

# Conservative Treatment of Shaft Femoral Fracture in Children Between Ages (12-48) Months

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## Abstract

**Back ground and Objective:** Spica cast is an effective method for treatment of closed femoral shaft fracture in young children.

**Aim of the study:** Study done to compare between early (1-4)days, and delayed spica cast treatment after traction 2-3 weeks as a definitive treatment to see any difference in terms of results and complications, their advantages, limitation of acceptable reduction, overgrowth Phenomenon, period of hospitalization and cost.

**Patients and Methods:** This study done in our teaching Hospital, Thirty eight patients closed femoral shaft fracture were included in our study their age range between (12-48) months, Antero posterior and lateral views of the injured femur were taken as well as x-ray of pelvis. In 22 patients, early spica cast was done in the first (1-4) days after admission to the hospital. 16 patients continue on skin traction (2-3) weeks, when the fracture feels sticky and early callus appear on the x-ray one and half a hip spica is done under general anesthesia under guide of x-ray screening.

**Results:** The mean age was 30 months, the sex distribution of the patients was 23males 61%, 15 females 39%. 22 cases, right sided fractures 58%, while left sided fractures in 16 children 42%. The causes of fracture femur in our study were 24cases (63%) for fall on the ground, 8cases (21%) by fall from height and lastly 6 cases (16%) by road traffic accident. The sites of fracture shaft femur in children, according to which third of the femur is affected were 20 cases 52%in the middle third, 12 cases 31% for the proximal third, and 6cases 17% in the distal third. Initial observation of complications in our patients immediately after removal of the spica in patients treated with early spica were 2 cases for shortening, while patients treated with delayed spica following skin traction only one cases. Regrinding lateral angulations only one cases. Recorded in early type of spica.

**Conclusions:** Fracture shaft femur in children treated by early spica cast or delayed spica cast proved to obtain good results in spite of the presence of some degrees of shortening or angulations'. Which prove to be limited at the end of follow up. In decreasing hospitalization time, thus the parents and the patients will be more obedient.

**Key word:** fracture shaft femur, skin traction, image intensifier, spica cast.

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## Introduction

Fracture of the shaft of the femur is among the most common fractures encountered in orthopedic practice. Because

the femur is the largest bone of the body and one of the principal load-bearing bones in the lower extremity, fractures can cause prolonged morbidity and extensive disability

unless treatment is appropriate [1,2] the femoral shaft is surrounded by powerful muscles, which cause severe displacement and this requires power full traction for their correction [3].

Although the femur usually requires a large amount of energy to fracture, fractures can occur with low amounts of energy in infants and toddlers, and in those with a weak area in the bone [4-6].

Because pediatric bone breaks at lower applied force than adult bone, the stress in bone is less and therefore there is less energy to drive the crack. Complete fractures in children are rarely comminuted owing to elastic nature of young bone that absorbs some of the force of impact [7].

Femoral shaft fractures are defined as fracture of the femoral diaphysis occurring from 5 cm below the lesser trochanter and proximal to the adductor tubercle [4].

Spica cast treatment is an effective method of treatment for closed femoral shaft fracture in children. Spica cast may be applied early (2 to 5) days or delayed if applied after a period of traction (2 to 3) weeks and weekly radiographic observation [1,3].

### **Aim of Study**

To compare between early (1 to 4) days spica application and delayed spica after traction (2 to 3) weeks, in children aged (12 to 48) months with closed femoral shaft fracture, their advantages, limitation of acceptable reduction, overgrowth Phenomenon, period of hospitalization and cost.

### **Patients and Methods**

This study was done at Hospital during the period between 1<sup>st</sup> May 2010 till 31th November 2011.

Thirty-eight Patients with closed femoral shaft fracture were included in our study aged between (12 to 48) months, the neurovascular component of the injured limb were then carefully assessed and compared to

the contra lateral side. Antero posterior and lateral views of X-rays of the injured femur were then taken as well as X-rays of pelvis. Skin traction was then applied to the injured limb in the emergency unit. The patient was then admitted to the orthopedic wards after a general reassessment.

### **Initial procedures:**

When the child is first seen, analgesia is given and standard radiographs are obtained, skin traction is used until the Spica can be applied at the same day or convenient theatre or when the child has been fully recovered from such complication as mild head or abdominal injury.

### **Early Spica cast:**

Twenty two patients were treated by this method, their age range between (12 to 48) months, Early spica cast was done in the first (1-4) days after admission to the hospital. The reduction and Spica cast for all was done under general anesthesia and guide of x-ray screening.

### **Delayed spica after traction:**

Sixteen patients were treated by this method, their range between (12 to 48) months. We continue on skin traction (1to5) weeks, with daily observation of our traction and weekly x-ray examination to avoid distraction. After two to three weeks when the fracture feels sticky and early callus appear on the x-ray a hip Spica is done under general anesthesia and guide of x-ray screening.

### **Application of the Spica:**

Under general anesthesia, surgeon holds the ankle in one hand the calf in the other hand and put the hip in the following positions (proximal third fracture: the hip flexed 45°, abduction: 30° and external rotation: 20°), (middle third fracture: hip flexion 30°, abduction 20° and external rotation 15°) and (distal third: hip flexion: 20° abduction 20° and external rotation: 15°) to the fracture side. And then an assistant apply cast at first starting from lower

abdomen to the Knee joint, then the plaster should be mold to correct any angulations. When the plaster has been set, long-leg cast is applied with the knee flexed 40 degrees to 60 degrees; the longitudinal traction is applied to the calf to correct any shortening. The position is checked with a fluoroscope and when this is satisfactory the leg cast is extended into one-and-a-half hip spica. We accept up to 2.5cm of shortening, 20° of anterior angulations, and 15° of valgus angulations. Any unacceptable angulations

can be corrected by wedging the Spica and plastered it again.

### Results

Thirty eight patients were followed for approximately six month after removing cast. Age ranged from (12 to 48) months. The mean age was 30 months. The gender distribution of the patients was 23 males 61%, 15 females 39%. 22 cases were right sided fractures 58% while left side fractures were in 16 patients 42% only.

**Table (1):** The side of fracture and distribution.

Side	Male	Female	Total	%
Right	15	7	22	58%
Left	8	8	16	42%
Total	23	15	38	100%
%	61%	39%	100%	

Table (2) showing different type of specific treatment and the number of the patients for each type in early spica we treated by this method 22patients (58%) of

our sample. In our study 16 patients (42%) of our cases were treated with spica after skin traction for (2to 3) weeks.

**Table (2):** Methods of treatment.

Type of treatment	No. of cases	Percentage
Early spica	22	58%
Delayed	16	42%

The causes of fracture shaft in children our study were 24 cases (63%) for fall on the ground, 8 cases (21 %) for fall from height

and lastly 6 cases (16%) for road traffic accident. As shown in Table (3).

**Table (3):** Causes of fracture.

Causes	No.	Percentage
Fall on the ground	24	63%
Fall from height	8	21%
Road traffic accident	6	16%
Total	38	100%

The sites of fracture shaft femur in children, according to which third of the femur is affected were 20 cases (52%) for the

middle third, 12cases (31%) for the proximal third and 6 cases (17%) for the distal third.



**Table (4):** Site of fracture shaft femur in children.

Sites of fracture	No. of patients	Percentage
Proximal third	12	31 %
Middle third	20	52 %
Distal third	6	17 %

Table (5) shows the types of fracture shaft femur in children. There were 20 cases (53%) with spiral fracture, 11 cases (29%) with

oblique fracture, and 7 cases (18%) with Transverse fracture.

**Table (5):** Types of fracture shaft in children.

Type of fracture	No. of patients	Percentage
Spiral	20	53 %
Oblique	11	29 %
Transverse	7	18 %

Initial observation of complications in our patients immediately after removal of the spica in patients treated with early Spica

were 2 cases for shortening, while patients treated with delayed Spica following skin traction only 1 cases.

**Table (6):** Complication immediately after removal of Spica (shortening).

Time of Spica application	Shortening				Total
	$\leq 2.5$ cm	%	$> 2.5$ cm	%	
Early	20	91%	2	9 %	22
Late	15	94%	1	6 %	16
<b>Total</b>	<b>35</b>	<b>92%</b>	<b>3</b>	<b>8 %</b>	<b>38</b>

**P value; 0.75**

There is no significant difference between early and late spica in terms of shortening.

Regarding anterior angulations directly removal of Spica theirs no any cases anterior angulations more than 20 degrees.

**Table (7):** Complication immediately after removal of Spica (anterior angulations).

Anterior angulations	Time of application of Spica				Total
	Early	%	Late	%	
$< 10$ degrees	12	55 %	9	56 %	21
10 to 20 degrees	10	45 %	7	44 %	17
<b>Total</b>	<b>22</b>	<b>100 %</b>	<b>16</b>	<b>100%</b>	<b>38</b>

**P value;  $\leq 0.91$**

There are no significant differences between early and late spica in terms of anterior angulations.

Regarding lateral angulations only one cases recorded in early type of spica.

**Table (8):** complication immediately after removal of spica (lateral angulations).

Lateral angulations	Time of spica application			
	Early	%	Late	%
<= 15 degrees	21	95 %	16	100 %
>15 degrees	1	4.5 %	0	0 %

**P value; 0. 39.**

There is no significant difference between early and late Spica in terms of lateral angulations.

During the period of follow- up all these patients had a good status of walking and good range of movement in knee joint. In our study there was no case of delayed or non-union, no case of abnormal rotation, no posterior angulations, no medial angulations and no case of knee stiffness was found.

**Discussion**

The protocol of treatment we used in children less than 4 years has been shown to be simple and effective, and of those who were not in schools such finding in agreement with Epps HR, Molenaar *et. al.* 2009, and Cassine *et. al.* 2005. The Spica is removed in the outpatient clinic when there is evidence of union (6 to 8) weeks. Early Spica treatment is also useful for children with associated mild head injury because of better care and mobilization, although they spend more time in hospital [9, 10, 18 and 21].

At the time of removing Spica in our study (6 to 8) weeks, the resulting shortening more than 2.5cm were (9%) in early type casting, (6%) in late type casting, anterior angulations (more than 20°) were not recorded in both types, only lateral angulations (4%) observed in early type while not recorded in the delayed type of Spica. Such research is proved by other study which done in Ankara by Akshin *et al.*, 2009 He did immediate hip spica casting in his study. The study consists of 47 (26 boys and 21 girls) patients.

Mean age was 40.3 months (range, 18months to 6 years). Patients were followed up by weekly X-ray controls for the first month. Patients were assessed for unacceptable shortening and mal alignment, the end result shortening (more than 2.5cm) did not develop in any patients, such finding agreed with other studies done by Aksahin *et al.*, ( 2009).

The results also compatible with other study which done by Cem Zeki Esenyell *et. al.*, 20 with 10 years follow up on 207 patient of fracture femoral shaft treated by skin traction then Spica for 4 to8 weeks, at late review result were no any cases developed shortening .And any angular deformity. So leg-length discrepancy was uncommon and not significant; the rarity of leg - length discrepancy at late review supports previous reports that growth stimulation is directly proportional to the amount of shortening equal and less than (2.5cm). [12, 19, 23] the mean age of our cases which included in our study are 30 months and more than 98% located between (12to 48) months and the cause of fracture in our study are 63% of fall on the ground, 21% are of FFH and 16% are of RTA. To compare with other study Desmond Brown *et.al*, [16]. In which most of cases located between 24to 36 months, the causes were child abuse and fall on ground may be at increased risk of fracture owing to changes in gait, increased mobility, greater climbing ability, but in our study there's no child abuse [16,17].

Our results allow the definition of criteria for acceptable positions of the fracture during

various stages of treatment. In children younger than 4 years of age, and at all stages of treatment, anterior angulations of less than 20 degrees and lateral angulations of less than 15 degrees are acceptable,

Angulations in excess of these amounts or in the opposite directions should be corrected by wedging the Spica. Correct rotation is achieved by placing the foot in a slightly out-turned position, with an additional 5 degrees lateral rotation for proximal fractures [1, 13, 20, and 23]. They are told that the child's gait will improve over a few months and the leg-length discrepancy will correct over a few years, this is proved by other previous studies Wallace *et.al*, [14, 19] and Aksahin *et. al.*, It is also in accordance with the general trend towards shorter hospital admissions for children will suffer a psychological trauma well be less early Spica and the child returned to the home and family to be in his normal environment Streissguth AP *et al.*, [11, 15].

### Conclusions

Fracture shaft femur in children treated by early Spica cast or delayed Spica cast proved to obtain good results in spite of the presence of some degrees of shortening or angulations, which prove to be limited at the end of follow up. Early Spica had the superiority over delayed Spica cast, In decreasing hospitalization time, thus the parents and the patients will be more obedient. Decreasing hospitalization time will allow more free beds for other patients.

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