

Operative Treatment of Tibial Plateau Fractures: Does a Submeniscal Arthrotomy Improve Long-Term Patient Outcome? A Prospective Surgeon Randomized Clinical Trial

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Purpose: This trial was conducted to determine the long-term functional outcome (>2 years) of displaced tibial plateau fracture patients treated with closed fluoroscopic-assisted reduction and internal fixation (CRIF) versus patients treated with standard open reduction with submeniscal arthrotomy and internal fixation (ORIF).

Methods: A prospective trial was conducted by accruing all patients between 18 and 70 years old with displaced AO/OTA 41B and 41C tibial plateau fractures. Sample size was chosen based upon the primary outcomes, KOOS (Knee Injury and Osteoarthritis Outcome Scale), with 12 points of difference, which would consist of 28 patients in each treatment arm ($P = 0.05$, power = 80%). Patients were randomized to treatment based upon the standard treatment of the surgeon involved following the call schedule for the day, either CRIF or ORIF. Postoperative CT was performed on all patients and they were followed for a minimum of 2 years. Primary outcome measures were the KOOS, Short Musculoskeletal Function Assessment (SMFA), and Short Form-36 (SF-36).

Results: 70 patients were recruited (62 patients were able to be followed for a minimum of 3 months and then up to the complete 2 years) with 35 patients in the CRIF group and 27 patients in the ORIF group. The CRIF group left hospital 1 day earlier. Postoperative CT scans showed that reductions were more satisfactory with the ORIF group especially in the posterolateral quadrant as compared to the CRIF group. The frequency of malreductions (>2 mm step or gap) in patients undergoing submeniscal arthrotomy versus fluoroscopic-assisted reduction was 16.6% and 41.4%, respectively ($P = 0.002$). The KOOS, at 2 years, showed that the CRIF had significantly less good outcomes in the subcategory quality of life (QoL) measurement ($P = 0.01$). Two-year follow-up showed that clinical alignment, radiographic reduction, patellofemoral crepitus, and condylar width were not significantly different ($P > 0.05$).

Conclusion: The CRIF group achieved the same quality of reductions except in the posterolateral quadrant of the tibial plateau, where it is was 7 times (odds ratio 7.2) more likely to malreduce the tibial plateau. Despite recent trends towards less invasive surgery, it is recommended that for displaced tibial plateau fractures, ORIF with submeniscal arthrotomy provides better long-term results (minimum of 2 years) as compared to closed reduction and fluoroscopic-assisted reduction.