Creating an Anesthesiologist-run Pacemaker and Defibrillator Service

Closing the Perioperative Care Gap for These Patients

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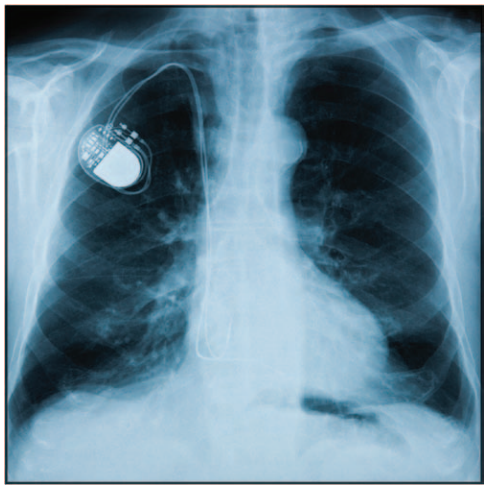
HISTORICALLY, anesthesiologists have relied on a combination of three strategies for the perioperative management of pacemakers (PMs) or implanted cardioverter-defibrillators (ICD)—consulting a cardiologist, calling a "device rep," and/or applying a magnet. However, none of these strategies provides ideal care for these patients. The first two options involve personnel who often are not immediately available and/or are unfamiliar with perioperative issues. All three options invite generic care not truly tailored to the patient, the procedure, or both. As one possible solution, Rooke *et al.*[1] created an "Anesthesiology Device Service (ADS)" for the perioperative management of these cardiovascular implanted electronic devices (CIEDs) at the University of Washington. Five anesthesiologists learned to interrogate and program these devices to provide customized, optimized care for CIED patients undergoing surgery. This training was conducted by electrophysiologists and device company representatives; it consisted of required reading, 20 h of didactic sessions, and a minimum of 30 proctored CIED interrogations. In addition, the lead member of the ADS became a testamur of the International Board of Heart Rhythm Examiners (IBHRE) in Cardiac Rhythm Device Therapy.



"We believe that the ability to obtain timely preoperative evaluation and immediate intraoperative assistance for these complicated patients can improve outcomes while lowering costs."

In this issue of Anesthesiology, Rooke *et al.* offer insight into the planning and execution of this service, as well as report quality performance data comparing their ADS to patients managed by a typical academic electrophysiology/cardiology service (EPCS) over the first 4 yr of the ADS. During this time, the ADS managed more than twice as many CIED patients than managed by the EPCS (548 *vs.* 250, respectively). The ADS resulted in a modest reduction in operative delays without appearing to compromise patient safety. On several occasions, the ADS successfully provided immediate intraoperative assistance for CIED malfunction or pseudomalfunction. The most serious error by the ADS was failure to suspend tachyarrhythmia detection preoperatively on one occasion. Another four errors were made by the ADS in restoring postoperative CIED function owing to CIED and programmer idiosyncrasies, but these errors were all promptly recognized and corrected. No apparent harm resulted from any of these errors, and the errors committed by the ADS appeared to decrease with experience. By comparison, the most common error made by the EPCS was failure to follow published perioperative management recommendations from the Heart Rhythm Society (HRS); unnecessarily programming CIEDs to pace asynchronously, which has the potential to induce malignant arrhythmias.[2] Perhaps, the programming errors made by the EPCS imply less familiarity with perioperative advisories or best perioperative practices than members of the ADS.

The impetus to create this service arose primarily from perceived case delays involving CIED patients. Indeed, some institutions discourage scheduling these patients as a first case owing to the difficulty of obtaining timely preoperative assistance.[3] Cardiologists have competing

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Corresponding article on page 1024.

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 Anesthesiology 2015; 123:990-2

interests, remain poorly incentivized to provide perioperative care, and, perhaps, might have little experience with implanted cardiac rhythm device management. Industry employed associated personnel (IEAPs; the device representatives) also have competing interests, mostly attending to implants, likely lack familiarity with anesthetic agents, intraoperative hemodynamics, and possibly arrhythmia management, and the HRS states that IEAPs should not be providing independent perioperative CIED care.[4] In addition, neither cardiologists nor IEAPs can remain with the patient for the entirety of the surgery to assist with suspected or real intraoperative rhythm issues. Routine magnet application has led to patient injury[5] and should no longer be performed.[6] Both the American Society of Anesthesiologists (ASA) Practice Advisory[7] and HRS Expert Consensus Statement[2] offer a number of warnings about the routine application of magnets—in fact, the ASA advisory specifically cautions against the routine use of a magnet over an ICD, and the HRS statement says that the approach of placing a magnet on any CIED without analyzing the patient's situation is no longer acceptable.

No doubt, arguments persist regarding whether these patients require special perioperative attention. Most clinicians believe that CIEDs are hardy, rarely fail, and undergo regular surveillance. Yet, analysis of U.S. Food and Drug Administration reports from 1996 to 2002 suggests that PMs fail at 0.5 per 100 implants per year.[8] More recent data from the period 2003 to 2007 suggests that ICDs fail at 0.4 (standard ICDs) and 2.3 (cardiac resynchronization ICDs) per 100 implants per year.[9] A more concerning report from the San Francisco Medical Examiners office covering the period of 2011 to 2013 suggests that CIED failure rates leading to patient death might be significantly higher.[10] Thus, ensuring appropriate CIED function preoperatively seems like a recommendation that should be universally accepted and followed. After all, the absence of symptoms does not imply the absence of a problem.

Currently, a variety of economic and market reports suggest that more than 3 million U.S. patients have a PM and more than 300,000 have an ICD. More than 300,000 adults and children in the United States underwent PM placement (new or revision) in 2014, and data from the U.S. ICD registry show more than 12,000 transvenous ICDs implanted per month.[11] Furthermore, at least one study suggests that many patients who should undergo ICD implantation do not.[12] An aging population, new indications for device use, and continued technological enhancements—such as the leadless transcatheter-deployed intracardiac PM[13] and the subcutaneous ICD[14]—will further increase the number and complexity of patients with a CIED. Consequently, all anesthesiologists, regardless of their scope of practice, should expect to encounter and manage such patients.

As testamurs of the IBHRE, we strongly believe that the ability to obtain timely preoperative evaluation and immediate intraoperative assistance for these complicated patients can improve outcomes and reduce costs by preventing case delays, cancellations, and even patient injury due to misunderstanding of a rhythm abnormality with inappropriate treatment.[15] In the bundled-care Perioperative Surgical Home, physician anesthesiologists can add value to their practice by creating services tailored to these higher risk (and therefore higher cost) patients. Rooke *et al.* clearly demonstrate that physician anesthesiologists are indeed capable of providing the care recommended by the ASA and HRS. Although an ADS can improve efficiency, reduce delays and cancellations, and concurrently maintain and hopefully improve patient safety and outcomes, the training process is not a trivial undertaking and the complexity involved suggest that this approach may limit its utility to high-volume settings. Another key consideration is that this approach requires, and fosters, excellent collaboration between anesthesiologists and cardiologists.

Although the structured ADS established by Rooke *et al.* is novel, physician anesthesiologists at other centers now deliver expert CIED care. Currently, eight anesthesiologists from five institutions in five different states hold testamur status as Certified Cardiac Device Specialists from the IBHRE. We would like to see more physician anesthesiologists undergo this training, achieve IBHRE testamur status, and help solidify the role of physician anesthesiologists in the future of bundled care medicine.

Competing Interests

The authors are not supported by, nor maintain any financial interest in, any commercial activity that may be associated with the topic of this article. Dr. Schulman has grant funding from Boston Scientific (Natick, Massachusetts), unrelated to this article.

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