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Research Article

**A COMPARISON BETWEEN THE OUTCOMES OF TWO
METHODS (INTRAMEDULLARY PIN FIXATION AND
TRACTION PLUS CASTING) IN THE PEDIATRICS FEMORAL
SHAFT FRACTURES**¹Rashida Kousar, ²Inam Ur Rehman, ³Dr. Arslan Ahmed¹Jinnah Hospital Lahore²Sheikh Zayed Hospital Rahim Yar Khan³Medical Officer THQ Hospital Chowk Azam**Abstract:**

Objective: Treatment of closed femoral shaft fractures in children of ages from 6-12 years is not consented. The current study was aim to assess and associate the interim result of children femoral shaft fractures with surgical treatment by intramedullary pin fixation and skeletal traction followed by a hip spica cast and to identify the best method for quicker unification of fracture.

Methodology: This study conducted from 2014 to 2017 in two hospitals for 32 months. Treatment of 66 closed fractures of the femoral shaft children was carry out and monitored till curing of fracture, removal of spica cast and inception of insecure walking in two groups i.e. 'spica cast after skeletal traction by 90 – 90 procedure (n=30)', 'internal fixation open reduction with intramedullary cast and pin (n=36)'. Chi-Squar test used for evaluation and comparison of hospital stay duration, time of casting, fracture's union, starting walk time and difficulties' ratio.

Results: All patients were averagely 7.4 years old. Follow-up was usually at 6 months. In all cases for both groups, curing of fractures was monitor on 8 and 12 weeks. The duration of un-enlistment in traction was longer as compare to surgery group. From time of admission in hospital to self-walking usual curing time for the traction was 75.3 days and for surgery group was 61.2 days.

Conclusion: Femoral shaft fractures (in 6-11 years old children) can be cure with traction plus spica casting and intramedullary pinning. Keeping in view least stay at hospital, less complication rates and quicker walking, the first choice of treatment could be intramedullary pin.

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INTRODUCTION:

In overall children fractures, share of femoral fractures is 1.6%. The boys' ratio is 2.6:1 with respect to girls. It is the cause of cast immobilization, maximizing hospital stay, school absence and seen amongst long bone fractures at any age [1-3]. The body's longest, movement tolerating and weight bearing bone is femur therefore, this fracture problem could be terrible for child and family. Falling down or child mistreatment is the major attributor to this fracture in younger ages [4]. The fracture in older children is mostly because of driving accident, sport events. With the increment of age and stiffening of bones, causing force of fracture should be more ruthless [5, 6]. Till date, numerous non-standard treatment methods were use. About all these fractures treated conventionally in the past with traction spica cast however, this method is currently in use for little children only [7].

With the usage of intramedullary rod or pin for treatment of femoral shaft fractures in children, a significant growth has recorded in open or closed lessening and inner fixation. It could be due to technical developments especially advancement of elastic stable intramedullary nailing (ESIN), or patients intent to stay for minimum time in hospital [8].

In below 6 years children, the favorite treatment process for femoral shaft fracture is generally with primary spica cast and close reduction. It is by surgery for children over 11 years, however, for ages between 6-12 years surgery and non-operative both with inside fixation could be use [9-11]. This study aimed to assess temporary outcomes of children femoral shaft fractures management and to equate the intramedullary pin fixation and traction & cast, vis-à-vis time till union and unprotected walking by matching the effects.

METHODOLOGY:

This research conducted at two hospitals in Lahore (Mayo Hospital and Services Hospital) as forthcoming and precise clinical trial from 2014 to 2017 (for 32 months), and children between 6 to 11 years having closed femoral shaft fracture were inducted. Trochanteric, pathologic, open, multiple trauma, segmental, and distal epiphyseal fractures excluded from study and only transverse, spiral and oblique closed femoral shaft fractures were included without involvement of gender. Patients were randomize in two groups on the basis of hospitalization and presentation. Traction method was use for first group and surgical for second.

Written consent from parents / guardians of patient was obtain on treatment plan explanation to parents and approval of Ethics committee of our hospitals.

In 1st group treatment: In operating room, under anesthesia, 90-90 skeletal traction and leg support with sling applied after putting in a 3 or 4 mm Steinman pin into proximal tibia. With serial radiographs proper reduction status was identify. Subsequent to initial conception of callus and primary binding (considered through tenderness, pain loss and motion on fracture area) 1^{1/2} spica cast applied after pin removal. Control radiographs obtained on week 3, 6, 12 and 16. Post union, cast detached, physiotherapy started and mobilization permitted till the patient can bear.

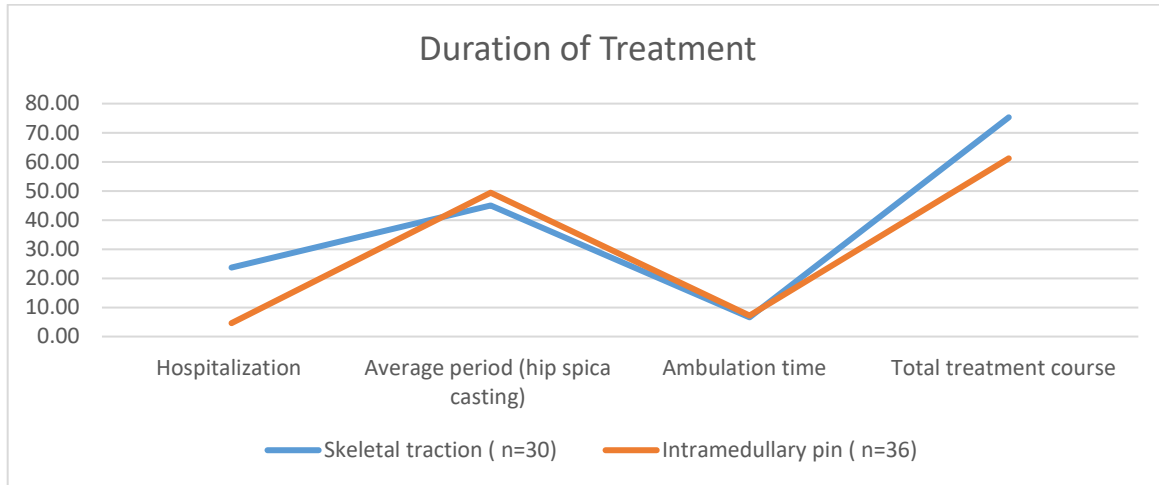
In 2nd group: Post arrangement in the operation room, in lateral position with typical anesthesia, fracture area uncovered with a 4-5cm opening. After that a 4-5 mm a little bent pin was implanted first rearward, within proximal portion along hip in flexion, and inside revolved and subsequent to decrease, into distal piece. Over the greater trochanter, pin end bended hypodermically. Reduction control executed through C-arm fluoroscopy and afterward a hip spica cast utilized. At an interval of 4 weeks radiographic evaluation sone. Post-unification of fracture and cast removal, stress accommodating and physiotherapy began after the patient's acceptance. Post operation from 20 to 24 weeks (mean 22 weeks) interval, pins were remove. For evaluation, following three time periods were keep in consideration:

- a. Hospital stay duration.
- b. Cast immobilization duration.
- c. Period of patients starting walk.

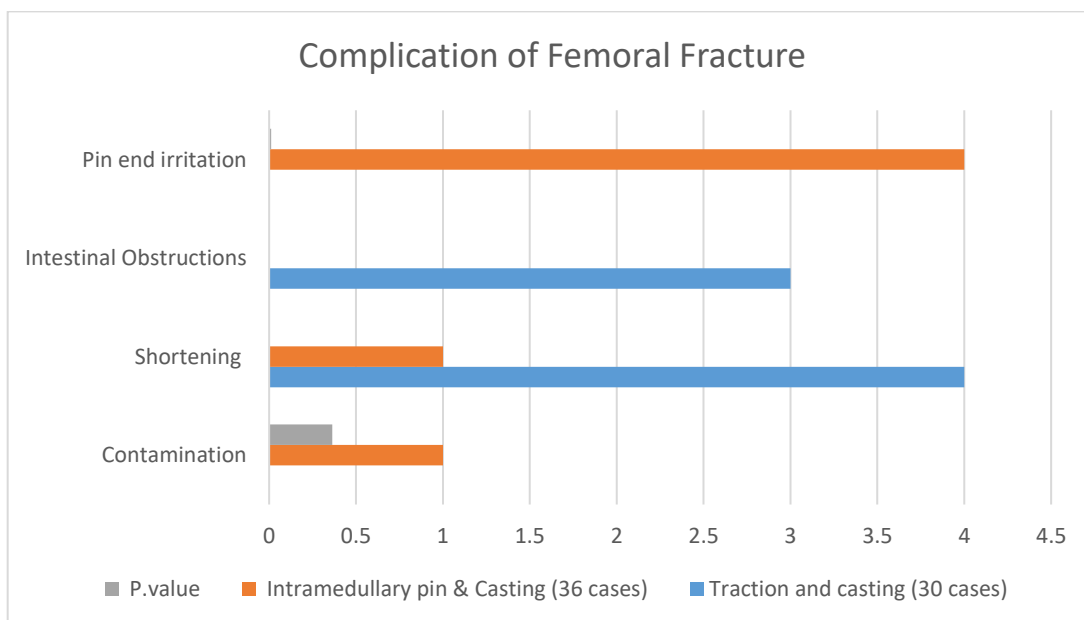
RESULTS:

Four of 70 patients (6-11 years old children) were exclude from study due to not been following up, however, 51 boys and 15 girls (total 66 patients with male to female ratio of 3.2/1) were available for 6 months and followed-up. In 45.4% (30) cases the fracture was due to vehicle accident, 28.8% (19) were because of pedestrian vehicle collision and 25.75% (17) were fall cases. In first group, 30 patients treated through skeletal traction, and 36 patients surgically treated in second group. At the injury time, 7.4 years was the average age of all patients. First group age was ranging from 6.2 - 9.3 years (Mean of 7.2 years) and 6.5-10.1 years (mean of 8.1 years) was for second group. Average timeframe of casting, stay at hospital, total treatment course, ambulation, and effects among both groups is synopsise in Table-I&II.

Mean Time of treatment (days)	Hospitalization	Average period (hip spica casting)	Ambulation time	Total treatment course
Skeletal traction (n=30)	23.70	45.00	6.60	75.30
Intramedullary pin (n=36)	4.60	49.40	7.20	61.20



Problem	Traction and casting (30 cases)	Intramedullary pin & Casting (36 cases)	P. value
Contamination	-	1.00(2.7%)	0.3640
Shortening	4.00(13%)	1.00(2.7%)	0.0000
Intestinal Obstructions	3.00(10%)	-	0.0020
Pin end irritation	-	4.00(11%)	0.0120



Between 8 to 12 weeks, rigorous joining together in all fractures was achieved. For 1st group, Average management time, till admission to self-walking was 75.3 days (ranging from 68-85 days) and for 2nd group 60.2 days (ranging from 57-72 days). None of these patients were having peripheral neurovascular impingement.

In surgery (second) group, one insidious infection case found and treated through antibiotics. Complaint of pain and discomfort at the pin end site of six patients resolved after removal of pins. In 1st group (four patients), average 1cm reduction and one intramedullary pin's patient, 1cm shortening detected. Fracture line of that patient was long obliquity. All patients were having acceptable varus or valgus angles. In three patients of 1st group during femoral shaft fractures treatment, unnecessary 15 degree lateral variation of leg observed, whereas, families of patients in 2nd group were more pleased of less stay at hospital and surgical treatment. At final checkup in both groups, knee and hip joints range of motion were natural.

DISCUSSION:

Femoral shaft fractures' treatment in children depends on weight and age of patient, position, fracture's character and related injuries [12]. Recommended treatment is non-surgical treatment along with primary hip spica cast for children under 5 years of age. Factually, skeletal traction is a traditional and safe procedure for older children's treatment because of not causing knee tightness, joining together of bone transpires logically, no surgery risk, however it can result into limb shortening or mal-union, and long hospitalization, which can't be tolerated in agitated children. Skeletal traction is famous for being an exceptional modality in various reports [13]. On other side, flexible intramedullary pin or nail is least intrusive and secure procedure, which keeps usual bone orientation with higher union rates. Moreover, it could be performed in several open and pathologic fractures. The stay at hospital is less as compared to traction procedure [14, 15]. Rare impingements in this method may include avascular necrosis of femoral head, surgical risks and or painful bursitis at the nail or pin end area [16-18]. For above 12 years children, management of femoral shaft fracture is generally as an adult by surgery, by means of plate and screw, intramedullary nail, external fixator. Both surgical and non-surgical methods can be adopted for patients among 6-12 years of age. Elastic intramedullary nail (ESIN) with Kirshner-wires or pins was used by Ligier et al, which was accomplished reversing or forward. This scheme offers a mixture of firm and flexible control. Through the bent or twisted wires rotating strength is attained which runs 3-view observation. Adjacent muscles' usual stiffness aids this strength and pins elasticity help in formation of callus through permitting fair micro gesticulation at the position of fracture [19, 20]. In this study the standard of ESIP with a one bent wire was used. Reeve et al, in an alike research, 90 patients of ages between 4 to 12 years were cured (49 cases by IMN surgery and 41 cases with femoral fracture by traction and casting). As compared to the

surgical group, impingements of traction and casting were in greater numbers [13].

In an alike study on 25 children femoral shaft fracture conducted by Kirby et al; evaluated in two distinct groups of IMN and traction plus cast, in which, in traction and casting group mal-union and shortening of >2.5cm were reported [21]. The difficulty of mal-union in traction and cast was more common as compared to surgical treatment in the studies of Singer, Arenson and Herndon [22, 23]. Flynn et al concluded (results of intramedullary nailing) that in children, treatment of majority of femoral fractures can be achieved through traction and casting [24]. As per current study the complete treatment period was 75.3 days and 61.2 days until onset of unprotected weight bearing for traction and cast and intramedullary pin fixation respectively. More problems noted in the traction against intramedullary pin patients. In traction group, Limb shortening and mal-rotation were extra with P value < 0.05 and these variances were statistically substantial. Both procedures lead to admirable unification of fractures. Even though the pin end irritation was the major drawback of intramedullary pin and required for a second operation for pin removal. After femoral shaft fractures in children, the common problem is over growth and its rectification is depending upon the age of child (in younger child, 2cm overruling at the fracture position can be tolerable). With the growth of child and bone remodeling, it is foreseen that the 1cm shortening in 5 patients of this study will be resolved. Another study with a minimum two years follow up for detection of this phenomenon will be required [25].

CONCLUSIONS:

In ages of 6-11 years, through skeletal traction or intramedullary pin procedures, closed pediatric femoral shaft fractures can be recovered successfully. However, for school going children, our recommendation for the 1st treatment choice for this

fracture would be internal fixation with IM pin due to less time of hospitalization and quickly start of walking.

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