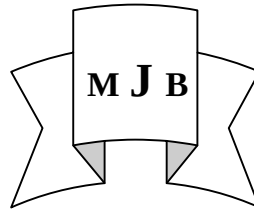


Femoral Shaft Fracture in Children Traction and Spica Casting Versus Immediate Spica Casting. (Clinical Comparative Study)

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Abstract

One hundred child with isolated non complicated femoral shaft fracture included in this clinical comparative study ,between 2005-2007 in Aldiwania teaching hospital. 50 child treated by immediate application of hip spica cast under general anesthesia and discharge of the child at the same day. Other 50 child treated by preliminary skin traction in the hospital for a period 2-3 weeks then after application of hip spica under general anesthesia.

After removal of the cast from all the children (6-8 weeks),shorting was seen in all children treated by immediate cast (43 case less than 2 cm ,7 cases more than 2 cm which regarded as a failure) while in other group shorting less than 2 cm was seen in 46 case , and more than 2 cm in 4 cases only.(p value more than 0.05, non significant).

After 2 years ,at the last follow up, limb length discrepancy was found only in 5 cases in children treated by immediate casting and in 4 cases treated by delay casting .which is non significant in both group. there's no significant angulations in both groups on short or late follow up. so we concluded that immediate hip spica cast application as definitive treatment for femoral shaft fracture in children between 2-10 years old represent an a good alternative method for the traditional method of preliminary traction in hospital and then hip spica. In addition its economic , safe, with short hospital stay and rapid return of the child to family.

كسر عظم الفخذ لدى الأطفال العلاج بالتجبس المباشر للكسر أو العلاج بالسحب الابتدائي ثم التجبس (دراسة مقارنة)

الخلاصة

تمت دراسة حالة مائة طفل من الأطفال الذين يعانون من كسر عظم الفخذ والذين أدخلوا إلى مستشفى الديوانية التعليمي للفترة مابين 2005-2007. كانت أعمار الأطفال مابين 2-10 سنة. تمت معالجة 50 طفل بطريقة التجبس المباشر للكسر تحت التخدير العام خلال أول يوم من دخولهم إلى المستشفى بينما عولج البقية (50) بالطريقة التقليدية، السحب الابتدائي للكسر بواسطة السحب الجليدي ولفترة تتراوح مابين 2-3 أسابيع في المستشفى وثم بعد ذلك التجبس تحت التخدير العام. أظهرت النتائج الأولية بعد إزالة الجبس مباشرة (6-8) أسابيع وكذلك النتائج المتأخرة (2 سنة بعد الكسر) بأنه لا توجد فروقات كبيرة بين الطريقتين فيما يخص طول أو اعوجاج العظم. لذلك فأن طريقة التجبس المباشر لكسر عظم الفخذ لدى الأطفال قد تمثل بديل جيد للطريقة التقليدية لمعالجة هذا الكسر.

Introduction

Femur fractures are the most common orthopedic injuries that requires hospitalization of children. As in adult femoral shaft fracture in children need to be maintained in acceptable alignment and brought out to length and rotationally oriented correctly[1-5].

Many successful methods have been reported in management of this fracture in children and the choice of a particular method is generally based upon the age of the child, fracture pattern , the presence of associated injuries and experience of the surgeon.

Both social and economic variable are also important, specially in developing countries.[6-8]

Hip spica casting is the standard modality of treatment of such fracture in children since the invention of plaster. Traction is also effective way to manage such injuries, however as the demand for inpatient bed is much higher than their availability, early discharge is beneficial.[8-10]

Although recent advances in external fixation and internal fixation have change this pattern specially in developed countries.

Early application of hip spica casting as definitive method of treatment has only recently been driven in popularity by the economics of health care.[11,12].

Aim of the Study

Our goal is to present our early and late clinical and radiological results of treating children with isolated uncomplicated femoral shaft in our locality using conservative method by immediate and delay casting, and compare between two methods.

Patients and Methods

This comparative clinical study done in orthopedic department of Aldiwanyia teaching hospital between (2005-2007).

We reviewed one hundred children from 2 years to 10 years old admitted to the hospital with isolated uncomplicated fracture of the femoral shaft. Those with supracondylar or subtrochanteric fracture were excluded from this study, as were pathological fractures. over all clinical and radiological outcome measure were analyzed.

Fifty child were treated by early application of spica casting after emergency management and radiological examination, either on the same day of admission or at the next day when the child admitted at night.

All hip spicae were applied under general anesthesia, traction applied on fracture limb, hip and knee were kept straight ,while ankle in neutral position.

Radiological examination were taken on the same day to check acceptable reduction.(less than 2 cm of overlap, and less than 20 degree of angulations in anterior posterior and medio-lateral plane were acceptable).all child are discharge from hospital at the same day of spica application.

Other fifty children were treated by delayed spica casting after a period of traction (balanced skin traction) applied to fracture limb in hospital for a period 2-3 weeks.

All children were followed in out patient clinic, every two weeks by assessment of the fracture reduction by the radiological examination until removal of spica cast after 6-8 weeks, then every four months for two years

after fracture to evaluate the shorting, angulations and malrotation, clinically and radiologically.

The mean age of children was (5.7) years, range (2-10) years, there were 65 males and 35 females (table 1) .

Results

Table 1 Number of children according to the age.

2-4 year	40
5-7 year	30
8-10 year	30
Total no.	100

Table 2 Number of children according to mechanism of injury.

Mechanism of injury	Number
Fall from height	58 case
Road traffic accident	27 case
Sport injury	15 case
total	100 case

The most common cause of fracture was fall from height , then road traffic accident and lastly sport injury. 73 fractures were on the right side and 27

on left side. 35 cases were transverse fracture, 45 case were short oblique fracture while 20 cases were spiral fracture (table 3) .

Table 3 Number of fracture

Type of fracture	number
Spiral	20 fracture
Short oblique	35 fracture
transverse	45 fracture

children according to configuration

After removal of the spica casting from all children, shorting was seen in all children treated by early casting, in 43 cases, less than 2 cm. (ranging from 0.2-2cm) which is acceptable, while in 7 cases shorting was more than 2 cm.(

range from 2.1-4 cm), which is not acceptable and these cases regarded as a failure and exposed to surgery.[14,13].All these 7 cases were above 7 years child with transverse fracture (table 4) .

Table 4 Limb length discrepancy in early casting group after removal of cast.

Number	Degree of shorting	%
43	Less than 2 cm	86%
7	More than 2cm	14%

while in other group shorting were seen in 46 cases which were accepted (less than 2cm),(range from 0.2 - 1.5cm) and in 4 cases was ,more than 2

cm (ranging from 2.2-3.5) which is not acceptable and those children exposed to surgery to overcome the shorting (table 5) .

Table 5 Limb length discrepancy in delay casting group after removal of cast.

Number	Degree of shorting	%
46	Less than 2 cm	92%
4	More than 2cm	8%

Angulations in any plane were ranging from (5-15) were seen in 20 cases treated by early casting, which is acceptable, while angulations in delay casting group were seen in 15 cases ranging from (5-10), which is acceptable also (Table 8) .

At the end of the last follow up visit (2 years), on clinical examination ,shorting was seen only in 7 cases in those child treated by early casting

ranging from (0.5-1 cm), while in children treated by delay casting ,was in 5 cases ranging from (0.5-0.8 cm). over growth were seen only in 3 cases that treated by delay casting (0.4-0.9 cm) (table 7) .

There was no angulations in all children after 2 years of follow up.

There was no significance mal-rotational deformity in both groups.

Table 6 Compare between early results of two group.

Method of treatment	Less than 2 cm of shorting	More than 2 cm of shorting	Total no. of cases
Immediate casting group	43	7	50
Delay casting group	46	4	50
Total number	89	11	100

* P value. more than 0.05. (non significance)

Table 7 Limb length discrepancy in both groups after 2 years.

.method of treatment	No. of cases with shorting	Degree of shorting	%	No. of cases without shorting	%	Total no. of cases
Immediate casting	7 cases	0.5-1 cm	16.2%	36 cases	83.8%	43
Delay casting	5 cases	0.4-0.9 cm	10.8%	41 cases	89.2%	46

P value more than 0.05 (non significant)

Table 8 Degree of angulations in coronal and sagittal plane after removal of the cast.

Method of treatment	No. of cases with angulations	Degree of angulations
immediate casting group	20 case	5-15 degree
Delay casting	15 case	5-10 degree

Case no.1. 7 year child, treated by immediate
Casting,4 weeks from fracture.



The same child ,after removal
Of the cast. 4 cm shorting



Case no. 2 . 8 year child treated by
Immediate cast.



The same child after 6 weeks



Case no 3. 4 year child with transverse
weeks in Fracture femur treated by immediate cast.

The same child after 4
cast

Discussion

Femoral shaft fracture are most common injury treated by pediatric orthopaedic surgeon. The vast majority of these fracture in children heal without any long term sequeale regardless of treatment method.[15]

Traditionally, these fracture in children are treated by initial traction for 2-3 weeks followed by hip spica casting till union occur. Recently many surgeon have been advocate surgical

modalities such as compression plates, flexible rods, and external fixation.[16]

Since the report in 1959 by Dameron and Thompson, interest in use early spica casting in treatment of femoral shaft fracture in children has increase.[17]

Spica cast is simple, safe, effective definitive method of treatment, it is cheap and associated with short hospital stay. it has been used with great success , largely because children

have tremendous ability to remodel the deformity that remain after closed treatment.

We evaluated our results of two different method of conservative treatment and compare with other study.

Our result was comparable with the results of Ali and Raza, they treated 100 child ,2-12 years, with closed femoral shaft fracture by two different methods. Traction with Thomas splint and early hip spica cast and compare the result of two methods, they found no significant difference between two group, and average shorting at 1 year in their study was 0.36 cm in early spica casting group.[18]. while average shorting at 2 year in our study was 0.75 cm in early casting group and 0.7 cm in delay casting group.

Spinner et al. have treated 32 children with femoral shaft fracture over 7 year period by primary closed reduction and double spica casting.[19].

For children over 3 years skeletal pin was passed through proximal tibial metaphysis, after 1 year almost all fractures united with 0.6 cm of shorting, but the angulations was a problem. which is comparable with our study although we used simple balanced skin traction without any skeletal pin, period of follow up was 2 years and we didn't find any problem with angulations on last follow up.

Sugi and Cole ,have treated 191 children up to 10 years of age by early spica casting, hip and knee kept in 40 - 60 degree with plaster under the sole of the foot was removed, so that planter flexion against it can not cause shorting. 180 children were reviewed four to eight years later, shorting at removal of the cast was seen in all children of 9-20 mm.[20]

At late review only 7 children had 6-13 mm of shorting, angular mal-alignment was not seen at late review. which is comparable to our result, although we use spica casting with hip and knee straight and foot in neutral position.

Martinez et al have reviewed retrospectively 51 children aged 3-11 years with femoral shaft fracture treated with early spica casting, they kept hip and knee in 40 degree of flexion. They have reviewed children till union of fracture, shorting more than 20 mm was most common problem.21 occurring in 22 (43%) children, angulations more than 15 degree occur in 4 cases. which is comparable to our result.[21]

Bashir and Nand, have treated 30 children under age of 12 years with femoral shaft fracture by immediate spica casting. At the time of removal of the cast shorting of 0.5-2.5 cm was in 15 out of 21 children, angulations was found in 3 out of 21 children. While in our study shorting was found in all cases treated by early casting although mostly less than 2 cm and angulations found in 20 cases out of 50 cases.[22]

Orhan Akinci et al evaluated 67 child with fracture femoral shaft treated by traction for 3 weeks followed by spica cast, average follow up was 23 month, 30 degree angulations was in 7 (10.4%) patients limb shorting in 10 (15%) patients. In our study shorting more than 2 cm was found in 4 cases, while angulations in 15 cases only.[23]

In our study, we found that transverse fracture is more liable for shorting when we treated by immediate casting when compare it with spiral or oblique fracture. this may be because it is difficult to achieve perfect apposition of the bone fragment, re-displacement is more common in the cast.

We didn't found any study correlate between type of fracture and method of treatment.

Complication related to spica cast in our study are insignificant such as soakage and breakage.

Recommendation

Because of compensatory over growth and potential correction of angulation by remodeling, in children , immediate hip spica in treatment femoral shaft fracture in children, represent good, economic, safe, effective method of treatment , with short hospital stay, and rapid return to home.

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