Use of an Antibiotic Spacer and Pedicled Groin Flap in the Treatment of Chronic Osteomyelitis of the Forearm: A Case Review

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Introduction

Chronic osteomyelitis is a difficult disease to treat that often involves a multidisciplinary team. Patients require prolonged IV antibiotics, often multiple surgical debridements, and may ultimately require amputation. It can occur exogenously or hematogenous; common mechanisms include direct inoculation from trauma, chronic open wounds, or soft tissue infections. The most common classification for chronic osteomyelitis is the Cierny-Mader classification that incorporates prognostic factors with treatment plan according to location of bony infection and the health of the patient[1]. An added challenge occurs when there is significant bone loss due to chronic osteomyelitis which can be addressed using the Masquelet technique, a two-staged procedure for reconstruction of long bone segmental defects in the trauma setting[2]. We present a case of a 43-year-old female with a history of intravenous drug abuse who presented for chronic osteomyelitis for approximately one year that was treated with several irrigation and debridements (I&D), antibiotic spacers, and a pedicled groin flap.

Case Presentation

Our patient was a 43-year-old right-hand-dominant female with reported a history of hepatitis C and IV drug abuse who presented for evaluation of chronic left forearm infection. The infection was reported to have started one year earlier after IV drug use and she had previously undergone multiple I&Ds. On initial presentation, there was an approximate 15 x 5 x 1 cm wound on the dorsal forearm with exposed bone and copious purulence (Figure 1). PIN motor nerve and sensation to dorsal hand were not intact; otherwise, the patient was neurovascularly intact. She was afebrile and her initial labs demonstrated a WBC of 5.6, hemoglobin 11.9, ESR 9, and CRP 0.37. She underwent initial I&D with the bony defects of the radius being 9 cm and ulna 5 cm. Two 2.0 Steinmann pins were coated in antibiotic cement containing tobramycin and vancomycin. Intraoperative cultures demonstrated methicillin resistant *Staphylococcus aureus* (MRSA), *Pseudomonas aeruginosa*, *Candida metapsilosis* and *Candida parapsilosis*. She underwent a total of 3 I&Ds with replacement of the antibiotic spacer with 2.5 mm antibiotic coated Steinmann pins during the second I&D.

Next, a pedicled groin flap using the superficial circumflex iliac artery was used as soft tissue coverage to the dorsal forearm. The flap was monitored for approximately 20 days before flap division and closure was completed. Initial I&D to flap closure totaled 34 days and the patient was discharged to facility to continue antibiotics and antifungals. She was eventually lost to follow up.

Figures

Figure 1: Left forearm on presentation

Figure 2: Left forearm during the first irrigation and debridement

Figure 3: Left forearm during second irrigation and debridements

Figure 4: Left forearm after application of pedicled flap

Figure 5: Left forearm after groin flap closure

Discussion

Patients presenting with chronic osteomyelitis with significant diaphyseal bone defect and lacking soft tissue coverage can be a challenge to manage. Treatment strategies include aggressive irrigation and debridement, appropriate antibiotics, stabilization of the extremity, and eventual reconstruction of the bony defect. Deng et al. utilized the Masquelet technique with pedicled gastrocnemius/soleus flaps for treating lower extremity fractures with segmental bone loss and lack of soft tissue coverage in the trauma setting. All 17 patients went on to union and no infections were reported.[3] Bor et al. evaluated the necessity of placing an autologous bone graft by using the antibiotic intramedullary spacer as definitive treatment for chronic osteomyelitis in both upper and lower extremities. Radiographs at the end of the study demonstrated no fractures or signs of bony erosion but this study did not include the presence of large segmental diaphyseal defects.[4]

Dhar et al. studied the use of the Masquelet technique in chronic osteomyelitis with segmental bone loss in a single bone of the forearm in 12 patients after fracture. They achieved bone union in all 12 forearms with mean time to radiographic union being 7.8 months.[5] These studies demonstrate the potential success utilizing the Masquelet technique with a pedicled groin flap in the setting of chronic osteomyelitis but none directly address the non-traumatic, both bone segmental defects requiring soft tissue coverage as seen in our patient.

Conclusion

The purpose of this case review is to describe our approach to treatment of chronic osteomyelitis with substantial diaphyseal bone loss and loss of soft tissue coverage. This is a lengthy process with coordination between multiple medical and surgical specialties for administration of appropriate antibiotics and surgical procedures. To our knowledge, this is the first case review of attempted Masquelet with use of a pedicled groin flap for the treatment of chronic osteomyelitis of the forearm and future studies can follow our treatment plan with goals of better evaluating its long-term success with more reliable patient follow up.

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