Three-dimensional computed tomography imaging of an implantable cardioverter-defibrillator lead fragment in the left ventricle of a heart transplant followed by successful transarterial extraction with a snare catheter†

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Abstract

We report on a 51-year old heart transplant recipient in whom a pacing lead fragment of his old implantable cardioverter-defibrillator (ICD) had been detected in the left ventricle following successful heart transplantation. The patient was transplanted after 5 weeks on high urgent status. A postoperative routine chest X-ray and a subsequent cardiac three-dimensional (3D) computed tomography scan showed a metallic foreign body bending during systole below the posterior mitral valve leaflet within the left ventricle of the heart transplant. Transarterial extraction therapy was planned and the femoral artery was cannulated in the usual fashion. An 8F snare catheter was directed into the left ventricle under fluoroscopic guidance. Successful extraction revealed a 3-cm, uncoated ICD fragment (diameter = 0.025 in.). Following extraction of the fragment echocardiography showed mild mitral regurgitation but no further adverse events occurred. The patient was discharged 2 days later. Transarterial fragment extraction using a snare catheter is a feasible, minimally invasive procedure in this clinical scenario. Careful inspection of all explanted hardware is strongly recommended to ensure that no portion of an ICD lead is left behind.

Keywords: Cardiac catheterization/intervention • Imaging • Transplantation • Implantable cardioverter-defibrillator therapy • Foreign body fragment

INTRODUCTION

Patients suffering from severe cardiomyopathy often require implantable cardioverter-defibrillator (ICD) implantation long before being considered suitable for cardiac transplantation. During transplantation, ICD lead extraction may require cutting the embedded leads to allow for complete removal.

CASE REPORT

A 51-year old patient with a long history of ischaemic cardiomyopathy and severe ventricular tachycardia was admitted to our institution due to congestive heart failure. Recurrent cardiac arrhythmias had necessitated the implantation of a biventricular ICD 5 years ago (Fig. 1a). The patient was treated with optimized medical therapy but still required...
ionotropic support, and therefore, was listed for heart transplantation. After 5 weeks on high urgent status, a successful heart transplantation was performed.

Following an uncomplicated clinical course, the patient was weaned from mechanical ventilation and fully mobilized 1 week after the transplantation. A routine chest X-ray and a subsequent ECG-gated cardiac three-dimensional (3D) computed tomography (CT) scan revealed a metallic foreign body bending during systole below the posterior mitral valve leaflet within the left ventricle (Fig. 1b–d; Supplementary Video 1). Transarterial extraction was planned via the femoral artery. An 8F snare catheter was directed into the left ventricle under the fluoroscopic guidance. Successful extraction via the lasso technique revealed a 3-cm, uncoated ICD fragment (diameter = 0.025 in.; Fig. 2a–g; Supplementary Video 2).

Most likely, a thin uncoated pacing lead fragment dislocated after the required lead cutting for explantation of the patient’s heart and, subsequently, was flushed into the left ventricle of the new transplant during the operation. Following the extraction of the fragment, echocardiography showed mild mitral regurgitation but no further adverse events occurred. The patient was discharged for rehabilitation 2 days after the procedure with no neurological deficits.

**DISCUSSION**

The increased use of permanent pacemakers or ICDs over the past 20 years has also resulted in increased lead removal procedures due to several associated complications such as infection, lead failure, dislocation or malpositioning [1]. Accidental lead malpositioning into the left atrium or left ventricle carries a potential risk of stroke or thromboembolism and often necessitates open cardiac surgery or catheter-based extraction [2]. Malpositioning into the left heart or lead fragment migration with arterial embolization may occur in cases of arteriovenous fistula, patent foramen ovale or ventricular septal defect and have already been reported [3,4].

However, to the best of our knowledge, the occurrence of an ICD lead fragment in the left ventricle of a heart transplant has never been reported in medical literature. Retrospectively ECG-gated cardiac 3D CT proved to be very valuable tool for the detection, localization and intervention planning, enabling the required extraction. Transarterial endovascular fragment extraction using a snare catheter is a feasible and minimally invasive procedure in this clinical scenario. Careful inspection of all explanted hardware is strongly recommended before transplanting the new heart to ensure that no portion of an ICD lead is left behind.
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SUPPLEMENTARY MATERIAL

Supplementary material is available at ICVTS online.

Conflict of interest: none declared.

REFERENCES


Figure 2: Transarterial extraction with a snare catheter in the catheterization laboratory. The metallic body bends during systole and straightens during diastole (a + b). The snare catheter is directed into the left ventricle via an arterial sheath (c) and brought into position for the lasso manoeuvre (d). The foreign body is captured by the snare catheter (e) and subsequently removed (f). The thin uncoated pacing lead fragment (3 cm in length with a diameter of 0.025 in.) after extraction (g).