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## Placement of a temporary pacemaker electrode through a persistent left superior vena cava

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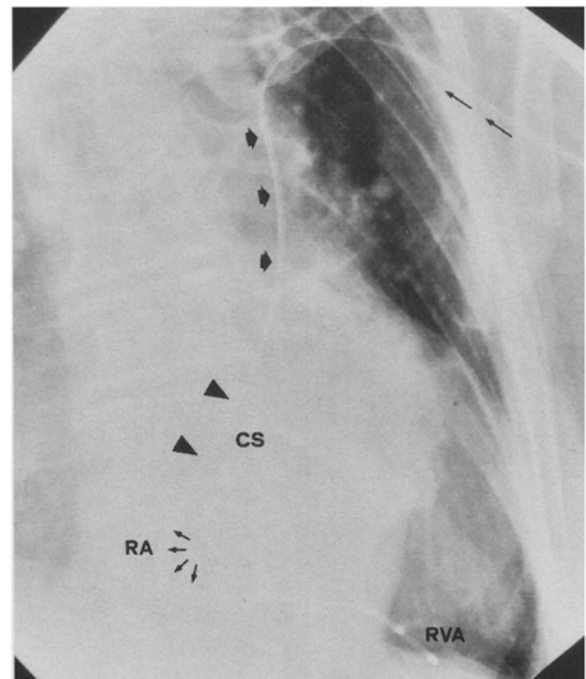
**Abstract** Perioperative temporary pacing was needed in a patient with congenital skeletal malformations and a cardiac conduction disturbance with incomplete trifascicular block. We report the successful placement of the pacemaker electrode through a persistent left superior vena cava (SVC).

**Key words** Persistent left superior vena cava · Pacemaker · Cardiovascular malformations

### Case report

A 69-year-old woman had to undergo surgical osteosynthesis because of a closed tri-malleolar fracture. This patient suffered from extensive congenital skeletal malformations including severe vertebral kyphoscoliosis and hypoplasia of the right arm. Because of these malformations, regional anaesthesia as well as oro-pharyngeal intubation for general anaesthesia were expected to be difficult. Besides a history of moderate arterial hypertension, no cardiovascular disease was known. The preoperative ECG revealed an incomplete trifascicular block, i. e. complete left bundle branch block combined with first degree AV block. Therefore, it was decided prophylactically to place a temporary pacemaker for the perioperative period.

Because of the malformations mentioned above, venous access by puncture of the subclavian or jugular veins was not feasible. After puncture of a left cubital vein, the pacemaker electrode could easily be advanced to the left subclavian vein. Despite fluoroscopic control, a further passage to the right in the direction of the superior vena cava (SVC) was not possible. The pacemaker lead took an unusual left-sided downward course crossing to the right on the level of the coronary sinus. This was most likely due to a persistent left SVC which was confirmed by contrast angiography. The lead was further advanced through the coronary sinus into the right atrium where its j-shaped soft tip enabled a successful passage through the tricuspid valve to the right ventricular apex (Fig. 1). Ventricular pacing was achieved with a good pacing threshold from this position. The perioperative course was uneventful and the temporary pacemaker lead was removed on the first postoperative day.



**Fig. 1** Temporary pacemaker lead introduced from the left arm (→) through a persistent left superior vena cava (◆), passing the coronary sinus (CS, ▲) into the right atrium (RA) and finally placed in the right ventricular apex (RVA)

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## Discussion

Recently it has been pointed out in this journal that “the intensivist should be aware of the occurrence of left-sided superior vena cava” when placing central venous catheters [1]. Accordingly, placement of pacemaker electrodes can be complicated by pre-existing congenital systemic venous anomalies [2]. The most common anomaly of the caval venous system is a persistent left SVC. Persistent left SVC can be present with a normal right SVC or, less commonly, as a single left SVC. It usually drains into the right atrium through the (eventually enlarged) coronary sinus. The estimated prevalence of a double superior caval system is 0.1–0.5% in the adult population [2, 3].

If a standard approach is not feasible because of abnormalities of the caval venous system, intensive care clinicians should remember that a temporary pacemaker lead can be placed through a persistent left SVC passing the coronary sinus into the right ventricle. Serious complications of coronary sinus catheterization, including perforation, cardiac tamponade and thrombosis, have rarely been reported, even in permanent pacing through a persistent left SVC [2, 4]. Assuming that the clinician is familiar with the anatomic anomalies, fluoroscopic control is available, j-shaped soft tip leads are used and the catheter is removed as soon as possible, the approach described can be valuable in selected clinical situations.

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## References

1. Boussuges A, Ambrosi P, Gannier M, Quenee V, Sainty JM (1997) Left-sided superior vena cava: diagnosis by magnetic resonance imaging. *Intensive Care Med* 23: 702–703
2. Zerbe F, Bornakowski J, Sarnowski W (1992) Pacemaker electrode implantation in patients with persistent left superior vena cava. *Br Heart J* 67: 65–66
3. Fisher MR, Hricak H, Higgins CB (1985) Magnetic resonance imaging of developmental venous anomalies. *Am J Roentgenol* 145: 705–709
4. Trigano JA (1986) Permanent pacing through a persistent left superior vena cava in 39 collected cases. *Clin Prog Electrophysiol Pacing* 4: 45–52