Outcomes of Proximal Third Tibial Shaft Fracture Managed with SIGN Intramedullary Nailing in a Resource-Limited Set-up: A Prospective Cohort Study

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Purpose: Proximal one-third tibial shaft fracture is a big challenge to manage due to the deforming forces from the patellar tendon, anterior compartment muscle, and pes anserinus pull. The outcome is variable depending on the techniques used, degree of bone comminution, soft-tissue injury, and implant used. The management option is mainly intramedullary nailing since it preserves the soft tissue and weight-sharing nature. In a resource-limited set-up, there is no polyaxial nail and C-arm; the only option to manage such injury is SIGN (Surgical Instrument Generation Network) locked type of intramedullary nail (IMN). This nail is uniaxial with 7° curve in the proximal end and it lacks the ability to control the deformities that will cause malunion. The aim of this study was to present the clinical, radiological, and patient-reported functional outcome of proximal third tibial shaft fracture managed with SIGN IMN in a resource-limited set-up.

Methods: A 2-year prospective cohort study was undertaken at a tertiary institution among patients with proximal tibial shaft fracture managed with SIGN IMN. All adult patients with extra-articular proximal tibial fracture were included in the study and followed for 6 months to 2 years. Their clinical, radiological, and patient-reported functional outcome (PROM) was recorded at 6 weeks and 3, 6, and 12 months until discharged from follow-up. Clinical infection, pain, time of weight bearing, and difficulty of walking were recorded. Postoperative angular malalignment was measured from Radiant DICOM image of patients› radiographs and the functional outcome was scored with Karistrom-Olerud score.

Results: A total of 178 patients with proximal third tibial shaft fracture were managed with SIGN IMN and included in the study. The mean age was 33.6 years (range, 15-70). Based on AO classification, 7.8% were AO-41 and the rest were AO-42. Majority of the patients (72.2%) were open fracture. Almost all of the proximal tibial fracture was in the typical valgus and apex anterior deformities. Clinically, there were 4 smoker patients (2.2%) who developed wound dehiscence and deep surgical site infections for whom SIGN nail was changed to external fixator. Eight patients (4.5%) were having delayed union and required nail exchange. Based on the Karistrom-Olerud score, functional outcome was determined at 6 and 12 months, which showed 84.3% good to excellent and 16.7% moderate to satisfactory result. There is no record of poor scoring. Radiologically, 14.7% of patients showed mild postoperative malalignment deformities (7°-10°).

Conclusion: Proximal tibial shaft fracture is not uncommon in resource-limited set-up and the management is challenging. Even though managing such fractures is difficult in resource-limited set-up, the clinical, radiological, and patient-reported outcome is satisfactory with SIGN IMN.