



Persistent left superior caval vein draining into right atrium, but not through the coronary sinus

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ABSTRACT

Persistence of the left superior caval vein is the most commonly reported thoracic venous anomaly. The vein usually drains into the right atrium through the coronary sinus, reflecting its developmental origin. We describe an unusual variant, in which the vein drained directly into the right atrium.

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A 51-year-old woman with a history of recurrent palpitations, and a documented regular narrow complex tachycardia, was referred for an electrophysiology study. It proved possible to insert a 4 French deflectable decapolar catheter into the expected site of the coronary sinus, but only atrial electrograms were recorded. The absence of any ventricular signals, and the unusually vertical course of the catheter, prompted us to investigate further. The decapolar catheter was then re-inserted more horizontally into the coronary sinus itself and a quadripolar catheter was placed at the previous site. We discussed whether the location of the quadripolar catheter was best explained based on a persistent left superior caval vein (LSCV) entering the proximal coronary sinus or entering the left atrium through a low interatrial communication. Hence, we replaced the decapolar catheter with a 5 French left Amplatz (AL1) catheter. This permitted us to perform an angiogram, which revealed a normal coronary sinus, but failed to clarify the location of the quadripolar catheter (Figs. 1a and 2a). Finally, by means of a venogram, performed using a left forearm vein, the catheter location was shown to be in a narrow persistent LSCV (Figs. 1b and 2b; Online video 1, 2). To our surprise, the persistent LSCV was seen to open directly into the right atrium. We then

completed the electrophysiological study in standard fashion, achieving successful modification of the slow pathway after having confirmed the diagnosis of atrioventricular nodal re-entrant tachycardia.

Persistence of the left SCV is the most reported thoracic venous anomaly, said to have a prevalence of 0.3–0.5% in the general population [1]. Embryologically, the vein is the persisting left anterior cardinal vein, which opens into the left horn of the systemic venous sinus, or “sinus venosus”. The extracardiac part of the vein usually regresses, persisting only as the oblique vein of the left atrium, and the ligament of Marshall. The proximal part of the left horn of the systemic venous sinus then forms the coronary sinus. Thus, when persistent, the left SCV drains into the right atrium through the coronary sinus. Since this course is still to the systemic atrium, the lesion remains hemodynamically insignificant. In a proportion of cases, however, due to fenestration or absence of the walls normally interposing between the coronary sinus and the left atrium, there can be systemic desaturation [2]. In our patient, the persisting vein opened directly into the right atrium, but not through the coronary sinus. To the best of our knowledge, this is only the second report of such an anomaly [3]. The embryological basis is difficult to explain; one possibility is that the channel represents an anastomotic connection between distal left SCV and the right atrium. It is important for the electrophysiologist to recognise the anomaly, as inadvertent placement of a catheter within the vein may go unnoticed, and lead to false recording of presumed signals from the coronary sinus.

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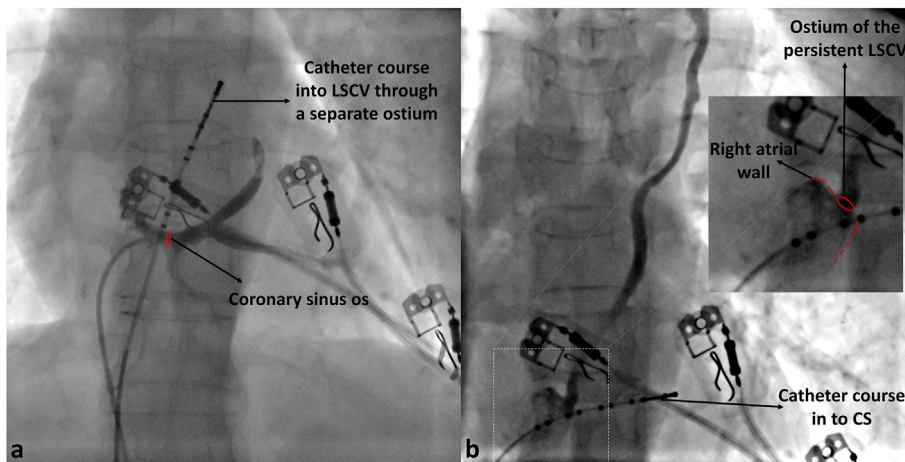


Fig. 1. **a.** Coronary sinus (CS) venogram in postero-anterior view demonstrating that the opening of left superior caval vein (LSCV) is adjacent to opening of CS. **b.** Left arm venogram in the same view, demonstrating a slender persistent LSCV opening directly into the right atrium. The inset highlights and marks the separate opening of the LSCV slightly away from the decapolar catheter course in the coronary sinus.

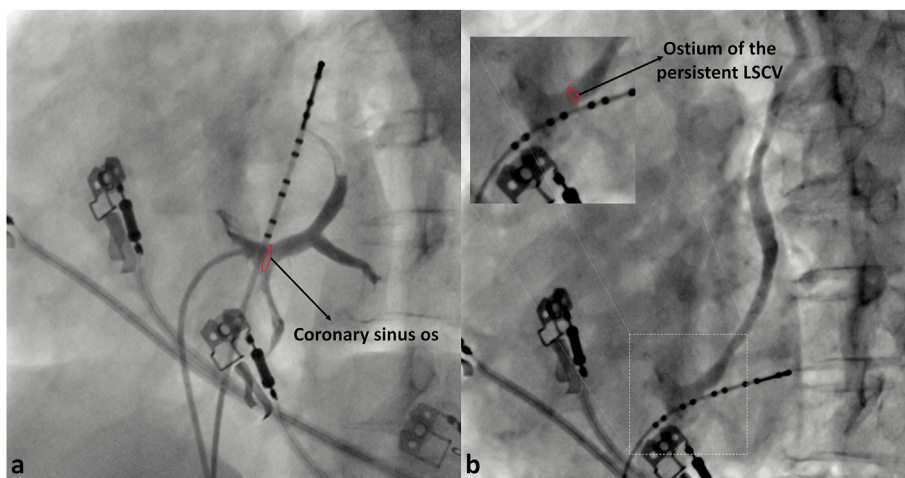


Fig. 2. **a.** Coronary sinus (CS) venogram in left anterior oblique 30° view demonstrating that the opening of left superior caval vein (LSCV) is adjacent to opening of CS. **b.** Left arm venogram in the same view, again demonstrating the separate opening of LSCV directly into the right atrium, highlighted in the inset.

Supplementary video related to this article can be found at <https://doi.org/10.1016/j.ipej.2021.05.005>

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Declaration of competing interest

There are no conflicts of interest.

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