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TREATMENT ACCORDING TITANIUM ELASTIC NAILING VS TRACTION AND HIP SPICA CAST IN CHILDREN AMONG AGE 6-12 YEARS

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Abstract:

Objective: *Comparison of Titanium elastic nailing with Skeletal Traction and Hip Spica Cast for the treatment of femoral shaft fracture in children having age between 6-12 Years in our setup.* ***Study Design:*** *Randomized control trials study.****Place and Duration of Study:*** *This study was conducted at the Nishtar Medical College and hospital, Multan from 1st June 2017 to 31st December 2017.****Materials and Methods:*** *In this study we included 60 patients with femoral shaft fracture. Patient coming in first 03 months were managed by traction and Hip Spica cast while next 03 months by TENs. Patient age 6-12 years with close fracture shaft of femur reported within one week of injury from both sexes were included in study.****Results:*** *In this study, 31 out of 60 patients were male and 29 females. Mean age of the patients was recorded as 8.90±2.00 years. In Fractures managed by TEN, average healing time was (08 weeks) compare to Spica group in which healing time was (10 weeks) ($p = 0.001$) , Similarly factor angulation is higher in Spica group ($p = 0.001$). Rotational deformity is less in TEN ($P < 0.005$) while lime length discrepancy was more in Spica group ($P < 0.001$). Duration of non-weight bearing is longer in Spica group $P < 0.005$. Flynn result scores were found better in TEN as related to Spica group.****Conclusion:*** *We concluded that outcome is significantly better in TEN group as compared to those undergoing traction followed by Spica cast.*

Key Words: *Femur, Hip Spica, Titanium elastic nailing, femoral shaft.*

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INTRODUCTION:

Femoral shaft fractures usually caused by Blunt trauma. These are common in age set among 6-12 years. The shaft is involved in majority of these cases [1,2]. Antegrade solid intramedullary trochanteric nail is used in skeletally mature cases, it is known as the standard treatment. Recent studies reveal that the results of internal fixation are better in older children, epically in high energy trauma [3].

Though, factures shaft of femur may be treated in various ways in children but choice of a particular method, usually, based on weight, age of the patient, pattern of fracture and practical experience of orthopaedic surgeon. Age is an important factor [4]. Treatment modality varies according to age. Spica Cast is used in children with less than 6 years intramedullary nailing is used in children more than 12 years of age. The debate exists in children between 6-12 years [5,6] currently, common treatment modalities for the management of femoral shaft fracture are traction followed by spica cast and titanium nailing among 6-12 years of age children. However this method of treatment includes various complications [8,9] one of the complications is daily activities, absence from school may lead to a greater socioeconomics burden. The use of titanium elastic nail is considered as advance method of management in children between 6-12 years of age, it helps in early bone healing while complication rate is also very low [10].

MATERIALS AND METHODS:

This randomized control trails study was conducted at Nishtar Medical College and hospital, Multan from 1st June 2017 to 31st December 2017. In this study we included 60 consecutive patients. Patient coming in first 03 months were managed by traction and Hip Spica cast while next 03 months by TENs. Patient ages 6-12 years with close fracture shaft of femur reported within one week of injury from both sexes were included in study.

The main mode of injury was due to road traffic. Accident 39.58% followed by fall from height 21.42% preoperative evaluation included full length radiograph of involved thigh including knee and hip joint both Anteroposterior and lateral views. The location of fractures in this study, 06 fractures were in proximal third, 46 in middle third, and 08 in distal third of femur. 30 ruptures were transvers, sixteen were short oblique, four were spiral and ten were slightly comminuted. Majority patient experienced surgery within six days of injury. Surgery was performed under general Anaesthesia with the patient in supine position. Image intensifier was used for reduction of fracture and placement of mails. Two titanium elastic nails of equal width were used. The width of each nail was found as per Flynn's Etal formula.

The diameter of the nail was chosen so that each nail occupies one third of medullary cavity, the nails were inserted in Retrograde fashion with medial and lateral incision 2-3 cm above the physis. Open reduction were required in four cases due to soft tissue interposition the nails were placed in medullary canal so that proximal end of nail is 1cm distal to proximal femoral physis. Post operatively patient's limb was elevated on pillow. Patients were trained on 3rd week post operatively without weight bearing. Limited weight bearing after 04 weeks and full weight bearing after 08 week depending on callus reaction.

Similarly in spica cast group, skeletal traction was applied through distal femoral pin for 7-10 days depending on shortening then Hip spica was applied by using Traction table with the help of image intensifier under G/A. the position of hip of injured extremity was kept in 15^0-20^0 flexion and injured limb in 10^0-15^0 external rotation. Spica was sustained till complete union at splintering site. Weight bearing was permitted 10 days after removal of spica.

All patients were monitored radiologically as well as clinically every 02 weeks for 06 months. Parameters studied were clinically and radiological features of union, mal-alignment, range of motion of affected side of knee, limb length discrepancy and any other complication found during study.

RESULTS:

In this study, 31 (51.7%) were male and 29 (48.3%) were Female (Table-1) Mean age was 8.90 $\pm$ 2.00 years and 8.97 $\pm$ 2.00 years in females. (Table-2).

Among 30 patients managed with titanium elastic nails, there were 16 boys and 14 girls the mean age was 10 years.

Of the 30 patients in the spica group. There were 15 boys and 15 girls with a mean age of 9.30 years. Fracture type, site of fracture and mode of injury was recorded. There were no significant differences between the groups. Incidence of injury in both male and female was found similar. In both collections follow up was 06 months ranging from 5-7 months.

In both groups, definitive treatment was started with in 24 hrs. i.e. skeletal traction was applied to Spica group and nailing was done in surgical group. So there was no significant delay of treatment found between the two groups similarly hospital stay was not significantly different in both groups nailing

group (7-12 Days mean 8.45 days) than spica group (8-15 days mean 10.15 Days)

Table No.1: Frequency of gender (n = 60)

Gender	No.	%
Male	31	51.7
Female	29	48.3

Table No.2: Mean age of the children

Gender	Age	Mean + SD
Male	7-11.6	8.84 + 2.03
Female	6-11.10	8.97 + 2.00

Table No.3: Comparison between Surgery & Spica Group

Parameter	**Group**	**Range**	**Mean**	**Signifi-cance (P value)**
Angulation	Surgery Spica	9-4^0 21-7^0	3.16 9.56	0.001
Rotational malalignemnt(^{0})	Surgery Spica	6-9^0 20-8^0	5.56 14.45	0.005
Union (weeks)	Surgery Spica	5-8 weeks 6- 12 weeks	6.35 8.15	0.001
Non-weight bearing (weeks)	Surgery Spica	4-8 weeks 7-11 weeks	5.31 7.20	0.005
LLD at 06 months follow-up (cm)	Surgery Spica	1cm to + 1cm 0.5cm to -2cm	0.56 1.25	0.000

Table No.4: Flynn et al's Scoring Criteria for TENS

	Excellent	Satisfactory	Poor
Pain	None	None	Present
Malalignment	<5^0	5-10^0	>10^0
Limb Length discrepancy	<1cm	102cm	>2cm
Complication	None	Minor	Major and/or lasting morbidity

In the nailing group, angulation > 5^0 in coronal/sagittal occurred in 02 patients (mean 3.2^0) than spica group which was significantly higher, occurred in 09 patients (mean 9.6^0) (P = 0.001).

Rotational irregularity was higher in spica group ranging from 10^0 internal spin to 20^0 external spin while in surgical group range is 5^0 internal rotation to 15^0 external rotation. This deformity is expressively higher in spica group (mean 14.34) than is surgical group (mean 5.32) P < 0.005 table 3.

Similarly time of healing was found significantly less

in TEN at a median of 6.36 weeks (range 5-8 weeks) where as in spica group (range was 6-12 weeks) with median 8.36 weeks P = 0.001 Table 3.

The duration of non-weight bearing (P < 0.001) post-operative duration at full weight bearing were all significantly higher in spica group in comparison with nailing group. (Table-3)

There was no major complication in surgical group while minor complication like skin irritation found in 02 cases. Similarly superficial infection was noted in 03 cases which was settled by giving antibiotics on the other hand in spica group 10 cases 33% had major difficulties including deformity (angulation, rotating, shortening) which is considerably higher P < 0.001.

After 06 months of follow-up, the difference in limb length discrepancy is significant between two groups. It was greater in spica group mean 1.22cm than in TEN mean 0.54 cm (P < 0.001) Table 3.

The proportion of patients with major complication was significantly higher in spica group. (P < 0.001).

DISCUSSION:

In children, spica casting with skeletal traction is used traditionally for the management of femoral shaft fractures; recent data reveals it possible effects on economics, emotional, social and educational costs. Contrary to this, elastic intramedullary achieved as significant popularity due to its psycho-socioeconomics and clinical outcome with a reduced rate of complications [11,12]. In this study, we compared TEN surgical methods with traction and spica cast with regards to duration bone union, hospital stay, time to start walking independently or with the help of support, parent satisfaction and return to school.

Our findings are in agreement with various other studies showing the benefits and efficacy of elastic nails for the management of femoral-shaft fractures. A study done by Wright and other used elastic intramedullary nail (antero-grade or retrograde) with kirschner wires or pins [13]. The data reveal that complications associated with TEN, include delayed unions, re-fractures, varus or valgus malalignments, nail tip irritations, malrotation, proximal nail migration and reached an overall compilation rat i.e. 11.7% [14].

We recorded that external fixation is an appropriate modality for the management of frmoral fractures in children, particularly when dealing with maultitrama-injured child and open fracture. Surgical management for these fractures using various fixation devices (plating, flexible nails, or antegrade trochanteric nail) achieved significant satisfactory results with lower rate of compilations in children more than 8 years of age, these findings are similar to other studies [15,16].

We recorded some difference in results with a study by Saseendar's, where patients in the surgical group were discharged only after suture removal to have a closer follow-up for the presence of early postoperative complications (if any), and the spica patients were commonly discharged after one or two days following spica casting after assessing for the presence of plaster-of-Paris-related complications. We recorded shorter time to start walking independently or with support and early return to school in patients managed With TEN while compared those with spica casting. It may be due to better contact of the fracture surfaces and anatomical reduction in those undergoing TEN and it is in accordance to with some other studies [17,18].

We recorded a higher frequency of malunion in traction and spica group when compared to those with TEN groups, these findings are comparable with a study by Lascombes et al, where traction and cast was compared with intramedullary nailing [19] and recorded mal-union in traction and cast group [20]. Some other studies revealed that the rate of malunion was higher in traction and cast group than those with TEN groups.

CONCLUSION:

We concluded that outcome is significantly better in TEN group as compared to those undergoing traction followed by Spica cast.

Conflict of Interest: The study has no conflict of interest to proclaim by any writer.

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