

Comparison of Treatment of Fracture Shaft of Femur in Children with Titanium Elastic Nail VS Hip Spica Casting

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Treatment of Fracture Femur with Elastic Nail VS Hip Spica Casting

ABSTRACT

Objective: Evaluate the validity of titanium elastic nailing technique in treatment of femoral shaft fracture in children and comparison to hip spica casting.

Study Design: Randomized control trial study.

Place and Duration of Study: This study was conducted at the Orthopedics department of QAMC/BV hospital Bahawalpur in one-year duration from January 2019 to January 2020.

Materials and Methods: Fifty children of age 5-15 year presented with femoral shaft fracture at emergency department were included and the study patients were allocated in two groups by lottery method. Supracondylar femur Subtrochanteric fractures were excluded. Data analysis was done by using SPSS version 23. Mean and standard deviation was calculated for numerical data and frequency percentages were calculated for categorical data.

Results: Mean coronal plane angulation, sagittal plane angulation, rotational malalignment, LLD at 1 year follow-up, union, non-weight-bearing, full weight-bearing and schooling lost, of TEN Group was $2.76 \pm 1.64^\circ$, $5.41 \pm 2.36^\circ$, $6.02 \pm 1.32^\circ$, 0.52 ± 0.11 cm, 6.71 ± 2.28 weeks, 4.66 ± 1.81 weeks, 6.39 ± 3.96 weeks, 7.43 ± 0.99 weeks.

Conclusion: Titanium elastic nailing is the treatment of choice for femoral shaft fracture between ages 5 to 15 years. Titanium elastic nailing reduces the malunion, shortening of length and enhances the union, early recovery and return to school.

Key Words: Hip Spica casting, Pediatric femur fracture, Titanium elastic nailing, Union, Coronal angulation.

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INTRODUCTION

Among pediatric injuries and fractures femoral shaft fractures are the most common fractures treated by orthopedic surgeon¹. These fractures result by high traumatic incidents, most common cause of these injuries are high energy trauma². Multiple treatment options are available for its management like hip Spica casting with and without traction and closed reduction, other options include Intramedullary gadejets, plates and fixations^{3,4}.

Most of children age less than 6 years can effectively managed with Spica casting and skeletally mature children/teenagers are so best managed with nailing technique (antigrade inter locked)⁵.

Among these all options best and effective technique for 6-16 years of age is still under debate⁶. Few years before this age group was managed with Spica casting after some time of traction application but this method of treatment have multiple complications like social, psychological, economics⁷.

Spica casting is a non-invasive procedure which not required time for wound healing and no risk of wound infection that why this procedure was recommended for children in previous years⁸. Latest technique of TEN and is property of non-infectious material replace the spica casting method⁹. From last two decade advantages of internal fixation and mobilization were highlighted day by day. External fixation and intramedullary nailing is a normal technique among surgical management⁰. This study was conducted to make the recognition about valid treatment of Pediatric femoral fracture like titanium elastic nailing or else.

MATERIALS AND METHODS

This study was started after ethical approval from board of hospital at orthopedic department of QAMC/BV hospital Bahawalpur. Study was completed in one-year duration from 2nd January 2019 to 1st January 2020. Patients were explained about purpose of study and written consent was obtained. Twenty patients of age 5-15 years were related for study and included, gastilo

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type I compound fracture of femoral shaft were included. Patients were divided into two groups (group TEN and group Spica) by lottery method. Patients in group TEN were treated with retrograde elastic nailing (equal sized titanium nails). Patients in group Spica were treated with Spica casting. Patients of age more than 15 years and segmental and comminuted fracture were excluded from study. Pathological fractures were also excluded. Standard method of elastic nailing was used and ends of nail were not bent. Fractures of instability and doubtful were done with long leg walking cast after one month of management. Stable fractures were fixed with support of Plaster of Paris Thigh corset. Some exercises for quadriceps strengthening were advised with non-weight bearing. In Spica group under general anesthesia one and half hip Spica was applied 20-30-degree flexion was given at hip and 10-15 degree at limb on external rotation. Full weight bearing was started after 1-2 weeks of casting and Spica casting was continued till union.

Collected data like age, gender, pattern of fracture, type of surgery, detail of fracture union rehabilitation milestones and complications were noted on SPSS version 23. Mean and standard deviation was calculated for numerical variables. Frequencies (percentages) were calculated for categorical data. Student t test and chi square test were applied to see association among variables. P value less than or equal to 0.05 was considered as significant.

RESULTS

Fifty patients were included in this study, both gender. The patients were divided into two groups i.e. TEN n=25 (50%) and Spica n=25 (50%). There were n=16 (64%) males and n=9 (36%) females, in TEN Group. While, in Spica, there were n=13 (52%) males and n=12 (48%) females. The mean age of Group TEN and Group Spica was 13.71±3.86 years and 12.36±2.78 years, respectively. (Table. 1).

Table No.1: Demographic characteristics of both the groups

Variable	Ten n=25 (50%)	Spica n=25 (50%)	P- value
Age (years)	13.71±3.86	12.36±2.78	0.274
Gender			
Male	n=16 (64%)	n=13 (52%)	0.639
Female	n=9 (36%)	n=12 (48%)	

The mean coronal plane angulation, sagittal plane angulation, rotational malalignment, LLD at 1 year follow-up, union, non-weight-bearing, full weight-bearing and schooling lost, of TEN Group was 2.76±1.64°, 5.41±2.36°, 6.02±1.32°, 0.52±0.11 cm, 6.71±2.28 weeks, 4.66±1.81 weeks, 6.39±3.96 weeks, 7.43±0.99 weeks, respectively. While, the mean coronal plane angulation, sagittal plane angulation, rotational

malalignment, LLD at 1 year follow-up, union, non-weight-bearing, full weight-bearing and schooling lost, of Spica Group was 10.21±2.55, 7.91±2.29, 14.22±3.37, 1.47±0.32 cm, 8.99±1.26 weeks, 8.01±3.02 weeks, 11.32±2.82 weeks and 14.32±3.18 weeks, respectively. (Table. 2).

Table No.2: Outcome comparison of both the groups

Variable	Ten n=25 (50%)	Spica n=25 (50%)	P- value
Coronal plane angulation (°)	2.76±1.64	10.21±2.55	0.000
Sagittal plane angulation (°)	5.41±2.36	7.91±2.29	0.028
Rotational malalignment (°)	6.02±1.32	14.22±3.37	0.000
LLD at 1 year follow-up (cm)	0.52±0.11	1.47±0.32	0.000
Union (weeks)	6.71±2.28	8.99±1.26	0.013
Non-weight-bearing (weeks)	4.66±1.81	8.01±3.02	0.008
Full weight-bearing (weeks)	6.39±3.96	11.32±2.82	0.005
Schooling lost (weeks)	7.43±0.99	14.32±3.18	0.000

DISCUSSION

Femoral fractures are common in children and treated with Spica casting and traction after Spica casting. This procedure also resulted in number of complications. In a study Mastinez et al¹¹ reported joint stiffness, malunion and delay in functional outcome. In another study conducted by Thomspson et al¹² reported that complications occurred in both groups but Spica group have higher complications. Our study also reported similar findings that Spica group have higher complications rate as compared to titanium elastic nailing.

In a study conducted by Saseendar et al¹³ reported that higher coronal plane angulation was present in Spica casting group, rotational malalignment and limb length discrepancy also higher in Spica casting. Similar finding was reported in a study by Flynn et al¹⁴. Another study was conducted by Pollak et al¹⁵ in 1994 and reported higher incidence of loss of reduction and malunion in Spica casting group.

I in angulation following titanium nailing is due to miss match of nails and loss of diameter at fracture site. This finding was reported by Saikia et al¹⁶ and Navayanan et al¹⁷. Both of these studies recommended that protocols and standards of procedure must be followed.

Lee et al¹⁸ reported higher incidence of shortening and angulation that unacceptable is high in Spica casting group as compared elastic nailing treatment modality. Another study by Singh et al¹⁹ also reported similar findings angulation shortening is an undesired complication. His study compared these results with elastic nailing in which group this complication is less found.

All actions before concluded that early union and weight bearing is the key to early recovery to routine work and school. Similar milestones were recognized by Griesberg et al²⁰. Hedin et al²¹ also conducted a study and reported that Spica casting have greater complications rate as compared to elastic nailing technique, malalignment and angulation miss match are two main outcomes that are essential to identify in both techniques.

CONCLUSION

This study reveals that Titanium elastic nailing is the treatment of choice for femoral shaft fracture between ages 5 to 15 years. Titanium elastic nailing reduces the malunion, shortening of length and enhances the union, early recovery and return to school.

Author's Contribution

Concept & Design of Study:	Muhammad Iqbal Buzdar
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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