



FREQUENCY OF LIMB SHORTENING IN FEMORAL SHAFT FRACTURES TREATED BY HIP SPICA CASTING IN CHILDREN IN TERTIARY CARE HOSPITAL.

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ABSTRACT... Objectives: In non-operative methods, hip spica casting is a gold standard for children under six years of age because of excellent bone union and remodeling qualities. The study was conducted to determine the frequency of limb shortening in femur shaft fractures in children treated by hip spica casting. **Study Design:** Descriptive cross sectional study. **Setting:** Orthopedics Department of Combined Military Hospital, Rawalakot, Pakistan which is the teaching hospital of Poonch Medical College, Rawalakot, AJK. **Period:** One year from July, 2016 to June, 2017. **Material and Methods:** After approval of the study from institution's ethical committee, all patients fulfilling the inclusion criteria were admitted through emergency or outpatient department for hip spica casting. It was descriptive cross sectional study and sampling was done by non-probability convenience sampling in 107 femur fracture patients treated by hip spica casting. Diagnosis of the fracture was based upon history of trauma with break in the continuity of shaft as seen by X-ray. Informed consent was obtained from parents/guardian to be included in the study. **Results:** The mean age was $5(\pm 2.04)$ years. Sixty eight percent patients were male and 32% were female. Sixty three percent patients had proximal femoral shaft fracture, 32% had middle femoral shaft fracture and 4% patients had distal femoral shaft fracture. The shortening of limb length was found in 14% of patients. **Conclusion:** In closed femoral shaft fractures, hip spica casting is a safe treatment in children. It has a low risk of complications. We recommend its use except for open fractures, multiple fractures, or fractures in older children.

Key words: Femur Shaft Fractures, Length Discrepancy, Limb Shortening, Spica Casting.

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INTRODUCTION

The femur fractures are classified according to the location as supracondylar, sub trochanteric, shaft (proximal, middle and distal thirds), and distal femoral physeal. The middle third of femur is most prone to fractures.¹ In children implant insertion is avoided so, to preserve the retinacular and lateral epiphyseal blood supply to the head, femoral neck and physis. Due to growing age, there is robust potential in children under five years to remodel the involved bony structures, and fractures closer to the physis may have greater tendency of remodeling than others.² In children, fracture potentially stimulate the bone growth and hence, there is risk of limb-length overgrowth.³

shaft fractures comprised of non surgical like pavlik harness, hip spica casting and surgical including plating, flexible nailing and external fixation etc. External fixation is an option reserved for patients with poly-trauma or open fracture in children.⁴

In non operative methods, spica casting is a gold standard for children under six years of age because of excellent bone union and remodeling qualities. It is most commonly used method of managing pediatric femur shaft fractures. Spica casting is a safe, simple and effective procedure, without possible complications of surgery and requires no specialized tools. It allows early discharge leading to early return of child to his family.⁵

Different options of treatment of pediatric femoral

Few problems related to spica casting are leg length discrepancy including shortening and lengthening, skin rashes, sores under the cast and loss of reduction in casting. Leg length discrepancy is one of the commonly faced problems with spica casting of femur shaft fracture in children.⁶ Despite, of few of these complications, the spica casting is recommended as first line of management in patients weighing 10-80 pound in close isolated fractures of the femur.

The main disadvantage is unacceptable shortening during treatment. Shortening of 2.5 cm is considered significant. However, accurate measurement is not that easy and great care must be given while measuring shortening.⁷ The reported proportion of shortening after spica casting is up to 13.35%.⁸ For post spica shortening, four types of treatment options are available, shoe lift, epiphysiodesis of the long leg, shortening of the long leg (in patients too old for epiphysiodesis), and lengthening of the short leg.⁹⁻¹¹

There is frequent occurrence of femur shaft fracture in children especially in hilly areas like Rawalakot, and lot of cases are reported in our teaching hospital. It is important to know the frequency of shortening of femur after spica casting as no such local study is available. Moreover, it will help to structure the guidelines for patient selection and counseling regarding prognosis following spica application. The results of this study will be used for self audit and also shared with other personnel involved in fracture rehabilitation and suggestions will be given regarding proper management and referral.

MATERIAL AND METHODS

The study was carried out at Orthopedics Department of Combined military hospital, Rawalakot Pakistan which is the teaching hospital of Poonch Medical College, Rawalakot, AJK. The study was completed in duration of one year from July, 2016 to June, 2017. Sample size was 106. It was calculated with the help of WHO software for sample size determination (13.35 % proportion of shortening⁸, 95% of confidence level and

6.5% margin of error). It was descriptive cross-sectional study. The sampling technique was non-probability consecutive sampling.

Inclusion Criteria

- Age below six years.
- Closed femur shaft (proximal, middle and distal) fracture on one side with other side normal.
- Both sexes.

Exclusion Criteria

- Pathological fractures associated with conditions like osteomyelitis, rickets, tumors or cysts, osteogenesis imperfecta detected by history, clinical and radiological examination.
- Patient presented after the two weeks of fracture.

Data Collection Procedure

After approval of the study from institution's ethical committee, all patients fulfilling the inclusion criteria were admitted through emergency or outpatient department for hip spica casting. Diagnosis of the fracture was based upon history of trauma with break in the continuity of shaft as seen by X-ray. The guardians of patients were informed about the procedure, care and follow up and patients were prepared for elective or emergency list. All the procedures were done by consultant orthopedic surgeon. Pre operative and post operative radiographs were taken for diagnosis and alignment of fracture site in hip spica cast.

At 2 weekly follow ups the child was supervised for cast condition. The assessment of shortening of femur was done at the time of removal of cast. Time of removal was calculated according to the formula (age in years + 3 = number of weeks). All these findings were observed by Consultant Orthopedics.

All the above information including name, age, gender, address & contact numbers and shortening was recorded on a predesigned proformas. Exclusion criteria were strictly followed to control any confounding factors and possible bias in the study results. The data was analyzed

using SPSS version 22.

RESULTS

Age distribution among 106 patients were analyzed. 50% (n=53) patients were in age group of 5-6 years followed by 30% (n=32) patients in age group of 2-4 years and 20% (n=21) patients were less than 2 years as presented graphically in Figure-1. Mean age was 5 years with standard deviation ± 2.04. Out of 106 patients n=72 (68%) were male and n=34 (32%) were female. Most of the patients n=67 (63%) had proximal femoral shaft fracture, n=34 (32%) had middle femoral shaft fracture and n=5 (4%) patients had distal femoral shaft fracture.

Limb length discrepancies of 106 patients are presented graphically in Figure-2. Hence, limb length shortening was found in 14 % (n=15) patients only. Shortening of limb length was correlated with age and gender distribution. Ten patients of shortening of limb length were found in age range of 5-6 years while 5 patients were found in age range of 2-4 years. Moreover, ten patients of shortening of limb length were male and 5 patients were female.

Shortening of limb length was correlated with site of fracture as well. Nine cases of shortening of limb length were found in middle of femoral shaft while 6 cases of shortening of limb length were found in proximal femoral shaft.

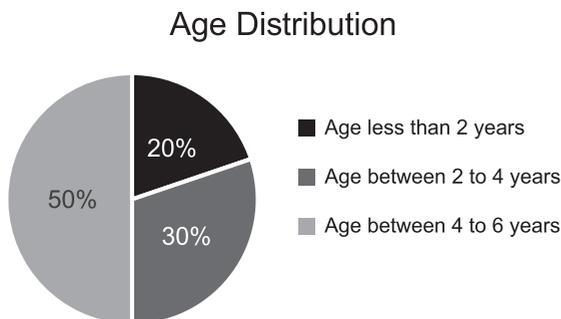


Figure-1. Age distribution among 106 patients

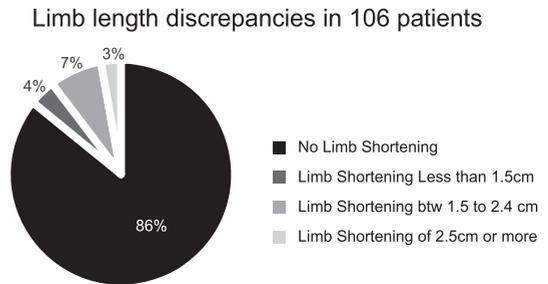


Figure-2. Limb length discrepancies in only 14% cases out of total 106 cases after spica casting

DISCUSSION

Epidemiological studies of paediatric femoral shaft fractures reveal that highest no. of fractures occur at the ages between two to six years due to falls.¹² However, our results are not consistent with a study from Karachi, Pakistan, where the maximum no of fractures occurred between the age of 5–11 years.¹³ The inconsistent results may be due to difference of altitude and terrain of both areas because chances of fall in younger children is much higher in the Rawalakot while the common cause of fractures in cities like Karachi is Road traffic accidents.

Boys have twice the rate of the femur fracture than girls.¹⁴⁻¹⁶ Our findings are consistent with these studies. Few other studies have findings that there is equal sex distribution of the femur fracture during the early childhood where the common mechanism is falls.¹⁷ The variation in results could be incidental. Moreover, it may be due to variation in grooming of child. In middle and lower socio-economic classes of society boys are born with a silver spoon, so they get over confident and are more involved in dangerous activities. Moreover, boys are more risk taking and hence, more prone to falls. Moreover, girls are more restricted in Islamic cultures and develop polite habits and hence are protected from falls.

Early closed reduction and hip spica casting has been an effective treatment modality. However, many studies matching early casting versus traction did not display any significant difference in outcomes.¹⁸ In our study shortening of limb length was found only in 14% of cases. Our results are quite encouraging when compared

with other studies, where the rate of shortening of limb length is around 20 % or more.¹⁹⁻²² The reason behind this success may be attributed to hard work of surgeons, expert spica casting techniques and vigilant evaluation of fracture alignment during reduction and healing period. The patient should be called for frequent follow-up visits and radiographs may be repeated especially during first 3 weeks to identify any shortening and displacement of the fracture in the spica cast.

Our study shows that incidence of shortening of limb length was found more in age range of 5-6 years as 10 cases were observed followed by 5 patients in age range 2-4 years. Hence, with the growing age the trend is towards greater failure of spica cast. Similar findings were observed in other studies.^{23,24}

CONCLUSION

In closed femoral shaft fractures, hip spica casting is a safe treatment in children. It has a low risk of complications. We recommend its use except for open fractures, multiple fractures, or fractures in older children.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Sultan Shah	Concept design, data collection and compilation, critical review.	
3	Sajid Razzaq	Data compilation, Concept design, critical review.	
4	Abdul Karim	Concept design, Data collection and compilation, critical review, Data analysis and proof reading.	
5	Ahsan ul Haq	Data compilation and proof reading.	
6	Abdul Sabour	Data compilation, Concept design, critical review.	