

Early Spica Cast in Children Femoral Shaft Fractures

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ABSTRACT

Objective: To find out the advantages of early spica cast as a treatment for isolated, uncomplicated femoral shaft fracture in children.

Study Design: Descriptive Study.

Place and Duration of Study: This study was carried out in the Department of Orthopaedics, DHQ Hospital, Dera Ghazi Khan from April 2009 to December 2010.

Patients and Methods: A total of 30 patients were included in the study. All patients under the age of 12 years, who presented during the study period with femoral shaft fracture were included in the study.

Results: A total of 30 children with femoral fractures were treated with early spica cast. Age ranged from 2 year to 11 years. Male to female ratio was 2.75:1. Majority of children were under 5 years. In most of the children spica cast was applied on the day of presentation within few hours and were sent home on the same day. Twenty one children were followed till removal of spica cast. Period of immobilization in spica cast ranged from 4 weeks to 7 weeks with average of 5.73 weeks. Common problems related to spica cast were soakage and breakage of spica which occurred in 9(42.85%) children. At the time of cast removal shortening ranged from 0.5cm to 2.5 cm in 15 out of 21 (71.42%) children:

Conclusion: Early spica cast is simple, effective and definite method of treatment with minimal complications and acceptable results in paediatric age group. It allows rapid return of child to family environment, thus avoiding prolonged separation from parents.

Key Words:- Children, Femoral shaft fractures, Hip spica

INTRODUCTION

Femoral shaft fractures in children are common and frequently require hospitalization^{1,2}. Traditionally femoral shaft fractures in children have been treated by some form of initial traction followed by spica cast immobilization. It is reported that interest in use of immediate or early spica cast has increased³. The advantages of this approach are decreased hospital stay and cost of treatment, avoidance of complications of traction and surgical fixation and rapid return of patients to their families⁴.

The problem with early spica cast treatment is shortening and deformity of limbs. Overgrowth of fractured limb and spontaneous correction of angulations at fracture site have been reported⁵. Perfect anatomical reduction is therefore not essential. Because of these characteristics in children, use of early spica cast seems to be an attractive treatment option. This study was conducted to establish the advantages of early spica cast as a treatment for isolated, uncomplicated femoral shaft fracture.

PATIENTS AND METHODS

This descriptive study was carried out in the Department of Orthopaedics, DHQ Hospital, Dera Ghazi Khan from April 2009 to December 2010. A total of 30 patients were included in the study. All patients under the age of 12 years, who presented during the study period with femoral shaft fracture were

included in the study. Patients having compound fractures and those with associated injuries were excluded. All patients had radiological evaluation of the injury. They were prepared for spica cast under general anaesthesia. Following recovery check x rays were taken to assess the reduction. Follow up done in outpatient clinic at weekly intervals for initial 3 weeks and then at longer intervals.

RESULTS

Thirty children with 30 femur shaft fractures who met criteria were enrolled for this study. The mean age of patients was 4.96 years, range 2 years to 11 years. There were 22 males and 8 females with M: F ratio of 2.75:1. (Table 1).

In majority of the patients the mode of injury was fall of object on patient i.e. 15 (50%) patients as shown in table-2.

Commonest problem with spica cast was soakage and breakage, which occurred in 9 out of 21 children (42.8%). Spica cast was reinforced in 6 (28.5%) children and changed in 2 (9.5%). None of the children required wedging. At the time of fracture healing i.e. at Femoral Shaft Fractures in Children Treated by early spica Cast removal of spica cast, shortening of fractured limb was seen in 15 out of 21 children. Shortening ranged from 0.5cm to 2.5cm (table-3).

After removal of cast parents were asked to bring their child after one year with fresh x-ray. Only 5 children could be followed for longer duration. A Three years

child presented after 6 months with 2cm lengthening of injured limb. One child had 0.5cm shortening of injured limb, while three children had equal limbs at one year follow up. There was no limping or any functional problem. Clinically both limbs remained equal.

Table No.1: Age and Sex Distribution (n=30)

Age	Male	Female	Total
<5	12	8	20
>5	10	-	10
Total	22	8	30

Table No.2: Mode of Injury (n=30)

Mode of Injury	No. of patients	%age
Road accident	6	20.0
Fall of object on patient	15	50.0
Sports injury	5	17.0
Hit by animal	4	3.0

Table No.3: Shortening at the Time of Fracture Healing

Shortening	No. of patients	%age
05 cm	02	09.5
1 cm	06	28.5
1.5 cm	04	19.0
2	02	09.5
2.5	01	04.8

DISCUSSION

Treatment of femoral fractures in children is controversial. Many surgeons have been quoted to advocate surgical modalities such as compression plates, flexible nails, and external fixators³.

Traditionally fractures in children are treated by initial traction for 3 to 4 weeks followed by hip spica cast till union occurs. Since the report in 1959 by Dameron and Thompson interest in use of early spica cast in the treatment of femoral shaft fracture in children has increased. Spica cast is simple, safe, effective and definitive method of treatment. It is cheap and associated with short hospital stay. The problem with early spica cast treatment is shortening and deformity of limb⁶.

Results of present study are comparable with others⁷. Ali and Raza have treated 100 children, aged 2 year to 12 years, with closed unilateral femoral shaft fractures by two methods. A) Thomas splint and B) early hip spica cast, fifty children in each group⁸. They have compared results of two methods in terms of time of union, degree of shortening and angulations in coronal and sagittal plane and found no significant difference between the two groups.

Duration of stay in hospital was 3.68 ± 2.11 days in early hip spica cast group. Average shortening at 1 year in their study was 0.36 cm in group B. Results of our study are comparable. Spinner et al have treated 32 children with femur fracture over 7 year period by

primary closed reduction and maintenance in double spica cast.

The hip and knee were flexed at 40 degree to 60°. They have removed sole of cast beneath the foot in all children in order to avoid shortening. Up to two centimeters of overriding, 30° of anterior angulation, and 15° of medial angulation were accepted. They have re-examined 75 children out of 85 for two to eighteen years after initial treatment. None of the children had any residual skeletal deformity or joint stiffness. The length discrepancies ranged from 1.7 cm of shortening to 0.9 cm of overgrowth of the fractured limb. Sugi and Cole have treated 191 children up to 10 years of age by early spica method⁷. They have included fractures of middle third of femur. They have kept knee and hip flexed at 40 degree to 60degree. They accepted up to 20mm of shortening 20° of anterior angulation and 15° of valgus angulation, but no posterior angulation or varus. Plaster under the sole of foot was removed so that planter flexion against it can not cause shortening as Irani et al did. 180 children were reviewed four and half to eight years later. Shortening at removal of cast was seen in all children of 9mm to 20mm (ranged from 0-10% of femoral length). At late review only seven children had from 6 to 13mm of shortening.

Angular malalignment was not seen at late review, while 13 children had 10-15° of medial rotation of the leg that was not noticed by parents or children. Nine children had complication due to spica, including pressure effects, malalignment of fracture and breakage of spica. In our patients we did not remove sole of cast underneath foot and found that shortening was not affected with presence of sole cast. In our patients shortening occurred in only 15 out of 21, as compared with all patients of Sugi and Cole at time of removal of spica. We do not have follow-up, therefore long term results can not be compared.

Most common problem was angulation which occurred in 3 (14.28%) out of 21 patients. Except in one patient angulation was within acceptable limits. Jamaluddin has prospectively studied 24 children aged 3 months to 10 years having femoral shaft fracture, treated by early spica cast. 5 He applied spica cast under sedation. Knee and hip were kept in 40-45 degrees of flexion. Foot part of cast was removed after about 3 to 4 weeks. The average hospital stay was 3.5 days. Shortening was the main problem and seen in all patients with an average of 15mm shortening at time of fracture union. Angulation was within acceptable limits in all patients. No complication related to spica cast was found.

In series of Ali and Raza duration of stay in hospital was 3.68 ± 2.11 days in early hip spica group, 11 while in series of Newton and Mubarak average hospital stay was 2.5 days⁹. The main concern in the treatment of femoral shaft fracture in children is shortening and deformity of the limb. In children, after fracture, femur grows at an increased rate. Overgrowth ranging from

1cm to 2.5cm has been reported by many authors^{10,11,12}. This overgrowth phenomenon following femur fracture has allowed acceptance of shortening up to 2cm at time fracture healing. Moreover, shortening up to 6 to 13 mm is not noticeable. Growing children also have ability to remodel malunited fractures. Spontaneous correction of up to 25 degrees of angular deformity has been reported¹³. Though rotation deformity usually does not correct, but up to 25 degrees of rotation is well tolerated¹⁴.

Complications related to spica cast are rare and insignificant. Nine out of 21 (42.85%) patients had soakage and breakage of spica, but only 2 required change of spica. None of patients needed wedging. Weiss et al have identified peroneal nerve palsy in 4 patients in a series of 110 paediatric femoral shaftfractures treated with early spica cast application¹⁵. All four had 90°/90° cast placed and underwent cast wedging for alignment. Peroneal nerve palsy occurred probably because of pressure on peroneal nerve while doing wedging. In our series no neurologic deficit was seen. This probably was because we kept hip and knee in neutral flexion and none of our patient underwent wedging of cast. Because of compensatory overgrowth and potential correction of angulation by remodeling process of fractures in children and minor complications related to spica cast, the use of early hip spica immobilization for the treatment of femoral fracture is an attractive alternate to the conventional method of treatment in children up to 11 years of age.

CONCLUSION

Early spica cast is simple, effective and definite method of treatment. Children up to 11 years of age can be safely treated with early spica cast. Early spica cast allows rapid return of child to family environment, thus avoiding prolonged separation from parents. Early spica cast also avoids complications related to traction and operative treatment methods.

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