

# Dual chamber pacemaker implantation via both right and persistent left superior vena cava. A case report

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**Figure 1** Left panel: Venography. Contrast injection from left arm shows persistent left superior vena cava draining into coronary sinus, in the presence of right superior vena cava draining into right atrium and a connecting brachiocephalic vein. Central panel: Fluoroscopy. Fluoroscopy shows the ventricular lead implanted via the right superior vena cava at interventricular septum (tip on the right), and the right atrial lead implanted via the persistent left superior vena cava through the coronary sinus, at right atrial appendage (tip on the left). Right panel: Chest X-ray. Chest X-ray performed after the procedure confirmed the position of both leads and the correct positioning.

## Summary

Persistent left superior vena cava (PLSVC) is a venous anomaly with a prevalence of 0.3–0.5% in the general population.<sup>1</sup> PLSVC is usually an incidental finding during implantation of transvenous cardiac device and the procedure may be unsuccessful or complicated.<sup>2,3</sup> A patient undergoing pacemaker implantation showed PLSVC, right superior vena cava (RSVC) and connecting brachiocephalic vein. The leads were inserted via both veins through cardiac chambers.

## Case description

A 70-year-old man was admitted to the hospital for exertional dyspnoea. The electrocardiogram (ECG) revealed third-degree atrioventricular block, and the patient was transferred to the Cardiac Intensive Care Unit.

The patient's medical history was positive for hypertension and type-II diabetes mellitus.

ECG monitoring confirmed the diagnosis of third-degree atrioventricular block with ventricular escape rate of 30 bpm. An

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echocardiogram showed mild reduction of left ventricular ejection fraction (49%). Of note, there was no evidence of dilated coronary sinus. A permanent dual chamber pacemaker implantation was scheduled.

During pacemaker implantation, left axillary vein puncture was performed under ultrasound guidance. At guidewire insertion, a persistent left superior vena cava (PLSVC) was incidentally found. Venography showed PLSVC draining into coronary sinus, in the presence of right superior vena cava (RSVC) draining into right atrium and a connecting brachiocephalic vein between the RSVC and the PLSVC (Figure 1). The right ventricular lead positioning was made through the RSVC to the right ventricle at interventricular septum, in a conventional manner. The right atrial lead was implanted via the PLSVC through the coronary sinus, at right atrial appendage, with active fixation. Due to the favourable angle exiting the coronary sinus ostium, it was not necessary to use a J-shaped stylet to gain access to atrial appendage. Sensing, impedance and pacing threshold were optimal in both chambers. Total procedure time was 100 min with fluoroscopy time of 4 min 13 s and dose area product 18504 mGy/cm<sup>2</sup>. Before patient discharge, a chest X-ray confirmed the correct positioning of both leads (Figure 1).

This case represents, to the best of our knowledge, the first report in which the ventricular lead was placed via the RSVC and the atrial

lead via the PLSVC. Alternative approaches would have been insertion of both leads through RVSC or PLSVC. Our approach could be a valid option in similar cases, providing input for implanting physicians.

**Consent:** The authors confirm that written consent for submission and publication of this case report including images and associated text has been obtained from the patient in line with COPE guidance.

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