

Initial Experience With a Technique for Wound Closure after Cardiac Device Implantation Designed to Reduce Infection and Minimize Tissue Scar Formation

Blair P. Grubb, MD,^{1*} Marlene Welch, MD, PhD,² Beverly Karabin, RN, PhD,¹ Warren Foster, MD,¹ Dong Zhang, MS,³ and Khalil Kanjwal, MD¹

Infection is a well-recognized complication that can occur after the implantation of cardiac devices such as pacemakers and implantable cardioverter defibrillators (ICDs). Reported infection rates after new device implantation are reported to be around 1%, while infection rates after device generator replacements are higher with a reported average of up to 4–5% per year. Here we report our experience using a modified plastic surgical technique for cardiac device wound closure designed to both reduce infections and enhance cosmetic outcomes. Patients were recruited from among those individuals undergoing routine cardiac device implantation (either new or replacement) at our institution. A total of 124 patients were included in the study. There were 74 women and 48 men, mean age 58 ± 16 years. There were 74 new pacemaker implants and 27 pacemaker generator replacements. There were 17 new ICD generator implants and 6 ICD generator reimplants. Mean follow-up time was 15 ± 16 months. During the follow-up period, there have been no device infections nor any wound dehiscences observed. Each patient felt that the scar was cosmetically acceptable. Two patients developed mild rashes to the clear plastic adhesive that resolved after removal. The modified wound closure technique described above appears to minimize cardiac device wound infections while facilitating cosmetically acceptable wound scar formation.

Keywords: cardiac pacemaker, wound, defibrillators, infection

INTRODUCTION

Infection is a well-recognized complication that can occur after the implantation of cardiac devices such as pacemakers and implantable cardioverter defibrillators. Reported infection rates after new device implantation are reported to be around 1%, whereas infection rates

after device generator replacements are higher with a reported average of up to 4–5% per year.^{1–4} In addition, the cosmetic appearance of the scar tissue over the site can be of concern for some patients, in particular after repeated pulse generator changes that occur over the course of years. Plastic surgeons have faced similar issues with implanted prosthetic devices and tissue expanders and have developed techniques to minimize both infection risk and scar formation. Here, we report our experience using a modified plastic surgical technique for cardiac device wound closure designed to both reduce infections and enhance cosmetic outcomes.

METHODS

Patients were recruited from among those individuals undergoing routine cardiac device implantation (either

¹Division of Cardiology, Electrophysiology Section, ²Division of Plastic Surgery, Department of Surgery, Health Science Campus, and ³Department of Biostatistics, University of Toledo Medical Center, Toledo, OH.

*Address for correspondence: Division of Cardiology, Section of Electrophysiology, 3000 Arlington Ave, Toledo, OH 43614. E-mail: blair.grubb@utoledo.edu

new or replacement) at our institution. All patients received preoperative intravenous antibiotics. After an initial sharp incision, meticulous blunt dissection was employed to either create (or reopen in case of replacement) a subfacial pocket. After cardiac device placement or replacement, the pocket was rinsed with an antibiotic solution, and the fascial layer was closed with a 2.0 absorbable braided polyfilament suture. The subdermal layer was then closed with a series of interrupted sutures using a 3.0 absorbable monofilament suture material (Fig. 1 and 2). Each of the sutures was approximately 5 mm apart from each other with the suture knot buried deep in the subcutaneous tissue (Fig. 3 and 4). The skin surface was then closed with surgical tissue adhesive (2-octyl cyanoacrylate), and the wound was dressed with a nonadherent gauze pad and a transparent adhesive film dressing. The patients were allowed to shower immediately after implantation if they so chose. The dressing was removed after 1 week. All patients were seen back in follow-up after 1-week, 1-month, and 3-month intervals at postimplant. Thereafter, patients were seen back in follow-up at 6-month intervals.

RESULTS

A total of 124 patients were included in the study. There were 74 women and 48 men, mean age 58 ± 16 years. There were 76 new pacemaker implants and 27 pacemaker generator replacements. Mean follow-up time was 15 ± 16 months. During the follow-up period, there were no device infections observed. Each patient

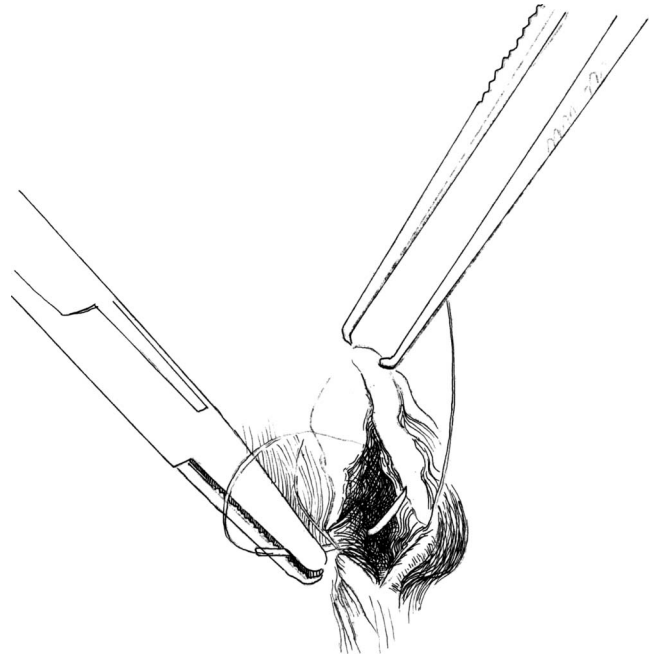


FIGURE 2. Position of the needle during the second half of the stitch placement: note that the needle is inserted superficially and exits deep into the tissue.

showered within 24 hours of the procedure and during the first week afterward with no adverse effects noted. Each patient felt that the scar left over the pulse generator insertion site was cosmetically acceptable (Figure 5). There were no wound dehiscences observed.

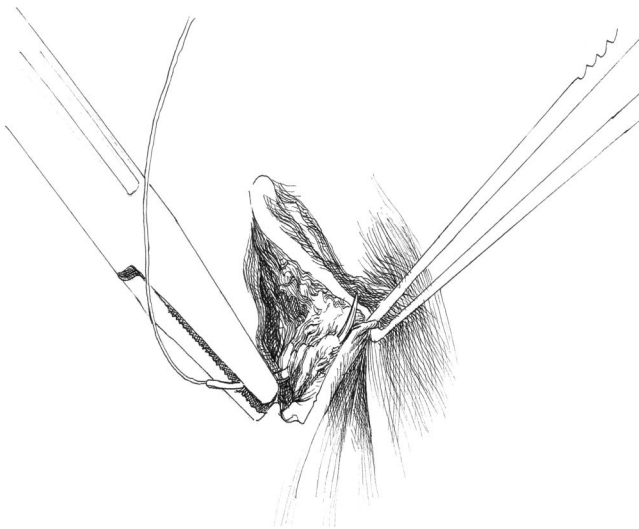


FIGURE 1. Position of the needle during the initial upward pass for the first pass of the stitch. Note that the needle is inserted deep into the tissue and exits superficially.

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FIGURE 3. Position of the sutures before tying a knot to bury the knot-free strands must be on the same side.

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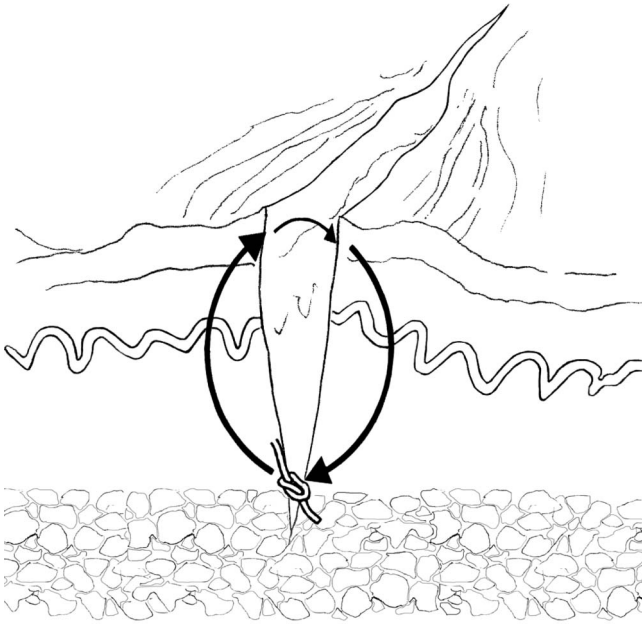


FIGURE 4. Final position of suture with buried knot.

Two patients developed mild allergic reactions to the clear plastic dressing that required early removal. In both cases, the rashes quickly faded, and there were no permanent sequelae. No patient reported chronic pain or discomfort in the scar site.

DISCUSSION

Infection after cardiac device placement or replacement is a recognized complication of the procedure.¹⁻⁴ Infections can have a devastating effect on the patient, leading to possible sepsis and almost always to removal of the entire pacing or defibrillation system.¹⁻⁶ Plastic



FIGURE 5. Final appearance of the wound at 2 months of follow-up.

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surgeons, when faced with similar issues, developed techniques for wound closure that both minimized infection risk while at the same time enhanced cosmetic appearance of the resultant scar tissue. We reasoned that similar techniques could be employed in cardiac device wound closure that could achieve similar ends. The modified wound closure technique was designed by a plastic surgeon (M.W.) and performed by an electrophysiologist (B.P.G.). After a brief learning curve, the closure technique could be quickly and easily performed within 10 minutes after closure of the deep fascial layer. One of the benefits of the wound closure technique that was most appreciated by the patient was the ability to shower immediately after the procedure in contrast to the traditional closure techniques that delay showering for up to 1 week after the procedure. The clear dressing covering of the wound allowed for early shower.

LIMITATIONS

This was a single-center experience with a relatively small number of patients. Due to these reasons, this study was underpowered. A study size of 81 patients would have had a power of 85% to detect the difference in infection rate from new device implants, and for replacement of generators, a study size of 197 patients would have been required to have a power of 80%. There was no control group in this study. Despite these limitations, we still believe that the results of this study will lay a foundation for a larger and a controlled study.

CONCLUSIONS

Our initial experience with the modified wound closure technique described herein has been quite favorable in terms of wound infections and enhancing cosmetic outcomes. The technique is simple, safe, and easy to learn. Larger studies will be necessary to further assess outcomes using this technique in cardiac device placements.

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