

CLINICAL VIGNETTE

Acute superior vena cava syndrome related to cardiac implantable electronic devices: a rare but potentially serious complication

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A 76-year-old woman (body mass index 19.81 kg/m²) was admitted to the Medical University of Warsaw for transvenous extraction of dislocated left ventricular (LV) leads and lead reimplantation. The patient had a history of hypertension, persistent atrial fibrillation, moderate mitral and tricuspid regurgitation, and chronic kidney disease. In addition, she previously suffered from a diffuse large B-cell lymphoma, hepatitis B, and right internal jugular vein thrombosis after central intravenous catheter placement for chemotherapy, and underwent splenectomy and hysterectomy in the past. Four years before admission she had an implantable cardioverter-defibrillator (ICD) implanted in the primary prevention of sudden cardiac death due to non-ischaeamic cardiomyopathy, probably secondary to seven cycles of chemotherapy administered previously for diffuse large B-cell lymphoma. Subsequently, the ICD was upgraded to a resynchronisation therapy device. During follow-up LV lead dislocation was diagnosed. Unsuccessful attempts to extract the lead using simple traction and Byrd dilator sheaths were made. Due to the failure of the procedure, another LV lead was implanted. The history of previous cardiac implantable electronic device (CIED)-related procedures is presented in Figure 1A–E. During the index hospitalisation the final attempt to extract the dysfunctional leads was made. The newer LV lead was extracted using Byrd dilator sheaths. During the extraction of the older LV lead using the same technique, the lead was fractured. Then, the fragmented part of the lead was extracted through femoral access using a lasso catheter, and only the lead tip was left. Finally, two new leads (an atrial one and an LV one) were implanted successfully through the left subclavian vein (Suppl. Fig. 1F — see journal website). Periprocedural transoesophageal echocardiography revealed no thrombi in the heart cavities, and turbulent flow in the superior vena cava (SVC), approximately 4 cm from its entry to the right atrium. Shortly after the procedure the patient reported dyspnoea, cough, chest pain, nausea, and vomiting. Clinical examination revealed facial swelling, bruising of the head and neck, and significantly enlarged superficial veins of the chest. The laboratory test results the day before and after the procedure are presented in Supplementary Table 1 (see journal website). Computed tomographic angiography of the chest was performed which visualised the SVC obstruction above the azygos vein with increased flow through the collateral circulation (Suppl. Fig. 1G, H — see journal website). A treatment with an infusion of unfractionated heparin was started, and gradually a complete resolution of the symptoms was obtained. The patient was discharged in a stable condition. During one-year follow-up, she was completely asymptomatic, and a high percentage of biventricular pacing was confirmed. In this report, we describe a rare, but potentially severe complication of numerous CIED-related procedures. Multiple procedures performed on venous vasculature, causing a possible intimal injury or vein stenosis provoked by indwelling leads, together with the patient's positive history of thrombosis seems to be the most reasonable explanation for the observed complication. With a rapidly growing population of CIED patients and increasing complexity of the procedures, SVC syndrome might be encountered more frequently in clinical practice.

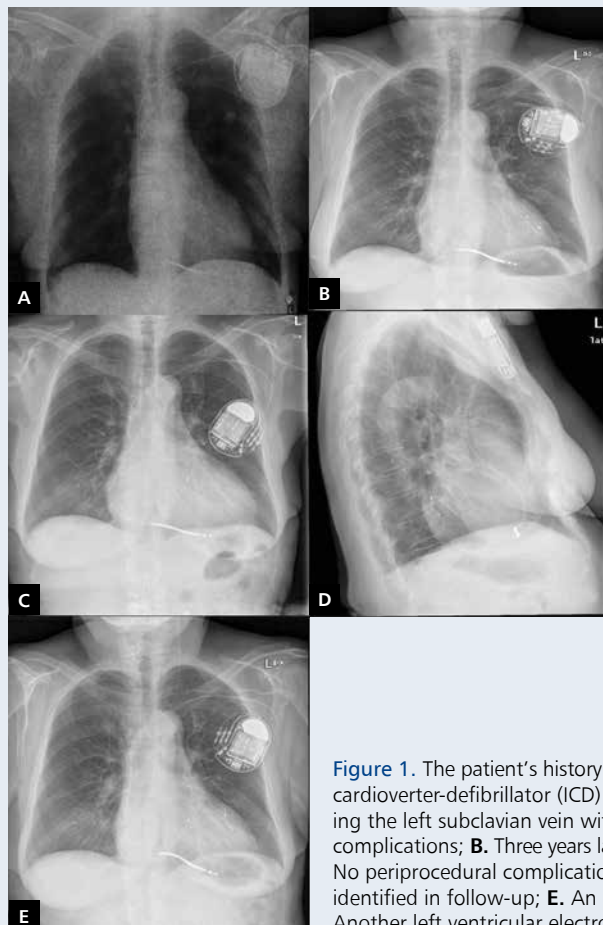


Figure 1. The patient's history of implanted cardiac devices. **A.** First single-chamber implantable cardioverter-defibrillator (ICD) implantation. The ventricular electrode implanted by puncturing the left subclavian vein with the tip located in the apex of the heart. No periprocedural complications; **B.** Three years later. ICD upgraded to a cardiac resynchronisation therapy device. No periprocedural complications; **C, D.** A year later. The left ventricular electrode dislocation identified in follow-up; **E.** An unsuccessful attempt to remove the dysfunctional electrode. Another left ventricular electrode implanted

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