

Predictors of Graft Creep in Induced Membrane Technique for Large Critical Bone Defects

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Purpose: Induced membrane technique (IMT) is used in the treatment of critical bone loss. Graft creep is a concern that may compromise outcomes. The purpose of the study was to identify risk factors for graft creep when using IMT for critically sized bone defects.

Methods: This was a retrospective review of 120 patients who underwent IMT for acute lower extremity trauma with bone loss from 2010-2020 at 4 Level I trauma centers. Demographics, infection status, regrafting, clinical outcomes, and radiographic measurements of bone defect were collected. Graft creep, which was defined as (1) those who underwent proximal regrafting or (2) those with a higher-than-average graft creep (HC) as measured radiographically. Those who had regrafting of the distal and proximal ends were defined as complete regrafting.

Results: The proximal regrafting group had a larger initial bone defect (9.45 cm, standard deviation [SD] 3.83) and had significantly more patients with an initial bone defect >10 cm (55.6%, $P = 0.011$) when compared to the complete regrafting and no regrafting groups. The complete regrafting group had a 50% infection rate, which was higher than the proximal regrafting group (33.3%) and no regrafting group (19.4%, $P = 0.022$). The HC group had a higher initial bone loss (7.24 cm, SD 3.70) compared to the lower-than-average graft creep group (LC) (5.41 cm, SD 3.05, $P = 0.009$). The HC group underwent more regrafting procedures (33.3%, $P = 0.029$) and had significantly fewer cases that had proximal spacer overlap (3%, $P = 0.024$) than the LC group. When controlling for infection, an initial bone defect greater than 10 cm had a significant risk ratio for future regrafting (2.869, confidence interval 1.124-7.322, $P = 0.027$).

Conclusion: Patients with an initial bone loss greater than 7.24 cm are at significant risk for graft creep and extreme bone loss of 10 cm may create severe graft creep that is at increased risk for regrafting. Surgeons should be meticulous in ensuring spacer overlap to prevent graft creep.