Surgical Approaches to Intramedullary Nailing of the Tibia: Comparative Analysis of Knee Pain and Functional Outcomes

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Background/Purpose: Postoperative knee pain is common following intramedullary nailing of the tibia, although the exact source is unclear and controversial. Historically, patellar tendon splitting and medial parapatellar approaches have been used most frequently, and both have resulted in similarly high rates of knee pain. Alternative surgical approaches have recently been described that place the knee in a semi-extended position, simplifying patient positioning, fracture reduction, fluoroscopic assessment, and implant insertion. Specifically, the semi-extended lateral parapatellar approach provides these and avoids violation of the knee joint capsule. The semi-extended lateral parapatellar approach is relatively novel, and therefore a comparison to a historical standard is warranted. We hypothesized that in a direct comparison of outcomes between patients having undergone intramedullary nailing of the tibia, patients treated with this approach would have decreased knee pain and better knee function compared to knee hyperflexion approaches (medial parapatellar and tendon splitting).

Methods: A trauma patient database from a single Level I center was queried for patients who underwent tibial intramedullary nailing for acute fracture between 2009 and 2013. Patients were contacted via telephone and surveyed for knee pain severity (NRS [Numeric Rating Scale] of 1 to 10) and location, and completion of the Lysholm Knee Scale (LKS). Data were compared between the semi-extended lateral parapatellar, medial parapatellar, and tendon-splitting groups regarding knee pain severity, knee pain location, total LKS, and individual knee function scores from the Lysholm questionnaire. Pre-hoc power analysis determined an adequate sample size to detect clinically significant differences in Lysholm score (n = 34). Post-hoc analysis was done using one-way ANOVA (analysis of variance) with a significance value set at $P < 0.05$.

Results: Each group consisted of 34 patients. Comparison between the 3 surgical approaches regarding knee pain severity found no significant difference (P = 0.69), with the following average ratings: semi-extended lateral parapatellar (3.26), tendon splitting (3.59), and medial parapatellar (3.63). Analysis also found no significant difference between the 3 groups in total LKS score (P = 0.33), with the following average sums: semi-extended lateral parapatellar (75.97), medial parapatellar (77.53), and tendon-splitting (81.68). Individual knee function scores from the LKS questionnaire were similar between the 3 groups, except for limping, which was significantly different, with medial patellar being significantly worse (P = 0.04). There was no significant difference in knee pain location between the 3 patient groups (P = 0.45).

Conclusion: In this adequately powered study, at minimum 1-year follow-up there were no statistically significant differences between any of the 3 approaches in knee pain severity, location, or overall knee function as determined by the LKS. The three were significantly different in postoperative limping, with medial parapatellar having the lowest LKS score. The semi-extended lateral parapatellar approach vastly simplifies many technical aspects of tibial nailing compared to those that involve hyperflexion of the knee, and does not involve violation of or instrumentation through the knee joint.

See pages 47 - 108 for financial disclosure information.