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Assessment of the effect of fixation of femoral shaft fracture in children within age range (5-15 years) with titanium elastic nails on, mode of reduction (closed or opened) ,early mobilization, and the duration of postoperative hospital stay for the patients.

Dr. Osman Tagalsir Osman Ali
MD. Trauma and orthopedic surgery.
Assistant professor Trauma and orthopedic surgery.
College of Medicine-NAJRAN UNIVERSITY.
e-mail: otagalsir@gmail.com

Dr.Wael Mohammed Al Zahrani , MBBS
Teaching assistant, faculty of medicine, Najran University K.S.A
E-mail: W.aldehri@hotmail.com



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Abstract:

The ideal treatment of femoral shaft fractures in children defined as one that controls alignment and length, comfortable for the child and convenient for the family, and causes the least negative psychological impact possible. This study was performed to assess the outcome, benefits, and, of titanium elastic nails in our local practice in Sudan. This is descriptive, retrospective, hospital-based study. The study was conducted in KHARTOUM NORTH HOSPITAL-SUDAN, department of orthopedic surgery, and the study population consisted of children within the age range between 5yrs to 15 years presented to orthopedic surgery department in KHARTOUM NORTH HOSPITAL-SUDAN, with femoral shaft fracture and fixed with retrograde titanium elastic nails, within the period from June/2010 to December/2010. Sample size was composed of 24 Children; 20 (83.3%) males; 4 (16.7%) females.

Results showed that Boys had a higher rate for fracture shaft of femur than girls within the age group (6yrs-15yrs), and this support what mentioned in the literature. It also concluded that retrograde titanium elastic nails are a good option for fixation of femoral shaft fracture in children with age range (5yrs -15 years) according to different causes such as it allows early mobilization of the child, so it prevents the development of the complications of recumbency.

Keywords: fixation, femoral shaft fracture ,children , titanium elastic nails ,early mobilization, postoperative hospital ,patients.



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Introduction

Although femoral shaft fractures constitute less than 2% of all fractures in children and adolescents, their treatment was controversial for many years. (1)

Prevailing opinion has favored nonoperative, and operative treatment and a variety of techniques have been advocated to avoid complications such as nonunion, limb-length discrepancy, malalignment, Osteonecrosis, and growth disturbance.(1)

Currently, operative methods of treatment are favored to allow early ambulation and shorter hospital stay, and to avoid detrimental psychological and social effects, often associated with prolonged nonoperative treatment, and to avoid complications. (1)

Traditionally, the treatments of choice in managing pediatric femur fractures have been traction and casting. (2)

Newer methods have focused on earlier mobility and shorter hospitalization. Use of retrograde titanium elastic nails can quicken stabilization while allowing enough motion at the fracture site to generate excellent callus.(2)

Literature review

The annual rate of femoral shaft fractures in children is 19.15 per 100,000. With regard to age, the distribution was bimodal, with peaks at 2 and 17 years. Boys had higher rates of fracture than girls at all ages, and blacks had higher rates than whites. The primary mechanisms of fracture were age-dependent and included falls for children younger than 6 years old, motor vehicle-pedestrian accidents for children 6 to 9 years old, and motor vehicle accidents for teenagers. Adverse socioeconomic conditions were significantly associated with higher rates of fracture. (3)

The ideal treatment of femoral shaft fractures in children defined as one that controls alignment and length, comfortable for the child and convenient for the family, and causes the least negative psychological impact possible.(3)



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Management of pediatric femoral fractures has evolved gradually in the past decade toward operative approaches because of a desire for more rapid recovery and reintegration of the patients, with the recognition that prolonged immobilization can have negative effects even in children.(3)

Justification:

This baseline study has been performed because, retrograde titanium elastic nails is known internationally as one of the effective operative methods for treatment of femoral shaft fracture in children, and characterized by , short hospital stay , early ambulation, early return to the normal activity, and, decrease the negative impact on the school performance for the children, and on the families, that occurs due to prolonged hospital stay, late mobilization of patients.

So this study was performed to assess the outcome, benefits, and, of titanium elastic nails in our local practice in Sudan.

Aim:

- Assessment of the effect of fixation of femoral shaft fracture in children within age range (5-15 years) with titanium elastic nails on, mode of reduction (closed or opened) ,early mobilization and, the duration of postoperative hospital stay for the patients.

Specific objectives:

- Assessment of the benefits of titanium elastic nails in the management of fracture femur in children.
- Assessment of the local results in relation to the international results.



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Study design and method:

Study type:

This is descriptive, retrospective, hospital-based study.

Study area:

The study was conducted in KHARTOUM NORTH HOSPITAL-SUDAN, department of orthopedic surgery.

Study population:

Children within the age range between 5yrs to 15 years presented to orthopedic surgery department in KHARTOUM NORTH HOSPITAL-SUDAN, with femoral shaft fracture and fixed with retrograde titanium elastic nails, within the period from June/2010 to December/2010.

Inclusion criteria:

- Children with femoral shaft fracture within age range 5-15yrs, Presented to KHARTOUM NORTH HOSPITAL-SUDAN, department of orthopedic surgery, and fixed with titanium elastic nails within the period from (June/2010) to (December/2010).

Exclusion criteria:

- Children are less than 5yrs old or more than 15yrs old.
- Children with associated other fractures except for the contralateral femur.
- Children first presented with malunion delayed union or nonunion of fracture shaft of the femur.
- Children with open fractures.

Sampling:

-Sample frame:

Orthopedic surgery department in KHARTOUM NORTH HOSPITAL-SUDAN

-Sample unit:



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Child \ Children.

This is a baseline study, and because there have been a limited number of cases available; all cases that fulfilled the inclusion criteria have been included in the sample population.

Tools of Data collection:

- Questionnaire filled from Inpatient hospital records and co-patients.
- Follow up the patients in the referred clinic.
- Examining the preoperative and Postoperative X-ray and at serial follow up.

Variables of the study:

Gender, age, weight, mode of trauma, days elapsed before the presentation, mode of intraoperative reduction (open or closed), days elapsed before ambulation, days of hospital stay.

Data management and analysis:

Statistically, age and weight were categorized in ranges, because there is a wide variation in the values of these variables in the sample community. While the values of certain numerical variables were analyzed as it is because there is no wide variation in its values in the sample community.

The frequencies in percentage, the mean and standard deviation from the mean were used, to describe and analyze the quantitative variables (age, weight, and days of elapsed before the presentation, days elapsed before ambulation, days of hospital stay, the interval between nail insertion and removal, hospital stay after removal).

The frequencies in percentage were used to analyze and describe the qualitative variables (gender, mode of trauma, open or closed reduction).

Chi-square was used to describe probabilities of relations between certain qualitative variables, (e.g., mode of trauma in relation to open or close reduction and days elapsed before presentation in relation to open or closed reduction).



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Results

Sample size was composed of 24 Children; 20 (83.3%) males; 4 (16.7%) females.

Their ages range 5-10 years; 18 (75%) between (5-10 years), and 6 (25%) between (11-15 years).

The mean age was (10.8years) and the STD from the mean (0.44).

The weight range (19kg-39kg) , (33.33%) their weight between 19kg-25kg , (20.83%) between 26kg-32kg ,(45.83%) between 33kg - 39kg.

The mean weight was (28kg), and the STD from the mean (0. 89).

Fractures resulted from fall down in (62.5 %), and from RTA in (37.5%) of cases.

22 children (91.67%) presented within the first three days after trauma, while 2 (8.33%) delayed for 10 days-15 days, one of them (4.15%) because, he was managed by the traditional bone setter, the other (4.15%) was referred from another state hospital. The mean was (1.8day); the STD was (0.28).

Closed reduction was achieved in (83.5%) of cases, while the open reduction in (16.5%).

All cases were allowed ambulation within the first three days postoperatively. (58.33%) in the 1st day, (37.5%) in the 2nd day,(4.17%) in the 3rd day postoperatively. The mean was (1.4day) and the STD was (0.58).

All cases were discharged from the hospital within six days after surgery. (20.83%) were discharged on the 2nd day,(37.5%) on the 3rd day, (29.17%) on the 4th day,(8.33%) on the 5th day,(4.17%) on the 6th day after surgery. The mean was (3.3days); the STD was (0.58).

There was a significant relationship between days elapsed before presentation to the hospital and open reduction, (P-value <0.05)



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Discussion

Boys had a higher rate for fracture shaft of femur than girls within the age group (6yrs-15yrs), and this support what mentioned in the literature. (3)

The primary mechanism of injury was a fall, while the small group was involved in RTA; this contrasting with the literature, in which the main etiological factor for fracture shaft of the femur in this age group is are a motor-vehicle accident, and motor-pedestrian accident.(3)

Most of the cases presented to the hospital early (within the first three days after trauma), and this may explain why closed reduction was successful in most of the cases.

Ambulation was allowed within four days, and discharge from hospital within six days postoperatively for all children, and these are important advantages of the retrograde titanium elastic nails.

There was a significant relationship between days elapsed before presentation to the hospital and open reduction, probably because of the muscle contraction, soft tissues interposition and establishment of soft callus formation (P-value <0.05)

Conclusion

Retrograde titanium elastic nails are a good option for fixation of femoral shaft fracture in children with age range (5yrs -15 years) that because:

- It allows early mobilization of the child, so it prevents the development of the complications of recumbency.
- It is associated with short hospitalization, probably, this, in turn, prevent the negative psychological, and financial impact on the children, and the families, and this may support its cost-effectiveness, and this may need further investigation.
- It is associated with a low risk of complications such as nonunion, limb-length discrepancy, and misalignment.
- Removal of the retrograde titanium elastic nails is a simple procedure and could be done as day case surgery.



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