Nonfunctional pacemaker leads: To remove or not to remove, that is the multifactorial question

Carol W. Chen, MD, and Pavan Atluri, MD

From the Division of Cardiovascular Surgery, Department of Surgery, University of Pennsylvania, Philadelphia, Pa.

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Address for reprints: Pavan Atluri, MD, Division of Cardiovascular Surgery, Department of Surgery, University of Pennsylvania, Silverstein 6, 3400 Spruce St, Philadelphia, PA 19104 (E-mail: Pavan.atluri@uphs.upenn.edu).

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In their stimulating case report, Chen and colleagues¹ describe unusual but notable sequelae after pacemaker laser lead extraction. As with any procedure, particularly those related to the cardiovascular system, a risk-to-benefit ratio must be carefully analyzed before the intervention. The report illustrates potential complications that should be thoroughly appreciated by all electrophysiologists and cardiac surgeons as more long-term pacing leads become nonfunctional or infected.

Although simple in concept, transvenous lead extraction is associated with a risk of significant complications, including arteriovenous fistula formation, as eloquently illustrated in this report. Among the methods for lead extraction, use of a laser extraction technique has become commonplace for electrophysiologists, often without surgical backup (Figure 1). Although laser-assisted extraction is highly efficacious, it is an independent predictor of major morbidity among lead extraction techniques.² In the randomized prospective Pacing Lead Extraction with the Excimer Sheath trial,³ the rate of major complication with laser-assisted extraction was roughly 2%, with 1 death and 3 other life-threatening events among 153 patients. The results demonstrate fairly low concomitant morbidity and mortality, yet the focus should remain on further minimizing the risk profile of the procedure.

More specific to the current case report, female gender and implant duration are risk factors for major complications and should factor strongly into the decision for lead removal.^{2,4,5} After 20 years and multiple revisions, the degree of fibrotic attachment of the lead to the venous lumen was likely to be extensive in this patient. Opposing factors cloud the decision-making process in this case. Removal of a noninfected, nonfunctional lead is assigned Level of Evidence C because it is often safe to abandon a failed lead that is not arrhythmogenic or causing other immediate threats to the patient.² However, this patient's young age argued against leaving the lead in place without

The laser sheath delivers energy to the free lead from intravenous scar tissue as it advances.

Central Message

Transvenous lead extraction is not always straightforward, and extra precautions—perhaps with additional preoperative and intraoperative evaluations—should be taken in high-risk patients.

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attempting removal because she was likely to require additional leads during the next several decades.

Also germane to the discussion is the management of the innominate artery-to-vein fistula. Similar iatrogenic

FIGURE 1. Diagram of laser sheath-assisted removal of lead. The laser sheath is advanced over the lead (top). Energy is delivered to free the lead from intraluminal fibrotic tissue (middle). The sheath continues to advance over the freed lead (bottom).

arteriovenous fistulas from the placement of central lines and pacemakers are increasingly being treated with minimally invasive techniques, such as percutaneous coil embolization⁶ and endovascular stenting,⁷ with good results. Yet, given the medial location of the fistula in this report and the need for tricuspid valve intervention, open repair via sternotomy as performed by the authors seemed to be the most appropriate approach.

Transvenous lead extraction is not always straightforward, and extra precautions—perhaps with additional preoperative and intraoperative evaluations—should be taken in patients who are likely to present a difficult procedure. A thorough understanding of anatomic relationships and potential complications can minimize adverse outcomes with this complex procedure. With the increasing prevalence of cardiovascular implantable electronic devices, cardiac surgeons will continue to see unique presentations of rare but critical complications associated with lead removal.

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