Surgical and functional outcomes of results of titanium elastic nailing system in paediatric diaphyseal fractures

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Introduction

Treatment of paediatric fractures dramatically changed in 1982, when MÉtaizeau and the team from Nancy (France), developed the technique of flexible stable intramedullary pinning (FSIMP) using titanium pins [1,2]. Since then there have been tremendous advances in the surgical options available to treat paediatric fractures. Pediatric orthopedists have increasingly recognized the advantages of fixation and rapid mobilization. Between 6 to 16 years, there are several available treatment options like traction followed by hip spica, external fixation, flexible stable intramedullary nails (ender or titanium), plate fixation, and locked intramedullary nailing [3,4,5,6,7]. Systematic review of literature provides little evidence to support one method of treatment over the other [8].

The treatment of long bone fractures in children less than 6 years and adolescents older than 16 years is straightforward. Titanium elastic nail (TEN) fixation was originally meant as a gold standard treatment method for femoral fractures [9], but was gradually applied to other long bone fractures in children, as it represents a midpoint between conservative and surgical modality with satisfactory results and minimal complications [10,11,12,13].

Much of the indexed publications and literature available on titanium elastic nailing is based on studies conducted outside the Indian...
subcontinent where the demographics like body weight on an average is different.
The aim of this study is to evaluate the results of operative treatment of paediatric diaphyseal fractures in the age group between 6 to 16 years using titanium elastic nailing system (TENS).

Aims and Objectives
1. To study the surgical and functional outcomes of titanium elastic nailing in diaphyseal fractures in children between the age of 6-16 years.
2. To study the complications associated with titanium elastic nailing.

Material and Methods
Type of Study: Prospective study.

Duration of Study: May 2012 to November 2014
Case Selection Criteria: During this period all patients posted for titanium elastic nailing were screened using the inclusion and exclusion criteria. Informed consent was taken from all patients that fit the inclusion criteria and all patients willing to undergo the study were included after approval from the ethics committee.

Inclusion Criteria:
- Children with diaphyseal fractures of long bones.
- Age between 6-16 years.

Exclusion criteria:
- Congenital disorders.
- Patients with pathological fractures.

Study Method
All patients diagnosed with fractures of long bones were assessed clinically and radiographs were taken. Patients who fell into the eligibility criteria were included in the study and followed up at 2 weeks, 6 weeks, 12 weeks and till maximum 1 year or till implant removal whichever was earlier. They were assessed clinically, radiographically and functionally using Flynn outcome scoring (Table 1-Annexure), Daruwala scoring (Table 2-Annexure) for forearm fractures. Radiographs were analysed in which the Limb alignment, delayed or non union (using Anthony scoring Table 5 annexure) were seen. Functional outcome was assessed by using quick Disability Arm, Shoulder, Hand scoring (Table 3-Annexure) for upper limbs and Lower Extremity Functional Score (Table 4-Annexure) for lower limbs at final follow up. Protocol was approved by Institutional review board. All patients were consented prior to inclusion in the study. Displaced fractures were immobilized using skin traction with Thomas splint (femur / tibia) or slab support till the day of surgery. Various demographic, clinical, investigative and operative findings were recorded from the hospital case file. Postoperative data collected was number of nails, postoperative immobilization, period of hospital stay, period of radiological union, return to normal work/daily activities, any complication, time to nail removal. Radiographs were evaluated for alignment, callus formation, nail position, and measurement of fracture location. Final outcome was graded excellent, satisfactory or poor based on criteria described by Flynn et al.

Results
Excellent in 73%, satisfactory in 27% cases based on Flynn score. Based on Daruwala forearm score Excellent in 53%, Good in 27% and Fair in 20% cases. Percentage of functionality based on LEFS Score was 89.15% and Percentage of disability according to Quick DASH was 6.6 for both bones and 7.4 for humerus. Grade 3 callus formation according to Anthony et al scale was seen at 6 weeks in 70% and 28% cases at 12 weeks.

Conclusion
Based on our results, we conclude that flexible intramedullary nailing is an effective way of fixation with excellent functional results and minimal complications in diaphyseal fractures in skeletally immature patients.

Clinical message
Titanium elastic nailing is a good modality of treatment with excellent results in the hands of experience surgeons with good surgical skills. Hence this should be undertaken after proper training as the learning curve is high.

Keywords: ESIN, TEN, diaphyseal fracture, Flynn

Reference


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