

Plaster-of-Paris and Plaster Technique



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Orthopaedic Uses of Cast

- 1) To support fractured bones, controlling movement of the fragments and resting the damaged tissues
- 2) To stabilise and rest joints in ligamentous injury
- 3) To support and immobilise joints and limbs post-operatively until healing has occurred
- 4) To correct a deformity
- 5) To ensure rest of infected tissues

Materials available for casting

- Plaster-of-Paris
- Synthetic Fiberglass Materials:
 - a) water activated*
 - b) non-water activated*
- Low-temperature thermoplastics

PLASTER-OF-PARIS

- The name POP is derived from an accident to a house built on a deposit of Gypsum, near Paris. The house burnt down. When rain fell on baked mud of the floors it was noted that footprints in mud set rock-hard.
- Plaster-of-paris bandages were first used by Matthysen, a Dutch military surgeon in 1952.

PLASTER-OF-PARIS

- The POP bandage consists of a roll of muslin stiffened by dextrose or starch and impregnated with the hemihydrate of calcium sulfate.
- When water is added, the calcium sulfate takes up its water of crystallization



PLASTER-OF-PARIS

- **Setting time:** *time taken to change from powder form to crystalline form.*
- **Drying time:** *time taken to change from crystalline form to anhydrous form.*
- Average setting time: **3-9 minutes**
- Average drying time: **24-72 hours**

PLASTER-OF-PARIS

- Factors decreasing setting time:

- 1) Hot water
- 2) Salt
- 3) Resin

- Factors increasing setting time:

- 1) Cold water
- 2) Sugar



POP ... various forms

SLAB:

- *only a part of circumference of limb is incorporated.*



CAST:

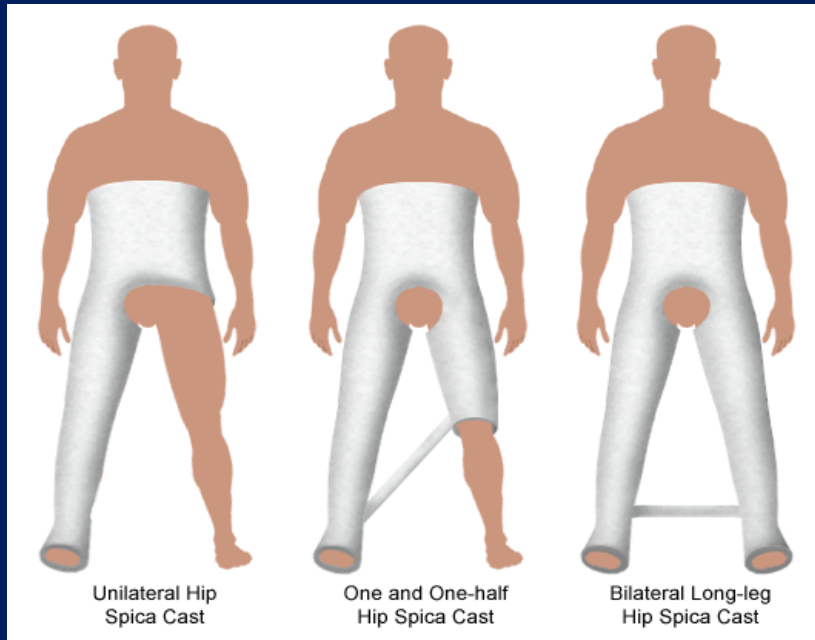
- *encircle whole circumference of the limb.*



POP ... various forms

SPICA

BRACE



PLASTER-OF-PARIS

Advantages:

- Cost-effective
- Non-allergic
- Easily moulded to different forms

Disadvantages:

- Radio-opaque - may occlude # lines
- Heavy
- Easily breaks when comes in contact with water



Synthetic Fiberglass Materials

Advantages:

- Lightweight, yet strong
- May be combined with waterproof liners to allow bathing and swimming in the cast.
- Often more radiolucent than plaster
- Lower risk of thermal injury:
 - Less material is required
 - Very low amount of thermal energy is released during the curing process.



Synthetic Fiberglass Materials

Disadvantages:

- More expensive
- More difficult to mold
- Higher risk of pressure on and constriction of the limb.



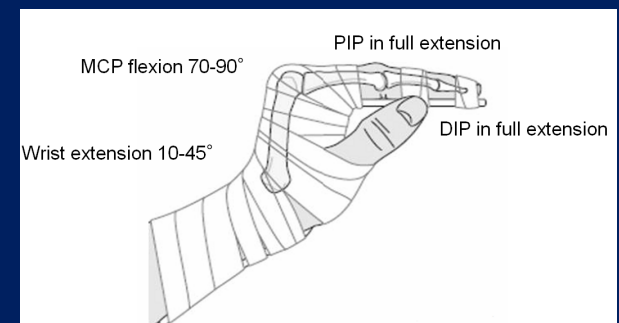
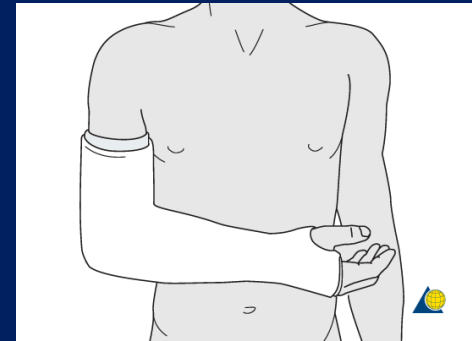
Rules of application of POP casts

- One joint above and one joint below.
- Joints should be immobilized in functional position.
- Moulded with palm and not with fingers to avoid indentation.
- Not too tight or too loose i.e. adequate padding

Position of Immobilization

Upper extremity

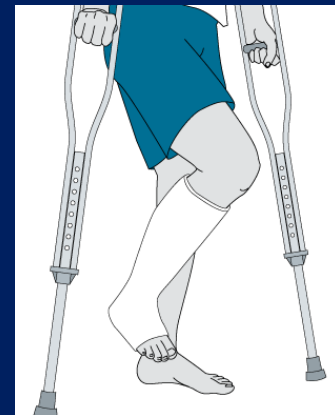
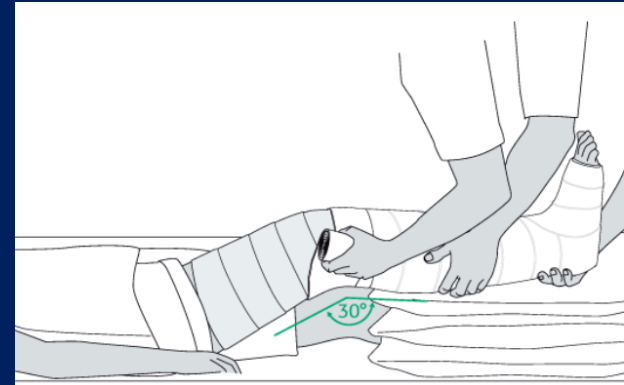
- **Elbow:** *90° of flexion*
- **Wrist:** *30° of extension*
- **Thumb:** *midway between maximal radial and palmar abduction*
- **Hand:** *intrinsic plus (MCP joints in at least 70° of flexion and IP joints in extension)*



Position of Immobilization

Lower extremity

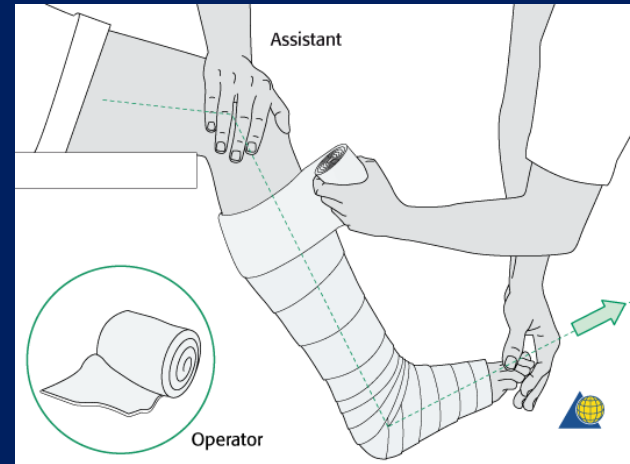
- Hip: *10-30° of abduction*
20-45° of flexion
15° of external rotation
- Knee: *15-30° of flexion*
- Ankle: *Neutral dorsiflexion*



Rules of application of POP casts

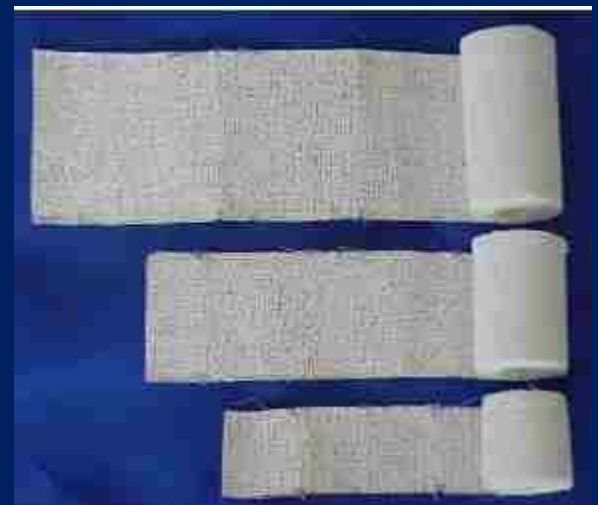
Padding:

This is placed from distal to proximal with a 50% overlap, a minimum two layers, and extra padding at the fibular head, malleoli, patella, and olecranon.



Plaster width:

- 15 cm width for thigh
- 12 cm width for lower leg
- 10 cm width for forearm and arm
- 8 cm width for wrist
- 5 cm width for fingers



Plaster Technique

- Plaster casts can be divided into 2 types:
 - 1) Unpadded plaster
 - 1) Padded plaster



Unpadded Plaster

- Made by applying the turns of wet bandage directly to the skin without using any textile. (used by Böhler)
- For practical purposes, if stockinet is used the resulting plaster can still be regarded as an unpadded cast.



Padded plaster cast

- A layer of cotton-wool is interposed between the skin and plaster, which is firmly compressed against the limb by applying wet plaster bandage under tension.
- The elastic pressure of the cotton enhances the fixation of limb by compensating for shrinkage in tissues .

Padded plaster cast

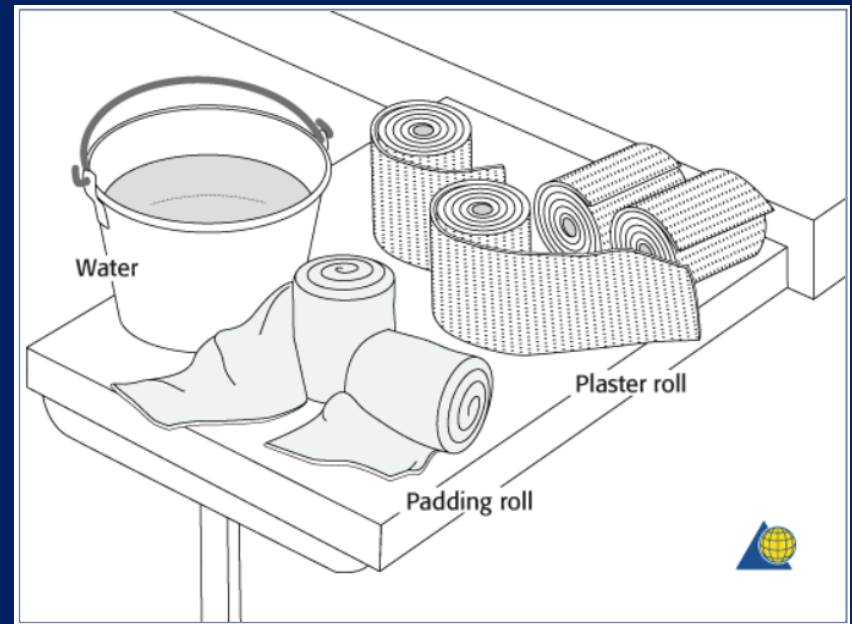
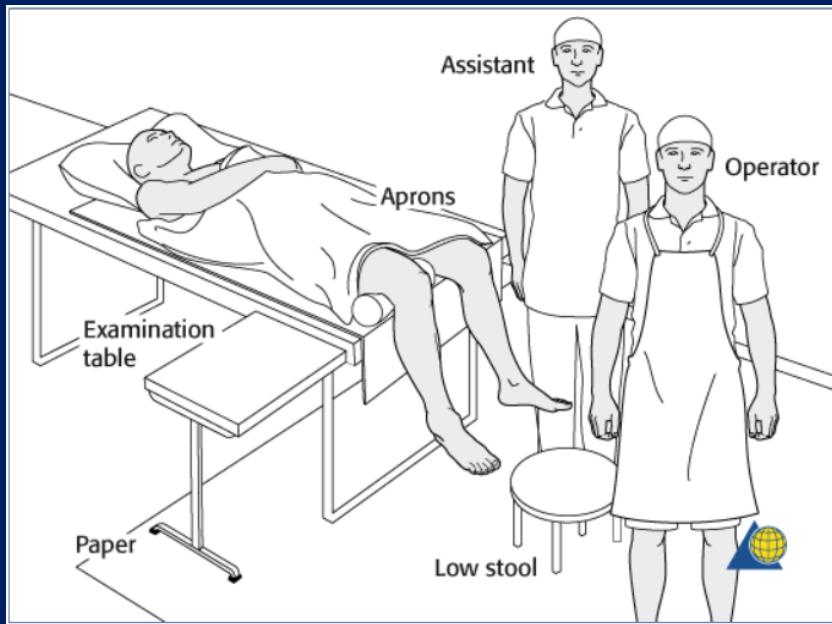


Triple sequence in Plaster Application

- Phase 1: examination
- Phase 2: plastering
- Phase 3: reduction and holding

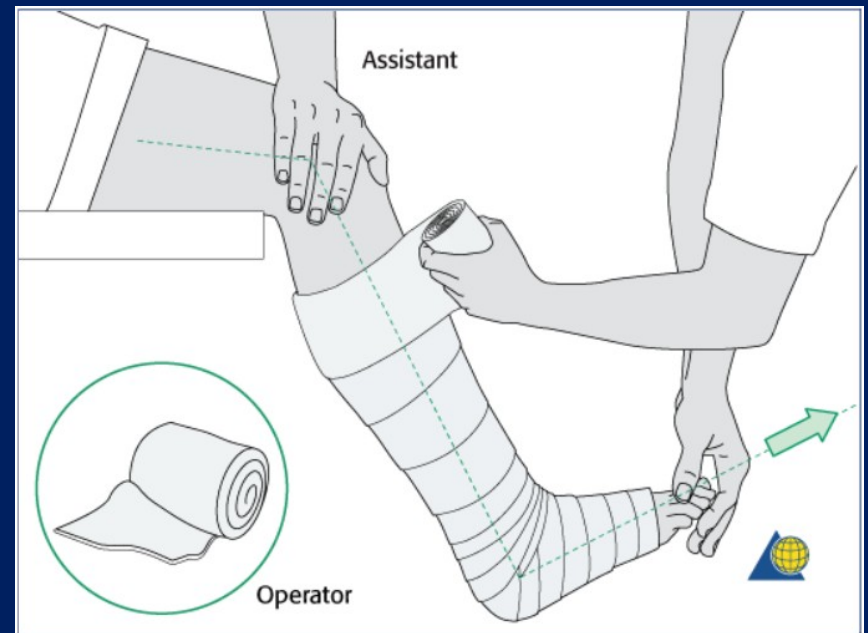
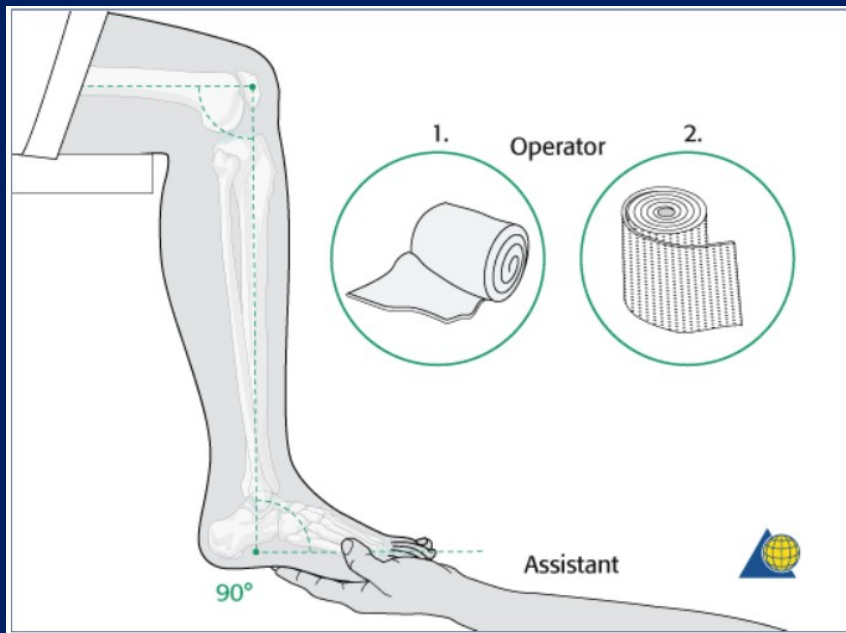
Plastering - principle

Preparation for cast application



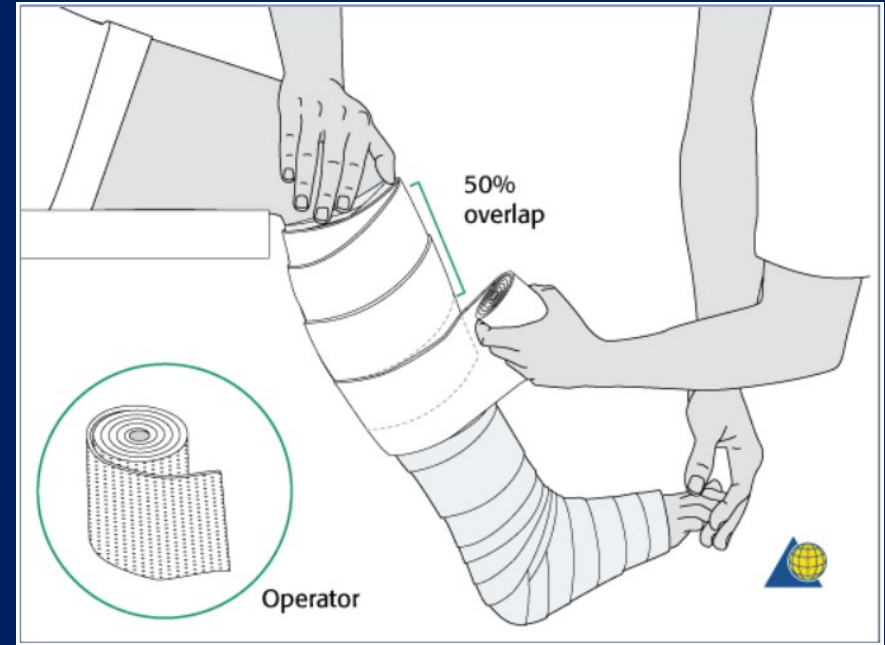
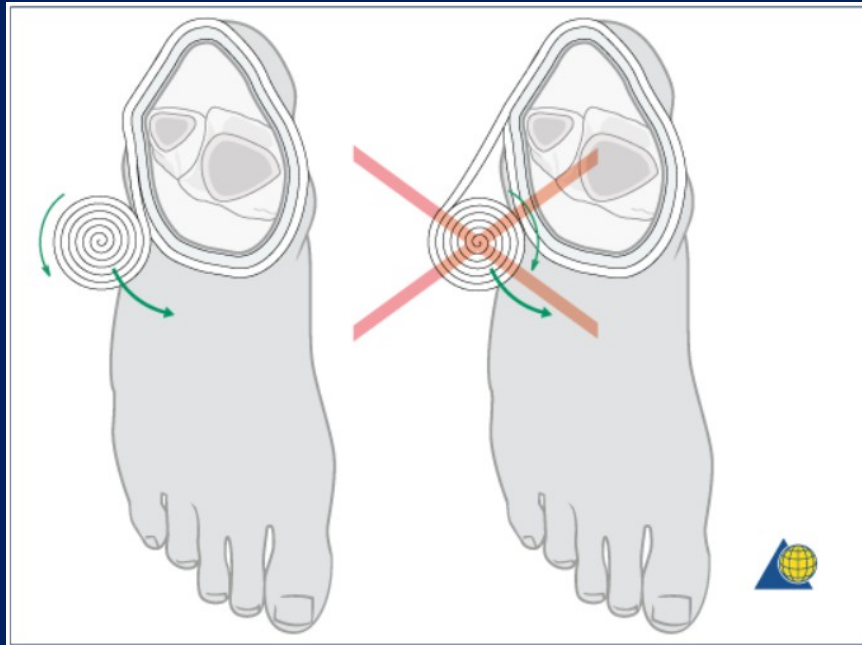
Plastering - principle

Application of the cast



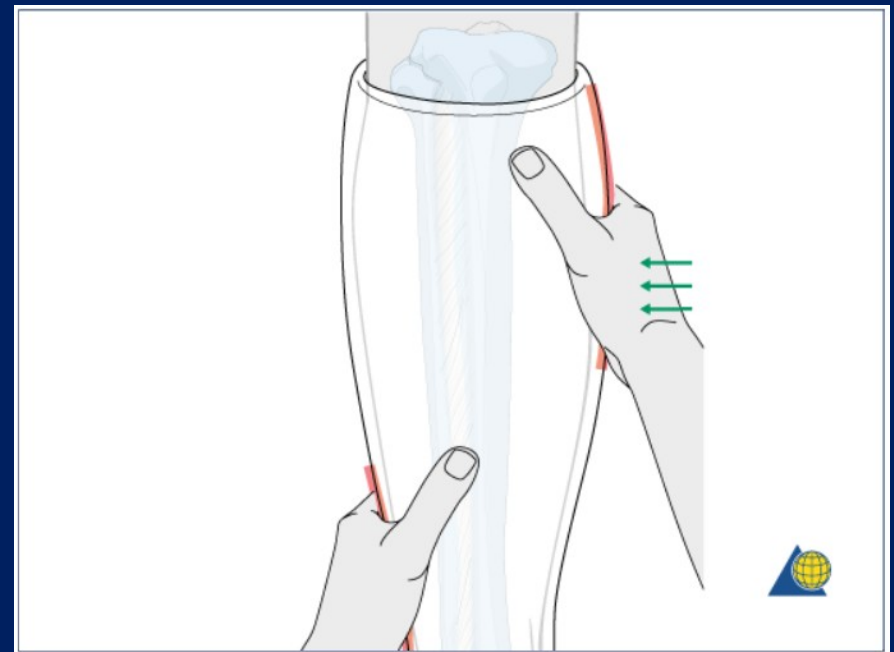
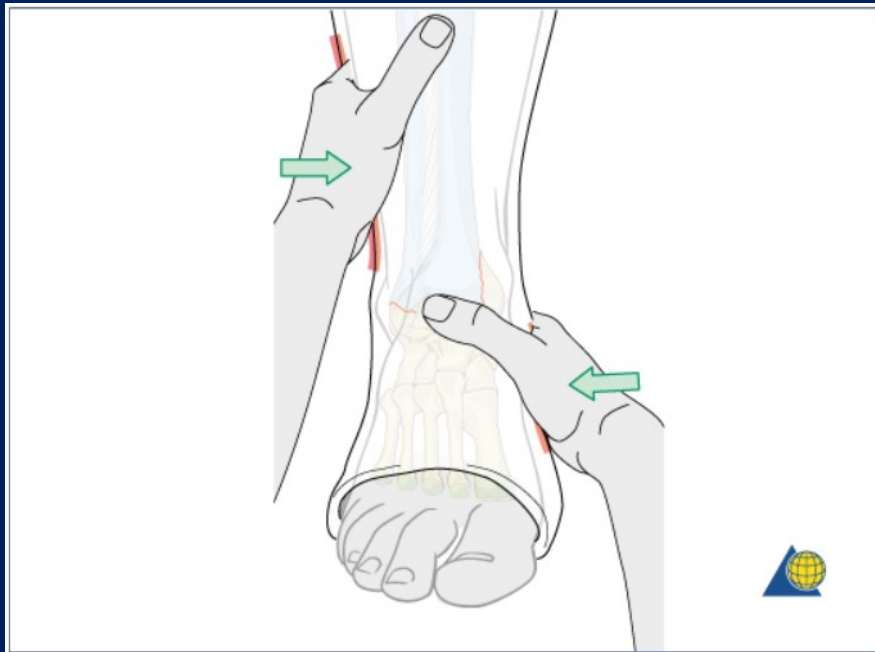
Plastering - principle

Application of the cast



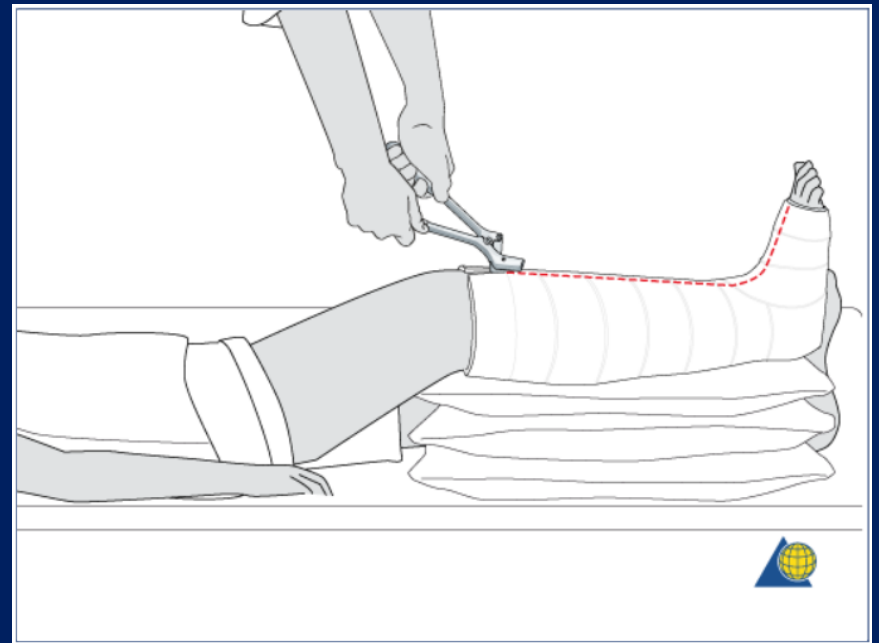
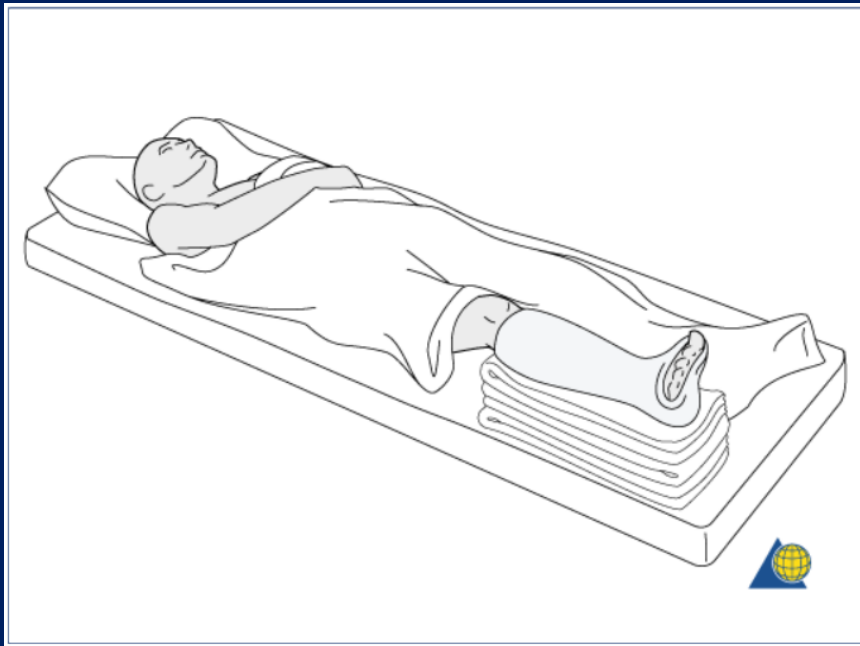
Plastering - principle

Reduction and holding



Plastering - principle

Evaporation period



Aftercare

Instructions to be given after applying POP:

1. Come immediately if any of following symptoms develops:
 - A) *Excessive pain,*
 - B) *Excessive swelling,*
 - C) *Bluish or white discolouration of fingers or toes*
2. Keep the plaster cast dry.
3. Mobilize all the joints which are not incorporated in the plaster to their full range of motion once plaster becomes dry.

Aftercare

4. Notice any cracks in the plaster.
5. Physiotherapy of muscles within the plaster and joints outside the plaster is necessary to ensure early rehabilitation.

Complications

Due to tight cast

- pain
- pressure sores
- compartment syndromes
- peripheral nerve injuries

Complications

Due to improper applications

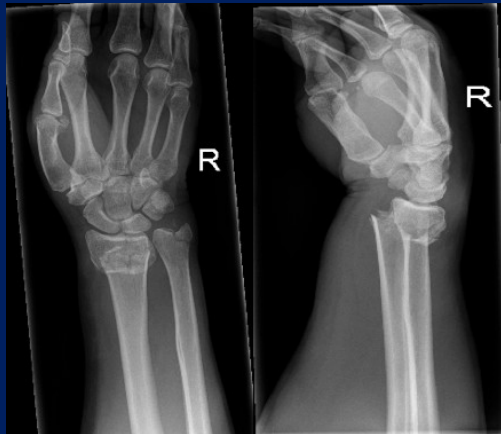
- joint stiffness
- plaster blisters and sores
- breakage

Due to plaster allergy

- allergic dermatitis

Plan for today ?

- POP in patient with distal radius fracture





Thank you for your attention