Is the Induced Membrane Technique Associated with Favorable Outcomes in Bone Defects Greater than 6 cm?

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Purpose: The aim of this study was to report on outcomes, complications, and re-intervention rates of patients treated with the Masquelet technique for lower extremity bone defects ≥6 cm.

Methods: Between March 2015 and March 2021, patients presenting with defects of the femur/tibia were eligible. Inclusion criteria were acute fracture with bone loss, septic nonunion, and chronic osteomyelitis with bone loss due to debridement. Patients were excluded with pathological fracture, defects <6 cm, or if treated with other procedures. Data collected included patient demographics, mechanism/type of injury, surgery type, time between the 2 stages, graft material, re-interventions, and complications. All patients were managed via protocol designed by the senior author.

Results: 37 patients (24 males) with a mean age of 38.3 years (range, 22-80) met inclusion criteria. 18 patients had tibial defects, mean defect length 7.7 cm (6-13 cm), whereas 19 patients had femoral defects mean length 8.1 cm (6-14). 12 cases were infected nonunions while the rest were acute bone loss following open fractures. External fixators were used in 10 cases with the fixation revised in the second stage to intramedullary nailing or plating. Mean time from the first to the second stage was 9 weeks (8-14). After the second stage there were 2 failures of fixation, 1 Ilizarov for tibia, the other one a distal femoral locking plate that required revision. Two cases during the second stage required returning to first stage (infection). One case (open tibia) after the first stage, due to flap failure, was converted to Ilizarov with acute shortening and subsequent bone transport. All the rest of the cases (36 in total) during the second stage were grafted with reamer-irrigator-aspirator graft, bone marrow aspirate, and platelet-rich plasma/bone morphogenetic protein-2. Mean time to radiological union (n = 36) was 7.4 months (6-12). The average time of healing of 1-cm defect was 1.2 months. There were 2 cases of leg length discrepancy (1 femur 2 cm; 1 tibia 1.5 cm). All patients regained full function without residual pain during last follow-up.

Conclusion: The Masquelet technique appears a safe option for management of defects >6 cm. Following a standardized protocol reduces the risk of re-interventions and improved outcomes.