Extraction of Sterile Leads
Is it Beneficial?

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KEYWORDS

• Lead extraction • Vascular access • Abandoned leads • Pacemaker
• Implantable cardioverter-defibrillator

KEY POINTS

- Risks and benefits of extracting sterile leads are unknown, as are the risks of abandoning leads.
- Each patient for extraction must be approached individually.
- Not all abandoned leads should be extracted, especially old leads and those in older patients and patients with limited life expectancies.
- With an experienced extractor and appropriate surgical backup, extractions can be done with low morbidity and mortality.
- Extraction can be useful in the management of patients with multiple leads and limited vascular access.

Extraction of chronically implanted endocardial leads is an infrequently performed procedure that carries considerable risk. Although the number of extraction procedures is growing, it is generally limited to referral centers with special expertise and interest in the procedure. The indications for extraction were originally classified in terms of clinical necessity (eg, absolute, relative, and discretionary), examples of which might include infection, vascular occlusion, and removal of unneeded/unwanted leads respectively. Although these indications are more specifically codified now,[1] decision making still depends on a patient-specific risk/benefit assessment of percutaneous extraction compared with potential alternatives. Complications of extraction are well documented, with a mortality risk of 0.2% to 0.8% and a major complication risk of 1% to 2%.[1] The major source of morbidity and mortality is great vessel or cardiac perforation, and thus immediately available surgical backup is mandatory.[1]

In certain situations, extraction is considered mandatory. Infection of any part of the cardiac rhythm device system mandates removal of all hardware[1,2] unless the patient has a limited life expectancy or presents extreme risk, in which case lifelong suppressive antibiotics might be considered. Other class I indications include vascular occlusion with the need for a new lead and no other available access, and a lead that interferes with treatment of a malignancy.

Elective extraction, defined as extraction of a lead that is either no longer functioning or no longer needed for the current device system, is controversial.[3–5] In these situations, consideration of extraction is based on assumptions of future long-term risk. Aside from the general precept that it is undesirable to have unnecessary foreign bodies in the vascular system, specific issues include the potential increase in risk of vascular obstruction and the anticipated increase in difficulty of removing a lead of greater implant duration should the system

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become infected. Whether such leads are removed currently depends on several factors: characteristics of the patient, characteristics of the lead, and characteristics of the physician and hospital involved in the patient's care. In high-volume extraction centers with experienced physicians and staff who are comfortable with lead extraction, and where support is immediately available from a cardiovascular surgeon familiar with the complications of lead extraction, extraction can be performed with a low complication rate.[6,7] However, all patients need to understand the potential for, and the nature of, complications and be given the opportunity to make their own decisions about whether to undergo the procedure.

This article presents 4 cases of complex device management to show the potential benefits and pitfalls of aggressive lead management.

CASE 1

Clinical History

An 11-year-old girl with genotyped long QT syndrome type III (LQT III) was referred for single-chamber implantable cardioverter-defibrillator (ICD) placement for primary prevention of sudden cardiac death. Her family initially came to medical attention when her mother presented with resuscitated sudden death. The initial implant was unremarkable with placement of a subpectoral single-chamber device. However, she presented 3 years later with a lead fracture.

Imaging Findings

Her presenting electrocardiogram (ECG) is shown in **Fig. 1** and has a borderline prolonged QT interval with the normal-appearing T wave and an extended QT segment characteristic of LQT III.

Laboratory Findings

Her tests were all within normal limits and noncontributory.

Physical Examination Findings

At presentation with her lead fracture, she was a thin 14-year-old girl with a prominent bulge in her left chest from her ICD. Her vitals were normal and examination was otherwise unremarkable. Interrogation of her ICD revealed a Medtronic single-chamber system with a Fidelis ICD lead that showed an out-of-range high impedance. There were no events on the arrhythmia log.

Clinical Course

She was admitted to the hospital for further work-up and management.

Questions

What is the optimal management of this patient?

Diagnosis

LQT III, Fidelis lead fracture.

Discussion

Given her clinical diagnosis and family history, she warrants continued prophylaxis against sudden death. The choice is between adding an additional lead and leaving the Fidelis lead in place, versus removal of the Fidelis lead and placement of a new lead. Although she has LQT III, she is

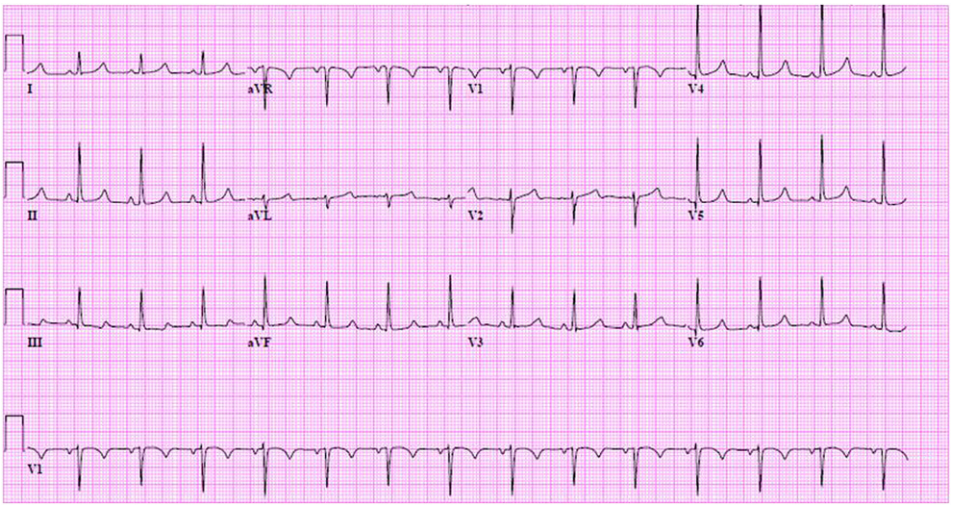

Fig. 1. Presenting ECG for patient 1. Note the QT prolongation with isoelectric ST segment and normal-appearing T wave, characteristic of long QT III.