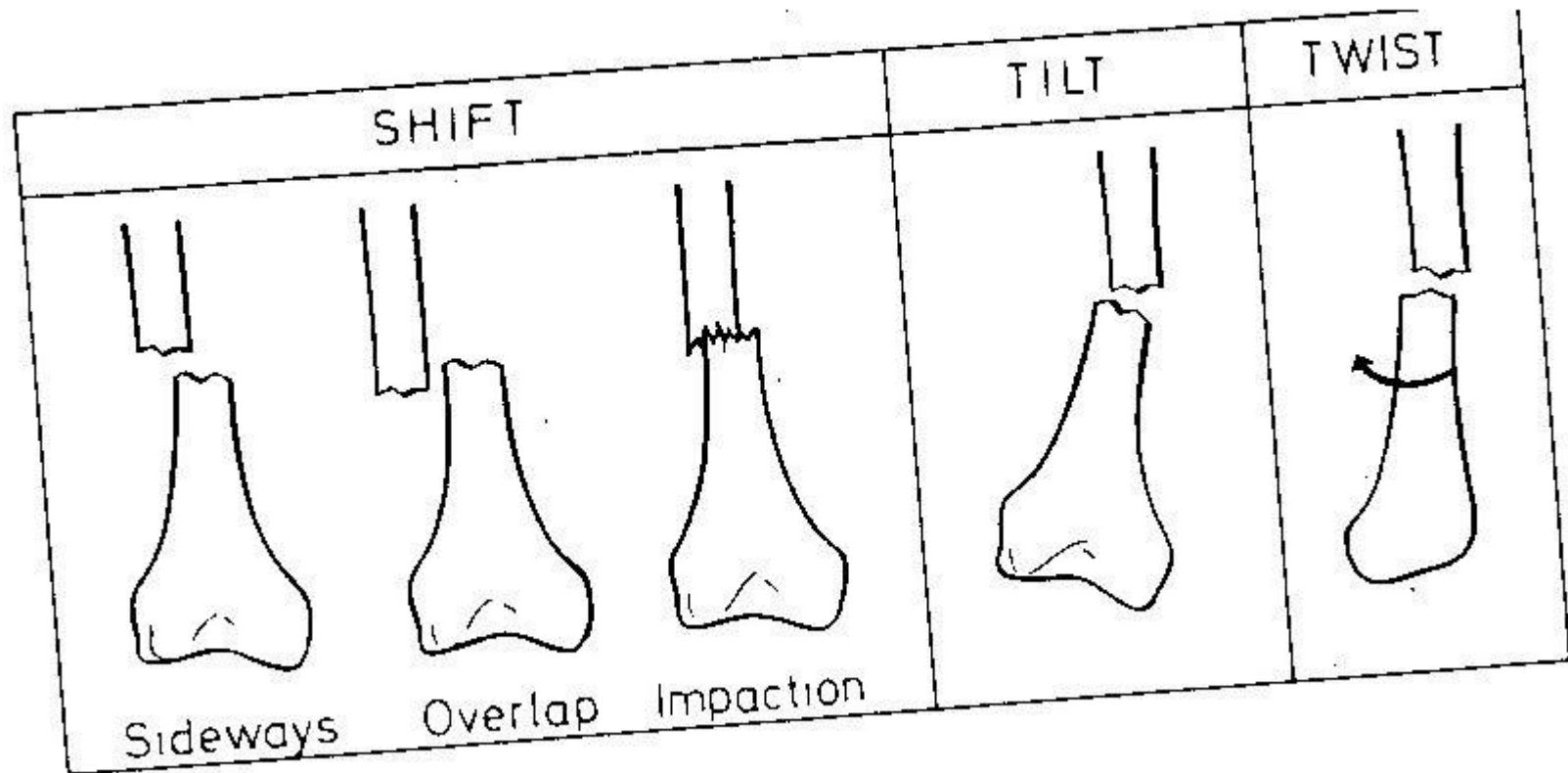
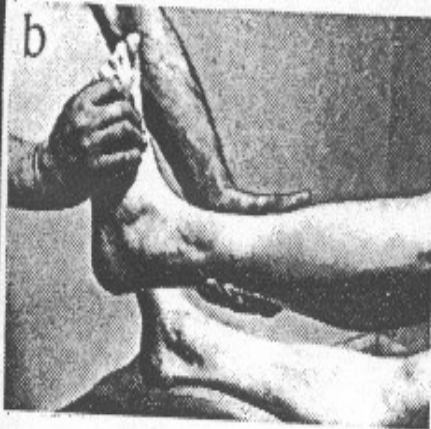
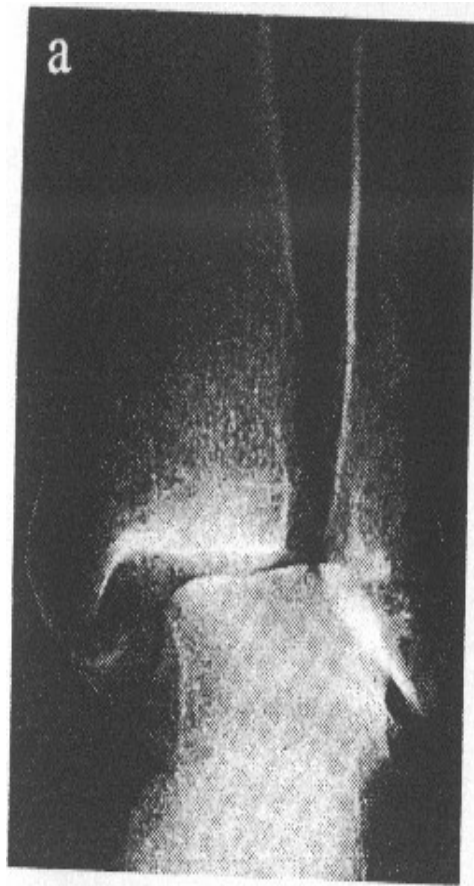


# Management of Fractures

Traumatology  
RHS 231  
Dr. Einas Al-Eisa  
Lecture 5





**23.12 Closed reduction** These two ankle fractures look somewhat similar but are caused by different forces. The causal force must be reversed to achieve reduction: (a) requires internal rotation (b); an adduction force (c) is needed for (d).

# Common methods of fracture immobilization

- **Plaster of Paris (POP):**
  - A high quality gypsum
  - The standard method of external splinting
  - Can be moulded to the part when wet

# Plaster of Paris

## Advantages

- Cheap, easily available, and quick to apply
- Radio translucent (bones can be x-rayed through the cast)
- No infection risk
- Reasonably comfortable
- Porous so that the limb can breath
- Fairly strong
- Easy to remove

# Plaster of Paris

## Disadvantages

- It may not be possible to reduce the fracture correctly or maintain the reduction
- Heavy and warm
- May cause pressure problems, rub the skin, and cause sores
- Not waterproof unless specially treated (smelly if it gets wet)

# Applying a plaster of Paris

- **Padding:**

- apply light padding of soft wool or cotton and stockinette over bony areas to avoid pressure sores

- **Water temperature:**

- the hotter the water → faster the plaster sets
- cold water gives more time to apply the cast (recommended for beginners)

# Applying a plaster of Paris

- **Dipping:**

- when dipping a plaster bandage hold it lightly so that water can penetrate to its centre

- **Application:**

- lay the bandage carefully over the limb and do not pull it tight



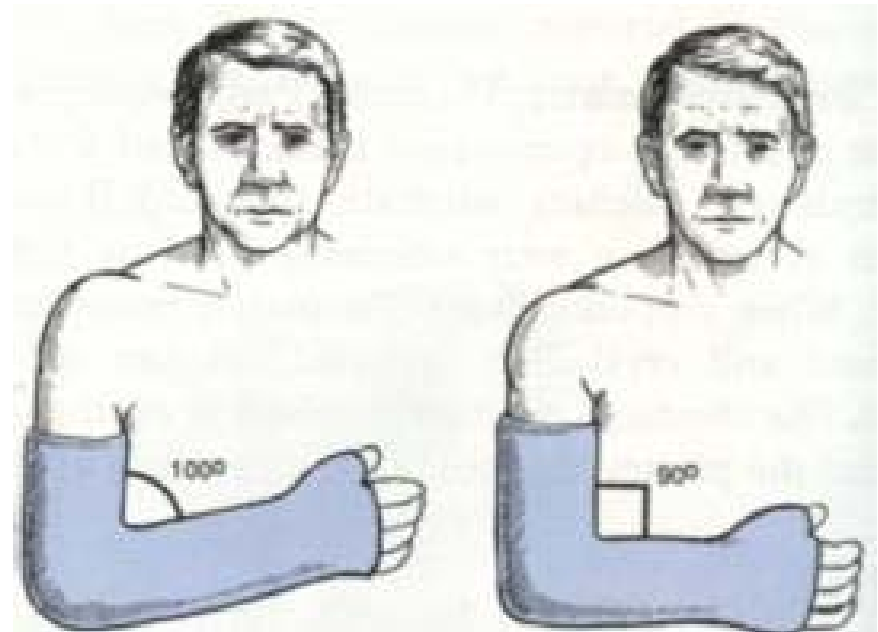


## **Dipping plaster bandage**

The plaster is held loosely under the water (not gripped).  
The end of the bandage is separated from the rest of the roll.

# Applying a plaster of Paris

- **The “100-90 trick”:**
  - if a joint has to be held flexed to 90 degrees, flex it 10 degrees more, apply the plaster and then put limb in the correct position
  - this avoids hard wrinkles in the plaster, which can cause pressure sores at the flexure crease



# Applying a plaster of Paris

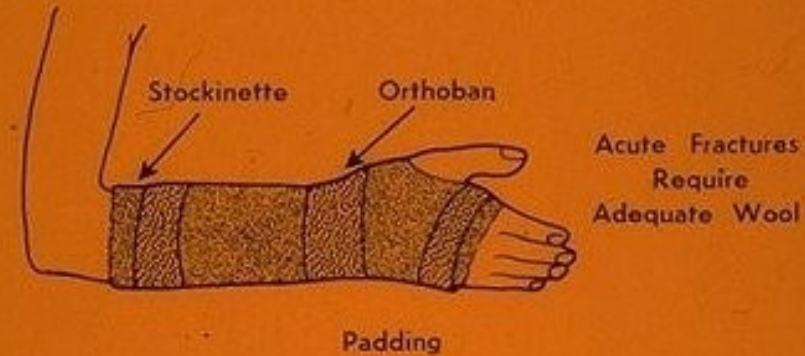
- **Splitting the cast:**

- split the cast and padding down to skin so that it can be spread or removed quickly



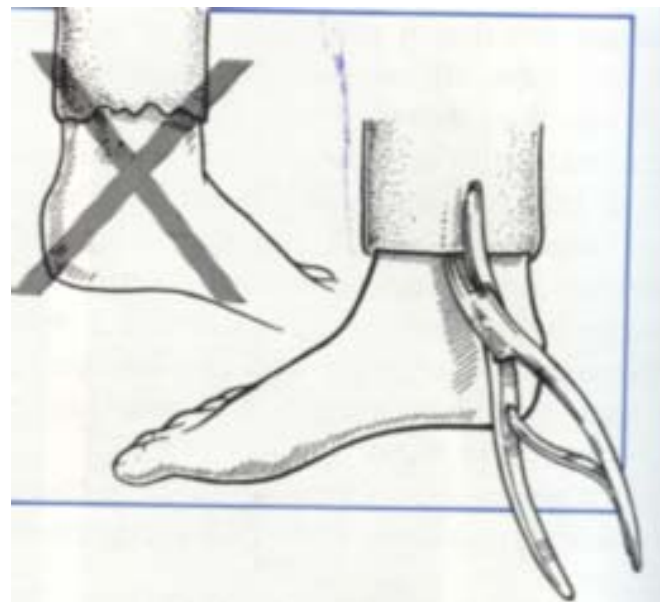
**Plaster of Paris** is the cheapest and easiest method of holding an unstable fracture after closed reduction.

## PLASTER OF PARIS TECHNIQUE



# Once the plaster is applied, check:

- **Edges:** check that edges are not too sharp and do not press on the skin
- **Circulation:** check that peripheral circulation is good
- **Advice:** tell the patient to seek help if limb is painful, numb, cold, or discolored



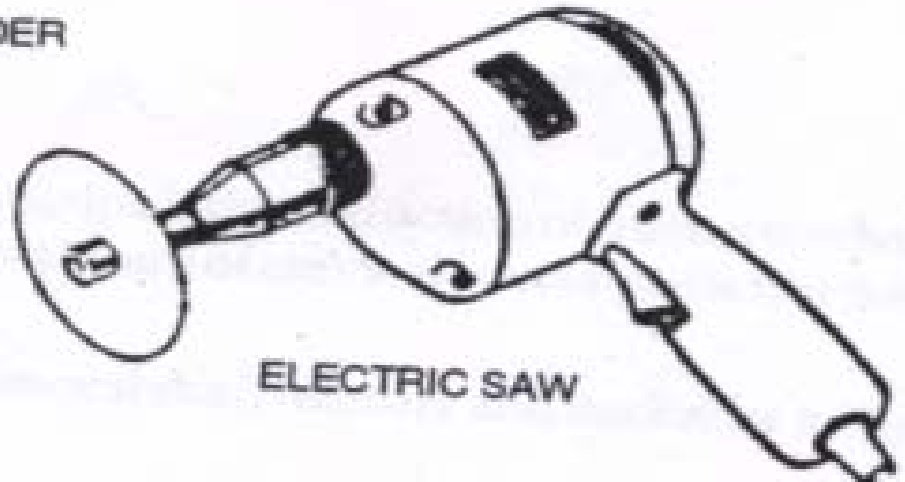
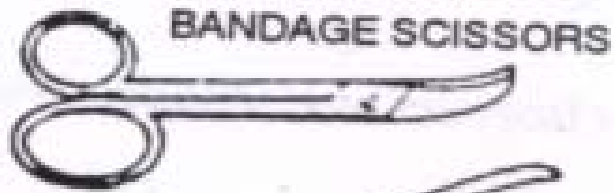
Plaster benders should be used to ease a tight cast

# Removing plaster

**Saws:** must only be pressed “up and down” at right angles of the plaster

**Shears:** used to cut plaster only and should not bruise skin

**Advice:** warn the patient that the limb will be stiff and that hard work will be needed to restore normal function



Removing plaster

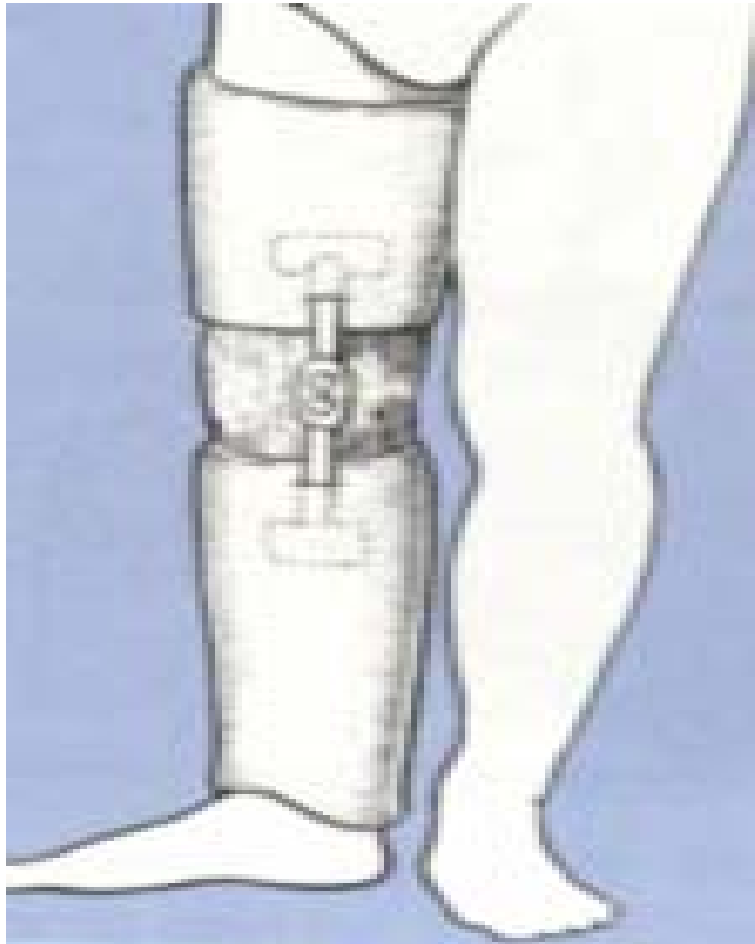
# Instruction for patients in Plaster of Paris:

- If fingers or toes become swollen, blue, painful or stiff →  
raise the limb and call your doctor
- Exercise all joint not included in Plaster
- If Plaster become loose or cracked,  
report to hospital as soon as possible



# Common methods of fracture immobilization

- **Functional bracing** (cast bracing):
  - = braces that have hinges to allow movement (provided that it does not stress the fracture site)
  - May promote union by improving the area's blood supply (as a result of movement)



**Cast Bracing**

This support weighs about one seventh of the weight of Plaster of Paris.

Fractures immobilized in a **skelecast** have been found to heal more quickly than when held with hot heavy complete plaster encasement.

A **knee hinge** can also be easily added to allow the knee to bend, as illustrated.



# Common methods of fracture immobilization

- **Slings:** used to support an injured arm or shoulder
  - ***Broad arm sling:*** made out of triangular bandage that supports the forearm & elbow, and takes the weight off the upper arm
  - ***Collar and cuff:*** allows the upper arm to hang free and does not support the elbow

# Common methods of fracture immobilization

- **Slings:**

- ***High sling:*** useful for hand injuries as it holds the hand well, but the position is uncomfortable (if there is swelling around the elbow).

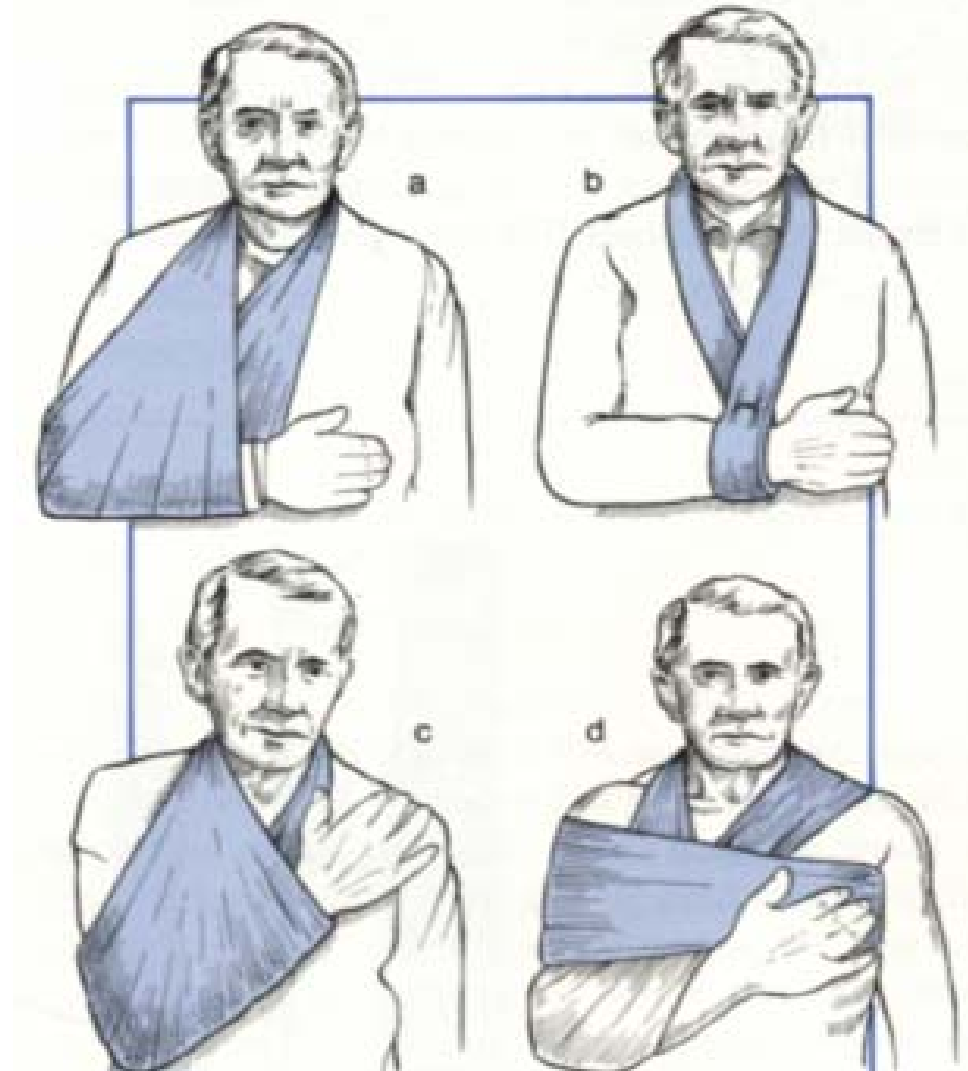
- Ulnar nerve damage can occur

- ***Sling and swathe:*** a body bandage is worn under the clothes.

- Useful after shoulder operations as it prevents any movement of the arm

# Types of slings:

- a- Broad arm sling
- b- Collar and cuff
- c- High sling
- d- Sling and swathe  
(body bandage)



# Common methods of fracture immobilization

- Fractures which cannot be held reduced on traction or in a cast need to be fixed, either **internally** or **externally**.

# Common methods of fracture immobilization

- **Internal fixation:**

- Open reduction and internal fixation (ORIF) = surgical intervention by applying a plate and screws to the fracture
- Allows a detailed inspection and accurate surgical assessment of the site of injury and procedure



# Common methods of fracture immobilization

- **Internal fixation:**

- Surgery may cause additional trauma and exposure to micro-organisms (infection)
- Bone will not grow and respond to stress normally, because some of the stresses will be taken by the implants themselves

# Internal fixation

- Bone fragments can be reassembled and held in perfect position with **screws**, **plates**, **wires** and **nails**.



# Indication for internal fixation

- Fractures that cannot be controlled in any other way
- Patients with fractures of more than one bone
- Fractures in which the blood supply to the limb is jeopardized and the vessels must be protected
- Intra-articular displaced fractures

# Common methods of fracture immobilization

- **Intramedullary (IM) nailing:**

- A hollow metal rod is introduced at one end of a *long bone*, travels down the medullary canal, and may be locked with screws distally and proximally
- Associated complications are less than with ORIF (less hospital stay & more rapid patient mobilization)

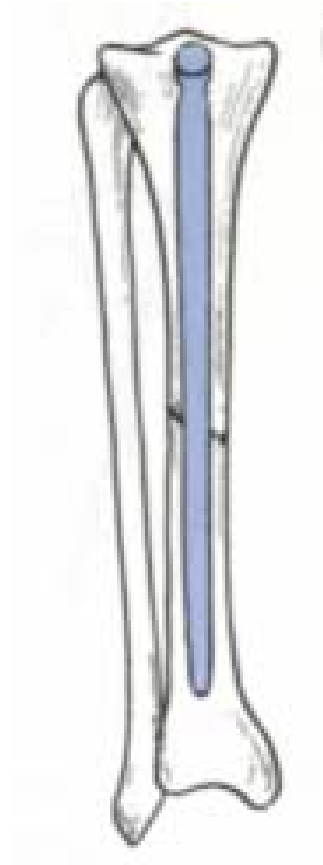
# Common methods of fracture immobilization

- **Intramedullary (IM) nailing:**

- When the locking screws are removed, the bone takes its normal stresses and adapts in accordance of Wolf's Law
- Example: fractures of the shaft of tibia and humerus

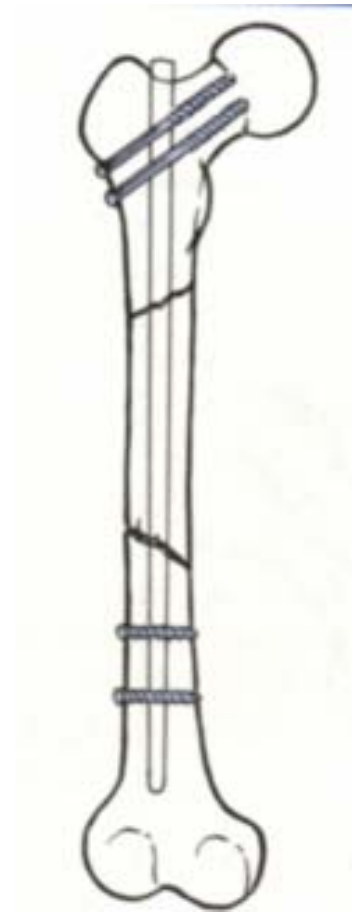
# Intramedullary nails

- Used for fractures at the middle of long bones
- Excellent for maintaining length and alignment



# Locking nails

- It is possible to insert an intramedullary nail and fix the fragments of bone to the nail itself.



# Intramedullary nails

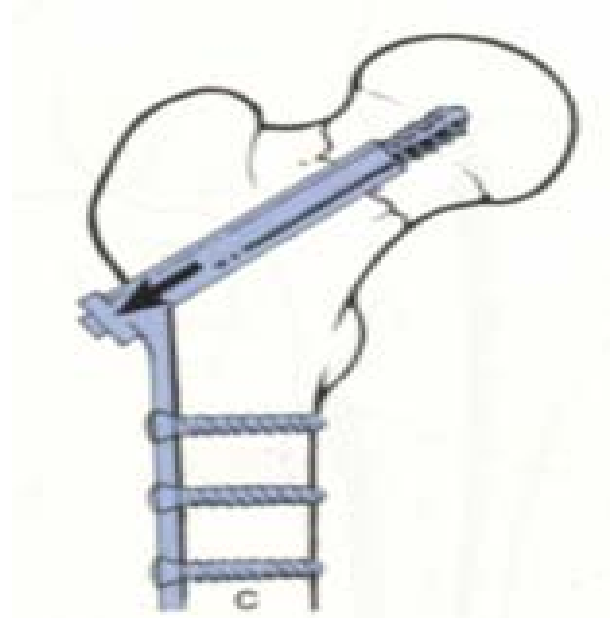
## Disadvantages

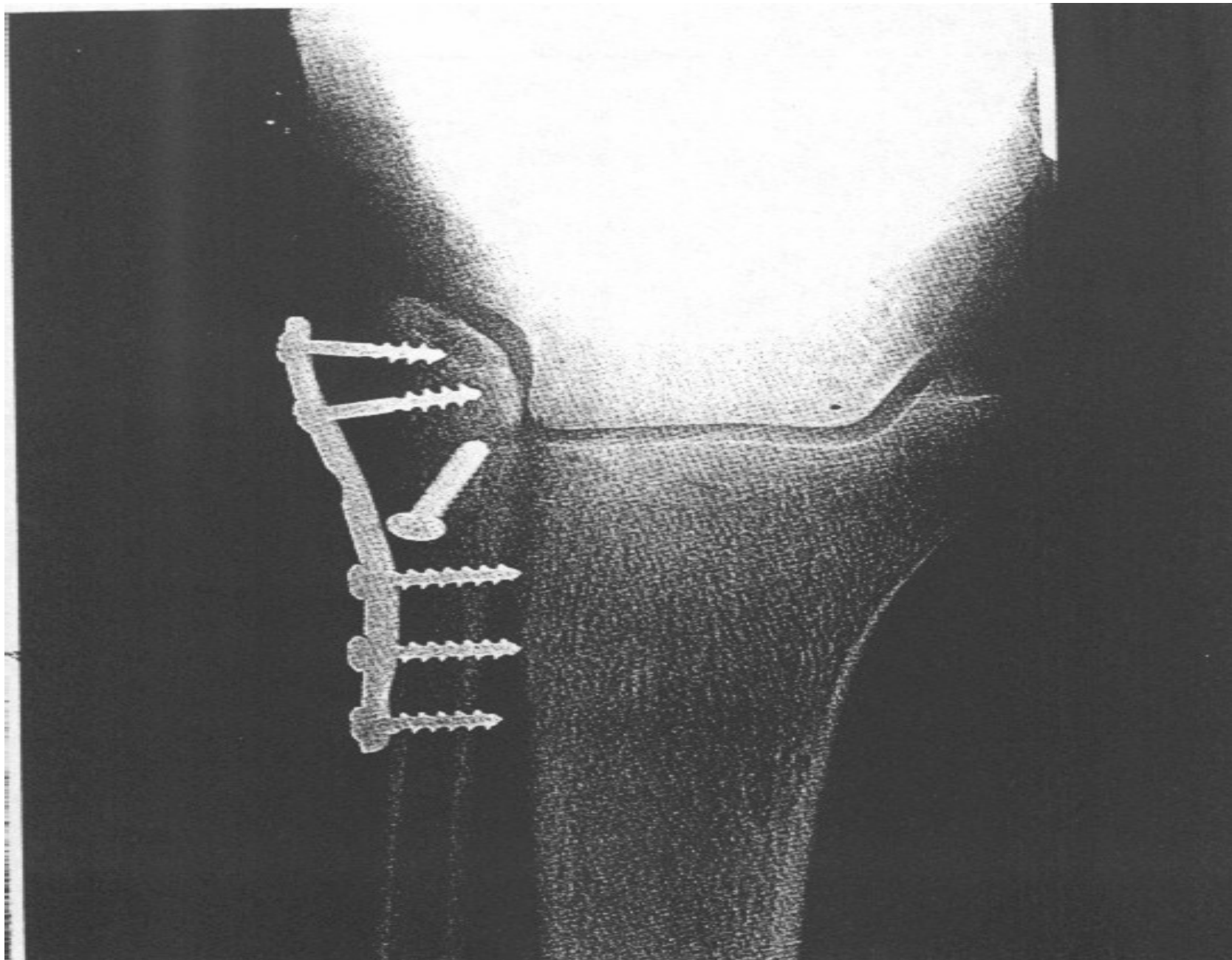
- Although nails hold length and alignment, they are less effective for controlling rotation.
- There is a risk of devitalizing the bone by exposing the bone and reaming the medullary cavity of each fragment.



# Nail-plates

- Some fractures, particularly the very common trochanteric fracture of the femur, can be treated with a nail and plate.





# Common methods of fracture immobilization

- **External fixation:**
  - Pins or wires are driven into the fragments and held by a piece of apparatus on the outside of the body

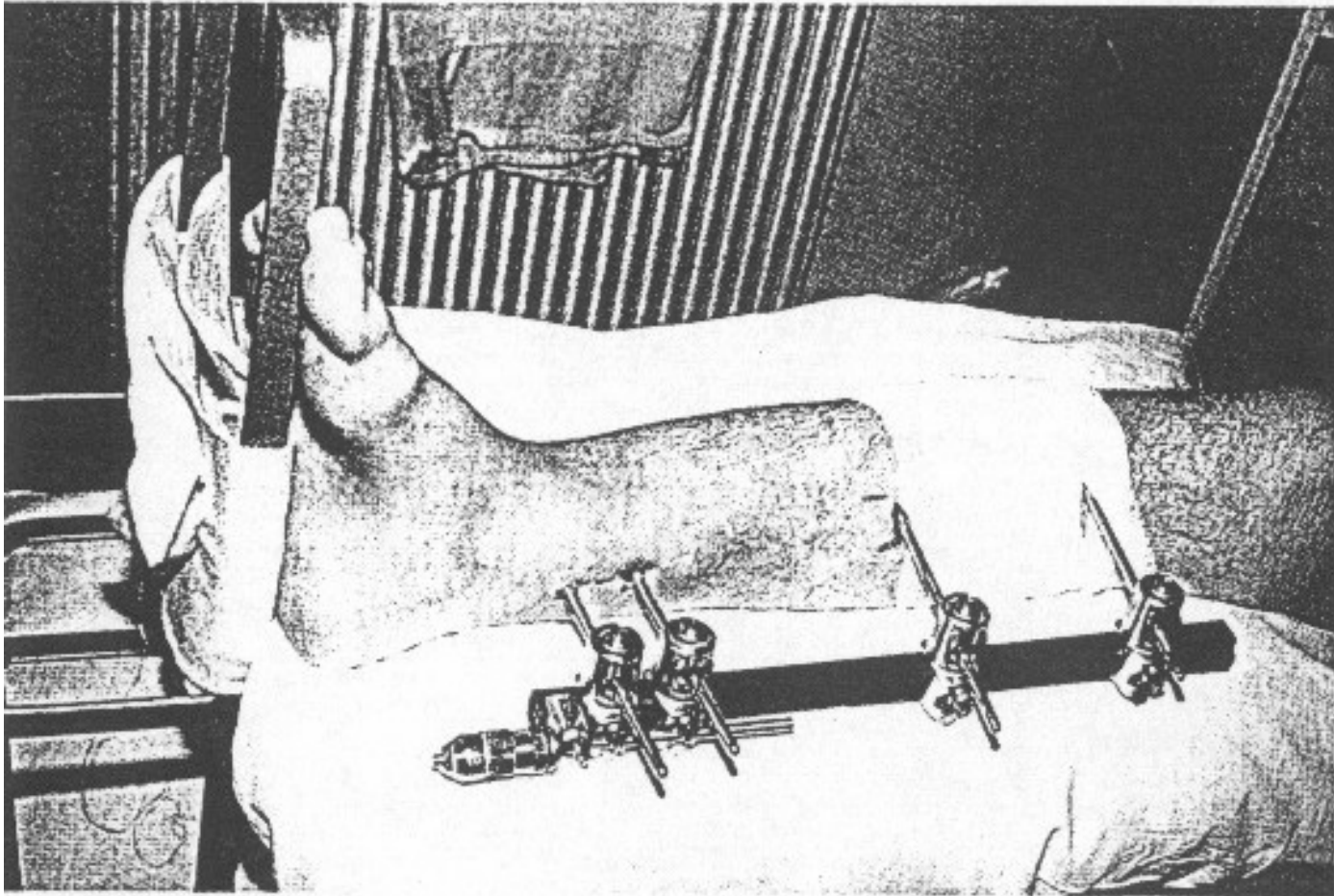


**External fixation**

# External fixation



## Advantages

- It can be used in patients with skin loss or infection
- The position of the fragments can be easily adjusted



**External fixation**

# The role of physiotherapy

- No two patients are alike   
Your approach should be flexible
- No two assessments are alike   
Learn the basic assessment principles, but tailor your assessment to each individual

# The role of physiotherapy

- No two treatment courses are alike →  
Recognize when a treatment is not working, and change or modify it
- No assessment can predict the outcome →  
Assess as you treat



# Patient assessment

- **History (medical & social):**

- Example: a person with internal fixation would not be considered for some electrotherapy
- The most effective physiotherapists are able to listen to what the patient tells them and incorporate this into treatment
- Do not ask leading or multiple questions

# Basic background information to record:

- Date and mode of onset
- Occupation
- Drug history
- X-rays / scans / other tests
- Family history
- Specific surgical instructions (e.g., partial weight-bearing for the next 3 weeks)

# Pain

- Location
- Type
- Duration
- Radiating?
- Alleviating or aggravating factors
- Visual analogue scales

# Objective examination

```
graph TD; A[Objective examination] --> B[Look:]; A --> C[Feel:]; A --> D[Move:]; B --- B1[Swelling]; B --- B2[Spasm]; B --- B3[Deformity]; B --- B4[Bruising]; B --- B5[Oedema]; B --- B6[Atrophy]; C --- C1[Swelling]; C --- C2[Heat]; C --- C3[Sensation]; C --- C4[Tenderness]; C --- C5[Spasm]; D --- D1[Active]; D --- D2[Passive]; D --- D3[Overpressure]; D --- D4[End-feel];
```

## **Look:**

Swelling  
Spasm  
Deformity  
Bruising  
Oedema  
Atrophy

## **Feel:**

Swelling  
Heat  
Sensation  
Tenderness  
Spasm

## **Move:**

Active  
Passive  
Overpressure  
End-feel

# Muscle strength

- Test the muscles surrounding the affected area, above and below the site of injury
- Example: rotator cuff weakness because of disuse following a 2 week immobilization in a collar and cuff due to Colles' fracture

# Setting goals

- The goals need to be SMART:
  - **S**pecific
  - **M**easurable
  - **A**chievable
  - **R**ealistic
  - **T**imely

# SMART Goals

## Examples

- Patient X will be able to do stairs (steps?), partial weight bearing, with 2 elbow crutches in 4 days
- Patient Y will be able to transfer safely from bed to chair within 2 days
- Patient Z will attain 50° of active knee flexion within a week

# NOT SMART Goals

## Examples

- Patient X will be able to walk in 8 months (not timely)
- Patient Y will be much better in 1 week (not specific)
- Patient Z will have more knee flexion with 1 week (not measurable and not specific)
- Patient X will be pain free within 1 day of sustaining fracture (not realistic)



# Continuous Passive Motion (CPM)

- Regular passive rhythmic motion performed by a machine
- Stimulate circulation and assist in reduction of swelling
- Encourages more rapid revascularization following ACL reconstruction or patellar tendon graft

# Continuous Passive Motion (CPM) Disadvantages

- It is passive, and therefore will **not** build muscle strength
- The appearance of the unit may threaten some patients
- May be bulky and expensive
- May be uncomfortable and cause pressure problems if positioned incorrectly
- Risk of infection if not properly cleaned