



Dermatologic surgery on the chest wall in patients with a cardiac surgery history: a review of material that may be encountered intraoperatively, including potential complications and suggestions for proceeding safely[☆]

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ARTICLE INFO

Article history:

Received 6 October 2015

Received in revised form 29 November 2015

Accepted 4 December 2015

Keywords:

dermatologic surgery
electrosurgery
pacemaker
pacer wire
steel suture

ABSTRACT

Background: Thoracic surgical procedures and the use of cardiac devices such as pacemakers are becoming increasingly prevalent in the population. As such, dermatologists may have a greater likelihood of encountering previously implanted or abandoned surgical material in the course of dermatologic surgery on the chest wall. A basic understanding of the wire types and the tunneling paths utilized in such procedures is important in accurately anticipating the presence of these wires to effectively manage any chance encounters.

Objective: We present a review on temporary epicardial pacing wires, temporary transvenous pacing wires, pacemaker leads, and surgical steel sutures in the context of dermatologic surgery.

Methods: A literature review was performed on frequently used wire material in patients with a history of cardiac surgery as well as related dermatologic complications from these materials.

Results & Conclusion: Dermatologic surgeons should particularly be aware that temporary epicardial pacing wires and pacemaker leads are not uncommonly abandoned in the chest wall of many patients. All patients with a cardiac surgery history should be questioned about possible retained wires. If wire material is encountered intraoperatively, immediately stop the procedure and do not attempt further manipulation of the wire until suggested steps are taken to ascertain the wire type.

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Introduction

As cardiac surgery is becoming more common due to an aging population and new advances in the diagnosis and treatment of cardiac conditions, dermatologists and dermatologic surgeons encounter many patients with cardiac surgery history. These patients may have had implanted cardiac devices such as pacemakers and implantable cardioverter-defibrillators (ICDs). Previous literature has outlined potential complications that can arise and precautions to be taken when performing dermatologic surgery with concomitant use of electrosurgery in these patients. However, the literature on problems that can arise from retained, temporary cardiac device equipment is severely lacking.

The authors recently encountered wire material encased in tumor during Mohs micrographic surgery on the chest wall in a patient with an active pacemaker and history of cardiac surgery. The wire was encountered as the tumor was traced. When it became clear that this wire was of a conducting nature, a chest x-ray (CXR) and cardiology consultation were

obtained. In this case, the wire was determined to be of a retained nature, from a temporary epicardial pacer placed after cardiac surgery and intentionally abandoned when no longer needed. We searched the literature for reports of similar findings during cutaneous surgery or guidelines on how to proceed after such an unsettling discovery and found none. We discovered that beyond ICDs and pacemakers—which are usually obvious due to the presence of a visible implanted generator on the chest wall—other types of material used in the course of open heart surgery may be encountered by dermatologists and dermatologic surgeons. We aim to provide a review of these materials to help our colleagues identify and manage foreign material that may be encountered, minimize potential hazards to patients during procedures, and diagnose cutaneous lesions that may occur secondary to retained material post-cardiac procedure.

Description of wire types and indications for use

Temporary epicardial pacer wires

Many cardiac surgeons routinely insert temporary epicardial pacer wires (TEPWs) after open heart surgery (e.g., valve replacement or repair, coronary artery bypass graft surgery, or heart transplant) for

[☆] Conflict of interest: The authors have no conflicts of interest to report.

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both therapeutic and diagnostic purposes due to an increased postoperative risk for myocardial dysfunction (Reade, 2007). TEPWs are usually monofilament stainless steel wires with an insulating coating (Fig. 1) passed from a starting point of the epicardium percutaneously to the right and left of the sternum for atrial and ventricular wire pairs, respectively. They are typically removed 2 to 7 days after surgery using gentle traction. If excessive resistance is encountered during wire withdrawal or the patient has an increased bleeding risk from a coagulopathy, the wires may be left in place at the discretion of the surgeon. TEPWs may also be purposefully sutured tightly in place by some surgeons for better contact with the epicardium and more reliable impulse conduction in critical situations, sometimes even with the intention of purposefully abandoning the wire.

Temporary transvenous pacing wires

Temporary transvenous pacing wires (TTPWs) are also used for short-term pacing but are typically only employed as a temporary bridge to permanent pacing in acute conditions such as symptomatic high-grade heart block. Although TTPWs and (transvenous) permanent pacing or ICD leads (discussed later) are very similar in placement, minor differences exist regarding insertion method and final placement of the ends interfacing with the pulse generators. TTPWs are directly placed into central veins—most commonly the internal jugular or subclavian—via a catheter and contain an inflatable balloon tip to help anchor the exposed conductive tip in the right atrium or ventricle before being connected to an external pulse generator. Similar to TEPWs, they also consist of a stainless steel core with an insulating plastic sleeve, but they have a larger caliber due to the additional channel needed to inflate the balloon anchor (Fig. 2). TTPWs are replaced with more permanent pacing wires during ICD or pacemaker placement. A review of the literature is negative for reports of abandoned TTPWs.

Permanent pacemakers and ICDs

Permanent pacemakers and ICDs are comprised of three components: the pulse generator, electrodes, and wires (the latter two forming the connecting leads). In contrast to TTPW, ICD or permanent pacer leads are inserted into the subclavian but are first tunneled subcutaneously to create space for the pulse generator to be buried under the skin. Although they are most commonly placed in the left upper quadrant of the chest wall due to anatomical considerations,

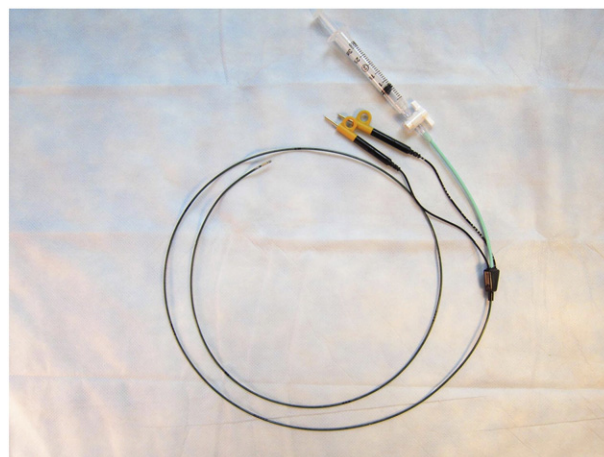


Fig. 2. Temporary transvenous pacing wire (TTPW): bipolar balloon pacing electrode catheter with deflated balloon tip.

pulse generator (and wires) can sometimes be found on the right as well. The implanted generator, or pacer box, is visible under the skin on the chest wall and therefore heralds the presence of adjacent subcutaneous pacing wires. The implanted pulse generators may be removed in special circumstances such as infection, host rejection, or equipment malfunction, but the leads are typically left in place unless infected (Love et al., 2000). For patients who have had a long history with a pacemaker or ICD, it may not be uncommon for them to have multiple “abandoned” nonfunctional pacer leads due to lead failure or changes of the pace generator (Bracke et al., 2001).

Steel suture wires

Most invasive cardiac surgeries require a median sternotomy for access that must later be closed with a high tensile material to aid in sternal edge reapproximation. Steel sutures are most commonly placed transternally to achieve this approximation, but they may occasionally be placed in a parasternal or paracostal fashion as well. Alternatives to traditional sternal wire closure include the use of stainless steel bands, polymer tapes (e.g., Ethicon), or absorbable sutures (typically in younger patients) either alone or in conjunction with sternal wires (Losanoff et al., 2002). Sternal wires are composed of bare surgical stainless steel attached to a suture needle for easier threading (Fig. 3). Wires are typically left in once placed but are

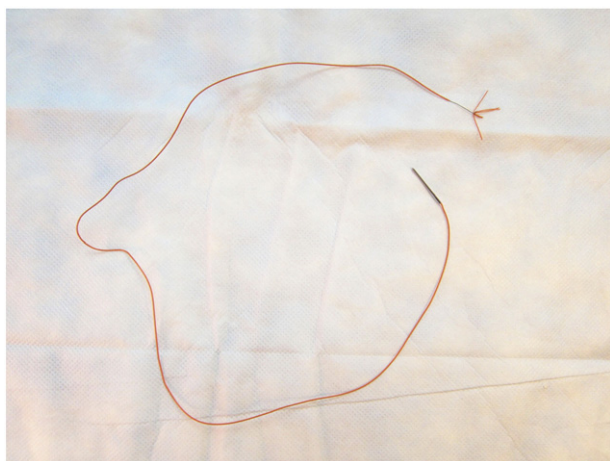


Fig. 1. Temporary epicardial pacing wire (TEPW) with ends flayed for increased traction when placed on the epicardial surface. The example shows an orange insulating coating, but actual colors may vary depending on the wire manufacturer.



Fig. 3. Steel suture: size 6 (0.8 mm diameter) monofilament surgical stainless steel suture with V-40 (tapercut 1/2 circle) needle.

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