Outcomes of Pilon Fixation in Tertiary Level 1 Trauma Center: Fix or Frame?

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Purpose: Pilon fractures are high-energy injuries, with significant long-term morbidity. Robust evidence to guide optimal surgical treatment is lacking. Our unit is unique in that it functions as both a regional trauma center and limb reconstruction service offering both open reduction and internal fixation (ORIF) and fine wire techniques. The aim of the study was to examine our outcomes for managing these complex injuries.

Methods: A retrospective review of a prospective database was performed to identify all pilon fractures from 2018-2020. Demographic, fracture and reoperation data were collated. Radiographs at final follow-up were assessed for union and measured for residual angular deformity. Time to union and presence of posttraumatic osteoarthritis at 2 years were recorded. Results were then analyzed using appropriate statistical tests, with $P<0.05$ considered statistically significant.

Results: A total of 60 pilon fractures undergoing fine wire frame fixation (n = 32) or ORIF (n = 28) were included. Of these, 70% were male. Mean age was 45.1 ± 19.1 years. Five cases (8.3%) were open—all treated by frame. Initial external fixator application was performed in 12 cases (20%) before definitive surgery, which occurred at a median of 4.5 days. Early fixation was performed in 21 of 60 cases (35%). Frame fixation was preferred for increasingly complex fractures (A 63.6% vs B 30.4% vs C 73.3%). There was no difference between treatment groups for gender (20/28 vs 22/32 males; P = 0.821), mean age (ORIF 42.0 ± 19.1 vs 48.3 ± 18.9; P = 0.234), time to surgery (6.2 ± 5.1 vs 5.8 ± 6.1 days; P = 0.477). There were no cases of proven deep infection. Frame patients had higher superficial infection rates (8/32 vs 0/28; P = 0.005), longer times to union (155 ± 59.1 vs 85.9 ± 33.1 days; P<0.001) and higher rates of posttraumatic osteoarthritis at 2 years (8/32 vs 1/28; P = 0.029). Frame patients had significantly worse sagittal plan angulation only at union (1.5 ± 2.5 vs 0.8° ± 1.7°; P = 0.023). No significant differences were seen in coronal plane (P = 0.200) and joint line (P = 0.273) angulation.

Conclusion: Both fine wire and ORIF techniques are appropriate for managing these injuries. Open fractures and C type fractures may dictate the preference toward frame fixation, but treatment should be individualized to the patient and injury. Radiological outcomes are similar between techniques, but time to union and rates of posttraumatic osteoarthritis are higher following frame fixation.