

Cast Bracing for Accelerated Treatment of Femur Fracture in the District Hospital

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The average time for healing after mid and lower femoral shaft fracture in adult men requires about 8 weeks in traction. We have successfully adapted a technique of cast bracing within the resources of many district hospitals which substantially shortens the in-hospital admission time to about 4 weeks.

Key words: Cast, bracing, femur, fracture, treatment

Introduction

The general treatment of femur fracture in our district hospitals has been skeletal traction using Steinman pin through proximal tibia. The ordinary bed is adjusted to allow for Perkins exercise. There are generally good results but the average length of hospitalization remains about 8 weeks. A recent review from Addis Ababa documents the success of this method citing an average length of traction 30-40 days followed by continued physiotherapy¹. This has been the general treatment for all femur fractures in our district hospitals (upper, mid, lower shaft femur; transverse, oblique, or comminuted).

The clinical problem of delayed union and the logistical problem of many patients with femur fracture in a ward of limited space led us to re-evaluate the treatment program. The cast brace method has been described to be effective and to shorten hospitalization^{2,3,4}. It has been studied biomechanically⁵. The theoretic advantage of a cast brace is early mobilization of the joint with mechanical support to prevent angulation. Care must be taken so that the brace is applied when there is adequate callus formation to prevent shortening when traction is removed. If weight bearing is delayed while the cast brace is in place, this potential complication can be avoided. The total time for healing and weight bearing is similar to patients treated by traction alone but the cast brace method can shorten the time of hospitalization.

We developed a system of functional cast bracing which we could apply after the initial period of Perkin's traction for 4 weeks. After initial development, the cast brace method was subsequently applied to all patients with mid and lower femur shaft fractures where the fracture site would be contained within the thigh cylinder. Fractures were oblique or transverse. A few fractures had minimal comminution. We did not apply this method to fractures of the upper third because of expected problems in angulation when the fracture site would not be included securely in the usual thigh cylinder (although some authors have found a solution applying cast brace even in proximal femur fractures)⁶. At this time there was clinical evidence of callous formation and early healing, ability to flex the femur slightly but not yet ability to raise the femur off the bed with knee extended. Without cast bracing, such patients would generally require an additional 2 weeks traction with Perkins exercise.

Methods

A retrospective audit was made of the experience treating femur fracture with an interest to review length of hospitalization and return to normal activity and the complications associated

with the treatment programs at Choma General Hospital for the ten-year period 2000 - 2009. Adult male patients were included of ages from 18-65 (median age 30). Records of theatre log and surgical clinic were reviewed by the author. Most patients were followed as outpatients for 9 months. All of these patients were treated by the one consultant surgeon during this period.

Table 1. Comparison of Effectiveness

| Treatment Group | Number Patients | Length Hospitalization (days) | Complications of infection | Complications of union (No of Patients) |
|-------------------------|-----------------|----------------------------------|----------------------------|---|
| Traction only | 38 | Mean Average 45 (range 40-50) | 6 (pin site) | 2 shortening over 2cm |
| Traction; Cast Brace | 15 | Mean Average 35 (range 30-42) | 1 pressure sore | 2 angulation 3 shortening over 2 cm |

Discussion

The general treatment of femur fracture in the adult in our district hospitals has been skeletal traction using Steinman pin through proximal tibia. It takes just a few demonstrations for many family bedside attendants to become proficient in helping their relatives begin a good daily exercise program. The patient is helped to sit up, the springs are removed from the distal third of the bed and the mattress folded. With slight adjustment of traction, the patient can begin flexing and extending the knee joint. We had been generally pleased with the results – good union being achieved, good range of motion preserved at the knee, fairly good preservation of muscle mass in the quadriceps as described in the comprehensive study of the technique by Bezabeh et al². There are few easily managed complications.

Although the skeletal traction with Perkins exercise gave generally good results, we had a few patients who required prolonged traction. None had non- union. Reports of functional cast bracing were reviewed² and adaptations were made for our environment. All patients had begun Perkins exercise with tibial Steinman pins in place. We found that we could apply cast brace after 4 (or sometimes 5) weeks, markedly decreasing the length of hospitalization for most patients. The cast brace method went through several modifications beginning with an unlocked but extension-limited hinge fixed to a plate which was embedded in plaster cylinders around thigh and leg. The final method simply used aluminium struts with bolt hinges (materials easily available in ordinary hardware shops) embedded in plaster cylinders. The patients were able to go home with crutches delaying weight bearing for another two- three weeks. The cast brace facilitates correct flexion/ extension exercise without the complication of valgus / varus angulation in this early period if weight bearing were to begin too early. The patients return for follow-up after 6 weeks for plaster removal. The patients were then followed up at 3 months and 6 months.

Two complications of the fracture deserve special attention in applying this technique. The incidence of shortening when cast bracing is applied after good callous formation is similar to patients treated with the more usual prolonged period of traction. The incidence of angulation may be higher if the fracture site is not well contained within the thigh plaster cylinder or if weight bearing begins too early. What the cast bracing method achieves is facilitating earlier discharge, with correctly aligned knee joint motion without continued traction in place; but patients must be warned against too early weight bearing.

Conclusion

Closed femur fractures of the mid and lower femur, can be successfully treated by skeletal traction with Perkins exercise followed by cast bracing at 4- 6 weeks. This method is achievable in district hospitals with locally sourced materials from hardware outlets. The final outcome in terms of joint mobility, muscle strength is probably similar but the benefit is shortened hospitalization – a genuine benefit for most small district hospitals and for many families in rural areas who must make repeated journeys to the hospital for care of their patient.

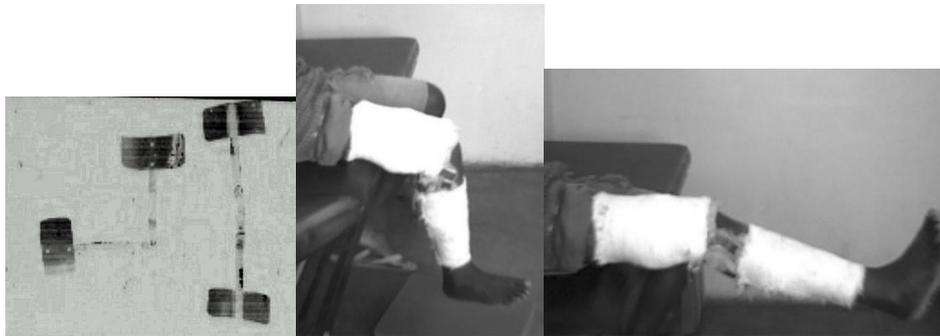


Figure 1. Simple Cast bracing materials available in rural district hospital

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Conflict of Interest

There was no agency funding, no conflict of interest.

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