

Infection of permanent pacing system with negative inflammatory markers

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A 67-year-old man received a dual-chamber pacemaker 26 years earlier owing to pharmacologically induced bradycardia (β -blockers used for treatment of long QT syndrome). The patient was scheduled for transvenous lead extraction (TLE) and dual-chamber implantable cardioverter-defibrillator (ICD-DR) implantation at the time of elective pacemaker replacement. A routine transthoracic echocardiogram (TTE) showed a vegetation or clot in the right atrium at lead crossing (FIGURE 1A), which was confirmed by transesophageal echocardiogram (TEE). The patient had no local or systemic clinical signs of infection and inflammatory markers were negative. TLE was delayed for a few weeks. A low-molecular-weight heparin and wide-spectrum antibiotics were administered. After the treatment, inflammatory markers remained negative and echocardiography showed unaltered images.

The TLE procedure of DDD removal and ICD implantation was successful although it was long and technically difficult owing to venous occlusion and firm lead adhesions to the vessels and cardiac walls. Eight days after the procedure, the patient was admitted to the hospital because of severe dyspnea and chest pain. Telemetric control showed ineffective ventricular pacing with sensing and impedance changes characteristic of cardiac wall perforation, which was further confirmed in TTE, chest X-ray, and CT. CT additionally showed small mediastinal edema and air presence in the pericardial sac with the ICD lead penetrating to the lung (FIGURE 1B). D-dimer levels were 5-fold higher, while the levels of other inflammatory markers were normal. A TLE of the perforating ICD lead with constant TEE monitoring was performed (FIGURE 1C). A cardiac surgeon was present during the whole procedure in case of massive hemorrhage to the mediastinum or lung tissue after lead removal. Owing to

large pus outflow after the opening of the pocket, a decision was made to remove the whole system. The procedure and hospitalization were uneventful. Subsequent contralateral ICD implantation was delayed (FIGURE 1D).

Our case shows an unusual presentation of pacemaker-related infection and a life-threatening complication of electrotherapy. Festering of the ICD pocket might be related to the first TLE procedure, which was long and complex. However, it might also be explained by pocket contact with the lead, which previously touched vegetation or the clot-like structure. It is an example of severe infection of the stimulation system without typical symptoms of inflammation and negative inflammatory markers. The available literature reports a different picture of the infection process—with fever and elevated inflammatory markers.¹ In our case, we observed vegetation or clot in the heart, venous obstruction on infected leads, and late ventricular perforation of the ICD lead. Owing to the presence of an additional structure in the heart, we scheduled diagnostic procedures and treatment; however, they did not resolve the problem.

There were no indications to diagnose lead-dependent infective endocarditis according to the guidelines.² A decision to implant a new system was made. It was reported previously that abnormal levels of selected inflammatory and thrombotic markers (D-dimers, fibrinogen, tissue factor) are associated with venous obstruction caused by the lead.³ Possibly, right ventricular perforation with subsequent surgical intervention facilitated an early diagnosis of the pocket infection. We are unsure whether ventricular perforation had been promoted by hidden infection. There are no data related to this subject in the literature. Of known perforation risk factors, only the active-fixation lead of the ICD was present in our case.⁴

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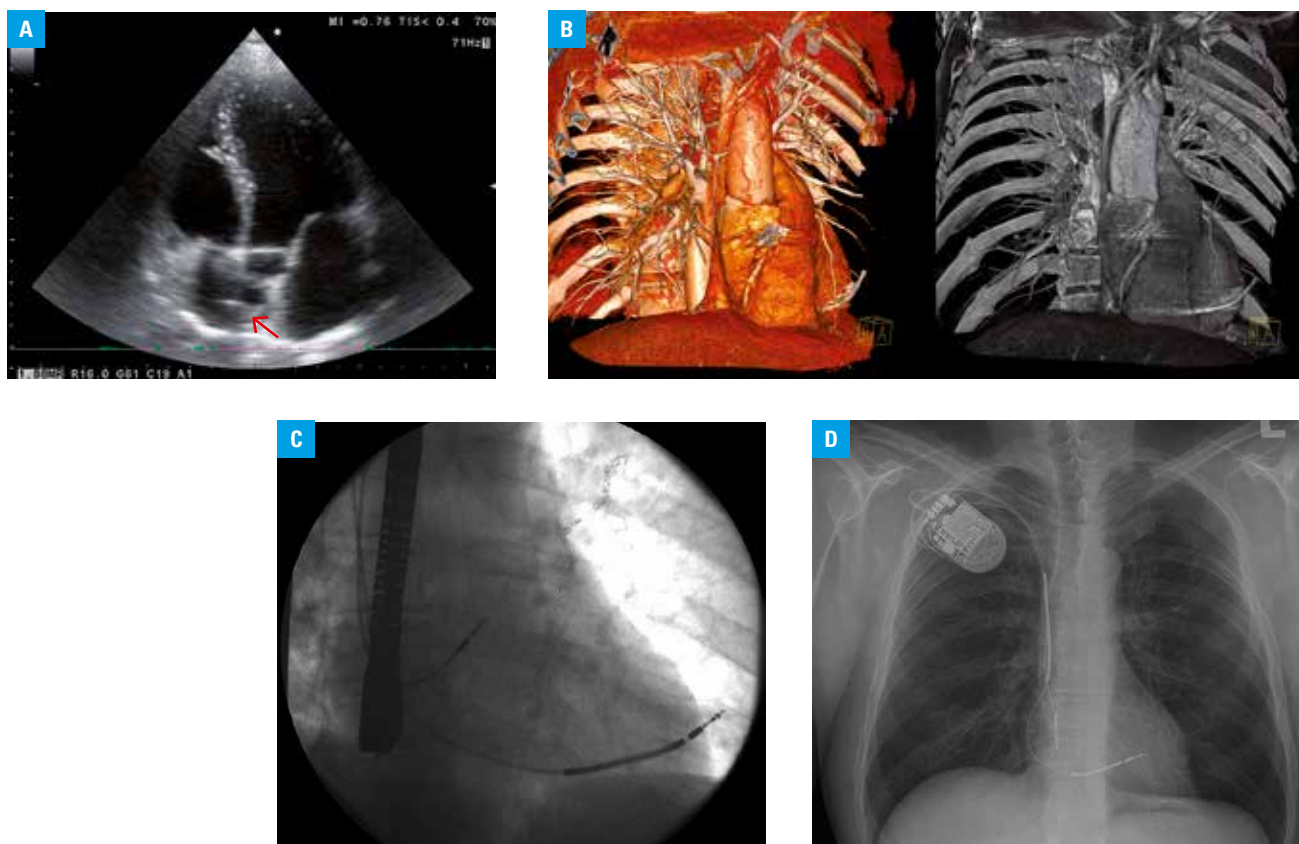


FIGURE 1 **A** – transthoracic echocardiogram: vegetation in the right atrium (arrow); **B** – ventricular perforation; **C** – intraoperative X-ray imaging; perforation and a transesophageal echocardiogram probe; **D** – an X-ray image of the implantable cardioverter-defibrillator on the right side

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