CASE REPORT

Very late perforation by a Riata implantable cardioverter-defibrillator lead—A case report

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Abstract
Cardiac perforation by a transvenous lead is an uncommon but serious complication. We herein present a case of very late perforation of a Riata implantable cardioverter-defibrillator lead, which occurred 8 years after implantation. The patient was successfully treated with percutaneous lead extraction using an excimer laser. Lead perforation should be considered, even after years from implantation.

KEYWORDS
device complication, excimer laser, lead extraction, Riata lead, very late lead perforation

1 | INTRODUCTION

Cardiac perforation by a transvenous lead is an uncommon but serious complication. Perforation usually occurs shortly after implantation; cases occurring after 1 month are considered to be rare. We herein present a case of very late perforation of a Riata implantable cardioverter-defibrillator (ICD) lead, which occurred 8 years after implantation.

2 | CASE REPORT

The patient was a 43-year-old man who had been resuscitated from idiopathic ventricular fibrillation and who had undergone the implantation of an ICD through the left subclavian vein in a community hospital. The ICD was successfully implanted with transvenous active fixation of the dual coil shock lead (Riata, 8 French, model 1580; St. Jude Medical system, Sylmar, CA, USA) in the right ventricular (RV) apex and the bipolar pacemaker lead (Fineline, 5 French, model 4479; Guidant, Indianapolis, IN, USA) in the right atrial appendage.

He had undergone local debridement without the removal of the ICD system 3 times after the implantation due to ICD pocket infection. At 2 weeks after implantation, the first round of local debridement was performed due to warmth and erosion of the skin over the pocket site. At 4 months after implantation, the second round of local debridement was performed for wound disruption and purulent discharge. Because the wound was disrupted again at 14 months after implantation, a third round of debridement was performed with deep insertion of the generator into a more inferior location.

At the time of implantation, the pacing threshold of the RV Riata lead was 0.75 V/0.5 ms, the R wave amplitude was 12 mV, and the pacing electrode impedance was 510 Ω. At 3 years after implantation, the pacing threshold suddenly increased to 5.0 V/1.0 ms, with a decrease in the R wave amplitude 4.1 mV (pacing electrode impedance 475 Ω). After 5 years, although the ICD no longer captured the RV, even at the maximum pacing output with an R wave amplitude of 5.5 mV and a pacing electrode impedance of 420 Ω, attending physicians decided not to replace the ICD system because neither sensing failure nor significant lead displacement was observed on a chest radiograph. At 8 years after implantation, the ICD started to deliver several inappropriate shocks because the RV lead could no longer sense the R wave. The pacing electrode impedance was 330 Ω at that time.

The patient was therefore referred to our hospital for lead extraction. Chest X-ray images of the ICD showed significant displacement of the lead tip in comparison with the time of
implantation (Figure 1). A CT scan of the thorax (Figure 2) showed perforation of the ICD lead through the anterior RV free wall and migration to the thoracic wall without pericardial effusion or pleural effusion. After discussion with the heart team, including cardiac surgeons, we decided to extract the lead transvenously under surgical backup with transesophageal echo monitoring and continuous blood pressure monitoring. The active fixation Riata lead was successfully unscrewed, but it could not be removed by simple traction using a locking stylet. Although some adhesion was observed between the leads, especially at the superior vena cava coil, the application of a laser to the atrial lead resulted in successful extraction. The Riata lead was easily moved by applying laser within only the left subclavian vein. The penetrating lead was successfully extracted via a percutaneous approach without any increase in pericardial effusion or pleural effusion. Because the patient had a history of ICD infection, we re-implanted a new ICD system via the opposite subclavian vein several days after the removal of the first device.

3 | DISCUSSION

Cardiac perforation by a transvenous lead is an uncommon but serious complication. The incidence of perforation by Riata leads is reported to range from 0.345% to 3.8%, which is relatively high. Perforation usually occurs shortly after implantation; cases occurring after 1 month are considered to be rare. Indeed, Danik et al reported that all cases of late perforation occurred within 6 weeks after implantation. Although Semmler et al reported a case of Durata lead perforation at 11 months after implantation, in the present case, lead perforation was diagnosed after 8 years. To the best of our knowledge, this represents the longest interval between implantation and the diagnosis of lead perforation.

Because this patient had been followed at a different hospital, we could not address the precise timing of the perforation. The patient was asymptomatic until inappropriate ICD shocks revealed lead perforation. An examination of the ICD suggested that the RV lead malfunction had occurred 3 years after implantation. A posteroanterior chest radiograph showed only a little change until 7 years after implantation. If a lateral chest radiograph had been taken simultaneously, it might have provided us more information about the location of the tip of the Riata lead. Taken together, these findings suggest that the lead perforation started 3 years after implantation, ultimately penetrating through the RV wall at 8 years after implantation.

As the patient underwent local debridement 3 times after implantation due to device infection, we could not deny the possibility that the perforation might have been an iatrogenic complication during the process of debridement. However, echocardiography after each round of debridement revealed no pericardial effusion that might suggest acute lead perforation. Furthermore, about 2 years had passed since the last round of debridement when the ICD showed an abnormal pacing threshold for the first time.

Active fixation small-diameter ICD leads have recently been reported to be associated with an increased risk of delayed cardiac perforation. However, in the present case, a standard diameter (8

FIGURE 1  Posteroanterior chest radiographs obtained just after implantation (A), at 3 y after implantation (B), at 7 y after implantation (C), at 8 y after implantation (D). The tip of the Riata lead (active fixation) was observed to have significantly migrated (white arrow). The location of the implantable cardioverter-defibrillator (ICD) generator had moved because of local debridement
French) Riata lead was used. Other predictors of lead perforation include older age, a low body mass index, the administration of corticosteroids and/or anticoagulants, and RV apical pacing.1–3

The appropriate management of lead perforation is still controversial. The management strategy should depend on the dynamics of symptoms, pericardial effusion, and hemodynamic status. If the patient is completely stable and asymptomatic, a perforated lead does not necessarily need to be extracted. If the patient is hemodynamically stable but has some trouble, such as inappropriate shock, the perforated lead should be extracted. If the patient is hemodynamically unstable, then surgical management seems to be the best treatment option. In hemodynamically stable patients, various reports have shown that most migrated leads can be safely removed by transvenous procedures with simple traction. In the present case, because of the long duration after implantation, the leads were successfully detached from the areas of adhesion using an excimer laser. Laborderie et al5 reported that urgent percutaneous pericardiocentesis and cardiac surgery were required in only 1 case after 10 percutaneous procedures. Needless to say, surgical backup with transesophageal or intracardiac echo monitoring is considered mandatory for percutaneous extraction.

Lead perforation may be asymptomatic, but can also result in major complications such as cardiac tamponade. The possibility of lead perforation should therefore be considered, even many years after implantation.

CONFLICT OF INTEREST

Authors declare no conflict of interests for this article.

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