

A Study of Pediatric Long Bone Fracture Treatment using Elastic Titanium Nails

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ABSTRACT

Introduction: various treatment methods are available to treat long bone fractures in children. Method of open reduction involves using intramedullary devices, plates, screws and external fixators. The aim of the present study is to retrospectively analyze the complication associated with the use of elastic titanium screw.

Material and methods: Retrospective study was performed in the institute, State during the period of 1 year. All of the patients underwent reduction under GA. The position of the nail was verified by image intensifier television. Anteroposterior and lateral radiographs were used to assess any angular deviations. Scanometry or panoramic radiographs were used to assess shortening or over-growth. All the data was arranged in tabulated for and analyzed using SPSS software. The results were expressed as percentage of total.

Result: The male:female was 1.55:1. The mean age of male subjects was 7.25+/-2.12 years and the mean age of females was 8.21+/-1.26 years. Right side was involved in 78.5% of subjects (n=22) and left side was affected in 21.4% (n=6). Majority of subjects met with an accident (39.2%). There were 32.1% subjects who sustained fracture because of fall and rest of the subjects had fracture due to collision (28.5%). Shortening of the limb was most common complication, which accounted for 17.9% of cases.

Conclusion: Titanium intramedullary nails provide a safe and a viable alternative for the fixation of paediatric long bone fractures. They have fewer complication rates.

Keywords: Fracture, Intramedullary, Paediatric, Titanium

INTRODUCTION

Treatment of fractures of long bones in children is undergoing continuous evolution. Non-operative treatment remains the mainstay for the management of long bones as children have higher remodelling potential.¹ Using Non-operative treatment more than 90% union rates have been achieved and functional recovery has been 100%.² Methods of closed reduction include the use of plaster cast and traction methods. Method of open reduction involves using intramedullary devices, plates, screws and external fixators. Methods of open reduction are indicated when there is malrotation, excessive shortening or angulations at the fracture site.³

A variety of intramedullary devices such as Rush nail etc are available in as an option to treat fractures in children but these provide poor stability against rotation and hence multiple pins need to be inserted for stabilization.⁴ In the recent years there has been an abundant use of elastic stable intramedullary nails.⁵ Titanium elastic nail is used for the fixation of diaphyseal fracture. It has an advantage of being inserted into the medullary canal without disturbing the growth plate. Everything has its own set of complications associated. The complication associated

with Titanium elastic nail includes pain at the site of insertion, shortening of fracture, delayed union and pseudoarthrosis. The aim of the present study was to retrospectively analyze the complication associated with the use of elastic titanium screw.

MATERIAL AND METHODS

Retrospective study was performed in the Department of Orthopedics, Kakatiya Medical College, Warangal. In this study, all the paediatric patients treated with titanium elastic nails during the month of June, 2014 were retrospectively analyzed for a period of one year i.e. till June, 2015. The details of the patient were obtained from the patient's record. The study was approved by Institute's ethical board. The injuries were majorly due to accident, falls or sports injuries.

All of the patients underwent reduction under GA. The position of the nail was verified by image intensifier television. Patients were administered appropriate antibiotics preoperatively. Anteroposterior and lateral radiographs were used to assess any angular deviations. Scanometry or panoramic radiographs were used to assess shortening or over-growth.

STATISTICAL ANALYSIS

All the data was arranged in tabulated for and analyzed using SPSS software. The results were expressed as percentage of total.

RESULTS

According to the present study total of 28 patients with fractures treated by elastic Titanium screws were analyzed. Table 1 shows that there were 17 males and 11 females involved in the study. The male:female was 1.55:1. The mean age of male subjects was 7.25+/-2.12 years and the mean age of females was 8.21+/-1.26 years.

Table 2 shows the most commonly affected side. Right side was involved in 78.5% of subjects (n=22) and left side was affected in 21.4% (n=6). There was a significant difference in the site of involvement, right side being more commonly affected than left.

Table 3 shows the mechanism of trauma leading to fracture. Majority of subjects met with an accident (39.2%). There were 32.1% subjects who sustained fracture because of fall and rest of the subjects had fracture due to collision (28.5%).

Table 4 shows the complication encountered after 12 months

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Sex	Frequency	Percentage
Male	17	60.7
Female	11	39.2
Total	28	100

Table-1: Gender distribution of the study population

Side affected	Frequency	Percentage
Right	22	78.5
Left	6	21.4
Total	28	100

Table-2: patient distribution according to the side affected

Injury	Frequency	Percentage
Fall	9	32.1
Collision	8	28.5
Accident	11	39.2
Total	28	100

Table-3: Distribution of patient according to source of injury

Complications	Frequency	Percentage
Wound infection	3	10.7
Hardware prominence	4	14.3
Overgrowth	3	10.7
Shortening	5	17.9
Loss of fracture position	1	3.6

Table-4: Complications encountered during postoperative period

of follow up. Shortening of the limb was most common complication, which accounted for 17.9% of cases. There were 4 cases which showed hardware prominence. There involving femur and one involving radius, in both the cases pins were removed after healing. There were 10.7% (n=3) cases of wound infection, which were resolved by antibiotics. There was one case of fracture malunion, in which reoperation was done to correct the position. There were no rational deformities encountered in our study.

DISCUSSION

Fracture can be seen commonly in children but there is always confusion regarding the type of reduction required. Whether to go for open reduction or closed reduction. The various deciding factors are patient's age, type of trauma, associated co morbidities and presence and extent of soft tissue injuries. Fractures in children are commonly because of high impact trauma. Intramedullary fixation has recently gained popularity as treatment modality for fixation of paediatric bone fractures. The history of intramedullary pins dates back to mid 19th century when ivory nails were used for the purpose of fixation.⁶ Elastic stable intramedullary nails are being used now days for long bone fractures in children, they cause minimal scarring.⁵ They are safe and offer a minimally invasive alternative with lower complication rates.⁷ These are made up of Titanium and offer high consolidation rates up to 97-100%.^{8,9} The duration of hospital stay is also reduced.

According to our study, there were certain complications during the postoperative period. Shortening was encountered in 17.9% of the population. Hardware prominence was seen in 14.3% of subjects. There were 10.7% cases that showed presence of wound infection and overgrowth. In a study conducted by Sink

et al¹⁰, shortening and angular deviation were seen during early postoperative period. Rathjen et al¹¹ encountered complications while treating unstable fractures using flexible femoral nails, which were similar to those while treating stable fractures.

In a study conducted by Atul Bhaskar et al¹², over 60 patients with various long bone fractures using titanium elastic nails, he found the following complications. There were two cases of wound infection and leg length discrepancy was seen in 3 children. In a study by Vrsansky et al¹³, this flexible nailing system was used in 308 fractures, all the cases showed stable union. The sample size of our study was small; a larger sample size could give better perspective of complication rates.

CONCLUSION

Titanium intramedullary nails provide a safe and a viable alternative for the fixation of paediatric long bone fractures. They have fewer complication rates. In our study, shortening had highest percentage (17.9) though various other complications were seen along with it.

REFERENCES

1. McKibbin B. The biology of fracture healing in long bones. *J Bone Joint Surg (Br)*. 1978;60:150-162.
2. El-Adl G, Mostafa MF, Khalil MA, et al. Titanium elastic nail fixation for paediatric femoral and tibial fractures. *Acta Orthop Belg*. 2009;75:512-520.
3. Sankar WN, Jones KJ, David Horn B, et al: Titanium elastic nails for pediatric tibial shaft fractures. *J Child Orthop*. 2007;1:281-286.
4. Lee SS, Mahar AT, Newton PO. Ender nail fixation of paediatric femur fractures: a biomechanical analysis. *J Pediatr Orthop (Am)*. 2001;21:442-445.
5. Helenius I, Lamberg TS, Kääriäinen S, et al: Operative treatment of fractures in children is increasing. A population-based study from Finland. *J Bone Joint Surg Am*. 2009;91:2612-2616.
6. Fischer LP, Fessy MH, Bejui J, et al. Ollier: the father of bone and joint and of reconstructive surgery (1830-1900). *Maitrise orthopédique* http://www.maitriseorthop.com/corpusmaitri/orthopedic/ollier_synth/ollie_us.shtml (accessed 25/05/04).
7. Johnson CW, Carmichael KD, Morris RP, Gilmer B. Biomechanical study of flexible intramedullary nails. *J Pediatr Orthop*. 2009;29:44-8.
8. Moroz LA, Launay F, Kocher MS, Newton PO, Frick SL, Sponseller PD, et al. Titanium elastic nailing of fractures of the femur in children. Predictors of complications and poor outcome. *J Bone Joint Surg Br*. 2006;88:1361-6.
9. Mahar A, Sink E, Faro F, Oka R, Newton PO. Differences in biomechanical stability of femur fracture fixation when using titanium nails of increasing diameter. *J Child Orthop*. 2007;1:211-5.
10. Sink EL, Faro F, Polousky J, Flynn K, Gralla J. Decreased complications of pediatric femur fractures with a change in management. *J Pediatr Orthop*. 2010;30:633-7.
11. Rathjen KE, Riccio AI, De La Garza D. Stainless steel flexible intramedullary fixation of unstable femoral shaft fractures in children. *J Pediatr Orthop*. 2007;27:432-41.
12. Bhaskar A. Treatment of long bone fractures in children by flexible titanium elastic nails. *Indian Journal of Orthopaedics*. 2005;39:166.
13. Vrsansky P, Bourdelat MD et al. Flexible stable intramedullary pinning technique in the treatment of pediatric fractures. *J Pediatr Orthop*. 2000;1:23-27.

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