An International Comparison of Acute Versus Staged Fixation of Bicondylar Tibial Plateau Fractures

Lazaro Mesa, MD; *Nicholas Birkett, MBChB, MSc; Reuben C. Lufrano, MD; Rutba Chatta, MD; Melihah Hassan, MD; Paul J. Hannon, MD; Joshua Mizels, BA; David Ensor, MBBS; David T. Watson, MD; Anjan R. Shah, MD; Benjamin Maxson, DO; Anthony F. Infante, DO; David Donohue, MD; Peter Bates, FRCS (Ortho); Katheryne Downes, PhD; Pramod Achan, MB, FRCS; Roy W. Sanders, MD, FAAOS; Ishvinder S. Grewal, MBBS, BSc; Hassan Riaz Mir, MD, MBA*
Royal Hospital London, London, United Kingdom

Purpose: Bicondylar tibial plateau fractures can pose treatment challenges due to complex fracture patterns and associated soft-tissue compromise. Historically these are treated with external fixation followed by staged open reduction and internal fixation (sORIF). Limitations of sORIF include increased cost, need for additional procedures, and increased difficulty of the definitive ORIF. Some surgeons perform acute ORIF (aORIF) of selected bicondylar tibial plateau fractures based upon clinical experience. This study evaluates the outcomes of aORIF versus sORIF of bicondylar tibial plateau fractures at two high-volume international trauma centers with similar treatment protocols.

Methods: A retrospective review of all operatively treated patients with AO/OTA 41-C fractures from 2011 to 2019 at two busy Level I trauma centers located in the US and UK was conducted. Adult patients with >6 months of follow-up were included. Patients were stratified into aORIF and sORIF groups. Patient demographics, comorbidities, American Society of Anesthesiologists class (ASA), mechanism of injury, associated injuries, open fracture grade, and ISS were collected. Outcomes included operative time, wound dehiscence, superficial and deep infection, nonunion, flap coverage, arthrodesis, arthroplasty, and posttraumatic arthritis. Groups were compared with Fisher exact, t tests, and Wilcoxon rank sum.

Results: 186 patients met all inclusion criteria, with median follow-up of 17 months (range, 6-98 months). 112 patients underwent aORIF and 74 underwent sORIF. The sORIF group had a higher percentage of men (77% vs 63%, $P = 0.05$), a higher ISS ($P = 0.01$), and a higher rate of open fractures (25.7% vs 12.5%, $P = 0.03$). The groups were statistically similar in other demographics, comorbidities, ASA, mechanism, and associated injuries. Operative time was significantly shorter in the aORIF group (149 vs 231 min, $P<0.001$). There was no statistically significant difference in wound dehiscence, deep infection, flap coverage, nonunion, unplanned reoperation, posttraumatic arthritis, and arthroplasty between groups. However, aORIF was associated with a significantly lower rate of superficial infection ($P = 0.01$).

Conclusion: We found no increased risk of complications with aORIF compared to sORIF for bicondylar tibial plateau fractures. While not all injuries may be appropriate for aORIF, our results demonstrate the safety of aORIF when patients are properly selected by experienced fracture surgeons.