Outcomes of Nonunion Repair for Distal Femur Fracture Nonunion

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Purpose: The purpose of this study was to report the outcomes of nonunion repair for aseptic distal femur nonunions in a large cohort of patients, in particular the rate of recalcitrant nonunion, defined as failure of the first nonunion repair. The secondary purpose was to identify patient, injury, and treatment factors associated with recalcitrant nonunion.

Methods: The retrospective cohort study at a Level I trauma center included all skeletally mature patients undergoing nonunion repair of a distal femur fracture (AO/OTA 33A or 33C) between 2005 and 2023. Patients with pathologic fractures or presumed septic nonunions were excluded. The primary outcome was the success of the first nonunion repair attempt, which was defined as obtaining clinical and radiographic union.

Results: The study included 102 patients; average age was 56 years (SD 15), and 64 patients (63%) were female. Open fractures were present in 47 patients (46%), and 60 patients (59%) had high-energy mechanism of injury. The average ISS was 17 (SD 9). 53 fractures were AO/OTA type 33A, while 49 were type 33C; 19 were periprosthetic fractures. The rate of recalcitrant nonunion (failure of the first nonunion repair) was 23%. Factors associated with development of recalcitrant nonunion included a diagnosis of fracture-related infection after the index nonunion repair procedure as well as the type of nonunion repair. Nonunion repair with a plate nail combination was significantly associated with decreased risk of recalcitrant nonunion (0 of 27, 0%) compared to nonunion repair with plate alone (8 of 28, 29%), nail alone (4 of 10, 40%), or graft alone (9 of 25, 36%), p =0.006. Looking at dual-column fixation constructs as a whole (including nail-plate, plate plus endosteal plate, lateral plate plus medial allograft strut, dual-plate), fixation with a bicolumnar construct was again associated with a lower rate of recalcitrant nonunion (1 of 36, 3%) compared to nail alone (4 of 10, 40%), plate alone (8 of 28, 29%), or graft alone (9 of 25, 36%), p = 0.003.

Conclusion: A recalcitrant nonunion developed in one in four patients with a presumed aseptic distal femoral nonunion after attempted nonunion repair. Fixation with a nail-plate or dual-column construct may decrease the risk of recalcitrant nonunion.