INNOVATIVE COLLECTIONS

COMMENTARY FROM THE SECTION EDITOR

Subacute Right Ventricular Pacemaker Lead Perforation: Often talked about in consent forms but rarely seen

Perforation or inadvertent malpositioning, of endocardial permanent pacemaker (or implant table defibrillator) leads may be an uncommon, yet serious and important, complication1,2 that, when recognized, can usually be treated effectively before disaster necessarily strikes. These issues are highlighted clearly in the case report in this issue of the journal by Welch et al.3 As the authors show, identification of lead migration and its treatment may require clues found on clinical presentation after implant and on diagnostic testing.

While uncommon, suspicions should be raised when there is a new, or increasing, pleural or pericardial effusion, changes in the QRS or P wave pacing morphologies, unusual positioning on chest radiograph (with changes suggesting migration), or increasing pacing threshold (or anodal unipolar pacing only).4 Clues, although non-specific, include pleuritic chest pain, dyspnea, diaphragmatic chest wall4–6 or abdominal stimulation7 hiccoughs,8 new unexplained chest hematoma,9 or new pericardial friction rub. Other conditions can mimic cardiac perforation10 or be confused with it.11

The diagnosis may be evident by findings noted on chest radiographs, echocardiography, or electrocardiography. The presence of a right bundle branch block during “right ventricular” pacing with specific morphologies may be diagnostic for perforation or help rule it out.12–14 Even home monitoring systems may help with the diagnosis.15 In some cases, computed tomography (CT) scanning is helpful to secure the diagnosis as has been reported as far back as the 1980s.16–19 Data from CT scanning suggest that asymptomatic lead perforation is much more common than expected.

Leads can be positioned correctly but perforate and migrate over time. As Welch et al. point out, this appears to be rare.3 Eventually, a lead may perforate the heart causing tamponade and end up in the pleural space,20 through the chest wall21 (near the breast).22 It may end up in subcutaneous tissue,23 perforating the rib24 or the mitral valve,25 or piercing multiple organs.26 It may even cause pneumopericardium.27

Perforation may be due, in part, to lead type, excess tension on the lead, malpositioning or specific patient characteristics. In some cases, even with a well-positioned lead at the time of implant, migration with slow perforation may occur due to stiffness or properties of the lead28,29 (rather uncommon now) or to the delicacy of the tissue into which the lead is placed or both. Older women may be at highest risk of perforation and lead migration. In the Mayo Clinic experience, presumed perforations (not necessary subacute or with lead migrations) were associated with effusions in 1.2% of implants.30

It is probably not unusual for endocardial leads to perforate at time of implantation. If the lead is recognized, pulled back, and repositioned, serious short- or long-term complications rarely ensue. It is not completely clear how many implanted endocardial leads have perforated as they are not always associated with symptoms of signs.31–33 Some still function well without long-term complication.

As we had reported in a case referred to us for further management, inadvertent endocardial pacemaker lead positioning can occur mistakenly via structures without even entering the cardiac chambers.34

A pacemaker system implant is generally a simple and straightforward procedure. Despite this, complications can occur at almost every conceivable step of the way. As Welch and colleagues discuss, ideally the complication of
perforation would be best avoided. Unfortunately, this problem is likely to be with us for quite some time. As Welch et al. further discuss, sometimes an innovative approach may be required to correct the problem once it occurs to avoid a disastrous consequence.3 Treatments vary from simply pulling the lead back to an open surgical approach depending on the clinical presentation and clinical judgment.35 Here,3 video-assisted thoracoscopic surgery proved effective. Being that it is not always possible with this complication, the best that can be done is be aware of the problem, make an early diagnosis, and treat promptly.

Brian Olshansky, MD, FHRS, FACC, FAHA
brian-olshansky@uiowa.edu
Professor of Medicine
Cardiac Electrophysiology
University of Iowa Hospitals
Iowa City, Iowa

References


