2.2 Fractures of the Upper Limb

There are a number of possible complications arising from this injury. Swelling is very common, but can be minimised by elevation of the limb and exercise of the joints not held in the cast. Elbow and shoulder stiffness may be a cause of considerable disability if allowed to persist. (N.B. The patient may also injure these areas in the fall, but not complain about them initially). Compression of the median nerve in the carpal tunnel will cause pins and needles in the fingers at first and a weakened grip later, if untreated. Non-union is rare, but mal-union due to displacement is frequently found, hence the need for a check X-ray at two weeks, with further manipulation if required.

An occasional problem is that of complex regional pain syndrome (Sudeck's Atrophy) (post-traumatic reflex dystrophy). This is a condition where the hand becomes red, shiny and painful when the plaster is removed. The discomfort clears up in about six months, but is better avoided by encouraging the patient to make as much use of the limb as possible whilst in a cast.

Smith's Fracture

Sometimes called a reverse Colles' because the displacement is anterior, this injury results from a backward fall, knocking the wrist forwards. The patient is often in middle age. The treatment is to manipulate the fracture and apply an above elbow back-slab or full arm cast. The position of the limb should be the wrist in dorsiflexion, the hand supinated (palm upwards) and the elbow at an angle of 90º. The main problem with this injury is slippage after manipulation and so these fractures often require internal fixation.

Wrist and Hand

Scaphoid Fracture

The scaphoid bone is situated on the thumb side of the proximal row of carpal bones, and may be injured by a fall on the outstretched hand or by a blow to the wrist. This is a young person's injury, the typical patient being a young man. Sometimes the fracture does not show up on the initial X-rays, (special views known as 'scaphoid views' are often requested) and should be repeated two weeks later.

In the meantime, if the history and symptoms are suggestive of the injury then it is treated as a scaphoid fracture until proved otherwise. The most significant symptom is pain in the area known as the "anatomical snuff box" on the thumb side of the wrist. The wrist is held in a well fitting plaster cast which incorporates the thumb to the interphalangeal, and holds the wrist in a position of dorsiflexion and radial deviation. When correctly applied, the patient should be able to oppose his thumb and index finger, but not the other fingers. The angle of the wrist is important, because following the fracture, the blood supply to the proximal fragment of the bone may be disrupted, leading to avascular necrosis and non-union. Research has long questioned the need to include the thumb, resulting in an increase of scaphoid fractures being treated in below elbow cast.

The cast is retained in place for six weeks, then an X-ray is taken. If there is no sign of callus the cast may be retained for another six weeks, or a screw fixation performed. Stiffness of the wrist is not uncommon following this prolonged splintage, but will clear up with usage.

Bennett's Fracture

A Bennett's fracture is a fracture dislocation of the first carpo-metacarpal joint at the base of the thumb.

It is caused by the thumb being knocked backwards, (e.g. a ski-pole injury). The joint is a saddle joint and it can be difficult to hold the fracture in the correct position after reduction. The cast used is known as a Bennett's plaster. It requires traction to be applied to the thumb, with pressure at the base of the thumb whilst the plaster is setting. Alternatively, a reduction under anaesthetic and 'K' wires or a screw are inserted to hold the fracture. The joint may have a limited range of movement after this injury.

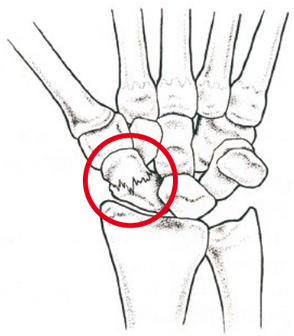
Metacarpal Fractures

The common cause of fractures to the metacarpals is a punch with the fist. The bone commonly affected is the fifth, which is usually angulated at the neck. If markedly displaced it may need to be straightened and then a slab is applied. The slab should extend along the forearm and to the tips of the fingers on the ulnar side or palmar side. (ulnar gutter or metacarpal slab) The wrist should be held in 45° of dorsiflexion, the metacarpophalangeal joints should be flexed to 90° and the interphalangeal joints should be held in extension. This position is the Position of Safe Immobilistation (POSI) for the hand.

Fractures of the Fingers

It is rare for fractures of the fingers to be placed in plaster. The common method of treatment is to strap the finger to its neighbour and encourage use. However, an injury known as a Mallett fracture, which is an avulsion fracture of the insertion of the extensor tendon from the terminal phalanx may be put into a plaster which holds the distal interphalangeal joint in extension and the proximal interphalangeal joint in flexion.

Fractured Scaphoid



2.3 Casts of the Upper Limb

Below Elbow Plaster Slab

Equipment Required

Basic trolley, see page 28 - plus:

Plaster of Paris

- Stockinette 5cm
- Soffban® Natural padding 10cm x 1 roll
- Gypsona® 15cm or 20cm x 1 roll or use a slab dispenser of the equivalent size
- Soffcrepe® bandage 7.5cm x 1 roll
- Strips of plaster of Paris
- Actimove® Umerus Sling or broad arm sling

Above Elbow Plaster Slab

Equipment Required

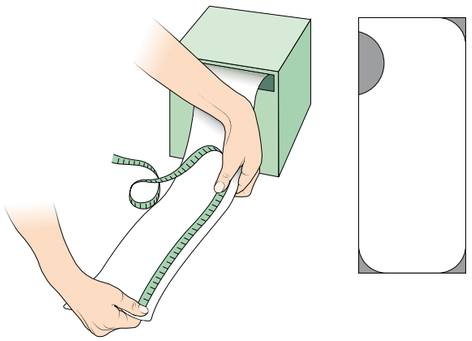
Basic trolley, see page 28 - plus:

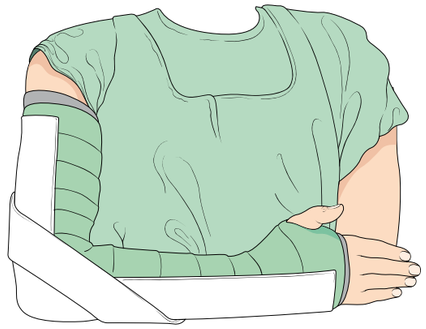
Plaster of Paris

- Stockinette 7.5cm (if used)
- Soffban® Natural padding 10cm x 2 rolls
- Gypsona® 10cm x 2 rolls and 15cm x 2 rolls or use slab dispensers 10cm and 15cm
- Soffcrepe® bandage 10cm x 1 roll
- Actimove® Umerus Sling

Slab dispenser

Below elbow slab





Application

The medical staff may prefer slabs to full casts. These are made by measuring the length required, the extent being the same as for a full cast. Add on 2cm to the length to allow the slab to be long enough to conform to the contours of the limb. The required length is cut from a plaster of Paris slab dispenser 15 or 20cm wide, depending on the size of the patient, or by forming a slab from 15 or 20cm plaster of Paris rolls using five to six layers. The slabs are then shaped, trimming top and lower end as required.

The limb is positioned and padding applied as for a full cast. The slab is folded concertina fashion and dipped into the water, holding the ends and maintaining the concertina folds. It is removed from the water, squeezed gently and straightened out. The slab is then carefully positioned on the limb and smoothed to fit the contours.

It is held in place with a wet crepe or cotton conforming bandage. These must be pre-soaked and squeezed out to avoid further shrinkage. The end of the bandage is fixed with a plaster of Paris strip applied over the area of the slab.

Application

The ultimate position of the limb will be dependent on the injury and displacement, if any, but will generally be about 90° at the elbow.

Prepare a 15cm or 10cm plaster of Paris slab, depending on the size of the patient, using 5 -7 layers. This slab should be long enough to extend from the axilla to the knuckles of the hand. Remember to allow a little for the slab to conform to the contours of the limb.

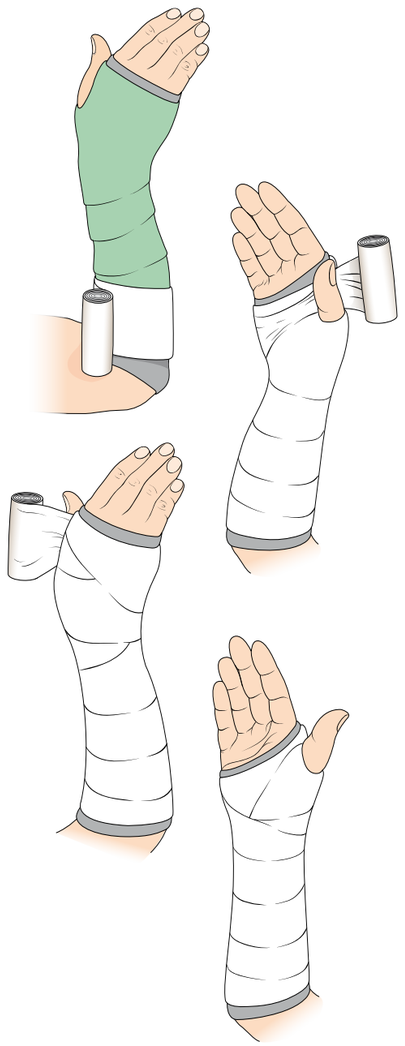
Prepare also 2 x 10cm plaster of Paris slabs of 5 layers and 25cm long. Place these each side of the elbow joint to reinforce it. The whole slab is then held in place by a pre-soaked and squeezed out crepe or conforming cotton bandage. Finish the application as for a below elbow slab.

2.3 Casts of the Upper Limb

Below Elbow or Colles' Type Cast

A 'Colles' cast' is a very loose term used to describe a type of cast applied in the treatment of many wrist injuries and conditions. The wrist should be positioned in slight palmar flexion and slight ulnar deviation, to a greater or lesser degree, according to the amount of displacement of the fracture. The position will be different for other injuries.

The completed cast should extend from just below the elbow - allowing full flexion there - to the knuckles at the back of the hand, and must show the palmar crease, to allow full flexion of the metacarpalphalangeal joints. The thumb should be completely free.



Equipment Required

Basic trolley, see page 28 - plus either of the following options:

Plaster of Paris

- Stockinette 5cm
- Soffban® Synthetic padding 10cm x 1 roll
- Gypsona® 10cm x 2 rolls
- Strips of plaster of Paris
- Actimove® Sling

Padding

Apply stockinette only swelling is unlikely. The ulnar styloid may require a circle of felt. A covering of undercast padding is applied firmly, smoothly and evenly.

Application

Casting commences at the elbow end of the cast, rolling from within out so that the bandage is brought up through the grip, thereby spreading the heads of the metacarpals. Pass through the grip twice with the first bandage. Start the second bandage at the elbow end as before, this time taking one further turn through the grip before completing the bandage back up the arm to the elbow. Mould the cast well into the palm.

When the cast is finally set, the limb is rested on a pillow and the cast is trimmed to allow all joints not encased to move freely. Make sure the palmar crease is fully visible to allow full flexion of the metacarpal phalengeal joints.

If stockinette was used it should be turned back over the edge of the cast and held in place with strips of plaster of Paris.

This applies to all upper limb casts. Full instructions must be given to the patient on the care of their limb and of the cast. These must be given verbally and in writing. A sling may be required initially, but do not forget to give information on exercises to prevent swelling and finger, elbow and shoulder stiffness. (See Appendices III and IV.) Follow-up care must also be arranged.

2.3 Casts of the Upper Limb

Synthetic

- Stockinette 5cm
- Non-adhesive felt 2.5cm
- Adhesive felt 2mm thick
- Soffban® Synthetic padding 10cm x 1 roll
- Delta-Cast® Conformable 5cm x 1 roll or 7.5cm x 1 roll
- Tensoplast® Sport cast edge tape 3cm
- Actimove® Sling

Padding

1 Apply stockinette and pad the ulnar styloid with felt, if prominent. Use a thin layer of non-adhesive felt around the base of the thumb or apply a smaller size stockinette to the thumb.

2 The 2mm adhesive felt may be needed to pad the edges of the cast. A covering of undercast padding is applied firmly, smoothly and evenly.

Application

3 Use either 1 x 5cm or 1 x 7.5cm casting bandage depending on the size of the limb. Bandaging commences at the elbow end of the cast, rolling from within out so that the bandage is brought up through the grip, thereby spreading the heads of the metacarpals, using a 50% overlap to create two layers.

4 Make a slightly curved cut to allow the bandage to go through the grip, laying the bandage on carefully.

Continue across the metacarpal heads and around the hand, returning through the grip on the next turn, cutting as before. Twice through the grip is sufficient. Continue with the bandage back up the arm in a single layer, turning in the stockinette at the elbow end, catching it with the last turn of the bandage.

Mould well into the palm and hold until the material has set. Trim, if necessary, to complete, turning in the remaining stockinette and hold in place with the adhesive tape.

5 Completed cast.