLSVC is typically an asymptomatic incidental finding, it may complicate procedures involving the upper venous system, such as central venous catheterization, intracardiac device implantation, and cardiopulmonary bypass requiring superior vena cava cannulation.[2] Beyond procedural challenges, PLSVC should be viewed as a potential marker of underrecognized venous anatomic complexity rather than a benign isolated variant. In patients undergoing advanced heart failure therapies or heart transplantation evaluation, unrecognized PLSVC may result not only in technical difficulties but also in misinterpretation of invasive hemodynamic data and suboptimal procedural planning. Accordingly, identification of this anomaly should prompt systematic re-evaluation of prior imaging and venous anatomy, particularly when upper venous access is anticipated. A careful review of existing radiologic studies before invasive procedures is therefore essential to optimize procedural strategy and avoid preventable complications.

ACKNOWLEDGMENTS

This research did not receive any specific grant from funding agencies. All authors had no conflicts of interest to disclose.

REFERENCES

[1] Perles Z, Nir A, Gavri S, *et al*. Prevalence of persistent superior vena cava and association with congenital heart anomalies. *Am J Cardiol* 2013; 112: 1214–1218.

[2] Bisoyi S, Jagannathan U, Dash AK, *et al*. Isolated persistent left superior vena cava: a case report and its clinical implications. *Ann Card Anaesth* 2017; 20: 104–107.

[3] Smolarek D, Jankowska H, Dorniak K, *et al*. A rare case of isolated persistent left superior vena cava diagnosed by echocardiography. *J Cardiothorac Surg* 2024; 19: 175.

[4] Azizova A, Onder O, Arslan S, *et al*. Persistent left superior vena cava: clinical importance and differential diagnoses. *Insights Imaging* 2020; 11: 110.

Please cite this article as: Velibey Y, Kalandarov I, Omar MB, Güvenc TS. An unexpected finding during right heart catheterization: isolated persistent left superior vena cava. *J Geriatr Cardiol* 2026; 23(4): 257−259. DOI: 10.26599/1671-5411.2026.04.004