SKIN TRACTION FOLLOWED BY SPICA CAST VERSUS EARLY SPICA CAST IN FEMORAL SHAFT FRACTURES OF CHILDREN

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ABSTRACT
Objective: To compare the results of skin traction followed by spica cast and early spica cast in the treatment of femoral shaft fractures in children.
Design & Duration: Quasi experimental study conducted from June 2004 to May 2006.
Setting: Orthopaedics Unit II, Civil Hospital, Karachi.
Patients: A total of 42 patients with fracture shaft femur, aged 3-10 years.
Methodology: The patients were randomly assigned into two groups; Group-I (n=21) patients underwent early spica application while Group-II (n=21) patients underwent skin traction in Thomas splint followed by spica cast.
Results: Among the total 42 patients, 29(69%) were male and 13(31%) female. The average age of patients was 7.6 years in Group-I and 7.8 years in Group-II. The mean spica application time was 42-56 days in Group-I and 21-28 days in Group II. Satisfactory results were seen in 17(81%) cases of Group-I and 20(95%) cases of Group-II.
Conclusion: Skin traction followed by spica cast and early spica cast for femoral shaft fractures in children (3-10 years) are comparable, but the results are better in the former group.

KEY WORDS: Femoral Shaft Fractures, Spica Cast, Skin Traction, Thomas’ Splint

INTRODUCTION
Fractures of the shaft of femur are common injuries in children that are associated with polytrauma, RTA and fall from height; the type of fracture depends upon the severity of trauma and the height of fall. The longitudinal muscle pull and spasm causes the femoral shaft fractures to shorten and angulate.1

The aim of treatment is to restore length and alignment, and to encourage union and early rehabilitation.1,2 There are options available for the treatment of femoral shaft fractures in children including immediate spica cast, skin traction through Thomas’ splint, longitudinal skin traction, ordinary Russel traction and - 90° skeletal traction.3-4 These fractures can be successfully treated conservatively, occasionally they may need internal fixation. Skin traction via Thomas’ splint is still an essential feature of these fractures in many centres, which compares favorably with other methods of treatment.5,6

The choice of treatment in children should include a simple method of immobilization which is comfortable for the child and the family, have fewer complications and inflict minimal psychological trauma. The excellent osteogenic potential of paediatric periostium permits rapid, aggressive fracture healing, so non-union is extremely rare.7 Besides remodeling is rapid, therefore permanent deformity is also rare.8

Accurate anatomical reduction of these fractures is usually not achievable, if possible it results in an increase in the length of the injured limb due to fracture related stimulation of growth; hence end to end apposition should be avoided. On the other hand an excessive shortening i.e. more than 2cms can occur at the time of union but is considered non-acceptable.9

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aged three years, a shortening of 0.5-1.5 cms is acceptable as the final outcome. The choice of treatment thus depends on the age of the child, and the location and the type of femoral fracture. The skill of the operating surgeon and the family atmosphere are additional considerations. Usually greater hospital stay is not acceptable due to economic and psychological reasons. New trends are being setup to improve the operative methods of treatment and early casting is being popularized. This study was undertaken to compare the results of early spica cast with those of skin traction via Thomas’ splint followed by spica cast.

PATIENTS & METHODS

This study was conducted in the Orthopaedics Unit II, Dow University of Health Sciences & Civil Hospital, Karachi from June 2004 to May 2006 on 42 children who presented with closed, unilateral femoral shaft fractures. Children with other associated injuries were excluded from the study. They were randomly assigned to two groups:

- Group-I: Early Spica Cast was applied.
- Group-II: Skin traction via Thomas’ splint was applied followed by Spica Cast.

In the emergency ward, the injured limb was splinted and antero-posterior and lateral radiographs taken, including hip and knee joints. Analgesia was given before splintage. Thorough clinical evaluation of the patients was done and the neurovascular status of the injured limb was assessed. Measurement of both the limbs were done using spino-malleolar distance, and any discrepancy was recorded. Shortening was also assessed from the X-rays noting the overlap of fractured fragments.

All patients (n=21) in the early spica cast group (Group-I) were kept on long leg POP slabs for about 24-48 hours. After this period one and a half spica cast was applied in the operation theatre under general anaesthesia. The hip was positioned 45° flexion, 20° abduction and 20° lateral rotation for proximal third; 30° flexion, 20° abduction and 15° lateral rotation for middle third and 20° flexion, 20° abduction and 15° lateral rotation for distal third fractures. Antero-posterior and lateral radiographs were taken. Shortening and angulation were measured. If over riding was within 2 cms and angulation in sagittal plane within 20° the spica cast was continued. Follow-up radiographs were taken at weekly intervals for four weeks, the spica was removed after 42-56 days, and radiographs and measurements were taken to confirm the length of both limbs.

The 21 children in Group II were treated with Thomas’ splint skin traction followed by spica cast. Before the application of Thomas’ splint adhesive plaster was applied both medially and laterally from mid thigh to foot, embending rope at both the ends. After giving traction, Thomas’ splint was applied properly and both ropes tied with the splint with a wooden bar place in between. The bar is rotated till full traction achieved. Antero-posterior and lateral radiographs taken and position assessed in both views. If there was any over riding then wooden bar was twisted again to achieve reduction. The tension of the bar was maintained for 3-4 weeks till soft callous formed. Radiographs were taken in both the views weekly. The spica cast was applied for another 3-4 weeks before physiotherapy started. Antero-posterior and lateral radiographs were taken at that time and measurements taken to compare the length of both the lower limbs.

Results of both the groups were compared, based on the following criteria of satisfactory outcome:
- Shortening within 2 cms at the time of cast removal.
- Angulation within 20° in sagittal plane and within 15° in the coronal plane at the time of cast removal.
- No complication needing change in management.

The patients who did not fulfill the above criteria were categorized as those with unsatisfactory results.

RESULTS

Out of 21 patients in Group-I (early spica cast), 15 were male and six were female. The details of their fractures is given in Table I. The results of their treatment were satisfactory in 17 and unsatisfactory in four cases. (Table II). Three patients developed more than 2 cms shortening and two patients unacceptable angulation, the latter was corrected by wedging the cast. All the patients had a shortening between 8-18mm (average 10.5mm).
Table II. Comparison of Treatment Results

<table>
<thead>
<tr>
<th>Result</th>
<th>Gp-I (n=21)</th>
<th>Gp-II (n=21)</th>
<th>Total (n=42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfactory</td>
<td>17(81%)</td>
<td>20(95%)</td>
<td>37(88%)</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>4(19%)</td>
<td>1(05%)</td>
<td>5(12%)</td>
</tr>
</tbody>
</table>

DISCUSSION

The goal of treatment in fracture of femoral shaft in children is to achieve union without discrepancy in limb length and deformity. To achieve this many treatment options are available. In the current study half the patients were treated with skin traction via Thomas’ splint for 3-4 weeks followed by spica cast for another 3-4 weeks. Spica cast was applied when the fracture site was non-tender and sticky. The results were good and there were fewer complications, but the hospital stay was prolonged making the treatment costly. To overcome this we modified our treatment i.e. after application of skin traction via Thomas’ splint, the patient was kept in the hospital for only three days and then discharged, after confirmation of good reduction by X-rays, and no length discrepancy or angulation. The patient was then followed-up in the outpatient weekly.

The other half of our patients were treated by early spica cast. They also had satisfactory results, though not as good as that with skin traction in Thomas’ splint followed by spica cast. Besides the prolonged application of spica cast causes more hygienic problems, skin ulceration, joint stiffness, pressure sores, and loss of reduction.

In our study of 42 children the functional results and complications are comparable with the findings of other authors. Studies by Burton and Fordyce, Allen et al, Splain and Denno, Henderson et al, and Rasool et al did not find much difference in the outcome between early spica cast and skin traction followed by spica cast. Staheli and Sheridan followed a group of children under nine years and found a length discrepancy less than 7mm. Sugi and Cole in their long term series on fracture femoral shaft in children conclude that the leg length discrepancy was rare and clinically insignificant.

CONCLUSION

The results of early spica cast and skin traction followed by spica cast are comparable in the treatment of fracture of shaft of femur in children. However, the latter method is better because of lesser length discrepancy, less deformity, less joint stiffness, lesser period of immobilization in spica cast, and fewer complication like ulceration, pressure sores and loss of reduction.

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