A subcutaneous implantable cardioverter-defibrillator (S-ICD) implantation in infection high-risk patient - a case study.

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Abstract

The cardiac device related infective endocarditis (CDRIE) is an important indication for the implantable cardiac device extraction. In patients after recovery from CDRIE, who present indication for implantable cardioverter-defibrillator (ICD) but without necessity for pacing therapy the subcutaneous ICD (S-ICD) seems to be a reasonable alternative. Here we present a patient with CRT-D device transferred to our hospital with

the diagnosis of CDRIE and many comorbidities. The patient presented increased inflammatory markers serum level during the entire period of hospitalization, after device explanation and termination of antibiotic therapy. The blood culture tests were negative and transesophageal echocardiography showed no sign of endocarditis, therefore despite inflammatory biomarkers the patient has been implanted with S-ICD.

Case description

The male patient of age 61 with a CRT-D device implanted 6 months earlier due to systolic heart failure was transferred from a local district hospital, with suspicion of cardiac device related infective endocarditis (CDRIE). At admission, the patient presented with fever (38.5°C), leukocytosis (WBC 13.5x10³/mm³), and increased CRP (334 mg/l). Blood culture

tests were positive for Gram-positive cocci. Transesophageal echocardiography revealed lead-attached vegetations. On the basis of this signs, the diagnosis of cardiac device related infective endocarditis (CDRIE) was confirmed. In addition, the patient presented with other comorbidities: diabetes mellitus with diabetic foot syndrome, persistent atrial fibrillation, coronary artery disease, chronic renal failure of level G3a, obesity

and dental caries. Moreover, left subclavian vein thrombosis was also diagnosed on the basis of ultrasonography performed due to left upper extremity edema on physical examination. At admission, antibiotic therapy was introduced with vancomycin, rifampicin and gentamicin, whereas the infected CRT-D device was extracted after 4 weeks. Antibiotic therapy with vancomycin was ceased 6 weeks after the lead extraction (therapy with gentamicin – after two weeks). Blood culture tests were negative. Subclavian vein thrombosis also disappeared after one month of therapy. Diabetic foot syndrome was treated under the care of a specialist in a diabetology unit and dental caries was treated with teeth extraction by a maxillofacial surgeon. During the course of therapy, renal failure was exacerbated and the glomerular filtration rate decreased from 60-50 to 22.4 ml/min. When the antibiotic therapy was finished, the patient's general condition ameliorated, the glomerular filtration rate (GFR) level normalized, there were no clinical signs of infection, yet CRP levels were still high (170 mg/ml) with a normal procalcitonin level. In transthoracic echocardiography there was no presence of vegetation. In transthoracic echocardiography left ventricle ejection fraction was low – 30%. Before CDRIE the patient had been implanted with a CRT-D due to heart failure with decreased ejection fraction (EF) and left bundle branch block (LBBB) in ECG shown in Figure 1 – ESC guidelines, class IIa^[1].

Figure 1. ECG before [A] and after [B] CRT-D implantation in the patient.

The risk of infection as well as CDRIE recurrence was very high. Although an implantable cardioverter-defibrillator (ICD) was still recommended (class I) in the patient^[1], the decision of transvenous ICD system implantation was considered too risky. In this situation the novel method of a subcutaneous ICD (S-ICD) system implantation is a reasonable alternative, especially because there was no indication for pacing therapy in the patient (no episodes of bradyarrhythmia under telemetric control) – class IIa according to ESC guidelines^[2]. Finally, the S-ICD system was implanted - the device was placed on the left anterior axillary line (Figure 2).

There were no perioperative complications. The position of the device and lead was checked intraoperatively and post-operatively by X-ray (Fig. 3). The Defibrillation Threshold Testing (DFT) was performed intraoperatively and the cardioverter-defibrillator was initially set up (Fig. 4).

Figure 2. An S-ICD implantation by steps: A – site marking, B – lead positioning, C – skin incision, D – device implantation.

In the following days, the inflammatory markers decreased (CRP to 70 mg/dl) and the patient was discharged in a good general status. Regular follow-up visits in the Implantable Cardiac Device Control and Telemonitoring Workshop, 1st Department of Cardiology were scheduled. To date, no complications have been reported.

Figure 3. Assessment of S-ICD (device and lead) position by X-ray: A – intraoperatively, B – post-operatively (chest X-ray, posteroanterior projection).

Figure 4. Initial program set-up for S-ICD performed directly after implantation.

Comments

Cardiac device related infective endocarditis is an indication for removal of the entire cardiac device hardware, according to ESC guidelines^[3]. However, chronic heart failure with decreased LVEF<35% is an indication for ICD implantation^[1]. The indications for reimplantation should be reassessed with caution in a patient after CDRIE and the optimal time for reimplantation remains controversial. Repeated procedures are independent risk factors for device-related infections according to multivariate analysis^[4]. Diabetes and underlying heart disease are also considered as independent risk factors for infection of implantable cardiac devices^[5]. Moreover, a patient after ICD implantation is more prone to infection than a patient after pacemaker implantation^[6]. Our patient presented all the risk factors mentioned above. In addition, he presented with an increased CRP level even after completion of antibiotic therapy. Nowadays, the S-ICD is a reasonable alternative for this group of patients, with respect to absolute absence of bradyarrhythmic indications for pacing^[7-9]. Moreover, the aforementioned device is more appropriate for high infection risk patients, because its lead is localized parallel to the parasternal line and does not contact the heart chambers, so the risk of cardiovascular implantable electronic device (CIED) infection is decreased^[8,10]. The systematic review performed by Chue et al. showed that only 2.7% of subjects after S-ICD implantation developed pocket infection in short-term observation^[11].

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Disclosures

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