Treatment of Complex Pilon Fractures: Pilot Study Comparing Primary Arthrodesis (PA) to Open Reduction and Internal Fixation (ORIF)

Sheridan Scott, MS-3[1], Damon Mar, Ph.D.[2], Dave Turkowitch[2], Brent Wise, M.D.[2]
[1]The University of Kansas School of Medicine-Kansas City, Kansas City, Kansas
[2]The University of Kansas School of Medicine-Kansas City, Kansas City, Kansas, Department of Orthopedic Surgery

Received Aug. 28, 2025; Accepted for publication Sept. 10, 2025; Published online Sept. 11, 2025
https://doi.org/10.17161/kjm.vol18.24444

Introduction. ORIF is preferred to PA for treating acute pilon fractures despite high complication rates, including the need for secondary arthrodesis. This study investigates patient-reported outcomes, physical functionality, and complication rates in patients who underwent PA versus ORIF following a complex pilon fracture.

Methods. The study included 15 patients treated for pilon fracture (12 ORIF and 3 PA). PA was performed via a novel surgical technique, and the ORIF group served as the control. Patient-reported outcomes were assessed using the Foot and Ankle Outcome Score (FAOS) and 12-Item Short Form Survey score (SF-12). Patient physical functionality via Opal sensors recorded timed-up-and-go (TUG) time, manual ROM (dorsiflexion-plantarflexion and inversion-eversion), walking cadence, walking speed, double support, stride length, and walking ankle ROM. Complication rates were determined upon reviewing medical records.

Results. Demographic data were comparable between ORIF and PA patients except for sex ($p = 0.044$). ORIF patients exhibited significantly decreased treated versus untreated ankle dorsiflexion-plantarflexion while standing compared to PA patients ($p = 0.007$). All other physical functionality measures and patient-reported outcomes were similar between groups. One PA patient (33%) had a complication of cellulitis, and 6 out of 12 ORIF patients (50%) had complications including dehiscence, malunion, osteomyelitis, and the need for secondary surgery (5 patients, 42%).

Conclusions. Minimal physical functionality and no patient-reported differences exist between pilon fracture patients treated with ORIF versus PA; however, patients who underwent ORIF had higher complication rates. This pilot study serves as a basis for future investigations and improving treatment recommendations.