

## **Outcomes After Different Alternatives for Definitive Treatment Following First Stage Masquelet**

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**Purpose:** Our goal was to evaluate alternatives for definitive reconstruction during staged treatment following a solid polymethylmethacrylate (PMMA) antibiotic spacer as the initial step toward the Masquelet induced-membrane technique (MIMT).

**Methods:** This was a retrospective review of a consecutive series (single center) of staged management of infected nonunions or open long bone fractures. Over 6.5 years, 95 cases were managed in a staged fashion with a solid PMMA antibiotic spacer, initiating the MIMT. Medical records and routine radiographs were reviewed to assess clinical outcomes. Age, sex, etiology, and time interval between stages were recorded, and analyzed using descriptive statistics.

**Results:** A total of 95 cases were analysed; 64 cases were treated by conventional Masquelet protocol with exchange for cancellous graft. Within this subgroup, 52 were subsegmental, and 12 segmental (OTA-OFC D3A/B 7; D3C 5). 22 cases had massive defects >8 cm (OTA-OFC D3C); 7 underwent successful bone transport. 11 received custom 3D-printed Ti scaffolds/cage; this resulted in 1 nonunion on 1 end, and a revision nail/graft was successful. Four cases underwent free bone transfers (3 free-fibula; 1 hemi-femur) with 1 nonunion. Nine cases were repeat 1st stage, with further debridement and revision of the PMMA spacer. Four initial failures occurred (2 infection/2 nonunion), and 1 late recurrent infection, 2 suspected reinfection (sterile), and 2 planned repeat procedures for a second 1st stage (resistant organisms). Four initial cases had treatment failure by MIMT, 3 of 4 were successfully retreated; 3 of these 4 were segmental (3/12 failed), and 3 of these were >8 cm (success only 2 of 5). For segmental defects <8 cm, 7 of 7 were successful. The initial success rate overall was 95.8%; the success rate after retreatment was 97.9%.

**Conclusion:** Conventional MIMT, bone transport, custom Ti scaffolds, and microvascular bone transfer are all excellent choices to complete the reconstruction during the second stage. For segmental defects exceeding 8 cm, all of the options outperformed conventional MIMT, which only achieved a 40% success rate in our series. Selecting the most suitable option for a particular patient is a crucial factor that almost certainly contributed to the excellent results reported here.

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