Tibial fractures — a useful plastering technique

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SUMMARY

The management of the acute tibial fracture is controversial, since no single method is appropriate in all circumstances and treatment indications often overlap. Given the potential problems in the management of this often difficult fracture, it is important that the attending clinician be familiar with both operative and conservative methods of treatment. In recent years, operative intervention has become increasingly popular, particularly the use of the intra-medullary locking nail, but such techniques are not without complications, including delayed union, non-union, malunion and infection.¹ The authors strongly believe that conservative treatment remains an important option in the treatment armamentarium. A plastering technique is therefore described which is easy to perform, maintains good reduction and avoids the need for skilled assistance, excessive analgesia or an anaesthetic. It can be performed when the patient is initially assessed in the accident department, and it has a definitive role in the treatment of closed tibial fractures.

Keywords: conservative treatment, plaster cast, tibial fracture

INTRODUCTION

Several techniques have been described for the application of plaster to fresh tibial fractures, perhaps those most commonly performed being (a) with the leg in a vertical position where gravity assists in fracture reduction, and (b) with the leg in the horizontal position where the thigh may be supported by a block, as described in Rockwood and Green's *Fractures in Adults* and in Watson-Jones' *Fractures and Joint Injuries*.^{2,3} More recently, an interesting modification to these procedures has been described by Burnett and Freedman, which obviates the need for an assistant and involves a two-stage plaster application followed by subsequent fracture reduction.⁴ Unfortunately, each of these methods is only appropriate when regional or general anaesthesia is used. Reduction

with intravenous analgesia may be attempted, but breakthrough pain is usually experienced. It is appropriate and normal practice for patients with such fractures to receive analgesia, often of the opiate type, when initially assessed in the accident and emergency (A&E) department, and it is important that such analgesia should be adequate to control pain. Using the plastering technique described below, significant breakthrough pain is unusual and therefore recourse to further analgesia is usually unnecessary.

METHOD

The requirements include the following items:

- (a) four strips of 8-inch-wide plaster wool to reach from groin to toes;
- (b) three strips of 8-inch-wide 6-ply plaster to reach from groin to toes;
- (c) three or four 8-inch plaster rolls;
- (d) two pillows, the top one covered with a plastic bag.

The procedure is as described below.

- (1) The patient lies supine with the limb placed on pillows and radiographs or fluoroscopy are used to confirm satisfactory fracture reduction.
- (2) The strips of 8-inch plaster wool are laid on to the anterior surface of the limb, one anteriorly, and one each anterolaterally and antero-medially with overlap, from upper thigh to heel. These are tucked under the thigh and calf leaving a narrow strip *uncovered* on the posterior surface of the limb (Fig. 1).
- (3) Plaster wool is now carefully rolled around the foot to cover all uncovered areas.
- (4) The three 8-inch plaster slabs are gently applied to the padded surface of the leg anteriorly, anteromedially and anterolaterally with overlap, once again ensuring some cover of the posterolateral and posteromedial surfaces. The plaster is moulded around the heel, whilst an assistant maintains the ankle in the neutral position until set. Once the plaster has set, approximately three-fifths or even four-fifths of

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Fig. 1. The wool strips are tucked around the thigh and calf to leave a narrow strip uncovered posteriorly.

the limb is supported, enabling it to be lifted comfortably, thereby controlling pain and maintaining reduction (Fig. 2).

- (5) Whilst elevated by an assistant, the fourth wool strip is applied to the posterior aspect of the thigh and leg, gently tucking it under the plaster medially and laterally (Fig. 3).
- (6) With the slabs now secured, the plaster is completed by using 8-inch plaster rolls from groin to toes (Fig. 4).
- (7) Once application is complete, a further check radiograph is performed to ensure that satisfactory alignment has been maintained.

If traction on the heel is required to maintain reduction, the technique is modified slightly so that the plaster slabs stop at the level of the ankle prior to elevation of the limb and plaster completion. The use of fluoroscopy to assess this is helpful.

This technique for tibial plaster application is not

technically demanding and could be undertaken by either A&E or orthopaedic staff, experienced in the initial management of patients with fractures. However, it is essential that check radiographs both at the beginning and at the end of the procedure be examined by medical staff competent to assess the adequacy of fracture reduction.

DISCUSSION

The patient with a closed tibial fracture is at particular risk of compartment syndrome. It is a policy, therefore, on this unit that all such patients be admitted for general and distal neurovascular observations, conducted by staff trained to recognize signs of early deterioration. Using the technique described, the plaster is not split routinely, but should evidence of rising pressure occur it is immediately split, opened to the level of

Fig. 2. With most of the limb now encircled by plaster, it can be lifted quite comfortably and reduction maintained.

Fig. 3. The fourth wool strip is applied to the bare area posteriorly.

Fig. 4. The slabs are secured with rolls of plaster from groin to toes and the plaster is complete.

the skin and intensive monitoring undertaken. If improvement does not occur, recourse to early pressure monitoring and/or surgery is necessary. Given the potential complications of an established compartment syndrome, the threshold for decompression is low.

We have used this technique many times as a means of definitive management of uncomplicated fresh tibial fractures, both stable and unstable. It is both simple and quick to perform, may be applied without skilled assistance, and is highly suitable for early application following initial assessment. Whilst the patient should be administered adequate analgesia before commencing the procedure, it is unusual for additional pain relief to be required during the procedure.

The acute tibial fracture is common, and may sometimes be difficult to manage. At a time when

controversy over management still exists, it is important that the conservative option remains an essential part of the attending clinician's somewhat limited armamentarium. The authors recommend this technique as a comfortable, definitive procedure in patients with acute closed tibial fractures which are undisplaced or reduce simply with longitudinal traction. In addition however, we would wish to point out that where other forms of fixation are to be undertaken, such as intramedullary nailing, this technique may be used to provide a useful and comfortable splint during the pre-operative period.

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