Experience in the treatment of femoral shaft fractures using a Vitrathene cast brace*

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The concept of weight bearing in the treatment of lower limb fractures was described as early as 1791 by John Hunter. Bohler (1953) and Sarmiento (1967) applied this principle to the treatment of fractures of the tibia. Interest in bracing of femoral shaft fractures to allow weight bearing was recently revived by Mooney et al. (1970) and reported in detail by Connolly et al. (1973).

In 1973 a project of bracing the fractured femur was undertaken by the Department of Orthopaedic Surgery and Occupational Therapy at The London Hospital.

Method of treatment

After reduction of the femoral fracture, Hamilton Russell skeletal traction was applied until the fracture was sticky. An occupational therapist and occupational therapy technician measured and made the brace (Fig. 1) as follows; a long leg plaster cast incorporating an ischial shelf is made, from which a positive cast using dental grade plaster is prepared. Shapes of 4.5mm Vitrathene and 6mm Plastazote are cut from patterns of the positive cast, heated together and moulded onto the positive cast and ischial shelf. The ischial shelf being added for comfort while wearing the brace. At this stage the Steinman pin is removed from the tibia and skin traction applied. The thigh and lower leg components are then fitted on the patient and necessary adjustments made. Knee joints consisting of stainless steel hinges and Duralumin struts are carefully aligned and riveted into place. Overlap tongues and Velcro straps are fitted and complete the brace.

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There were 17 females and 40 males. The right side was involved in 36 patients, the left in 20 and in one patient the fracture was bilateral.

Figure 2 shows the time spent in traction, with a range of 2 to 10 weeks. Three patients were referred cases of established non-union and spent longer in traction, as did a fourth patient who required removal of an internal fixation device. For the remaining 53 patients, the average time spent in traction was 5.9 weeks.

Figure 3 shows that the time spent in the cast brace ranged from 4 to 19 weeks. The 3 cases of non-union spent longer in the brace. A fourth patient was still in the brace at the time of writing because of an ipsilateral fracture of the tibia. The remaining 53 patients spent, on average, 9.9 weeks in the brace.

The hospital stay ranged from 5 to 12 weeks with an average of 8.1 (±2.0) weeks. The total time from sustaining the fracture to removal of the brace was on average 15.9 (±4.4) weeks, with a range 8 to 24 weeks, inclusive of the 3 cases of established non-union.

Figure 4 shows the site and type of fracture, 61% being upper or middle third fractures. The average fracture angulation, as measured on both AP and lateral X-rays before bracing was 6 degrees (±5 degrees) with a range of 0 to 23 degrees. After bracing the average fracture angulation was again 6 degrees (±6 degrees) with a range of 0 to 29 degrees. All the fractures united satisfactorily after bracing, including those cases of established non-union referred to us. The cases of non-
union may require up to 8 months in the brace. An example of a healed mid-shaft fracture after bracing is seen in Figure 5.

Loss of position in the brace occurred in 8 per cent of all fractures. The resulting union was clinically and functionally acceptable, however, and loss of position was avoided in subsequent fractures by applying a pelvic band for upper and mid-third fractures. Some 24 weeks after the fracture average knee flexion obtained was 115 degrees (±20 degrees). No shortening occurred in the brace.

A total of 49 patients were able to remove and re-apply the brace at an average of 2-6 weeks after the brace was first applied. Three of the younger patients required the help of a parent while 5 of the older patients needed additional help. At an average of 2-0 weeks after the brace was first applied 51 patients were able to manage stairs in a brace. We have records of 26 patients returning to work at an average of 5 months after the fracture. An additional 14 patients were of working age but their return to work date was not available for reasons of vagrancy or their being referred from outside our area.

Conclusion


In upper or middle third fractures, alignment was sometimes lost, this may be prevented by adding a pelvic band in abduction.

In all, 57 patients were treated by femoral bracing. On average they were hospitalized for 8-1 weeks, spent 5-9 weeks in traction, a further 9-9 weeks in a brace and attained 115 degrees of knee flexion.

REFERENCES


