

# Surgical extraction of cardiac resynchronization therapy system with concomitant implantation of a new system with the use of epicardial leads in a patient with endocarditis

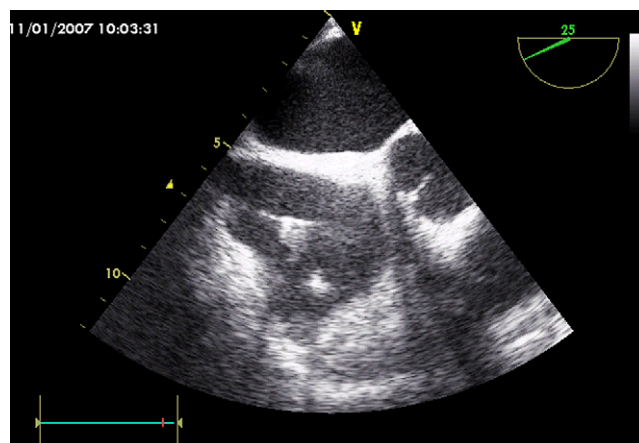
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**E**ndocarditis related to a transvenously implanted cardiac resynchronization therapy (CRT) system is a rare but serious therapeutic challenge, particularly in those patients in whom interruption of biventricular stimulation induces dramatic deterioration of their hemodynamic status.

## Clinical Summary

We report the case of a 57-year-old man with a CRT system implanted transvenously in 2003 owing to dilative cardiomyopathy, in whom infective endocarditis with blood cultures positive for methicillin-resistant *Staphylococcus epidermidis* was diagnosed. The preoperative transthoracic echocardiogram revealed abnormal, moving echoes in the right atrium, impaired left ventricular ejection fraction of 20%, moderate mitral regurgitation, and severe tricuspid regurgitation. Transesophageal echocardiography confirmed the presence of two large vegetations (>1 cm in diameter) attached to the pacing leads within the right atrium (Figure 1). A temporary interruption of biventricular stimulation during preoperative echocardiography induced a deterioration of global systolic function, appearance of asynchrony, increase in mitral regurgitation, and after 15 minutes, signs of dyspnea and orthopnea. Consequently, the patient was qualified for a combined procedure of surgical removal of the infected CRT system with concomitant implantation of a new system with the use of epicardial leads.

The intervention was carried out with a median sternotomy approach, cardiopulmonary bypass, and cardioplegic arrest. After opening of the right atrium, the left ventricular lead proved to be firmly connected to the atrial wall by a tissue sleeve (Figure 2). Its mobilization was possible only after careful surgical separation. Subsequently, the distal ends of all three leads were completely removed from the heart and cut off at the level of the superior vena cava. The examination of the tricuspid valve did not reveal any pathologic condition necessitating surgical intervention. Bipolar epicardial leads (CapSure Epi 4968; Medtronic, Inc, Minneapolis, Minn) were implanted on the right atrium, right ventricle, and the lateral wall of the left ventricle within the most delayed segment according



**Figure 1.** Transesophageal echocardiogram showing two vegetations greater than 10 mm in diameter in the right atrium.

to the preoperative echocardiographic study. After release of the crossclamp, in the reperfusion period the pacing and sensing parameters were verified and subsequently the leads were connected to the biventricular pacemaker (Insync III; Medtronic) located in the abdominal wall. The biventricular stimulation was activated. After weaning from cardiopulmonary bypass, the sternotomy was closed routinely, and subsequently the old pacemaker was removed completely with the proximal ends of the old leads. The postoperative course was uneventful. The samples cultures confirmed the *S. epidermidis* etiology of the infection. After 30 days of antimicrobial treatment, the blood cultures were sterile and the patient's clinical status improved. In the pre-discharge echocardiogram, an improvement in CRT effect compared with preoperative status was confirmed with a left ventricular ejection fraction of 35% and a reduction in mitral and tricuspid regurgitation. The patient was discharged in very good general condition and leads a normal life.

## Discussion

In recent years CRT has been proved to be an effective treatment option for patients with congestive heart failure and systolic dyssynchrony.<sup>1</sup> However, the increasing implementation of CRT in clinical practice will result in a growing number of patients with endocarditis related to CRT pacing leads. It has been demonstrated that the only efficient treatment method of endocarditis on pacemaker leads is the removal of the entire pacing system.<sup>2,3</sup> On the other hand, in some patients with advanced heart failure, the continuity of CRT therapy with its acute beneficial impact on systolic synchrony, diastolic filling time, and mitral regurgitation is crucial for maintaining hemodynamic stability.

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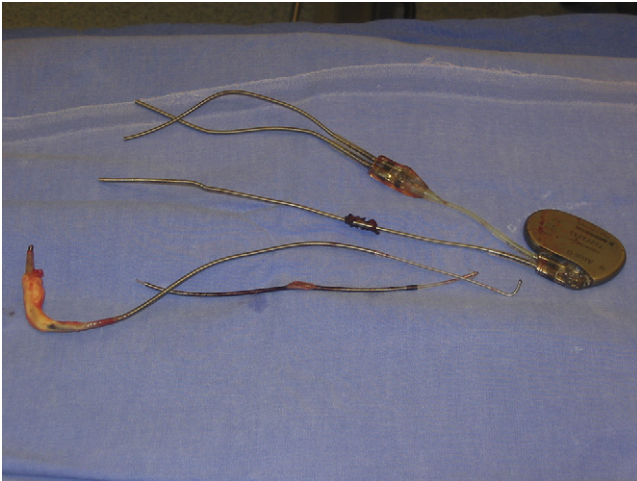
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**Figure 2. CRT system extracted from the patient.**

In this setting, the surgical extraction of the CRT system with concomitant implantation of the new system with the use of epicardial leads may be a promising solution.

Moreover, the excellent exposition of the heart helps to overcome the limitations associated with coronary sinus anatomy, inasmuch as the left ventricular lead can be easily placed at the optimal site, which is of greatest importance for maximizing the benefit from CRT.<sup>4</sup>

We used bipolar nonpenetrating epicardial leads. The steroid-eluting tips prevent local fibrosis at the implantation site and ensure very good pacing and sensing parameters at long-term follow-up.<sup>4</sup>

Some authors advocate transvenous pacemaker lead removal regardless the size of vegetations.<sup>5</sup> However, an extensive body of evidence supports the strategy of surgical extraction in case of vegetations exceeding 10 mm in diameter to prevent embolic complications.<sup>2</sup> Moreover, in this case an attempt at transvenous removal could be risky considering the solid tissue sleeve connecting the left ventricular lead to the atrial wall (Figure 2).

In conclusion, we propose surgical extraction of the transvenously implanted CRT system with concomitant implantation of a new epicardial system as an effective treatment method of infective endocarditis, without the necessity of CRT interruption.

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