Treatment of Posttraumatic Osteomyelitis and Infected Nonunions in the Lower Extremity Using a Multi-Staged Induced Membrane Technique: Success Rates of Limb Reconstruction and Risk Factors for Infection Recurrence

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Purpose: There is limited clinical evidence regarding the ability of induced membrane technique (IMT) to treat critical-sized bone defects (CSBDs) due to infected nonunion (IN) or posttraumatic osteomyelitis (PTOM). This study evaluates the success rates of limb reconstruction after treatment with multi-staged IMT for CSBD of the lower extremity due to IN or PTOM.

Methods: A total of 328 patients diagnosed with IN or PTOM based on clinical and radiographic findings were treated with a multi-staged IMT from 2013 to 2018. There were 140 cases of CSBD of the tibia and femur with at least 24-month follow-up after bone grafting. The success rate of limb reconstruction was evaluated as the primary outcome measure. The variables associated with recurrence of infection (ROI) were also analyzed.

Results: CSBDs in 43 femurs and 97 tibias were included. The mean infection duration before initial treatment was 71.1 months. On average, 2.5 operative debridements were performed before final bone grafting based on the result of intraoperative post-debridement culture results. The primary success rate of limb reconstruction was 75% (105 of 140 patients) at a mean follow-up of 45.3 months. There were 35 cases of ROI at a mean of 18.5 months after staged bone grafting. An infected free flap, a surprise positive culture, deviation from our protocol, and an elevated erythrocyte sedimentation rate before bone final grafting were all identified as independent risk factors of infection recurrence.

Conclusion: Treating recalcitrant IN and PTOM of the lower extremity with a systematic staged IMT protocol demonstrates favorable success rates.