

Single-Stage Treatment of Osteomyelitis for Digital Salvage by Using an Antibiotic-Eluting, Methylmethacrylate Joint-Spanning Spacer

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Osteomyelitis of the digit is a challenging problem that can result in amputation. We describe 13 cases of osteomyelitis involving bones of the hand managed with a novel technique. We reviewed records of 12 patients (13 digits) who had joint-spanning, antibiotic-eluting (tobramycin or vancomycin), methylmethacrylate spacers placed as definitive, single-stage treatment for digital osteomyelitis. The primary outcome was digit salvage. Secondary outcomes were infection eradication (no recurrence at 3 months) and spacer removal. Patients were followed up until the infection resolved (ie, no cutaneous signs of infection, including pain, erythema, or swelling). At a mean of 24 months, 10 of 13 infections had successful one-stage treatment. One patient required a second operation to revise a soft tissue flap but the spacer remained in place. Two spacers were removed because of malalignment. An antibiotic-eluting methylmethacrylate spacer is an innovative treatment for digital osteomyelitis. In 12 consecutive patients (13 digits), we successfully salvaged the digit. (*J Hand Surg Am.* 2017; ■(■):1.e1-e7. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Digital salvage, methylmethacrylate spacer, one-stage, osteomyelitis.



SALVAGE OF A DIGIT IN THE PRESENCE OF osteomyelitis can be complex and challenging. Debridement to remove all of the infected bone and residual microbial biofilm may rob the involved digits of precious bone stock. If the joint space is also involved, after debridement the resultant joint is often painful and rendered unstable, limiting function of the digit. When debridement fails or osteomyelitis is persistent, usually the digit has typically been amputated, a definitive treatment that results in some degree of permanent hand disability.

Placement of an antibiotic spacer provides an alternative treatment option that has the potential to salvage the digit (Fig. 1). The advent of such antibiotic spacers has allowed soft tissue and joint stabilization without the use of an external fixation device, which itself is prone to infection. For example, the prosthesis of antibiotic-loaded acrylic cement (PROSTALAC) (DePuy Synthes Joint Reconstruction, Warsaw, IN) antibiotic-eluting hip spacer, used for temporary hip reconstruction after removal of an infected total hip prosthesis, allows lower-extremity forces to be transmitted and the patient to ambulate.

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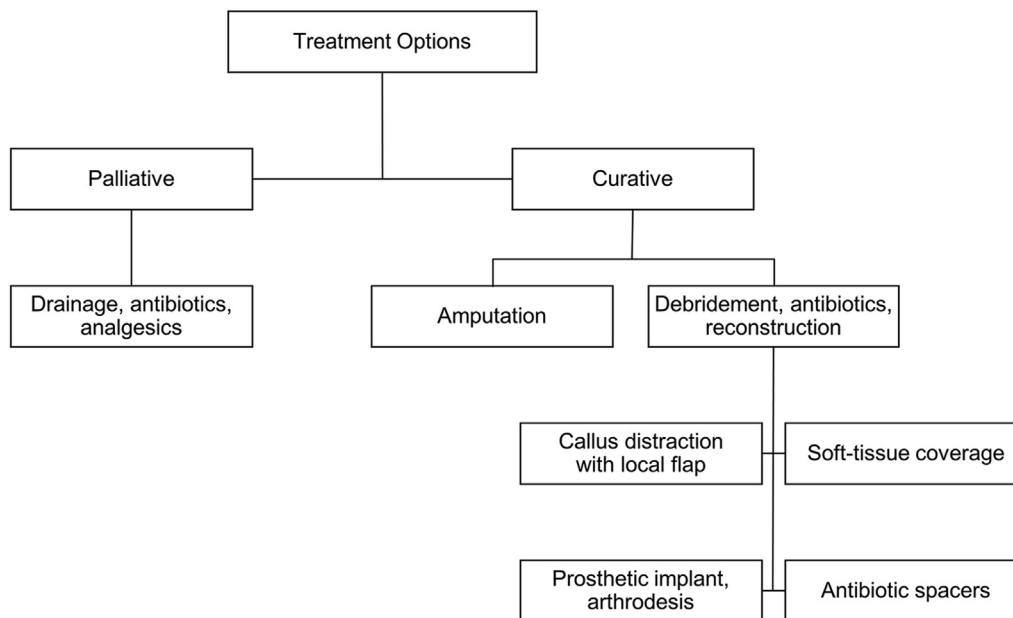


FIGURE 1: Treatment options for osteomyelitis in the bones of the hand.

We applied this concept by using an antibiotic-eluting spacer for osteomyelitis infections in the hand. This technique maintained the soft tissue envelope and provided local, continuous, long-term antibiotic treatment for the residual infection.

For large joints, the spacer is removed typically after 6 weeks, depending on the severity of infection and grade of soft tissue injury, after which arthroplasty or arthrodesis is performed.

We propose that the methylmethacrylate (MMA) spacer can be used as a definitive treatment and allow for digital salvage of the small bones of the hand. In this report, we present 13 cases of osteomyelitis of the phalanges and metacarpals that were treated with an antibiotic-eluting, joint-spanning spacer as a single-stage, definitive treatment for salvage.

PATIENTS, INDICATIONS, AND CONTRAINDICATIONS

We obtained informed consent from all patients included in the study. After the institutional review board approved the study, we retrospectively reviewed electronic health records for patients treated for osteomyelitis of the hand bones from 2000 through 2015. All patients were referred urgently or emergently with signs of cutaneous infection and a concern for osteomyelitis on imaging after outpatient treatment had failed. Patients were included in the study if they had osteomyelitis and were in need of surgical debridement to salvage the digit. Patients were excluded if their infections resolved without debridement and did not require

operative intervention. Twelve patients of a single surgeon were identified, all of whom were treated by joint debridement and placement of a custom-fashioned, antibiotic-impregnated MMA spacer. Spacers were constructed from premixed tobramycin MMA cement or MMA cement mixed with 1 g powdered vancomycin or an antifungal agent. Intraoperative microbial cultures were obtained for all cases. All patients had empiric treatment continued until the specific infectious microorganisms were identified by culture. The patient cohort consisted of 5 men and 7 women, mean age 68.5 years (range, 38–87 years).

Patients were followed up by a team consisting of the hand surgeon and onsite certified occupational therapists, who monitored wound characteristics. Serial imaging studies, including radiographic and magnetic resonance images, were obtained to monitor eradication of infection and bone healing. The patients were observed until their underlying infections resolved.

The primary outcome was one-stage digit salvage. Secondary outcomes included eradication of the infection, as defined by the absence of recurrent infection at 3 months and the need for spacer removal. Unless stated otherwise, the spacer remained in place. A case example of one of the patients treated is described to illustrate the use of the MMA spacer for digit salvage.

CASE ILLUSTRATION AND SURGICAL TECHNIQUE

A 76-year-old man who was right-hand dominant was seen at another facility. He had an 8-month

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