Right ventricular outflow tract implantation of an active fixation defibrillation lead through a persistent left superior vena cava

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Persistent left superior vena cava (LSVC) is a rare congenital anomaly which can add difficulties in placing defibrillation leads and achieving good defibrillation thresholds. Previous reports described placement of leads at or near the right ventricular apex. We hereby report the first case of a dual-coil, active fixation defibrillation lead, successfully implanted into the anterior-septal right ventricular outflow tract, through a persistent LSVC.

Case report

A 72-year-old male with an old anterior myocardial infarction, in New York Heart Association (NYHA) class II heart failure, with severe left ventricular systolic dysfunction (global ejection fraction of 25%), large calcified apical aneurysm, and chronic atrial fibrillation was admitted to our department due to haemodynamically unstable monomorphic ventricular tachycardia. On the basis of the current guidelines, a decision was made to implant a single chamber internal cardioverter defibrillator (ICD).

Via the left cephalic vein, a dual-coil active fixation defibrillation lead (St Jude Medical, Riata 1580, 65 cm) was advanced through a previously undetected persistent left superior vena cava (LSVC) draining into the coronary sinus. The LSVC with atresia of the right superior vena cava was confirmed by subsequent venography. The lead was placed into the anterior-septal right ventricular outflow tract (RVOT), using a single stylet shaped as a large rounded J (Figure 1).

The R wave amplitude, pacing threshold, and pacing impedance were 13.4 mV, 0.9 mV at 0.4 ms, and 539 Ohms, respectively. The lead was connected to a single chamber ICD (St Jude Medical, Epic VR V-197). Ventricular fibrillation was induced and successfully terminated with a 20 J shock between the distal coil and the can (using the one-induction protocol); the defibrillation impedance was 57 Ohms. The proximal coil was connected, but functionally excluded from the circuit because of the unusual position and the potentially ineffective distribution of the shock wave.

Three months later, lead position and parameters remained stable. No signs of either early or late perforation were detected.

Discussion

Persistence of LSVC is a rare anomaly, reported in ~0.3% of the general population and in ~0.5% of pacemaker implantations. The particular technical challenge of implanting pacemaker and defibrillator leads through an LSVC is the acute angle imposed on the lead, when passing from the plane of the coronary sinus ostium to the plane of the tricuspid valve.

The majority of previous reports, dealing with ICD implantation, described the placement of passive fixation defibrillator leads through an LSVC at the RV apex, because this site is considered to be the best for a stable position of the lead. Active fixation leads have also been placed at the RV apex.1,2 Papperini et al.3 described the placement of a defibrillator lead at the base of the RVOT, but this was of a passive fixation type.

In contrast to these reports, we achieved implantation of an active fixation defibrillator lead in the anterior-septal RVOT. This position was achieved without major difficulties, by using a usual stylet, shaped as a large J.
In conclusion, to the best of our knowledge, this is the first report of a dual-coil active fixation defibrillation lead, successfully implanted into the RVOT through a persistent LSVC.

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References