

The Suprapatellar Variant of the Semi-Extended Surgical Approach Improves Intramedullary Nail Position Compared with the Conventional Medial Parapatellar Surgical Approach

Alan Johnstone, MD¹; Christopher Munro, MD¹; Pedro Caba, MD²; Ismael Escriba, MD³; Daren Forward, MD⁴; Markus Graf, MD⁵;

¹Aberdeen Royal Infirmary, GREAT BRITAIN; ²Hospital de 12 Octubre, SPAIN;

³Hospital La Fe, SPAIN; ⁴Queens Medical Centre, GREAT BRITAIN;

⁵Medizinisches Zentrum StadteRegion, GERMANY

Background/Purpose: Proximal third tibial shaft fractures remain a challenge to treat with intramedullary nails (IMNs) due to the risk of creating malunion by using the conventional medial parapatellar (CMPP) surgical approach. Although the lateral parapatellar approach reduces the incidence of valgus malunion, recurvatum is still a concern. To reduce malalignment, Tornetta and Collins postulated the semi-extended (SE) approach for IMN insertion since placing the knee in approximately 15° of flexion usually results in good proximal fracture alignment. Their original article described using an open approach involving reflection of the patella, but more recently, a less invasive modification of the SE approach that permits IMN insertion using a suprapatellar incision (SPSE) has been developed. We hypothesized that the SPSE surgical approach permits more accurate placement of the guidewire (GW) and the IMN compared with the CMPP approach.

Methods: A multicenter randomized controlled trial (RCT) was undertaken comparing the CMPP approach with the SPSE approach. 94 patients with isolated extra-articular tibial shaft fractures were recruited. Standardized AP and lateral perioperative and early postoperative radiographs were used to assess (1) GW and (2) IMN alignment with respect to the long axes of the tibia, (3) the starting point of the GW on the proximal tibia in both planes, and (4) the final position of the proximal end of the nail in both planes within the proximal tibia. One experienced assessor, blinded to the treatments, undertook all measurements. Statistical analysis was undertaken using a Mann-Whitney U test with significance set at $P < 0.05$.

Results: Overall alignment of (1) the GW and (2) the IMN with respect to the long axes of the tibia, (3) the GW starting point, and (4) the final position of the IMN in the proximal tibia were all improved by using the SPSE approach, although not all were statistically significant. The notable statistically significant results relate mainly to IMN placement and are as follows: overall IMN alignment in the coronal plane, $P = 0.0061$; overall IMN alignment in the sagittal plane, $P = 0.0032$; and final position of the proximal end of the IMN within the proximal tibia in the sagittal plane, $P = 0.0294$ --favoring the SPSE approach.

Conclusion: The results of this multicenter RCT confirms that GW and IMN position is improved when the SPSE approach is used compared with the CMPP approach. However, the most interesting findings relate to (1) IMN alignment with respect to the long axes of the tibia and (2) the final position of the IMN in the proximal tibia in the sagittal plane. In essence, while using a CMPP approach to insert an IMN, the initially acceptable GW position is lost following reaming of the canal. This presumably results from eccentric reaming though using protective sleeves that are displaced by pressure from the patella and the patellar tendon. This problem is not observed using the SPSE approach and infers that the SPSE surgical approach is the preferred one for treating proximal third and segmental tibial fractures where the potential for malunion is of great concern.

See pages 47 - 108 for financial disclosure information.