Reduced Anterior Knee Pain and Improved Function Following Suprapatellar versus Infrapatellar Intramedullary Nailing of the Tibia: Results of a Randomized Controlled Trial

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Purpose: This trial evaluated postoperative knee pain and function at 6 weeks and 12 months in patients undergoing intramedullary nailing (IMN) via the suprapatellar (SP) or infrapatellar (IP) approach, hypothesizing the SP approach would result in decreased anterior knee pain and improved function.

Methods: A prospective parallel-group randomized controlled trial was conducted on patients with tibia shaft fractures at a major metropolitan trauma center between November 2017 and February 2020. Patients were eligible if they were skeletally mature, with an acute tibial shaft fracture amenable to IMN (as agreed by 2 post-fellowship orthopaedic trauma surgeons). Exclusion criteria included periprosthetic fractures, nonunions, contralateral injury that would restrict weightbearing, previous knee surgery, and the presence of a compound wound that precluded randomization. Eligible patients were randomly allocated to either an SP or IP approach, and otherwise received identical postoperative care. The primary outcome measures were anterior knee pain, through the visual analog scale (VAS; 0-10) and function using the Kujala score at 6 weeks and 12 months. These were collected either at the postoperative outpatient review, or through a phone interview. Secondary outcomes included radiographic alignment, radiation exposure, and nonunion. Alignment was assessed using proximal and distal medial tibial and lateral tibial angles. Malalignment was defined as a discrepancy of ≥5° in either view, Investigators were blinded to the approach.

Results: 90 fractures (48 IP, 42 SP) qualified for analysis. The SP approach demonstrated reduced pain at both 6 weeks (VAS SP M = 2.48; IP M = 4.08, $P<0.05$) and 12 months (VAS SP M = 0.73; IP M = 2.85, $P<0.05$) postoperatively. Knee function exhibited greater improvements using the SP approach at both time points (6-week Kujala: SP M = 52.52, IP M = 44.33, $P<0.05$; 12-month Kujala: SP M = 91.8, IP M = 81.7, $P<0.05$). Radiation exposure was less for the SP group, when compared to the IP group (mGy SP M = 1.27, IP M = 1.70). Malignment was found in 20% of SP and 36% of IP.

Conclusion: Compared to the IP approach, the SP approach was associated with less pain and improved function at both 6 weeks and 1 year postoperatively. These data add to a growing body of evidence demonstrating the functional and clinical utility of the SP approach, compared to the IP approach.