

# Long-Term Wound Palliation to Manage Exposed Hardware in the Setting of Peripheral Arterial Disease

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**Summary:** Exposed orthopedic hardware in the lower extremity complicated by peripheral arterial disease typically demands multiple operative procedures by several disciplines to maintain skeletal integrity and achieve complete wound healing. For ambulatory patients that are either not candidates for lower extremity revascularization or prefer not to pursue surgical attempts at limb preservation, wound palliation is a potential management strategy. We discuss a patient with a history of severe peripheral arterial disease and a left pilon fracture previously treated with open reduction and internal fixation. He presented with a 2-month history of open wounds and exposed hardware over his left tibia. Though he initially underwent surgical revascularization to improve circulation to his lower extremity, the arterial bypass occluded within 6 months of the operation. At that point, the patient decided to forego any additional surgical intervention, including hardware removal, in favor of local wound care and expectant management. Remarkably, the wound remained stable in size over the next 14 years, he remained ambulatory, and never developed a deep wound infection. Though palliative wound care alone is understandably not the recommended first-line therapy for managing nonhealing wounds, it may be a safe and potentially durable alternative to major lower extremity amputation when revascularization and soft-tissue coverage cannot be achieved. (*Plast Reconstr Surg Glob Open* 2019;7:e2058; doi: 10.1097/GOX.0000000000002058; Published online 13 February 2019.)

## INTRODUCTION

Exposed orthopedic hardware is a limb-threatening situation that traditionally requires early, aggressive management.<sup>1,2</sup> If chronically exposed, however, the hardware is typically removed, and the soft-tissue defect is subsequently reconstructed with well-vascularized tissue, including the use of flap coverage.<sup>3-6</sup> This problem is significantly complicated by peripheral arterial disease (PAD).<sup>7</sup> If reconstruction attempts fail, for instance, amputation is offered to avoid the potentially life-threatening infectious complications associated with exposed hardware.<sup>8</sup> Herein,

we present a case of a PAD-related nonhealing wound with exposed hardware for which the patient elected to forego these surgical limb preservation efforts in favor of a conservative, long-term strategy of palliative wound care.

## CASE PRESENTATION

A 41-year-old man was working as a gravedigger when he initially sustained a left pilon fracture, requiring open reduction and internal fixation at an outside institution in 1988. Fifteen years later, he suffered a work-related injury while using a weed trimmer, resulting in wounds over his left medial ankle. On presentation to our hospital in 2003, the wounds had been present for 2 months. The patient also indicated that he had a 30 pack-year smoking history and one-block calf claudication.

In total, his wounds measured 6×2 cm with obviously exposed hardware (Fig. 1). There were no clinical signs of infection. Pedal pulses were absent, and ankle-brachial indices were 0.56 (right) and 0.55 (left). Left ankle radiograph showed intact medial and lateral hardware (Fig. 2),

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*Received for publication July 31, 2018; accepted October 17, 2018.*

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DOI: 10.1097/GOX.0000000000002058

**Disclosure:** The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.



**Fig. 1.** Appearance of the patient's chronic nonhealing wound with exposed hardware located over the distal left tibia in 2005 (A), 2012 (B), and 2017 (C). The patient's foot is toward the bottom of the photographs.



**Fig. 2.** Initial radiograph from 2003 showing stable and intact hardware in the distal left tibia and fibula.

and angiography revealed diffuse disease throughout the left superficial femoral artery, an occluded left popliteal artery, and single-vessel runoff to the foot through the posterior tibial artery.

Though the patient was eligible for hardware removal, he was deemed a poor candidate for free-flap reconstruction of the resultant defect, given the compromised arterial circulation throughout his limb. Therefore, to first reestablish in-line blood flow and salvage the extremity, he underwent revascularization via common femoral-posterior tibial artery bypass using autologous vein.

He tolerated the procedure well, but 6 months postoperatively, his wounds had coalesced into a single soft-tissue defect with exposed pins. Doppler imaging and angiography demonstrated graft occlusion. Considering the significant risk this open wound posed, other revascularization options were discussed. At this point, however, the patient preferred not to have any additional intervention for his extremity unless absolutely necessary. Multiple clinicians documented discussing either aggressive limb salvage efforts (including femorodistal bypass and flap coverage) or leg amputation, often on the rationale of preventing ascending infection and sepsis. Despite this, he remained resolute in his desire to pursue expectant management with local wound care only, simply consisting of daily dressing changes.

Over a 14-year follow-up, the wound remained relatively stable in size (Fig. 1), the patient never developed a deep wound infection, and imaging continued to show stable hardware. Extraordinarily, the patient remained ambulatory and actively employed to age 70. He died of an unrelated myocardial infarction 14 years after his wounds first appeared.

## DISCUSSION

Nonhealing, PAD-associated soft-tissue defects represent a challenging problem with a natural history marked by high amputation-related morbidity and a 1-year mortality rate of 25%.<sup>9,10</sup> Strikingly, among those with severe PAD who receive a major (ie, above-ankle) amputation, up to 75% are no longer able to ambulate and 50% can no longer live independently.<sup>11</sup> Therefore, limb preservation efforts in the setting of soft-tissue defects must aim to control and prevent infection, improve arterial flow, and restore an intact skin barrier.<sup>12</sup>

Though local wound care alone has a poor limb salvage rate of 10% at 10 years, this type of expectant management is actually more beneficial to the patient and more cost-effective than primary major amputation for PAD-related soft-tissue defects.<sup>13</sup> Additionally, studies have identified wound palliation, defined as wound care without the expectation of complete healing, as a potentially safe alternative to major amputation in this setting.<sup>11,14</sup>

However, this is all complicated by concomitant orthopedic hardware exposure. Particularly problematic is the distal third of the lower extremity, given the fragile vas-

culature and paucity of local soft tissue available for the necessary reconstruction.<sup>5,7,15</sup> Considering that attempts at hardware preservation are most successful when initiated within 2–3 weeks of exposure,<sup>1</sup> our patient was not a candidate for preservation as he already had a 2-month history of exposure on initial evaluation. Though the ideal treatment plan was to revascularize the limb followed by hardware removal and reliable free-flap coverage,<sup>1</sup> the patient adamantly preferred local wound care only.

The concept of wound palliation is often discussed for uninfected wounds in the end-of-life setting, traditionally indicated when: (1) the primary treatment goal is symptom management rather than complete healing; or (2) aggressive intervention or treatment of an underlying pathology is not consistent with the patient's goals of care.<sup>14,16–19</sup> Remarkably, however, this patient lived independently for 14 years with a significant soft-tissue defect in the setting of clearly compromised arterial perfusion and never experienced a deep wound infection or any other complication necessitating emergent intervention. Although other studies note that approximately 31% of such patients ultimately require major amputation, they also happen to report a low rate of ascending sepsis.<sup>11</sup> Though the patient remained a candidate for revascularization after the occlusion of his initial graft, he decided against further surgical intervention since he relied on his ambulatory status for his job and had no reliable support system to aid in rehabilitation efforts. Given the patient's wishes and his personal goals of care, wound palliation afforded him the opportunity to successfully defer major amputation for the remainder of his life.

### CONCLUSIONS

Though wound palliation is certainly not first-line management for exposed hardware in ambulatory individuals with PAD, it may serve as an approach to avoid immediate amputation-related functional impairment in patients that are either deemed poor candidates for revascularization or who wish to forego surgical attempts at limb preservation. In the context of current literature, this case illustrates that palliative management for these select patients, in the setting of clear expectations and a multidisciplinary team of providers, may be considered a potential management strategy.

### ETHICAL STANDARDS

The patient provided written informed consent prior to this case description and agreed to the use of potentially identifiable photography in research publications.

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