Rigid Intramedullary Fixation for Pediatric and Adolescent Tibia Fractures in Low- and Middle-Income Countries

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INTRODUCTION: Tibial shaft fractures are one of the most common long bone fractures in children and adolescents. Although a majority of these fractures can be managed conservatively, operative options include external fixation, plate osteosynthesis, and intramedullary nails (IMN). We assessed the rates of union and painless weight-bearing after rigid IMN fixation of pediatric and adolescent tibial shaft fractures in patients in lower-resource settings.

METHODS: We queried the SIGN (Surgical Implant Generation Network) Fracture Care International online database to identify patients with tibial shaft fractures treated by rigid intramedullary nailing in the setting of an open proximal tibial physis. Patients without a minimum of 6 months follow-up were excluded. We evaluated the most recent follow-up radiograph to determine a modified Radiographic Union Scale in Tibial fractures (mRUST) score. A mRUST score of ≥11 was associated with radiographic union. We also recorded the percentage of patients that achieved painless full-weight bearing as determined by the treating surgeon.

RESULTS: There were 400 patients with pediatric or adolescent tibial fractures, including 296 males (74%) and 104 females (26%) from 32 countries. The average age at the time of surgery was 16.1 ± 2.3 years (range, 4 to 18 years). Approximately half of the patients (n=194, 49%) had open proximal tibial physes at the time of surgery. The average duration of follow-up was 1.4 years (range, 6 months to 11.2 years). Road traffic accident was the most common mechanism of injury affecting 209 patients (52%). There were 94 patients (24%) with open fractures. All patients were treated with reamed intramedullary nailing. At final follow-up, 371 patients (93%) had a mRUST score of ≥11 (range, 4 to 16) and 338 patients (85%) had painless full-weight bearing. There were six patients (2%) that developed an infection postoperatively.

DISCUSSION AND CONCLUSION: In resource-poor settings, the management of tibial shaft fractures may be complicated by lack of intraoperative fluoroscopy, access to appropriate orthopaedic implants, and limited intraoperative power. Furthermore, clinical follow-up may be limited due to financial restraints or obstacles to transportation. The findings from this investigation demonstrate that pediatric and adolescent tibial shaft fractures treated with rigid IMN fixation achieve high rates of union with a relatively low complication profile.