3 Femoral fractures
3.11 I Proximal femoral fractures - Management with minimal resources

Indication  All proximal femoral fractures

1 Introduction

Fractures of the upper end of the femur should be treated operatively.

They should only be considered for nonoperative fracture treatment if there are neither facilities, nor skills, for surgical treatment.

2 First Aid

The ABC of primary care for the injured always takes precedence over the fracture treatment. Once the safety of the patient has been established, attention is directed to the fracture.

It is important in treating any femoral fracture to splint the whole leg as soon as possible, and before transport of the patient. For that purpose you need two firm boards or sticks along the leg, suitably padded, one on the inside and one along the leg and the body on the outside.
Any soft material such as clothing, blankets, etc. can be used as emergency padding.

The splints should then be kept in place by bandages around both splints and ...

... the leg as well as the body.

Suitably splinted, the patient can be transported to the chosen hospital facility.

If no boards are available some stabilization can be achieved by splinting the fractured leg to the uninjured leg, with padding in between.

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3 Principles

Once a radiological diagnosis has been made, decisions about non-operative management can be taken.

For non-impacted intracapsular fractures, the best non-surgical care is to relieve pain and mobilize the patient despite the fracture. These fractures will not unite with non-surgical treatment and mobilization of the patient as a whole is of paramount importance.

If a radiological diagnosis is not available, the possibility of a displaced intracapsular fracture of the proximal femur may be suggested by external rotation with slight to moderate shortening (2.5 – 5 cm), which increases only slightly with proximally directed pressure on the leg. Non-operative treatment of such patients is not based upon bone healing, which, as noted, does not occur without surgical treatment. Traction can be omitted, or discontinued and the patient mobilized as soon as comfort permits.
If there is marked thigh shortening which increases progressively, or is associated with palpable bone deformity, the patient is more likely to have an extracapsular fracture with potential for healing. Patients with these injuries are reasonable candidates for 6-8 weeks of traction, as described below, followed by progressive ambulation, with delayed weightbearing, in hopes of avoiding excessive deformity.

For proximal femur fractures that are likely to be extracapsular (pertrochanteric or subtrochanteric), the non-operative regimen is as follows.

3.1 Straight skin traction
Nonoperative treatment means that the patient will be in some form of traction for at least 6-8 weeks, often 10-12 weeks. The preliminary treatment usually is straight skin traction, later converted to skeletal traction.

Note the padding under the patient’s calf, to keep the heel from pressing on the bed beneath it.

Disadvantages of prolonged skin traction are:
- Loosening
- Constriction
- Friction with skin irritation
- Allergy

3.2 Hamilton-Russell (balanced) skin traction
If skin traction is likely to be used for more than 24 hours, greater patient comfort and better control of the fracture can be achieved by using Hamilton-Russell skin traction.

To apply Hamilton-Russell traction, a dedicated orthopedic bed, or a standard bed in combination with a mobile Balkan beam frame, is needed.

A padded sling is placed behind the slightly flexed knee and skin traction applied to the lower leg. The traction cord and pulley system are shown here.

The principle of the parallelogram of forces determines that the upward pull of the sling and the longitudinal pull of the skin traction create a resolution of force in the line of the femur, as illustrated.

This configuration of traction and leg support also can be adjusted to control femoral rotation, by directing the upward support medially or laterally. Generally, to minimize external rotation at the fracture, the patella should be pointing upward, nearly perpendicular to the bed surface.
A simpler alternative to this technique involves two separate systems.

- a sling suspended from the overhead frame, or supported with a rope and pulley counterweight, to provide an upward force, which lifts the leg off the bed
- longitudinal (distal) traction applied with skin or skeletal technique.

The resulting vector force, as illustrated, is oblique, the vector sum of the upward and distal forces applied by the two weights.

Note: With any longitudinal traction, the foot of the bed must be raised, tilting the bed, to avoid the traction weight’s pulling the patient down the bed.

With the tilted bed the weight of the patient acts as countertraction.

### 4 Skin traction

#### 4.1 Application

This photograph shows a commercially available skin traction kit.

A simple skin traction kit can be made easily, from a roll of non-elastic adhesive strapping (approximately 3 inches, 8 cms, wide), some foam padding for the malleolar region and a wooden spacer block (suitably drilled for cord attachment).
Prior to the application of the adhesive traction strip, the skin is painted with friar’s balsam (Tinct. benz.co.), or equivalent.

The strip is then applied to the lower leg, from the level of the knee.

The strapping is applied to the inner side of the leg, then unrolled a little further, to allow placement of the spacer and of the foam; it can then be applied to the outer side of the leg.

It is important to ensure that the wooden spacer lies transversely, i.e. parallel to the sole of the foot.

To prevent the development of blisters, the skin traction needs to be applied without folds or creases in the adhesive material and the covering bandage should be non-elastic.

Should a crease be inevitable, due to the contour of the limb, the creased area should be lifted, partially slit transversally and the edges overlapped.
Once the adhesive strip is satisfactorily in place, ensuring that the padded lower section overlies the malleoli, an inelastic bandage is carefully wrapped around the limb from just above the malleoli to the top of the strip.

Apply the overlying bandages spirally, overlapping by half.

5 Skeletal traction

The initial skin traction should soon be converted to skeletal traction via a tibial pin.
5.1 Preparation for applying skeletal traction
This is greatly aided by the use of a pre-assembled, sterile pack, containing the following items:

- Sterile towels
- Disinfectant
- Syringe
- Needles
- Local anaesthetic
- Scalpel with pointed blade
- Sharp pointed Steinmann pin, or Denham pin
- Jacobs chuck with T-handle
- Stirrup

5.2 Local anesthesia
After painting the skin with antiseptic and draping with sterile towels, inject a bolus of local anaesthesia (5 ml of 2% lignocaine) on each side of the tibial tuberosity, into the lateral skin at the proposed site of pin insertion and medially at the anticipated exit point, infiltrating down to the periosteum.

5.3 Insertion of traction pin
At the entry point, a stab incision is made through the skin with a pointed scalpel.

A Steinmann, or preferably a Denham pin (a Denham pin has a short threaded section in the centre to prevent side-to-side motion of the pin in the bone), mounted in the T-handle, is inserted manually at a point about 2 cm dorsal to the tibial tuberosity.

As the pin is felt to penetrate the far cortex, check that the exit will coincide with the area of local anaesthetic infiltration. If not, inject additional local anaesthetic. Once the point of the pin clearly declares its exit site, make a small stab incision in the overlying skin.

Once the pin is in place, ensure that there is no tension on the skin at the entry and exit points. If there is, then a small relieving incision may be necessary.
5.4 Traction setup

It is important that the stirrup be freely mobile around the traction pin, to prevent rotation of the pin within the bone. Rotating pins loosen quickly and significantly increase the risk of pin track infection.

Application of upward and distal forces to the skeletal traction pin. A rope tied to the traction pin stirrup can apply the upward force. Distal force can then be applied separately via a loop of rope tied to each end of the pin and running distally along the medial and lateral surfaces of the calf. This must be padded to protect the skin, and a spreader (usually wood) distal to the foot is essential to avoid pressure on the malleoli.

Another alternative is to make a Nissen-type traction loop, as illustrated. These were previously available commercially, but now probably will require local fabrication, if desired.
Often the simplest alternative is to use a single rope from the traction pin stirrup, directed overhead and distally through a pulley (and then through a second pulley at the foot of the bed). The position of the first pulley determines the force vector (direction) of the traction, presuming the patient remains in the selected location. Weight and direction of the traction should be adjusted to lift the knee approximately one fist-width off the bed. Pillows under the calf support the lower leg, prevent excessive knee flexion, and keep the heel off the bed, as shown.

5.5 Pin care
In order to prevent pin track infection, apply a slit gauze swab (sponge) as a dressing around the pin and do not remove the crust that develops around the pin on the skin. The gauze swab should only be changed infrequently.

6 Mobilization in bed
Assisted active mobilization and chest physiotherapy should start from day one. With the aid of a “monkey chain” as shown, the patient can lift himself up and the traction system allows mobilization of the knee.
7 Aftercare

General guidelines
Intertrochanteric fractures usually stabilize within 6-8 weeks and changing to touch weight bearing on crutches should then be considered.

At this stage an x-ray is highly desirable to give further information on healing. Visible bridging callus suggests that progressive weightbearing can begin. If radiography is not available, mobilization in bed can typically be started 6-8 weeks after injury, and progressed as tolerated, encouraging the patient to use walking aids for support, to minimize pain at the fracture site. The ability to bear full weight without pain is a good sign of fracture healing.

Discharge to home care should be delayed until the patient can get in and out of bed independently, and is mobile on crutches.

The patient in homecare should not sit for prolonged periods in a chair, if avoidable, as this will lead to a flexion contracture at the hip joint.

Note: Non-weight bearing involves flexion of the hip which can greatly increase the angular load on the healing fracture. Many surgeons believe that touch weight bearing, which allows the healing femur to be more vertical, is safer at this stage.

From about 10 weeks onwards partial weight bearing should be started and increased to full weight bearing at +/- 12-14 weeks.