ICD lead abandonment is without risk? A case of "lead on lead crime"

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Introduction

Lead failure rates of implantable cardioverter-defibrillators (ICDs) vary depending on design and composition, and can be as high as 40% a few years post implant.[1] The Sprint Fidelis lead (Medtronic, Minneapolis, MN) was recalled in 2007 because it is prone to fracture, particularly to its pace-sense conductor, which predisposes patients to inappropriate shocks;[2] its yearly failure rate is estimated at 3.75%, with acceleration in failure rates after first implant year.[2] Management of patients with Fidelis leads is based on lead status and patient profile and can include noninvasive monitoring of a functional lead, abandoning the old and adding a new ICD or a pace-sense lead, and complete extraction and reimplant of a new lead. We present a case where an abandoned Fidelis lead damaged its neighboring lead from lead-on-lead friction and discuss our proposed management of such cases.

Case report

A 48-year-old man with nonischemic dilated cardiomyopathy had an ICD implant for secondary prevention, which included a dual-coil Sprint Fidelis (6949) lead. In 2010, the Fidelis lead was capped and abandoned owing to fracture and a new St Jude Medical 7121 Durata lead (St Jude Medical, St Paul, MN) was added. The patient sought medical attention after his St Jude Medical Fortify ICD alarm was triggered owing to reduced lead impedance at 180 ohms; impedance trend was gradually decreasing but never led to oversensing or inappropriate therapies. Radiographs did not show any clear insulation breach; however, they did demonstrate the new ICD lead crossing the old one (Figure 1). Given that a reliably functioning ICD lead was necessary for this patient, discussions regarding treatment options culminated in a complete system extraction and reimplant strategy. Successful extraction of both ICD leads

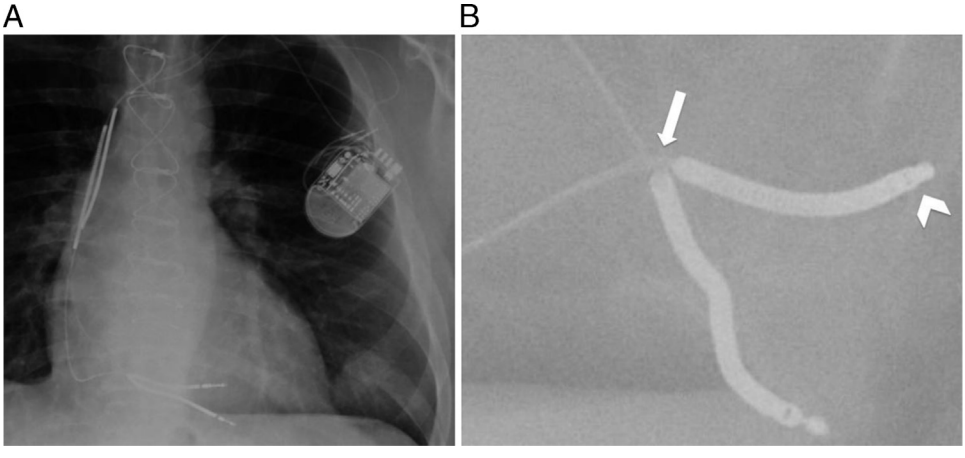

Figure 1 **A:** Posteroanterior chest radiograph view depicting intact insulation of both the abandoned Sprint Fidelis and added Durata leads. **B:** Lateral chest radiograph zoomed-in view of the described leads (*white arrow:* site of lead-on-lead interaction; *white arrowhead*: newly implanted Durata lead).

was performed as previously described using an LLD and 16 F laser sheath (Spectranetics, Colorado Springs, CO). The site of the Durata lead insulation breach was proximal to the distal defibrillation coil where it crossed the right ventricular coil of the abandoned Sprint Fidelis lead (Figure 2). The mechanism of insulation breach was very likely lead-on-lead

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KEY TEACHING POINTS

- The management of failed cardiac electronic device leads continues to be clinically challenging. The chosen treatment option should be individualized based on the patient's clinical status and physician's surgical experience.
- Lead-on-lead interaction and insulation damage is a real concern when a new lead is implanted adjacent to an abandoned one, and can be avoided with lead extraction when clinically indicated.
- Lead extraction procedures after careful clinical evaluation are relatively safe when performed in an experienced center.

friction between the 2 leads at the atrioventricular junction where they crossed the tricuspid valve (Figure 1).

Discussion

This case illustrates one of the many potential pitfalls of abandoning a failed ICD lead. Lead-on-lead interaction and insulation abrasion from friction with another have been reported in St Jude Medical Riata and Durata ICD leads.[3] To eliminate the risk of similar lead-on-lead insulation abrasion, it is thus ideal to have a failed lead completely extracted prior to adding a new one. The major concern with this approach is the risk of complications that can be associated with extraction. Fortunately, with improved techniques and operator experience over time, lead extractions can now be performed safely at high-volume centers with negligible rates of major procedural complications or deaths.[4] Although this case involved a recalled Fidelis lead, the recalled Riata lead may pose an even higher risk of abandonment. The extrusion of cables has been associated not only with lead–lead interaction, but also with thrombus formation and cable migration. In addition to lead–lead interactions, lead abandonment has been associated with an increased risk of infection, issues with venous occlusion, future difficultly of extraction, and the prohibition of future magnetic resonance imaging scanning.[5] As always, treatment decisions should be made on a case-by-case, individual basis. However, if extraction can be offered with a high success and low complication rate, it should be considered for patients with failed ICD leads and with a reasonable life expectancy.

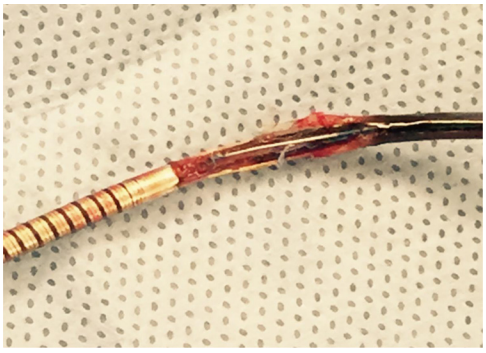

Figure 2 Insulation breach in the extracted St Jude Medical Durata lead near the distal defibrillation coil.

Conclusion

The management of failed cardiac electronic device leads continues to be clinically challenging. Physicians are often confronted with the option of abandoning or extracting failed leads prior to adding a novel one. The chosen treatment option should be individualized based on the patient's clinical status and physician's surgical experience. Lead-on-lead interaction and insulation damage is a real concern when a new lead is implanted adjacent to an abandoned one, and can be avoided with lead extraction when clinically indicated.

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