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ORIGINAL ARTICLE

Determine the Mean Duration of Union in Femoral Shaft Fracture in Children Treated with Elastic Intra-Medullary Nailing

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ABSTRACT

Objective: The aim of this study is to determine the functional outcomes and mean duration of union in femoral shaft fracture in children treated with elastic intra-medullary nailing.

Study Design: Retrospective

Place and Duration: Conducted at Orthopaedic Unit Ayub Medical Teaching Institute Abbottabad and District Headquarter Teaching Hospital Gomal Medical College Dera Ismail Khan for duration from May 2020 to January 2021 (09 months).

Methods: Total sixty eight patients with age ranges between 5-12 years were presented in this study. Patients detailed demographics age, sex and BMI were calculated after taking informed written consent. Complete patients were treated with elastic intramedullary nailing. Radiological assessment was done. Mean union time and complications associated to procedure were examined. Functional outcomes were analyzed according to the Flyn's criteria. Follow-up was taken at 8 months postoperatively. Complete data was analyzed by SPSS 22.0 version.

Results: Out of 68 patients**,** there were 48 (68.6%) males and 20 (31.4%) females. Most of the patients 41 (60.35) were aged between 8-12 years and the rest 27 (39.65%) were between 5-8 years.34 (50%) fractures were caused because of road accidents, falling from height were 20 (29.41%), due to sports were 10 (14.70%) and 4 (5.9%) were due to simple fall. 32 (47.06%) patients had left side fracture and 36 (52.94%) had right side fracture. Mean union time among patients was 4.14±2.72 months and there was no any case of non union. According to Flyn's criteria, 50 (73.53%) cases had excellent results, 14 (20.6%) patients had good and fair results were among 4 (5.9%) cases. Complications were observed bone stiffness, delayed union and varus deformity among all cases.

Conclusion: We concluded in this study thatElastic intramedullary nailing for femoral shaft fractures in children is safe and effective treatment modality. Union of bone achieved all the patients and majority of patients had excellent functional outcomes.

Keywords: Femoral shaft fractures, Children, Elastic intra-medullary nail

INTRODUCTION

Femoral shaft fractures are the most common pediatric injuries treated by orthopedic surgeons resulting in high direct and indirect medical costs (1). The incidence of femoral fractures is 20 – 25 per lakh children per year (2). The treatment of such fractures range from closed reduction with hip Spica, Bryant's traction and surgical stabilization with devices like plate and screws, nails, ESIN and external fixators (1). Each method has its own set of advantages and disadvantages.

Most pediatric fractures are treated conservatively, as nonsurgical management has been the standard care of treatment for most young children historically, because of rapid healing and spontaneous correction of angulation. The results were usually satisfactory in the long term (1). The cost of care is low and the outcome is generally good. In older children, conservative treatment results in loss of reduction, malunion, psychological intolerance to both the child as well as the family and complications associated with plaster, hence, in the last two decades there has been a growing tendency towards a more operative approach in children over six years of age.

Ideally in children between 6-16 years, the fracture needs an internal splint that shares load, maintains reduction and does not endanger the growth areas or blood supply of the femoral head and minimizes morbidity as well as complications3.

Plating offers rigid fixation and it needs a larger exposure with increased blood loss, resurgery for implant removal and scarring. It is a load bearing device and refracture is a risk (4). Antegrade nailing is used in children near skeletal maturity (5). External fixators are mainly used in open fractures (6).

ESIN was introduced for femoral fractures by Nancy group in 1979 (3).Titanium implants are increasingly used for ESIN as titanium has an excellent biocompatibility and its elasticity limits the amount that the nail is permanently deformed during insertion and also promotes callus formation by limiting stress shielding. TEN acts as an internal splint, maintains length and alignment that allows rapid mobilization while permitting enough fracture site motion for callus formation and potentially has low risk of osteonecrosis, physical injury and refracture (7). Due to its favorable results and lack of serious complications it

remains the ideal treatment of choice for stabilization of pediatric femoral fractures.

MATERIAL AND METHODS

This retrospective study was conducted atOrthopaedic Unit Ayub Medical Teaching Institute Abbottabad and District Headquarter Teaching Hospital Gomal Medical College Dera Ismail Khan for duration from May 2020 to January 2021 (09 months). The study was comprised of sixty eight patients. Patients detailed demographics age, sex and BMI were calculated after taking informed written consent. Patients with pathological fractures, metabolic bone disease and children < 5 years of age were excluded from this study.

Complete patients were treated with elastic intramedullary nailing. Radiological assessment was done. Mean union time and complications associated to procedure were examined. Functional outcomes were analyzed according to the Flyn's criteria as excellent, good and fair. Follow-up was taken at 8 months postoperatively. Complete data was analyzed by SPSS 22.0 version. Categorical variables were assessed by percentages and frequencies.

RESULTS

Out of 68 patients**,** there were 48 (68.6%) males and 20 (31.4%) females. Most of the patients 41 (60.35) were aged between 8-12 years and the rest 27 (39.65%) were between 5-8 years.34 (50%) fractures were caused because of road accidents, falling from height were 20 (29.41%), due to sports were 10 (14.70%) and 4 (5.9%) were due to simple fall. 32 (47.06%) patients had left side fracture and 36 (52.94%) had right side fracture. (table 1)

Table 1: Baseline details demographics on enrolled cases

Variables	Frequency	%age
Gender		
Male	48	68.6
Female	20	31.4
Age (years)		
5-8 years	27	39.65
8-12 years	41	60.35
Cause of fracture		
RTA	34	50
Fall from height	20	29.41
Sports	10	14.70
Simple fall	4	5.9
Side of fracture		
Left	32	47.06
Right	36	52.94

Table 2: Post-operatively functional outcomes among all cases

Variables	Frequency (n=68)	%age
Mean Union time	4.14±2.72	-
Outcomes (Flyn's criteria)		
Excellent	50	73.53
Good	14	20.6
Fair	4	5.9
Poor	0	0
Total	68	100

Mean union time among patients was 4.14±2.72 months and there was no any case of non union. According to Flyn's criteria, 50 (73.53%) cases had excellent results, 14 (20.6%) patients had good and fair results were among 4 (5.9%) cases.(table 2)

Complications were observed bone stiffness among 3 (4.41%), delayed union found in 2 (2.94%) and varus deformity was 1 (1.5%) among all cases. (table 3)

Table 3: Post-operatively complications among all cases

Variables	Frequency (n=68)	%age
Complications		
bone stiffness	3	4.41
delayed union	2	2.94
varus deformity	1	1.5

Among all the 68 cases, 64 (94.1%) patients were satisfied and 4 (5.9%) cases were unsatisfied.(table 4)

Table 4: Satisfaction among all cases

Variables	Frequency (n=68)	%age
Satisfaction		
Yes	64	94.1
No	4	5.9

DISCUSSION

Intramedullary elastic stable nailing acts as an inner spline which promotes the patient's earlier mobilization. This sort of treatment includes a minimally invasive technique, no growth plate damage and no interruption of the supply of femoral head blood.[8] In this retrospective study sixty children of both genders with age ranges 5-12 years who had femoral shaft fractures were presented. Out of 68 patients**,** there were 48 (68.6%) males and 20 (31.4%) females.The population of 88.39 percent male and 14.6 percent female tibial fractured patitudesalso were discovered in a further study by Ali et al. in Karachi, Pakistan. [9]

Mean union time in our study was 4.14±2.72 months. According to Flyn's criteria, 50 (73.53%) cases had excellent results, 14 (20.6%) patients had good and fair results were among 4 (5.9%) cases.All fractures in this series were joined without non-union within 20 weeks of fixing. Children with transverse fractures had a shorter time of union and were found to be more heavy than other children. In comparison with women, male children had earlier union rates. Oh et al found that a ll 31 fractures in his series were healed without delay in 12 weeks. [10] In 42 patients receiving ESIN all fractures have been cured in about 88 days a study by Buechsenchuetz et al. [10] Vidyadharn et al [12] evaluated theclinical radiation from interlocking nail in tibia and discovered that the average time for healing fractures was 20.1 weeks while the average duration for our investigation was 18 weeks. He also brought out the great clinical-radiological outcomes of careful intramedullary nails to cause tibial diaphysial fractures and is rather safe. In a Turkish research 26 intra-medullary clinging fractures were treated. [13] It is five months between now and the Union. Their investigation found that intramedullinary locking is more suitable for cominuted fractures since the periosteal circulation is better preserved and the complication rate is hence reduced. [13]

In our study RTA was the most common cause found in 34 (50%)cases, falling from height were 20 (29.41%), due to sports were 10 (14.70%) and 4 (5.9%) were due to

simple fall. These findings were comparable to the previous findings. [14] Complications were observed bone stiffness among 3 (4.41%), delayed union found in 2 (2.94%) and varus deformity was 1 (1.5%) among all cases.[15] Over all satisfaction rate among 68 cases were 94.1% and average union weeks were 20, this was similar to the previous many studies. Drosos et al [16], Nork et al [17] and Shah et al. re-fixed 36 intramedullary SIGN nail tibial fractures with a total union rate of 97.2% and a mean period of 22 weeks to the union.[18]Court-Brown et al investigated 25 patients without infection, malunion, non union or delayed union with an average union duration of 15.4 weeks. In a study of Larsen et al[19] 45 patients evaluated . The average duration to heal of fracture was 16.7 weeks in a group of reamed patients and 25.7 weeks in a group of unream. The difference (P=0.004) was important. A randomizedblinded trial of 1319 cases in which a tibial shaft fracture had been treated with either intramedullary or unbeatable nailing was performed by Mohit Bhandari et al. (2008) and demonstrated the potential benefitsfor reamed intramedulla nailing in closed fractured patients. [20]

Femoral wave fractures are treated well with elastic nailing. They do well for the majority.

CONCLUSION

We concluded in this study thatElastic intramedullary nailing for femoral shaft fractures in children is safe and effective treatment modality. Union of bone achieved all the patients and majority of patients had excellent functional outcomes.

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