

GOOD MORNING

**DEPARTMENT OF ORTHOPAEDICS
J.J.M MEDICAL COLLEGE
DAVANGERE**

**SEMINAR ON
TRACTIONS IN ORTHOPAEDICS**

MODERATORS:

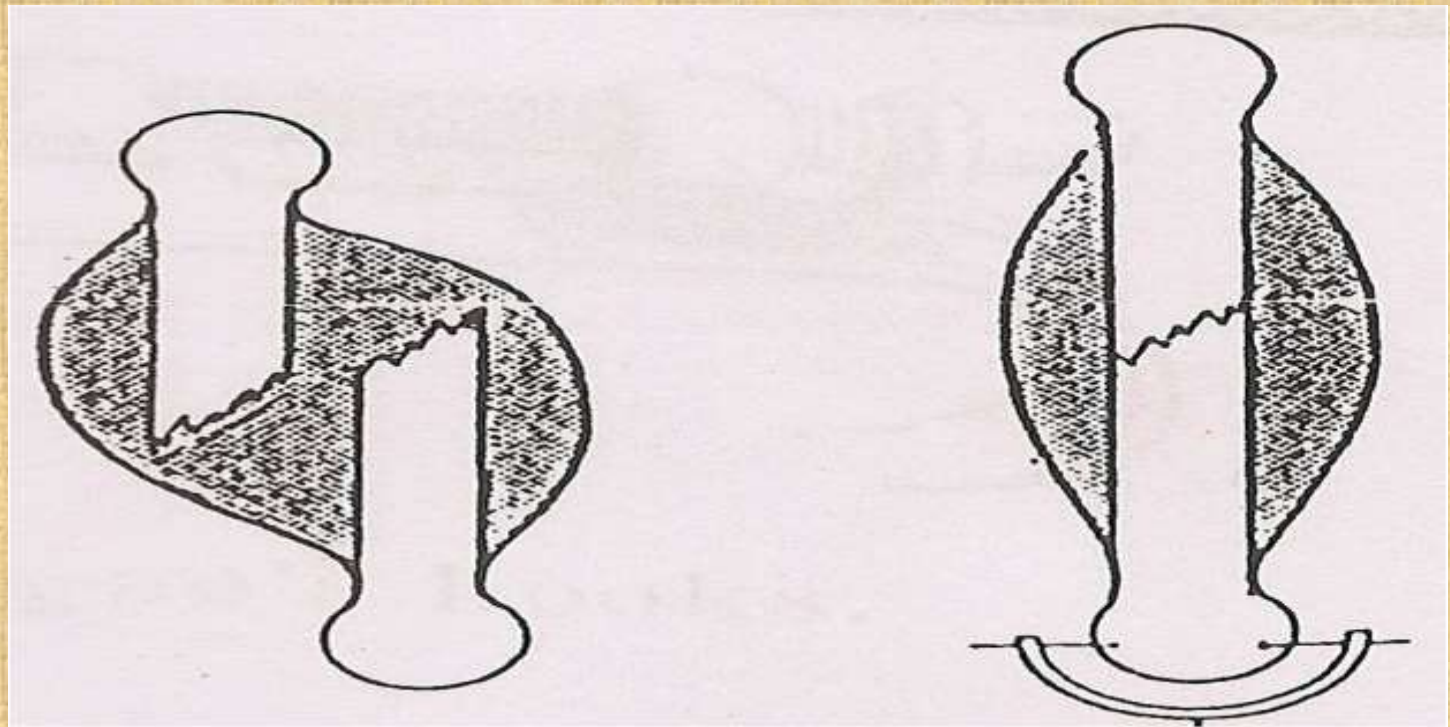
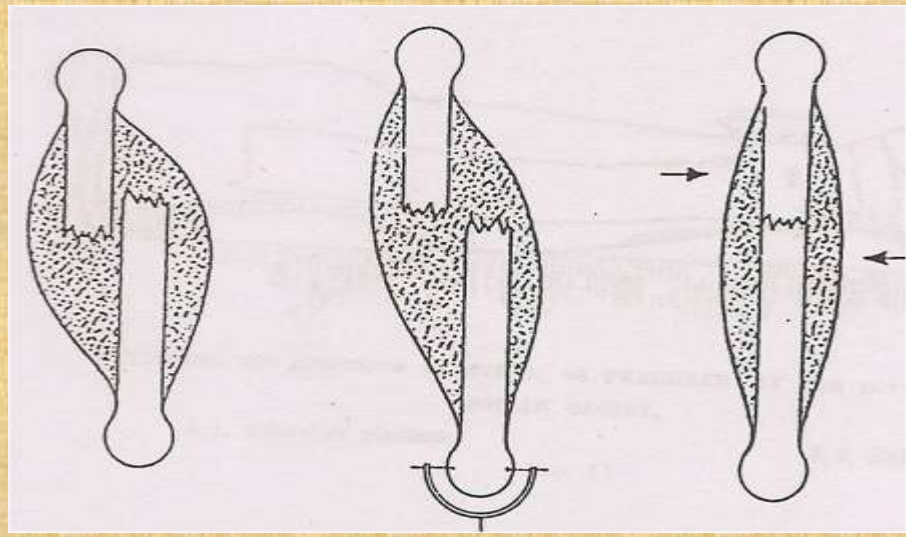
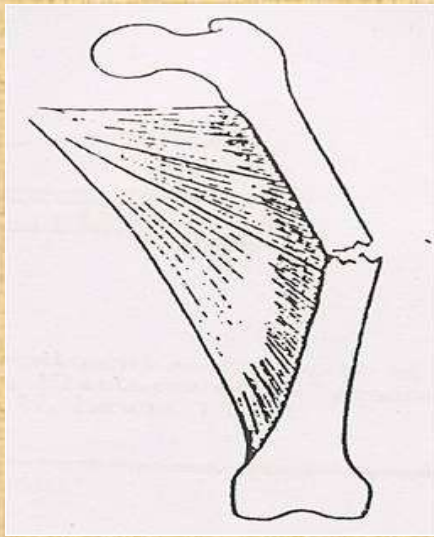
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DEFINITION:

Traction is defined as an act of drawing or exerting a pulling force applied to limbs, bones, or other tissues along the longitudinal axis of the structure to pull the tissues apart, often for realignment.

- When limb becomes painful as a result of inflammation or fracture the controlling muscles go into spasm and can produce deformity which impairs the future function of limb.
- Traction when applied to the injured limb can overcome the effect of original deforming forces.

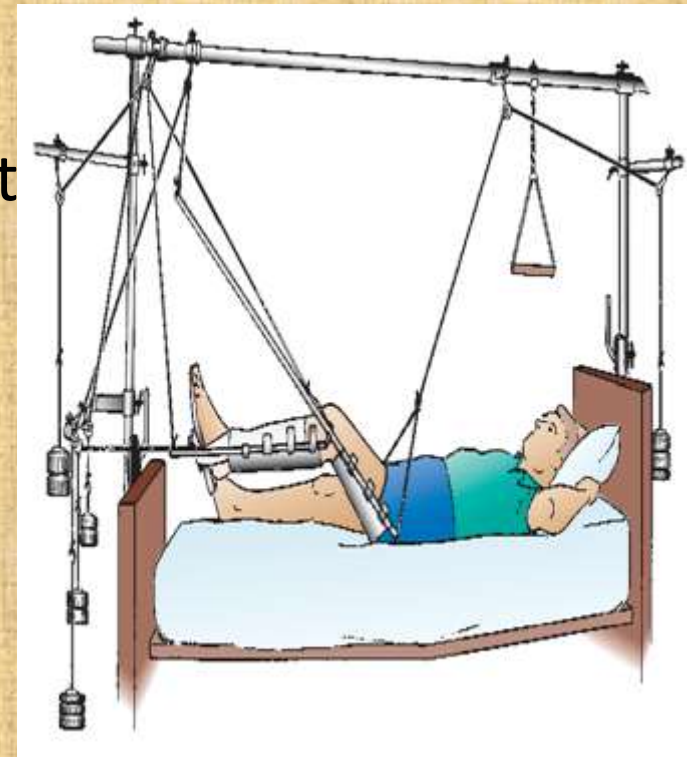


Traction is applied

- Reduce a fracture
- Reduce dislocation of a joint
- Relieve pain
- Rest the limb in functional position
- Aid in healing of bone.
- Overcome muscle spasm and deforming forces.
- Correction of soft tissue contractures by pulling them gradually

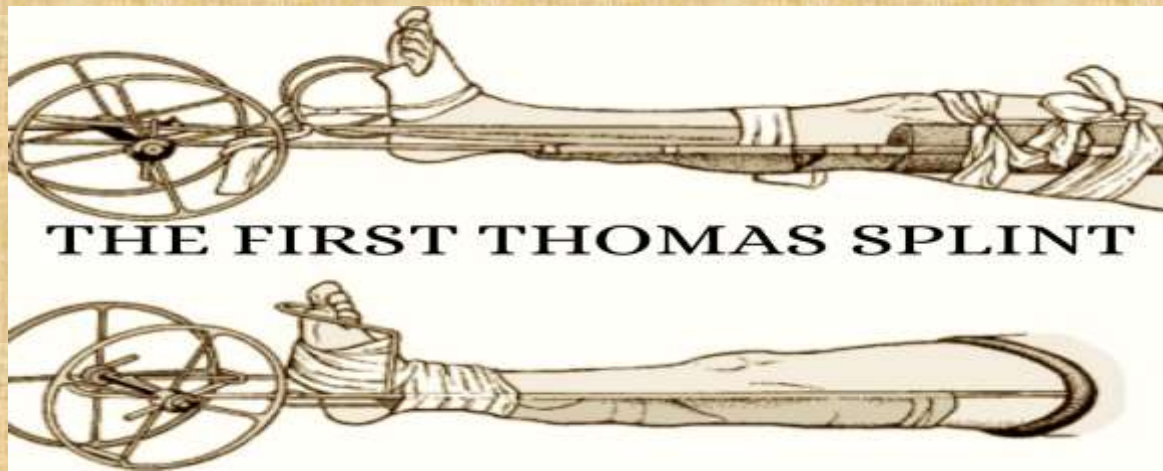
Essential materials for traction

- Firm mattress or a bed board.
Facility to elevate the head end and foot end of the bed.
- An overhead frame, trapeze, monkey ropes and side rails to shift the position of the patient.
- Bars, pulleys, ropes, wt hangers, skeletal traction apparatus and plaster cast materials.
- Traction must always be opposed by counter traction.
- Constant care and vigilance to avoid all the hazards of prolonged bed rest

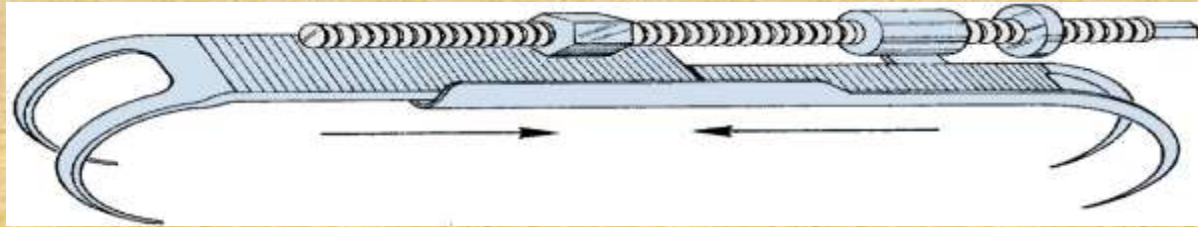


HISTORY OF TRACTION

- *Hippocrates* (460-360BC) treated fracture shaft of femur and of leg with the leg straight in extension.
- *Percival Pott* (1714-1788) - He taught that the fractured limb should be placed in the position in which the muscles are most relaxed.
- *Josiah Crosby* - First to demonstrate and effectively promote the use of skin traction for the treatment of shaft of femur
- *Thomas Bryant* introduced Bryant's traction for treatment of fracture shaft femur in children.



- *Malgaigne* in 1847 introduced the 1st effective traction which grasped the *bone itself*. He used *Malgaigne's* hooks.



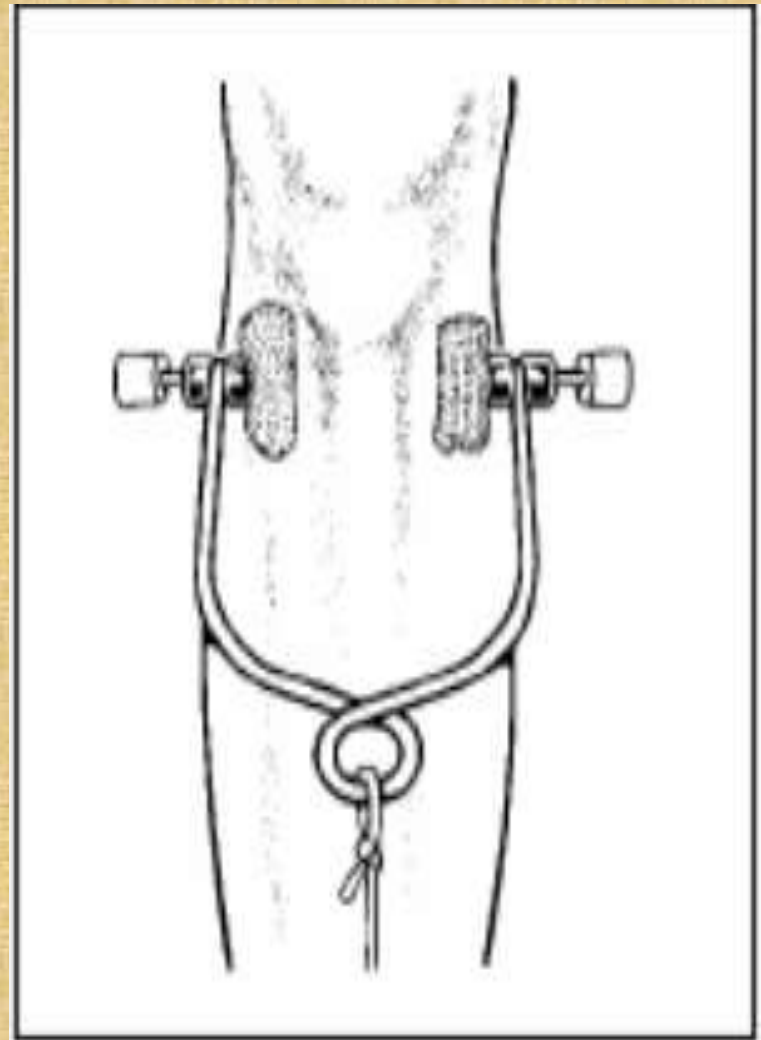
- *Steinmann* (1872-1932) in 1907 introduced a method of applying *skeletal traction to the femur* by means of pins driven into the femoral *condyles*.



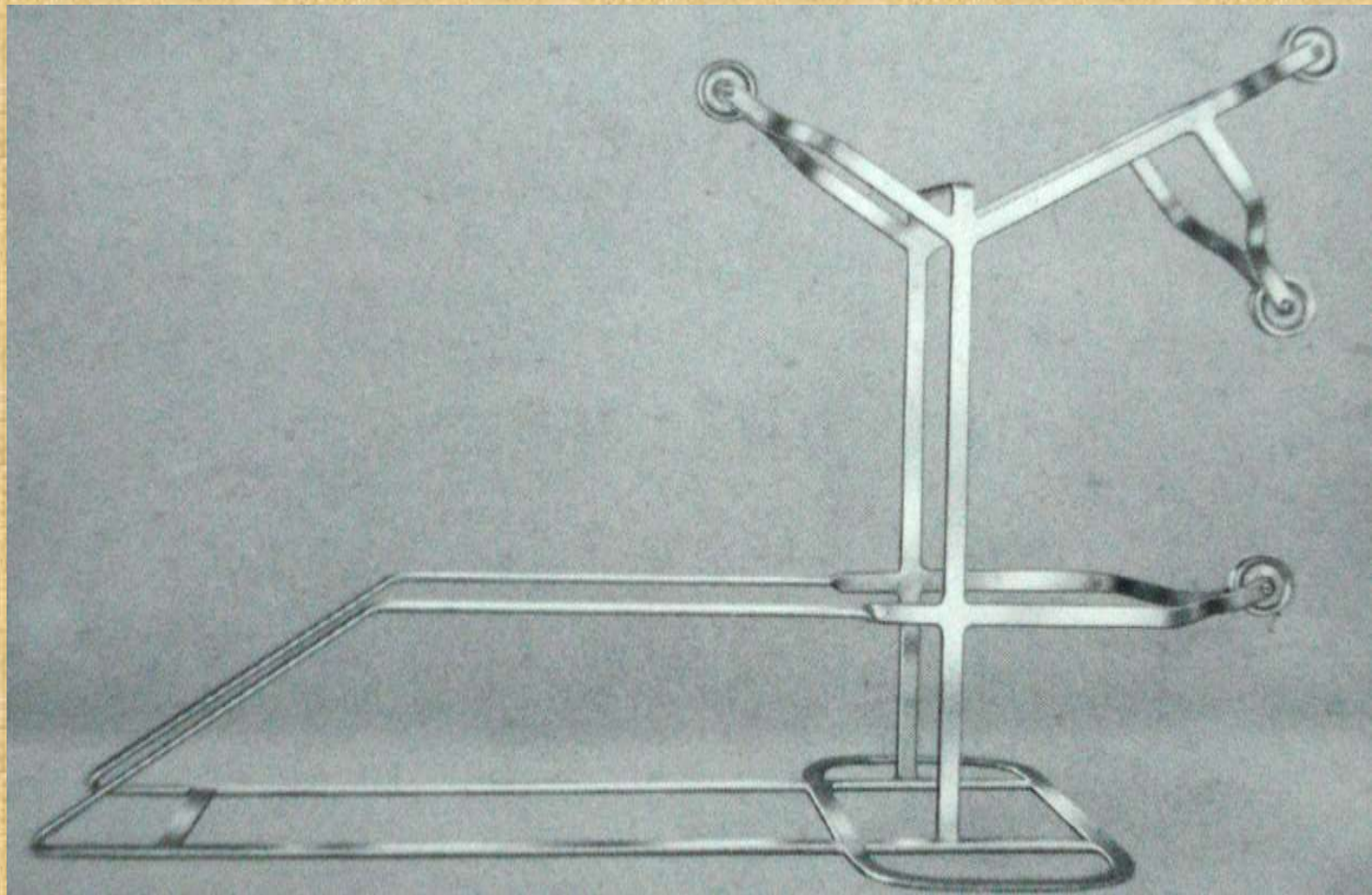
- *Lorenz Bohler* - "the father of traumatology" popularized skeletal traction worldwide by means of Steinmann pin after he devised Bohler's stirrup. He modified Braun's splint and developed the multipurpose Bohler Braun splint



Bohlers stirrup with steinmann pin



Bohlers Stirrup with steinman pin
Applied as skeletal traction



Bohler Braun frame

METHODS OF APPLYING TRACTION

- Skin traction
 - 1)Adhesive
 - 2)Non-adhesive
- Skeletal traction

SKIN TRACTION



Skin traction

Used as a definitive method of treatment as well as a first aid or temporary measure.

Mechanism:

- Traction force is applied over a large area. Load is spread and is more comfortable and efficient.
- Force applied is transmitted from skin to the bones, via the superficial fascia, deep fascia and intermuscular septa.
- For better efficiency, the traction force is applied only to the limb distal to the fracture.

Maximum weight:

Recommended is 6.7kg (depending on size and age of *patient*) ($1/10^{\text{th}}$ the body weight).

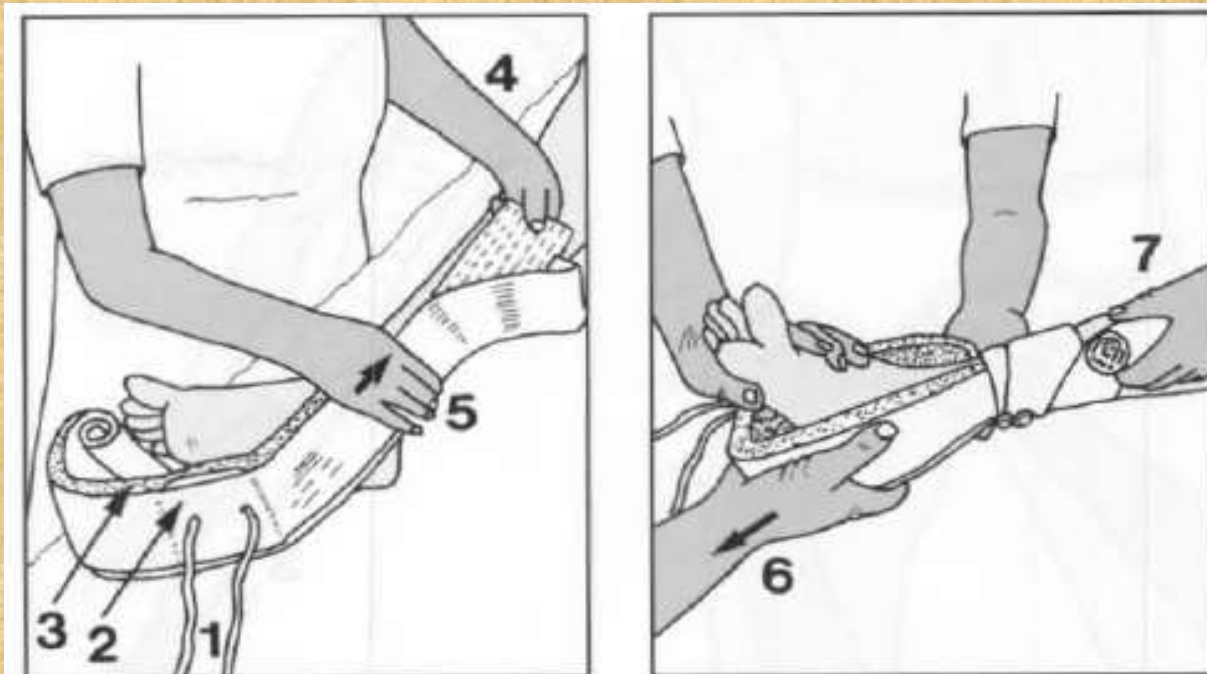
METHODS OF APPLYING SKIN TRACTION

1. ADHESIVE SKIN TRACTION

2. NON ADHESIVE SKIN TRACTION

Adhesive skin traction

- Prepare the skin by shaving washing and drying
- Use adhesive strapping which can be stretched only transversely
- Avoid placing adhesive strapping over bony prominences
- Leave a loop of 2 inches (5cm) projecting beyond the distal end of limb to allow the movement of finger / foot



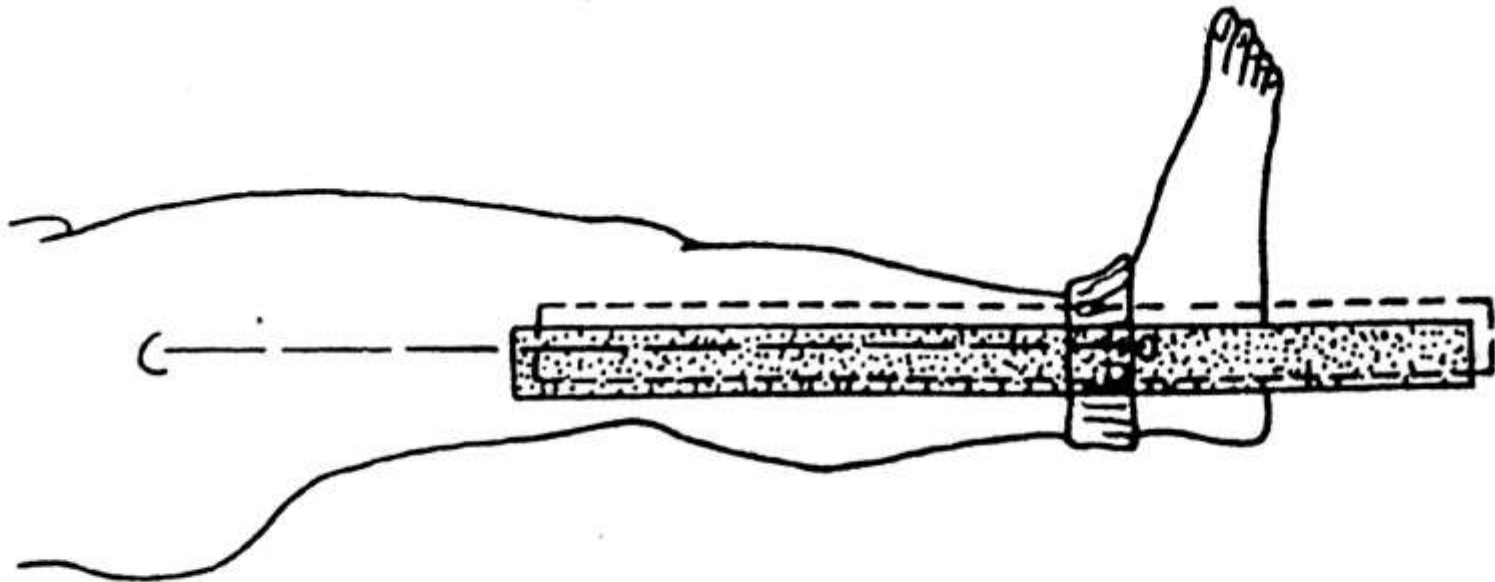


Fig. 1.1 Skin traction: note that on the lateral side, the strapping lies slightly behind and parallel to a line between the lateral malleolus and the greater trochanter.

- Always leave a free skin between the straps
- Must not be too tight or too loose
- Leave the heels free
- Can be safely used for 4-6 weeks
- It may be pulled down day by day

Non-Adhesive skin traction

- This consists of lengths of soft, ventilated latex foam rubber, laminated into a strong cloth backing.
- These are useful in thin and atrophic skin or when there is sensitivity to adhesive strapping. It is applied in similar fashion as adhesive skin traction
- As the grip is less secure, frequent reapplication may be necessary
- Attached traction weight should not be more than 4.5kg (10 lbs)



Non adhesive skin traction

Indications of skin traction

- Temporary management of femoral neck fractures and intertrochanteric fractures.
- Management of femoral shaft fractures in older and hefty children.
- Undisplaced fracture of acetabulum.
- After reduction of a dislocation of the hip.
- Prevent minor fixed flexion deformities of the hip or knee.
- Management of low back ache.
- Post Gullitone amputation to approximate the tissues.

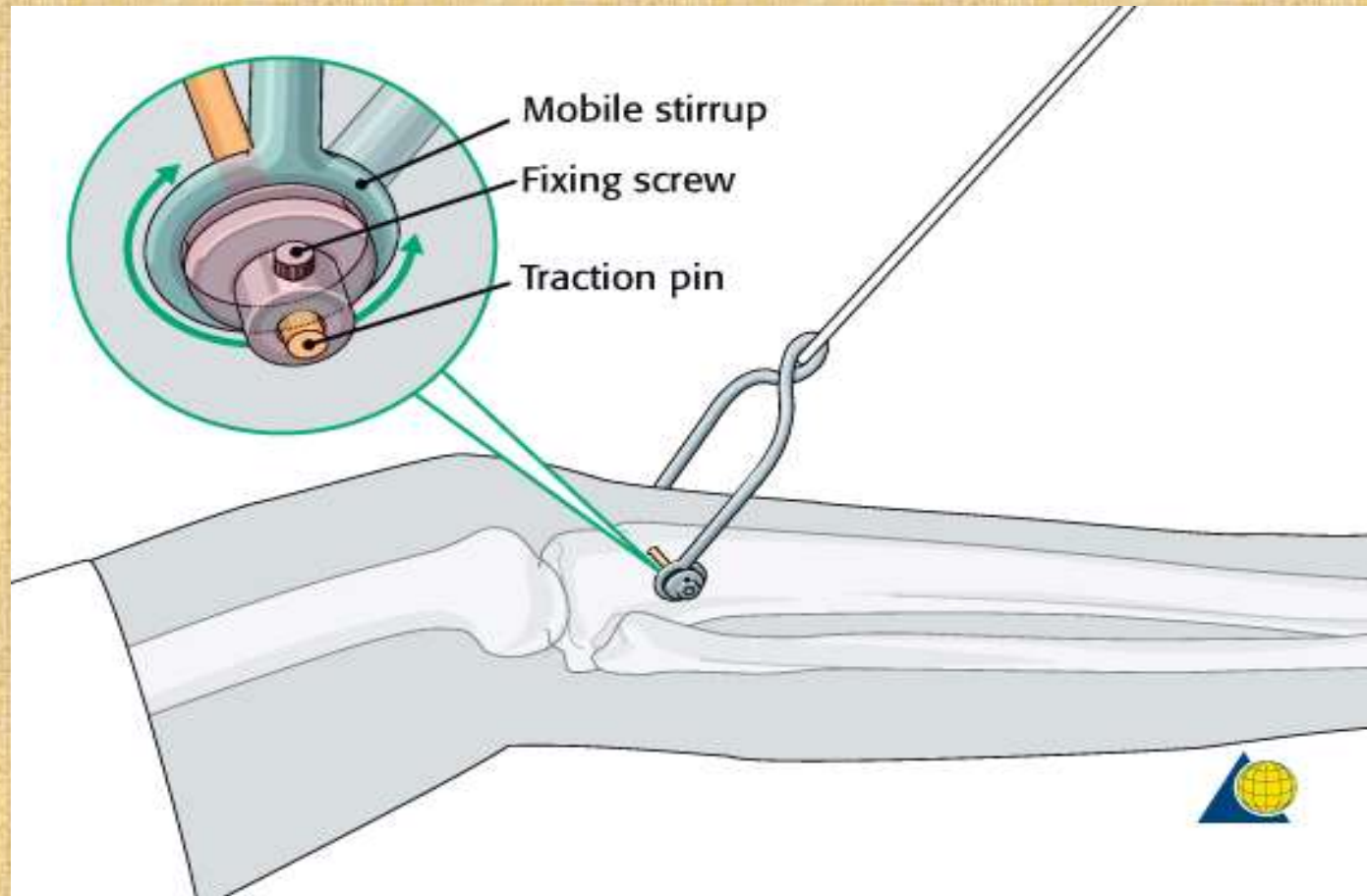
Contraindications of skin traction

1. Abrasion & Laceration of skin.
2. Dermatitis.
3. Any fragile condition of skin.
4. Impairment of circulation-varicose ulcers, Impending gangrene.
5. Marked shortening of bony fragments where more traction weight has to be applied.

Complications of skin traction

- Allergic reaction to adhesive.
- Excoriation of skin from slipping of adhesive strapping.
- Pressure sores around malleoli & tendoachilles.
- Common peroneal nerve palsy.

SKELETAL TRACTION



SKELETAL TRACTION

- Traction force is applied directly to the bone by means of pins or wire driven through the bone
- It is used more frequently in the management of lower limb fractures.
- It may be employed as a means of reducing or of maintaining the reduction of a fracture
- It should be reserved for those cases in which skin traction is contraindicated

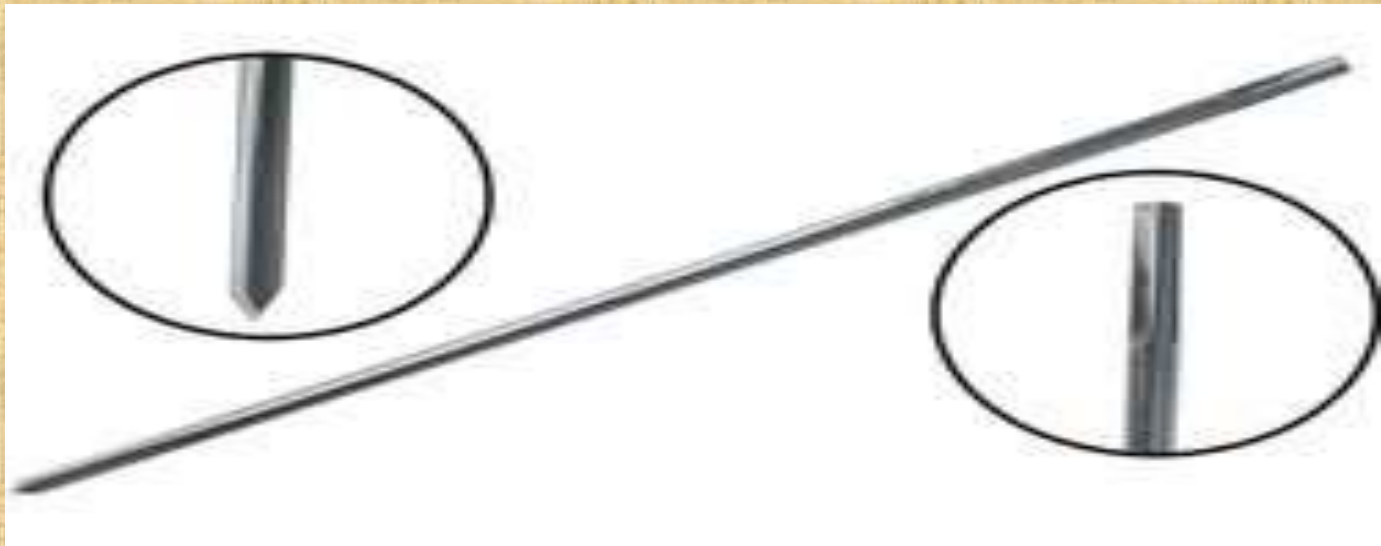
EQUIPMENTS

Most commonly used pins are

- 1) Steinman pin
- 2) Denhams pin
- 3) K wire

Steinman pin:

- Are rigid stainless steel pins of varying length, 4 to 6 mm diameter.
- After insertion a special, stirrup (Bohler 1929) is attached to the pin.
- The Bohler stirrup allows the direction of the traction to be changed without turning the pin in the bone.



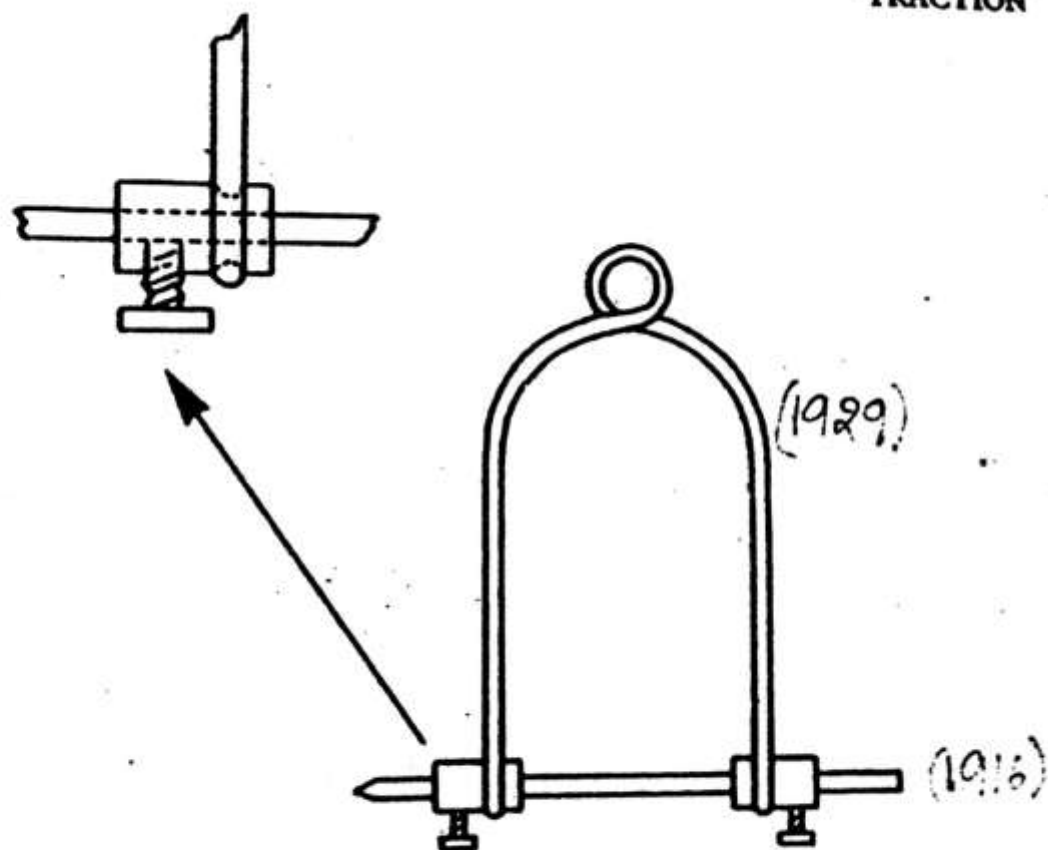
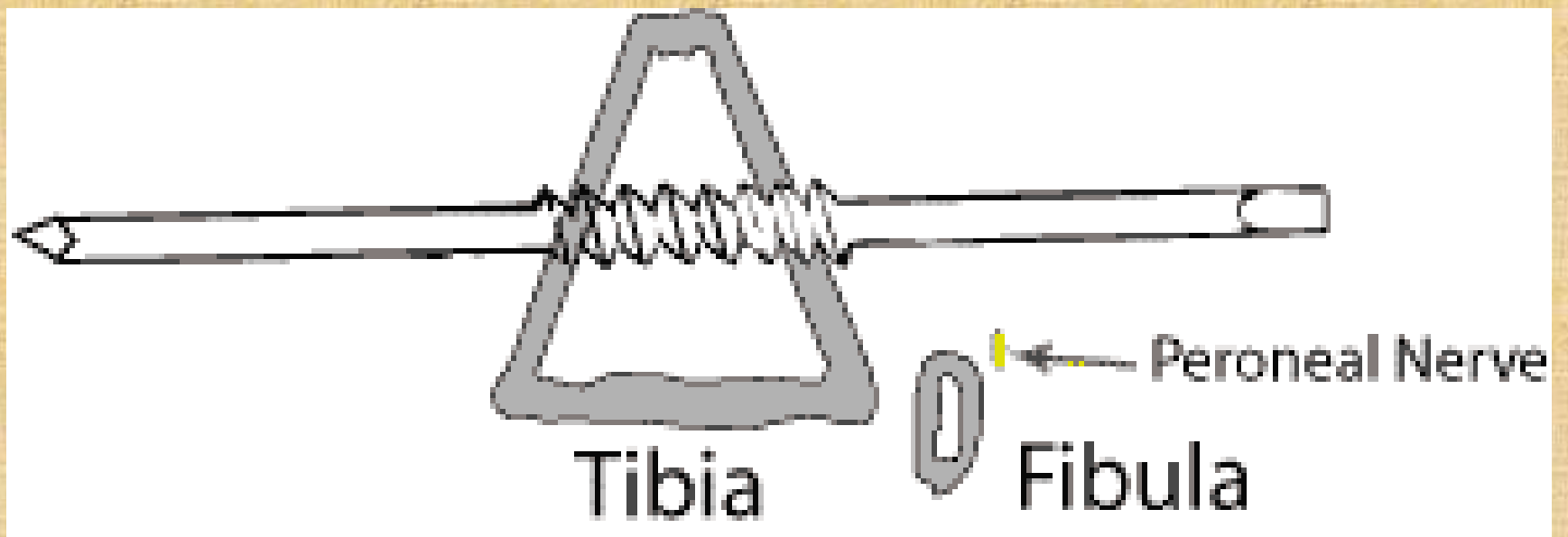


Fig. 1.3 Böhler stirrup with Steinmann pin.

Denham Pin :

- Similar to Steinmanns pin except for a short threaded length situated in the center and held in the introducer.
- It engages the bony cortex and reduces the risk of pin sliding.
- Used in
 - a) cancellous bones &
 - b) osteoporotic bones



Kirschner wire:

- Is of small diameter and is insufficiently rigid until pulled taut in a special stirrup, rotation of the stirrup is imparted to the wire.
- Though they are thin but if proper special stirrup is used they can withstand a large traction force because the stirrup provides longitudinal tension force which increases the rigidity of the K-wire.

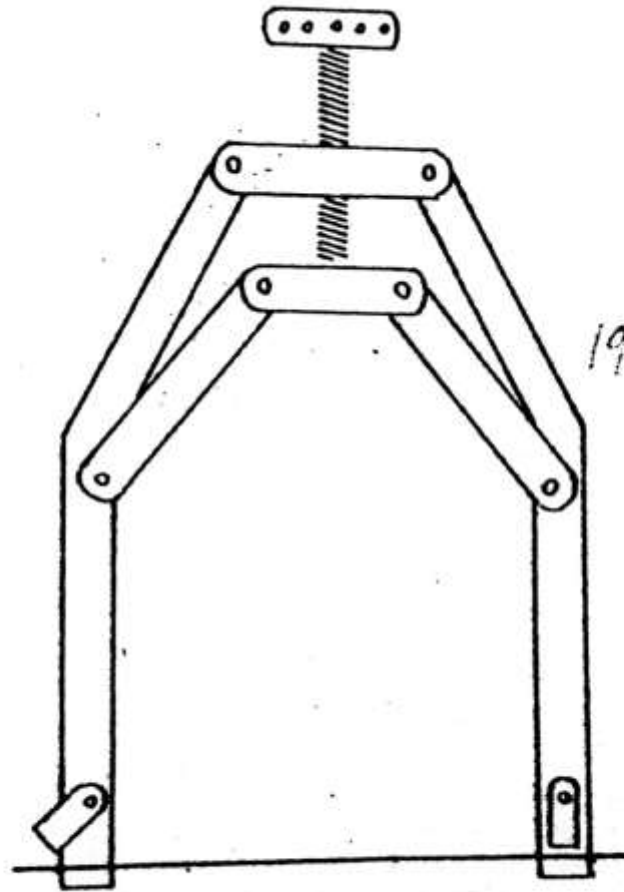


Fig. 1.5 Kirschner wire strainer.



K wire strainer

Common sites for application of skeletal traction

a) Olecranon:

- K- wire is passed 3cms distal to tip of the olecranon.
- passed medial to lateral at right angle to the longitudinal axis of ulna deep to subcutaneous border to avoid injury to ulnar nerve
- For supra condylar and trans condylar # humerus
- Unstable # shaft of humerus
- A screw eye can also be used

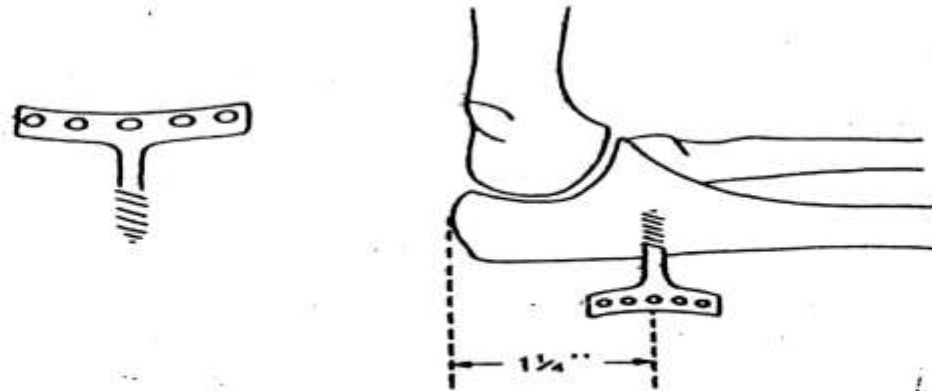


Fig. 4.23 Olecranon traction. Screw eye and its site of insertion into the ulna.

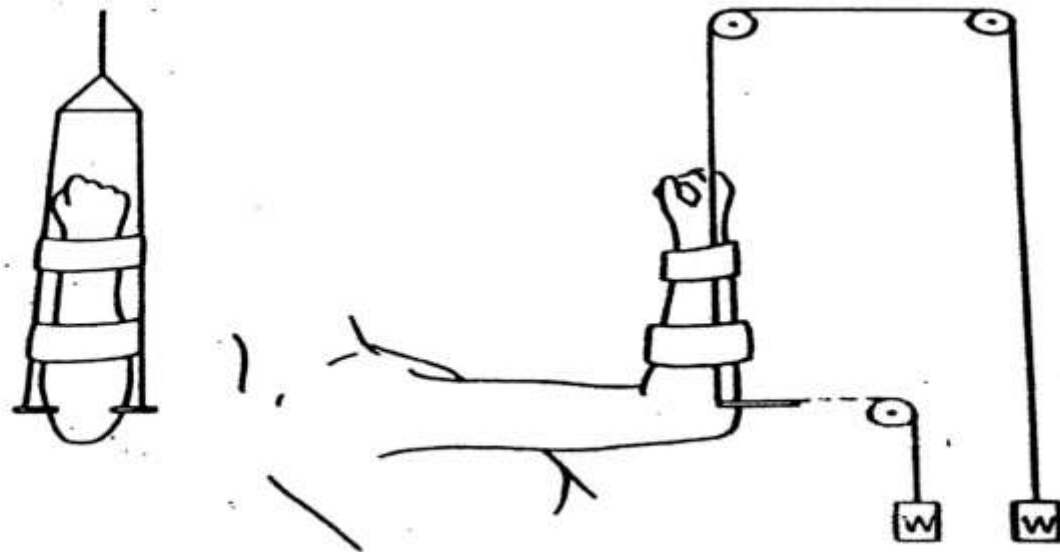
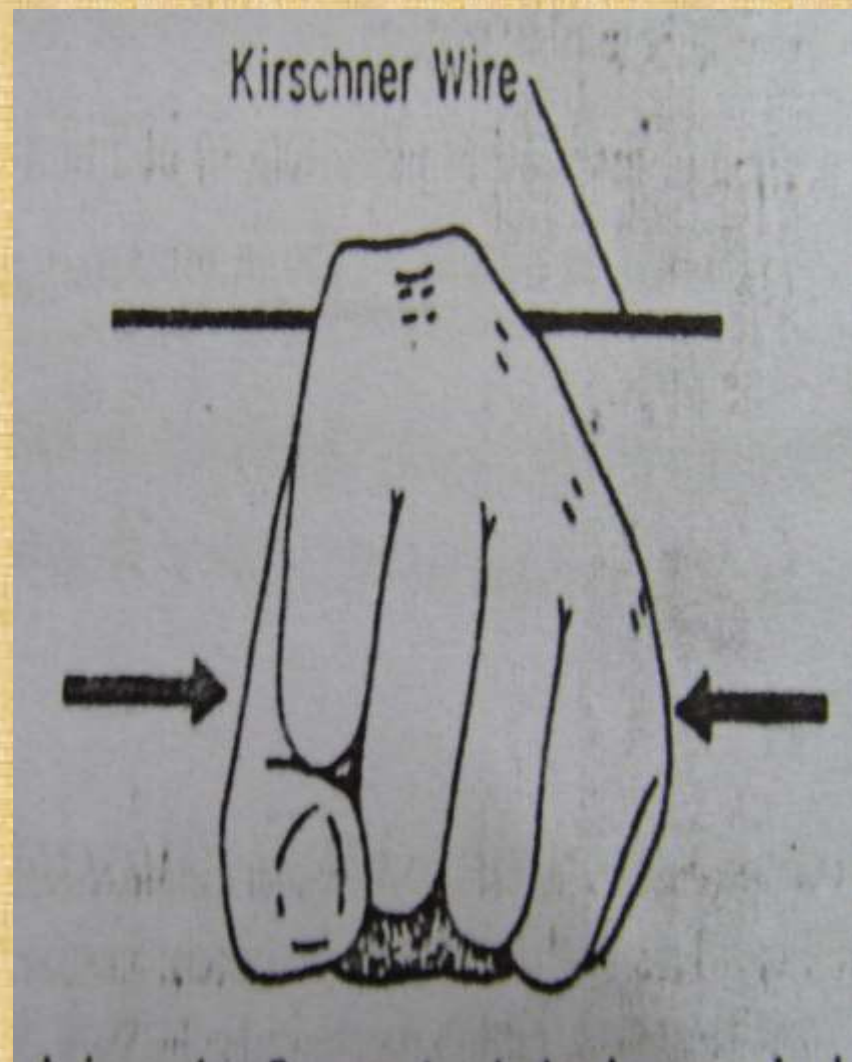


Fig. 4.24 Olecranon traction.

b)Metacarpals:

- Placed through diaphysis of 2nd and 3rd metacarpals.
- It trasverses 2nd and 3rd metacarpal at right angle to longitudinal axis of radius.
- USED IN COMMUNITED #s OF BONES OF FOREARM-PARTICULARLY THAT OF LOWER END OF RADIUS.



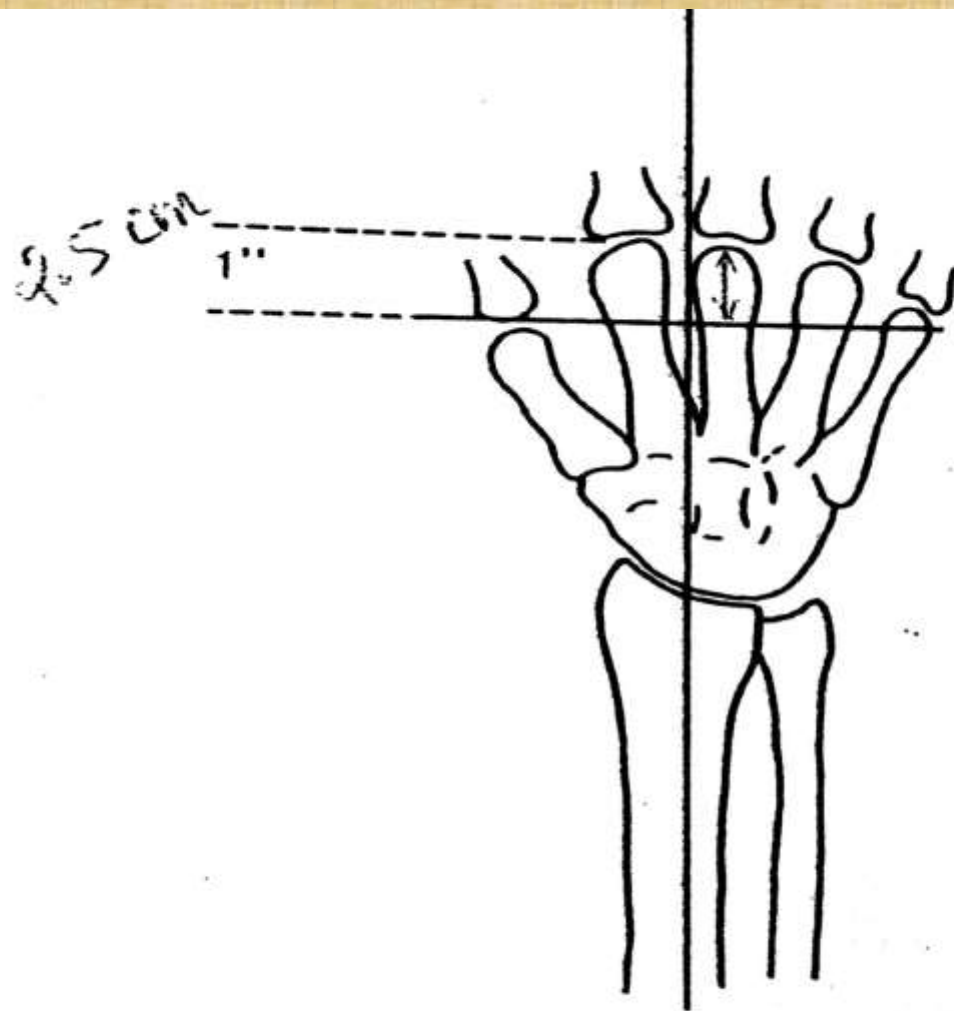
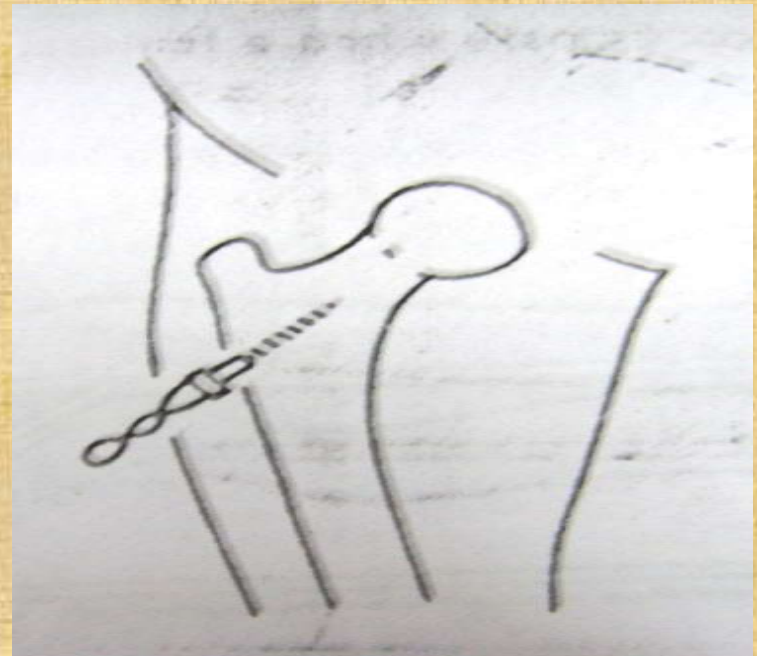


Fig. 1.7 Position for Kirschner wire in second and third metacarpals. Note that the wire is at right angles to the long axis of the radius.

C) Upper end of femur:

- Point of insertion is lateral surface of femur 2.5 cm below the most prominent part of GT midway between ant and post surface.
- Used in central fracture dislocation of hip
- Cancellous screw or screw eye is used



d) Lower end of femur:

- Point of insertion is determined by 2 ways
- Pin is passed as anteriorly as possible to avoid neurovascular structures.
- Avoid entering the knee joint

Disadvantages :

Prolonged traction through lower end of femur predisposes to knee stiffness

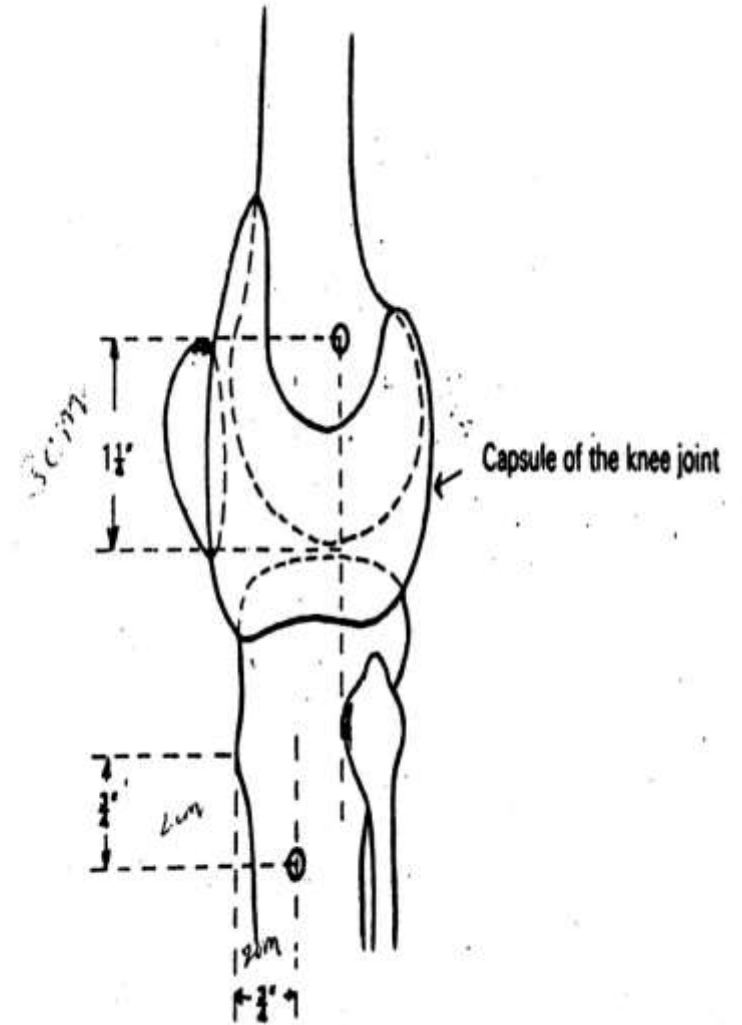
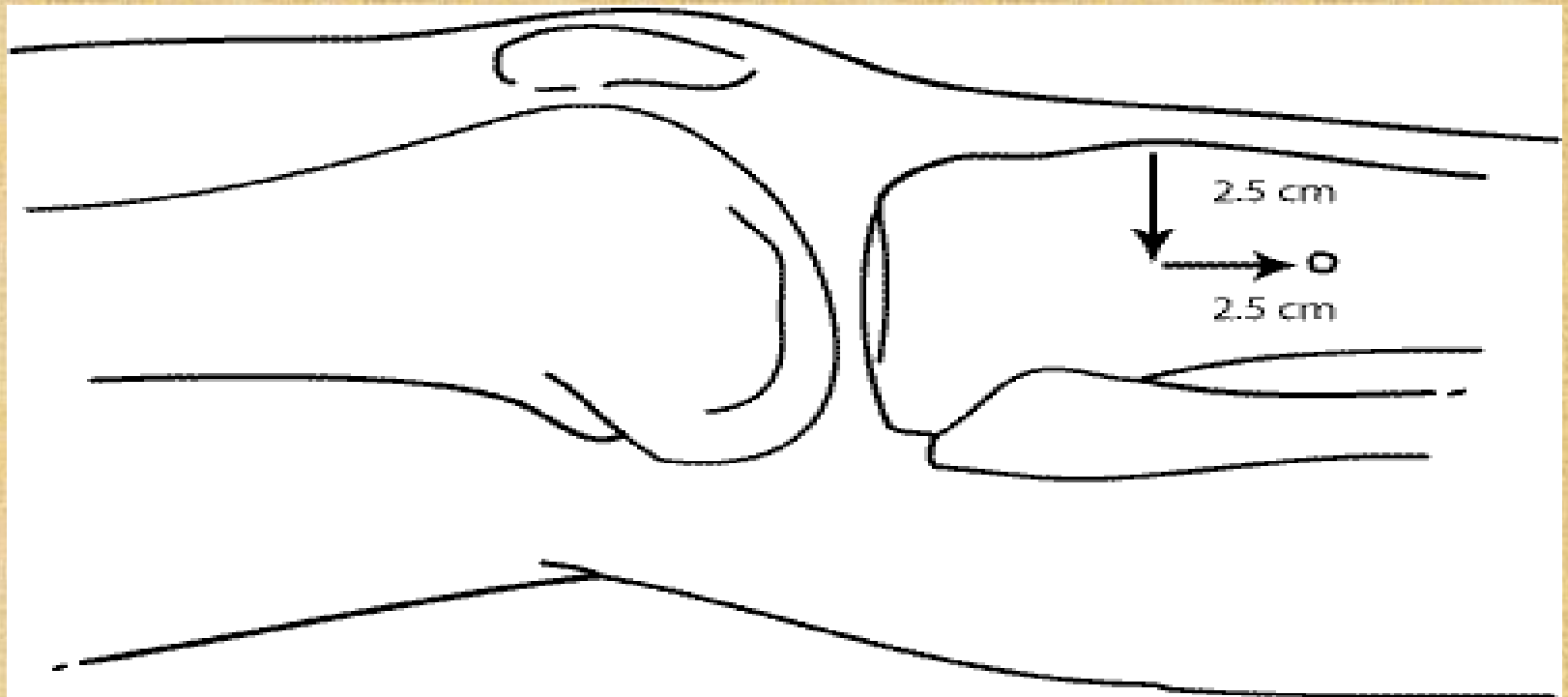


Fig. 1.9 Position for Steinmann pin in lower end of femur and upper end of tibia.

e) Upper end of Tibia:

- Point of insertion
- Pin should be inserted from lateral to medial side
- In young patients avoid open epiphysis.



f) Lower end of Tibia:

- Point of insertion 5 cm above the level of ankle joint

g) Calcaneus:

- Point of insertion
- Avoid subtalar joint

Advantages:

Traction force directly in line of the calf muscles and counteract their pull

Disadvantages:

- Subtalar joint stiffness
- Infection
- Frequent loosening

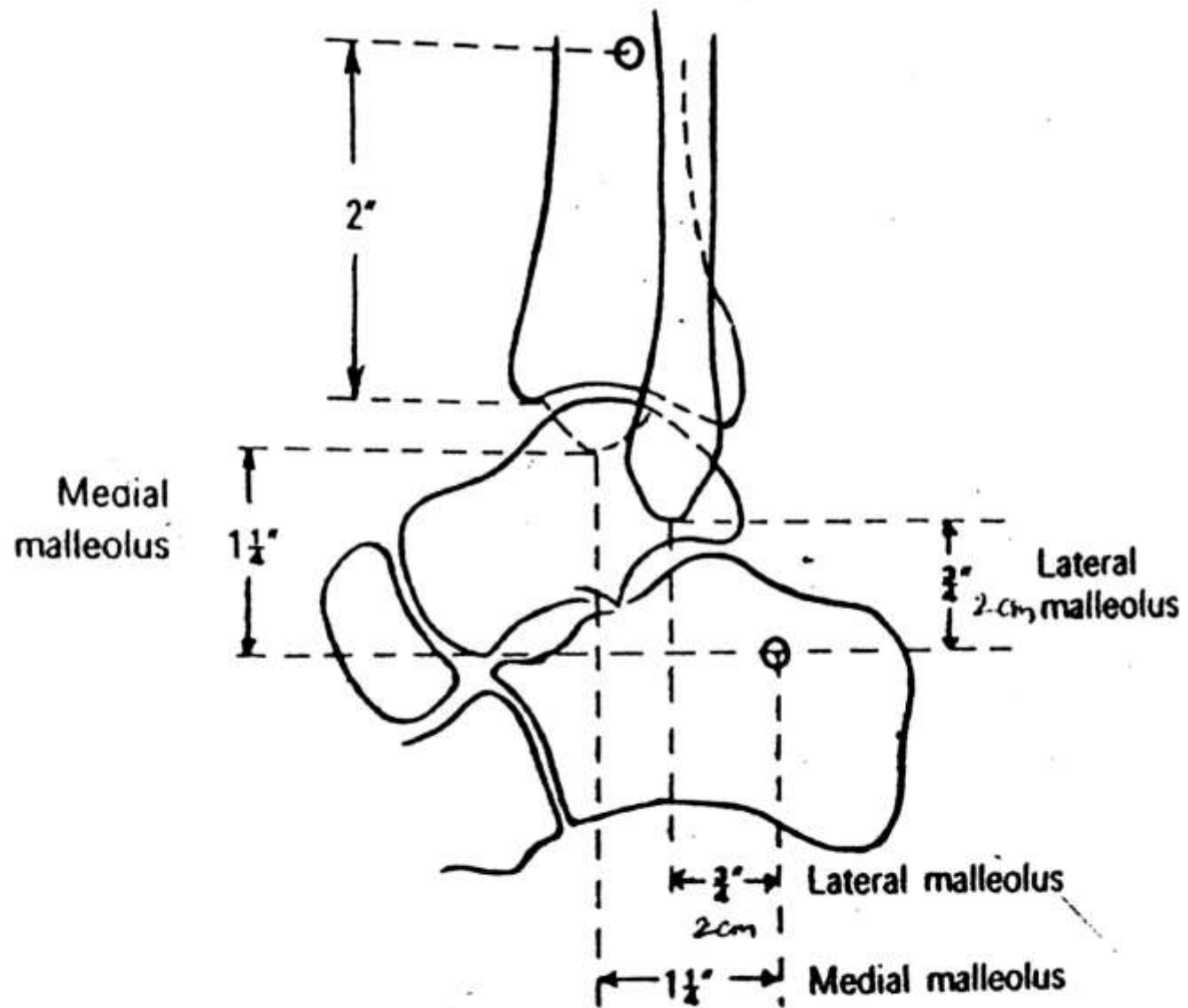


Fig. 1.10 Position for Steinmann pin in lower end of tibia and calcaneus.

PROCEDURE OF SKELETAL TRACTION

COMPLICATIONS OF SKELETAL TRACTION

- Introduction of infection into a bone.
- Incorrect placement of pin
 - -Allows pin to cut out of bone.
 - -Makes control of rotation of limb difficult.
 - -Makes application of splint difficult.
 - -Unequal pull causes pin to move in the bone causing ischemic necrosis
- Large traction force.
 - -Distraction at fracture site.
 - -Ligament damage.
- Damage to epiphyseal growth plate in children.
- Depressed scar and stiffness of joints.

COUNTER TRACTION

- Reason for applying Traction is to counteract deforming effect of muscle spasm and this tends to draw body in direction of traction.
- To prevent this, force is to be used in opposite direction called **Counter-traction**.
- It can be done in two methods
 - A) Fixed Traction
 - B) Sliding Traction
 - C) Combination of above

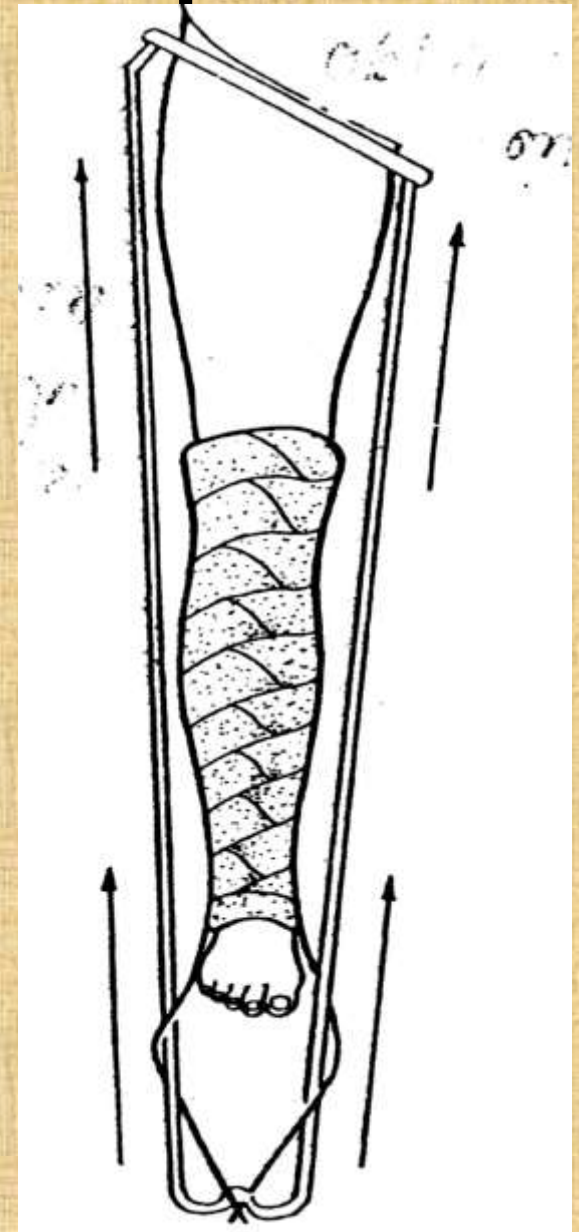
FIXED TRACTION

When counter traction acts through an appliance which obtains purchase on a part of the body, its called a fixed traction.

METHODS OF FIXED COUNTER TRACTION

Fixed traction in Thomas` splint

- Maintain but not obtain reduction
- Counter thrust passes up the side bars to padded ring around the root of the limb.
- The malleoli are well padded to avoid pressure sores.
- The outer traction cord passes above and the inner cord passes below its respective side bar, to hold the limb in medial rotation.
- The traction cords are tied over the end of the Thomas spint.
- A traction wt of 5lb(2.3kg)attached to the Thomas`splint is sufficient

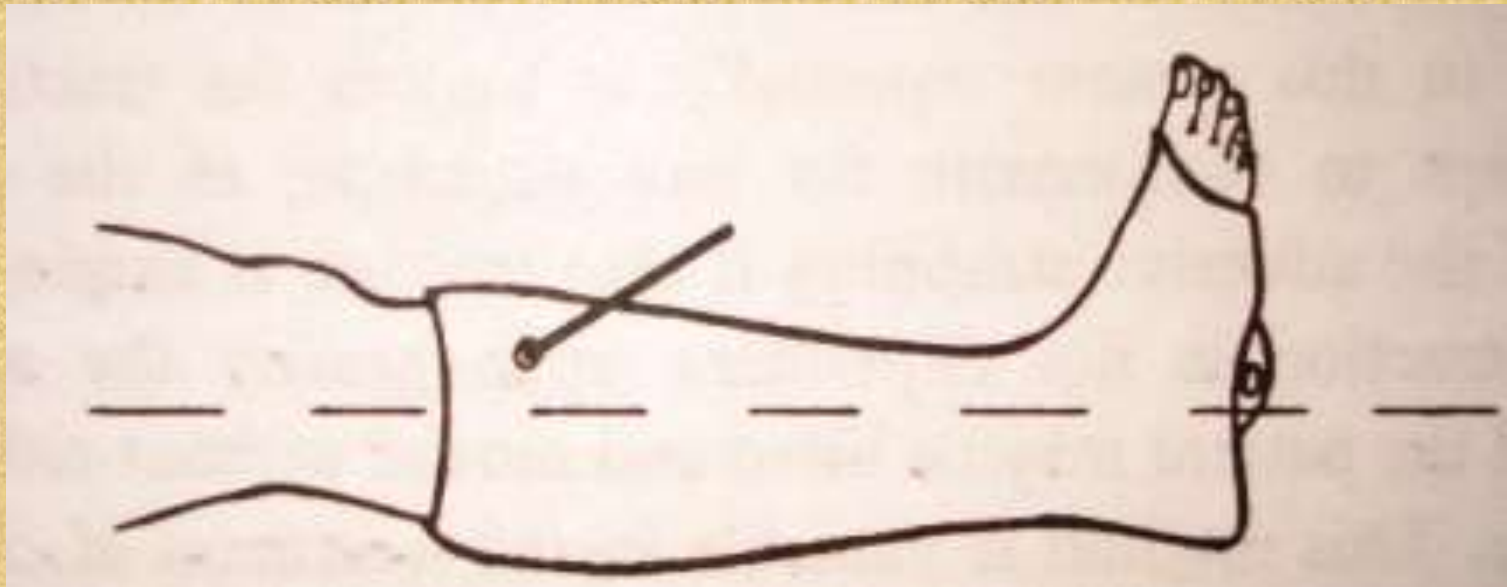


Advantages of Thomas splint:

- Distraction at the # site less likely to occur
- No need to tighten the traction cords repeatedly
- Apparatus is self contained and can be moved without risk of displacement of #

Traction unit

- Introduced by Charnley.
- For the treatment of # Shaft Of Femur.
- Consists of upper tibial steinman pin incorporated in a below knee cast which is then fit in to a Thomas` splint



Advantages:

1. Compression of the tissue of the upper calf including common peroneal nerve does not occur
2. Equinus deformity at the ankle can't occur because the foot is supported by plaster cast
3. The tendo-calcaneus is protected by the padded cast
4. Rotation of the foot and the distal fragment is controlled
5. A fracture of the ipsilateral tibia can be treated conservatively at the same time.

ROGER ANDERSON WELL-LEG TRACTION

- Originally used in management of #s of pelvis, femur, tibia.
- Skeletal traction being applied to injured leg, while the well leg was employed for counter traction.
- But this method is valuable in correcting either abduction and adduction deformity at the hip.

PRINCIPLE:

- With abduction deformity at the hip, the affected limb appears to be longer. When Traction is applied to the well limb and Affected limb is simultaneously pushed Up (counter traction), the abduction deformity is reduced.

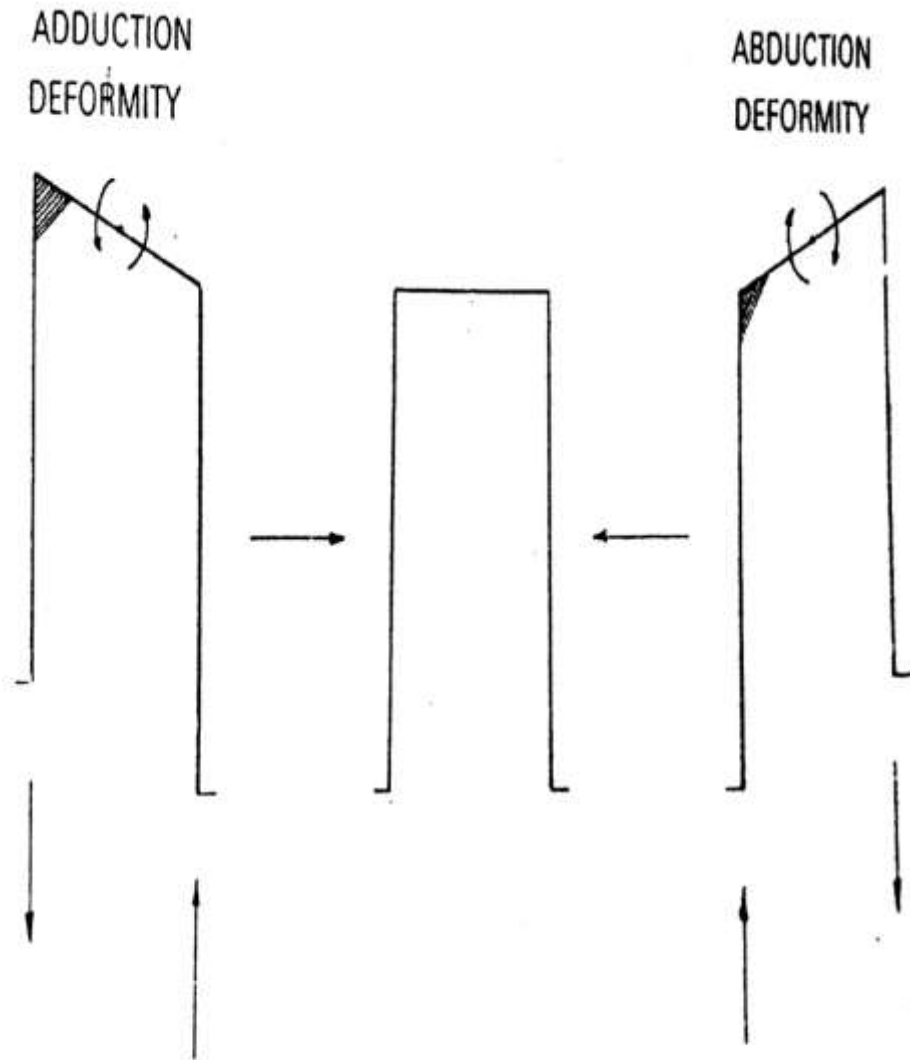


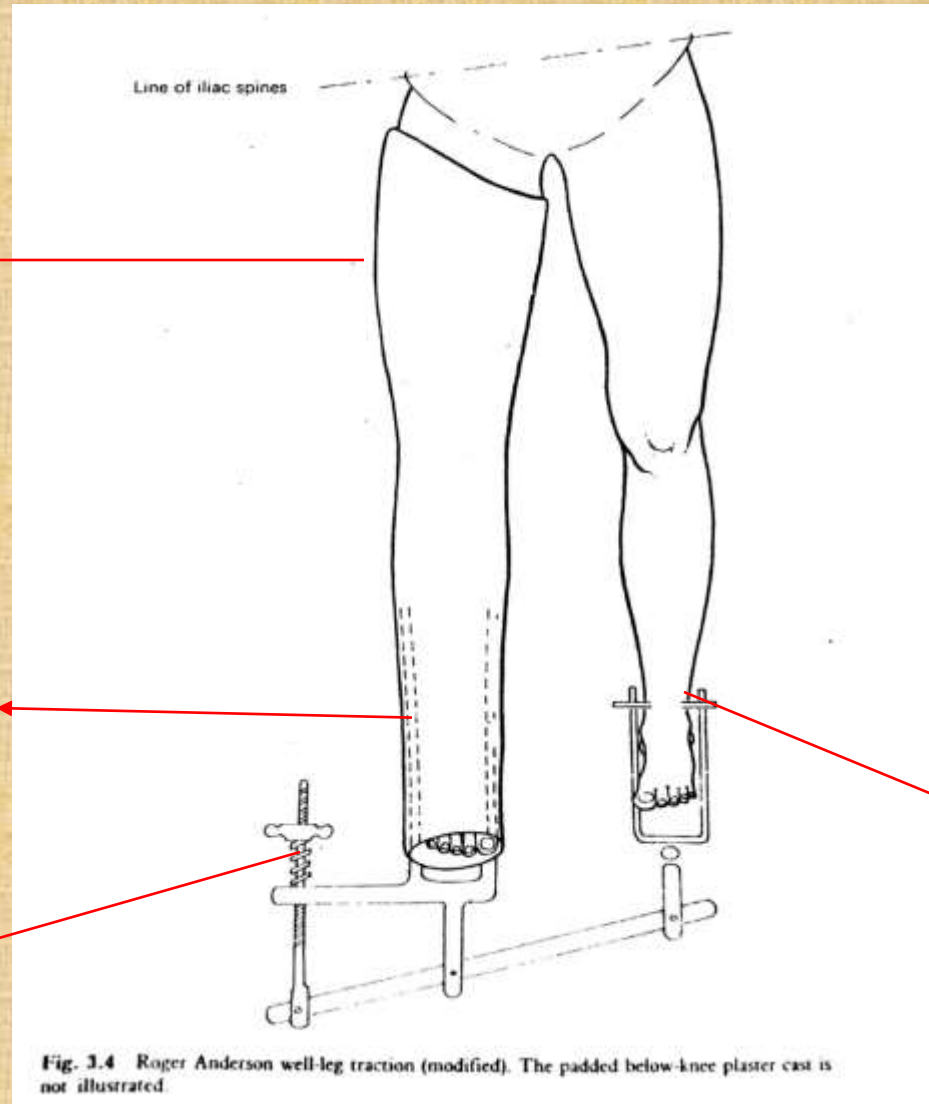
Fig. 3.3 Diagrammatic illustration of the principle of Roger Anderson well-leg traction.

REVERSING THE ARRANGEMENT WILL REDUCE AN ADDUCTION DEFORMITY.

A/K PLASTER CAST
LIMB WHICH WILL
BE PUSHED UP

LARGE STIRRUP IN
PLASTER

BY ALTERING THE
POSITION OF SCREW
THE RELATIVE
POSITIONS OF TWO
STIRRUP CAN BE
ALTERED.



STEINMENN PIN
THROUGH LOWER
END OF THE TIBIA
OF
THE LIMB WHICH
IS
TO BE PULLED
DOWN.

SLIDING TRACTION

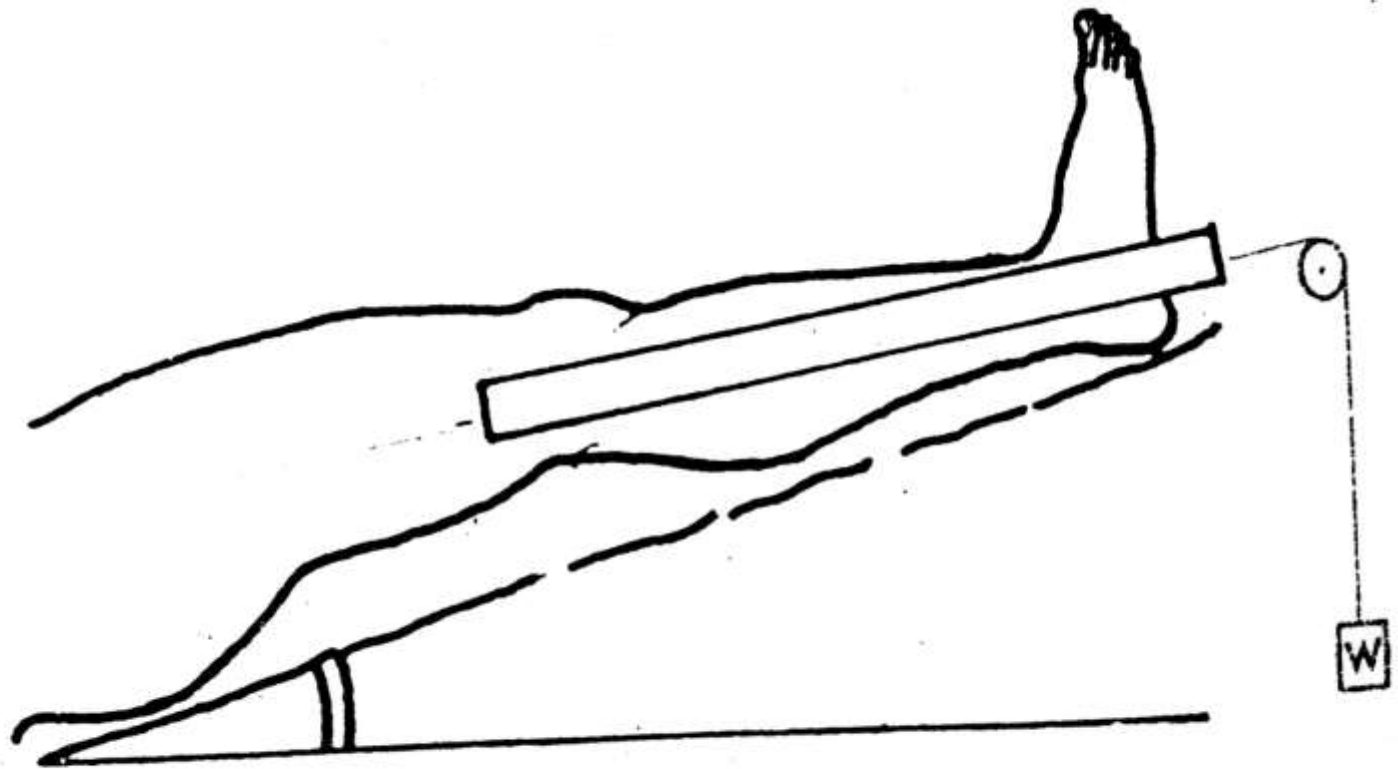


Fig. 4.1 The principle of sliding traction.

SLIDING TRACTION

- **Definition:**

When the weight of all or part of the body acting under the influence of gravity is utilized to provide counter traction, the arrangement is called sliding traction.

- **Principle:**

The traction force is applied by weight attached to adhesive strapping or a steel pin by a cord acting over a pulley. Counter traction is obtained by raising one end of the bed by means of wooden blocks so that the body tends to slide in the opposite direction.

Different types of sliding traction used are:

1) In lower limb

- a. Bucks extension skin traction
- b. Perkins traction
- c. Russel traction
- d. Tulloch- Brown Traction
- e. 90-90 Traction
- f. Gallows/ Bryants Traction
- g. Bohler – Braun frame
- h. Lateral upper femoral traction
- i. Pelvic tracton

2) In upper limb

- a. Dunlop traction
- b. Olecranon pin traction
- c. Metacarpal pin traction

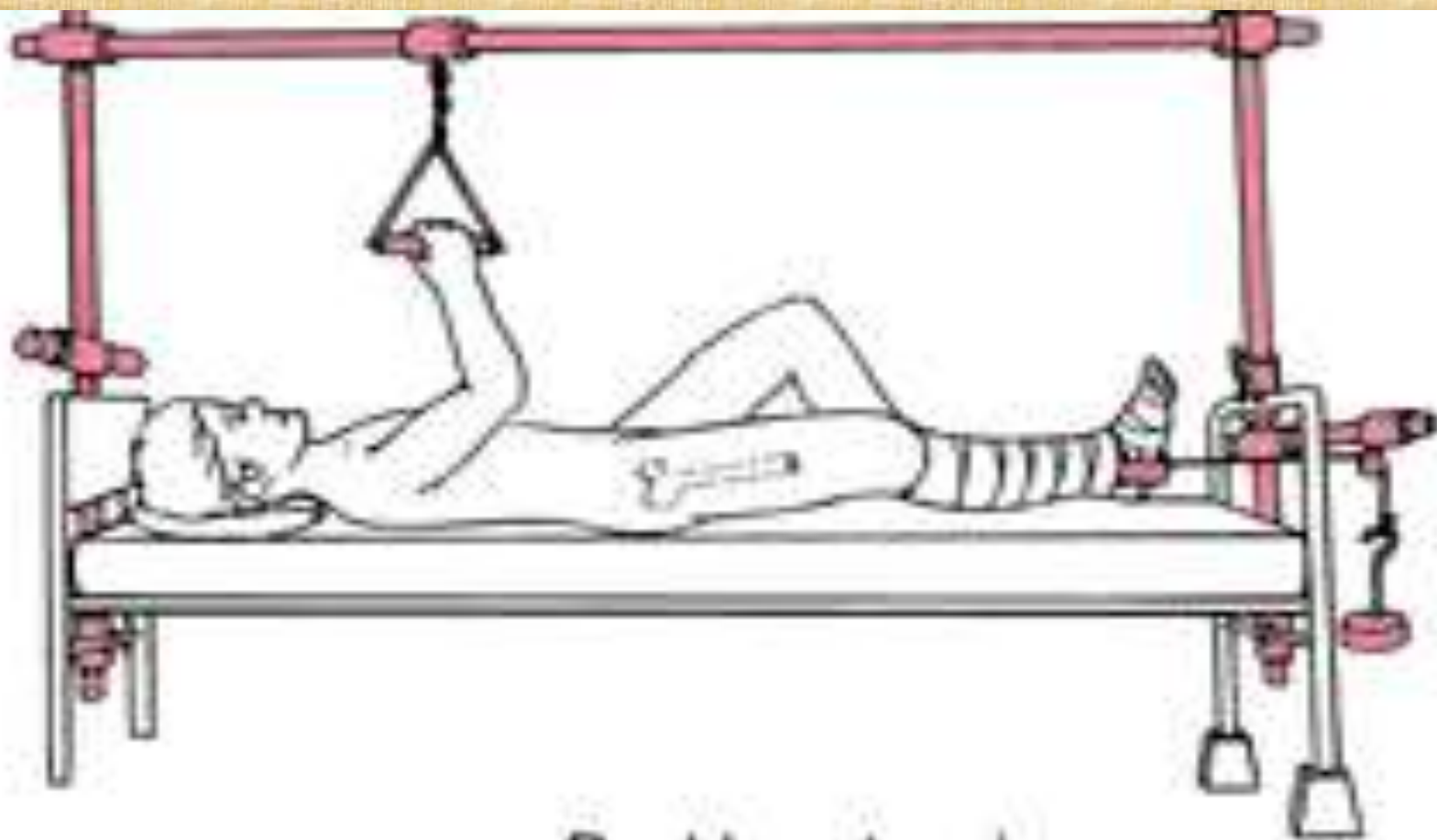
3) Spinal traction

- a. Cervical traction
 - Halter or non skeletal traction
 - Canvas or Chamois head halter
 - Crile head halter
 - Skull or skeletal traction
- b. Halopelvic traction

BUCK`S TRACTION

USED IN THE TEMPORARY MANAGEMENT OF

- Femoral neck fractures,
- Femoral shaft fractures in older and larger children,
- Undisplaced #s of acetabulum,
- In place of pelvic traction,
- Correction of minor fixed flexion deformities of hip
- After reduction of dislocation of hip.



Buck's extension

APPLICATION:

- APPLY ADHESIVE STRAPPING TO ABOVE KNEE OR IN ELDERLY VENTOFOAM SKIN TRACTION
- SUPPORT THE LEG WITH PILLOW.
- PASS THE CORD FROM SPREADER OVER PULLEY.
- ATTACH 2.3-3.2kgs (5 – 7 lbs) TO THE CORD.
- ELEVATE THE FOOT END OF BED.

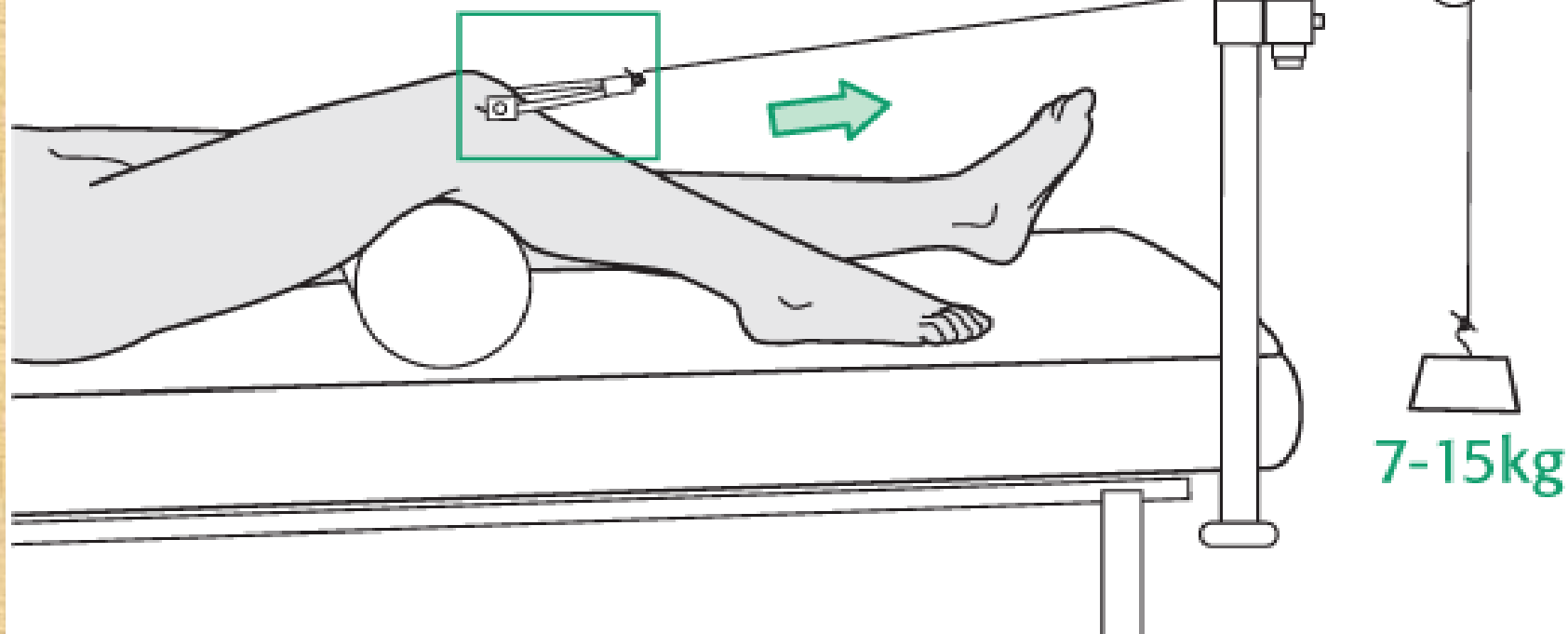
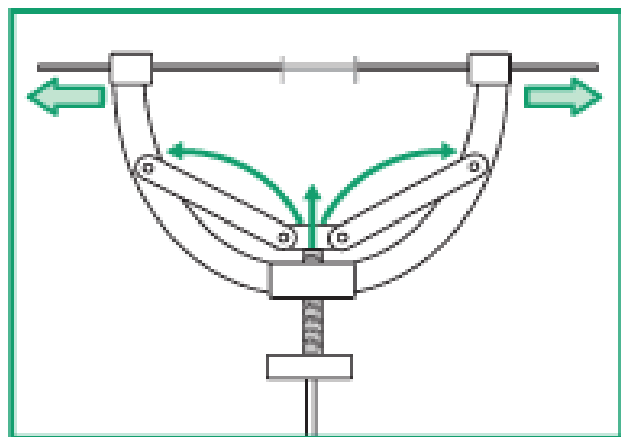
PERKIN'S TRACTION

USE IN TREATMENT OF

- Fracture tibia
- # femur from subtrochanteric region distally in all ages
- fracture Trochanter in <50 yrs

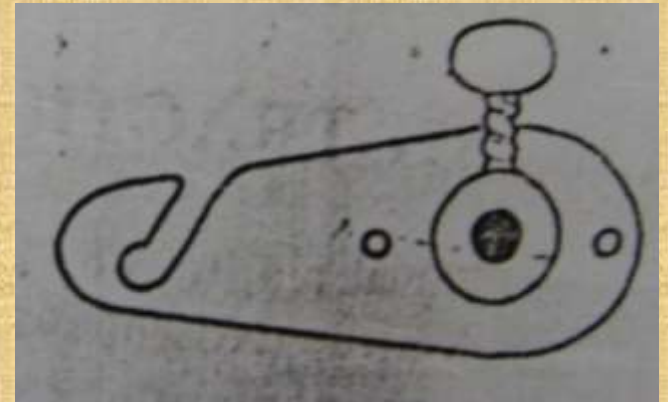
PRINCIPLE:

- It is the use of Skeletal traction without any external splintage coupled with active movements of injured limb
- Perkins showed that by encouraging early muscular activity stiffness of joint was prevented by extensibility of muscles by reciprocal innervation.



Application

- Under GA and aseptic precautions,
- Insert Denham pin through upper Tibia
- Attach Simonis swivel to each end of pin
- Connect 2 traction cords to each swivel
- Pass each cord over separate pulleys



Hamilton –Russel Traction

Indications:

- Management of the fracture shaft of femur
- After arthroplasty operations on the hip

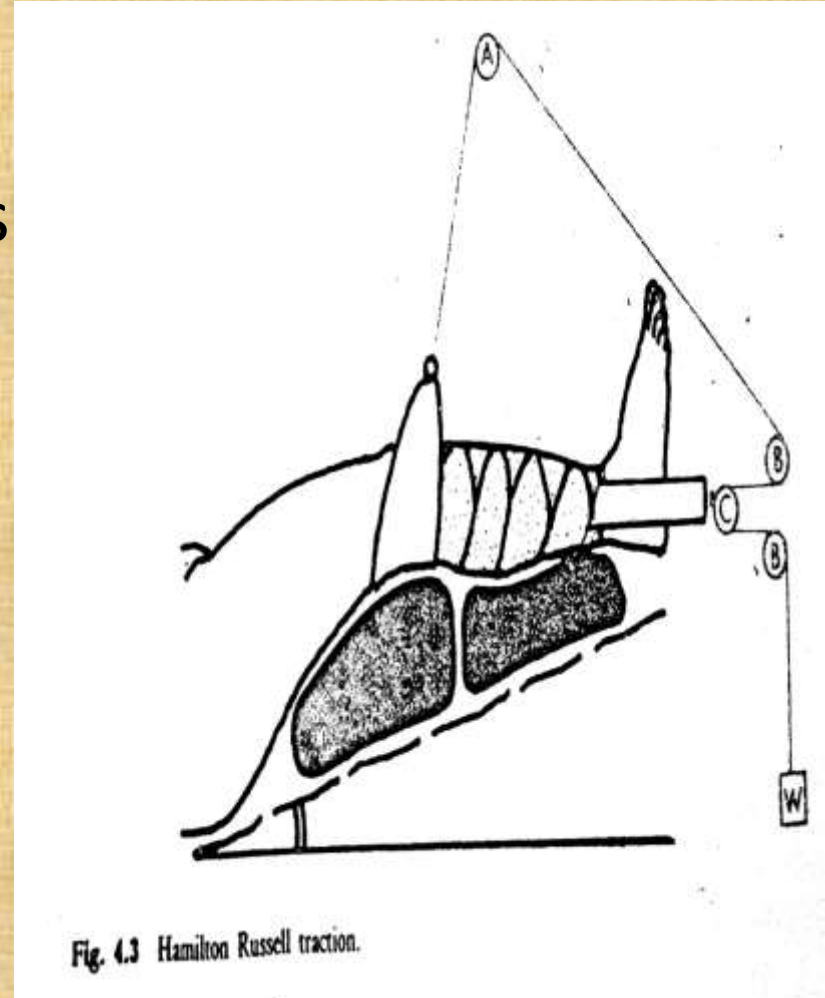
Application:

- Below knee skin traction
- Pulley attached to spreader
- Soft sling placed under knee

Weight

adults – 3.6 kg

children – 0.28- 1.8 kg



Advantage:

Based on law of parallelogram of forces that - the 2 pulley blocks at the foot of the bed theoretically doubles the pull on the limb and the resultant traction is in axis of 30° to the horizontal i.e. in line of shaft of femur

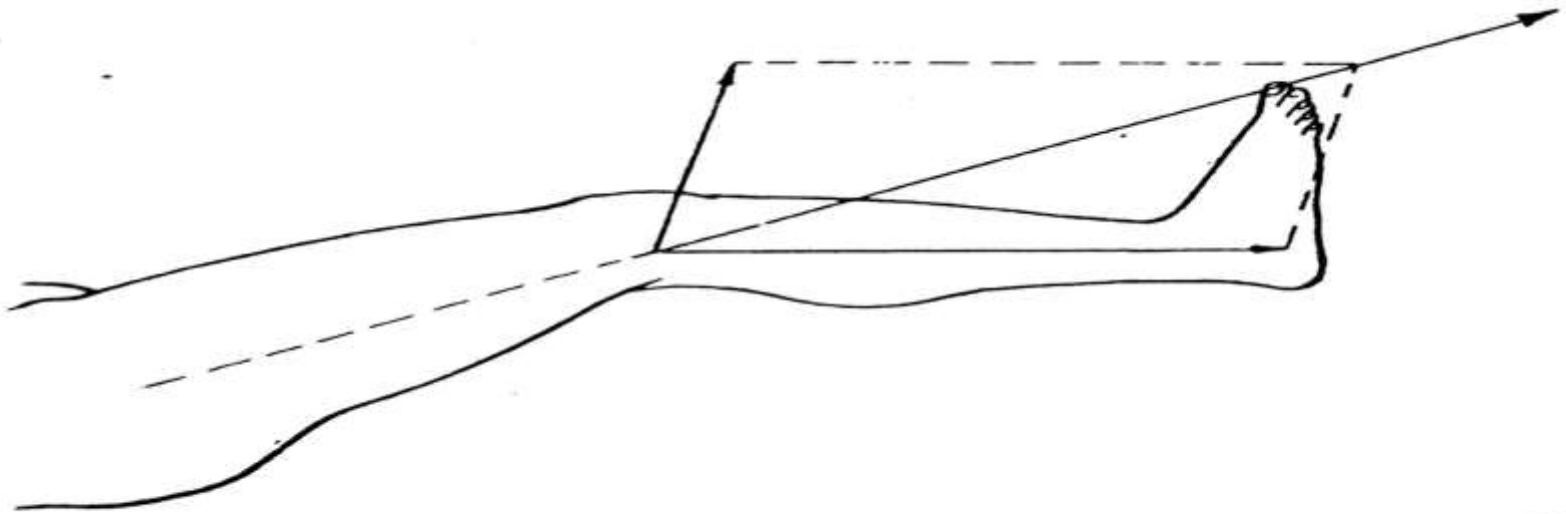


Fig. 4.4 . Theory of Hamilton Russell traction. The construction of a parallelogram of forces shows that the resultant force acts in the line of the femoral shaft.

TULLOCH BROWN TRACTION

Application:

- Steinman pin through the proximal tibia.
- Support legs on slings suspended from light duralumin U-loop which is slipped over the ends of Steinman pin.
- Attach the Nissen stirrup to the steinman pin it enables leg to be suspended and rotation of movements controlled.
- Foot supported in Perspex foot plate & foot end elevated.

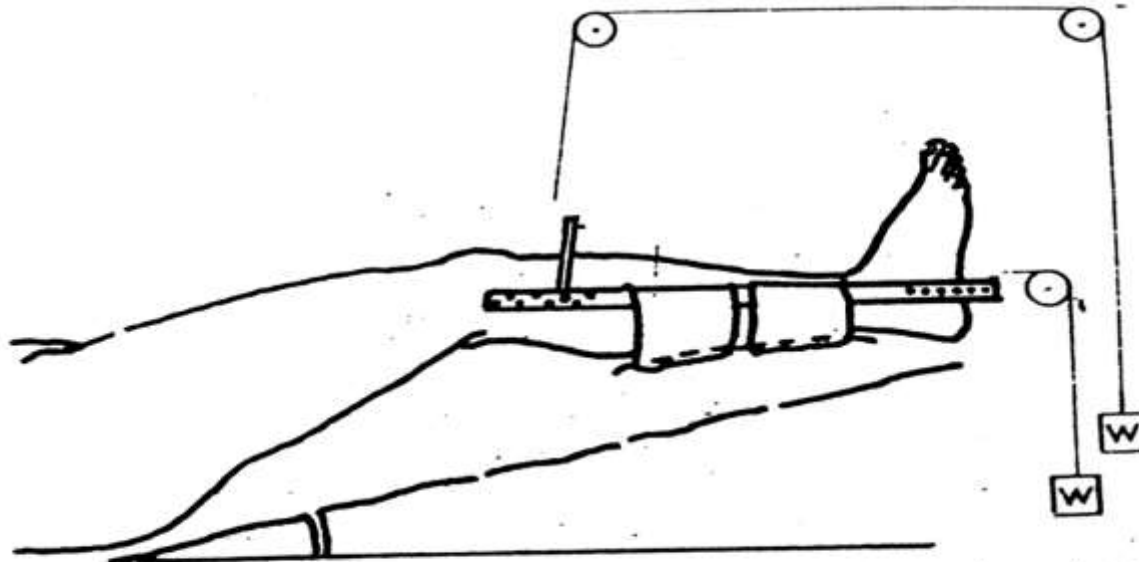


Fig. 4.5 Tulloch Brown U-loop tibial pin traction. Alternatively the traction cords can be arranged as for Hamilton Russell traction (Fig. 4.3). A Nissen foot plate can be attached to the U-loop to maintain dorsiflexion at the ankle.

NINETY/NINETY TRACTION

- Devised by Obletz (1946)
- Used in # femur with wounds over post aspect of thigh (operative & post op management)
- Subtrochanteric and proximal third # femur
- Used in both children and adults
- Here both hip and knee are flexed to 90 degree.
- Skeletal traction is applied through lower femur or upper tibia
- 3 methods of supporting leg in 90/90 traction

USING B/K CAST

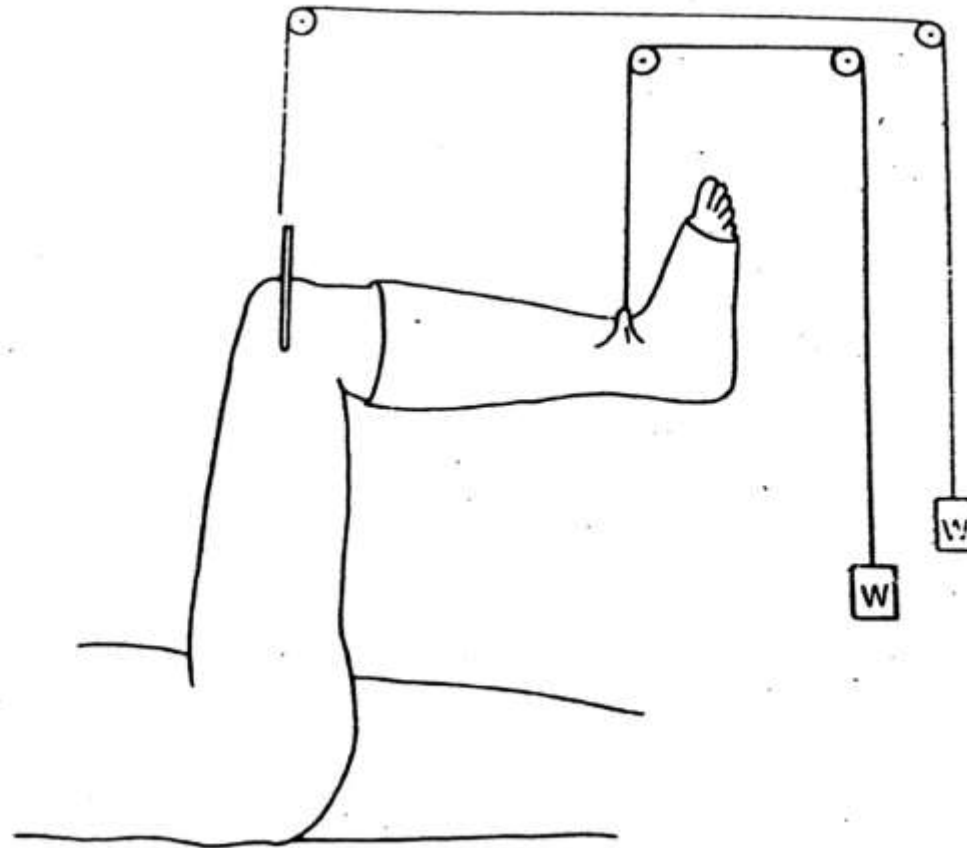


Fig. 4.10 90/90 traction using a below-knee plaster cast.

USING A SECOND STEINMAN PIN

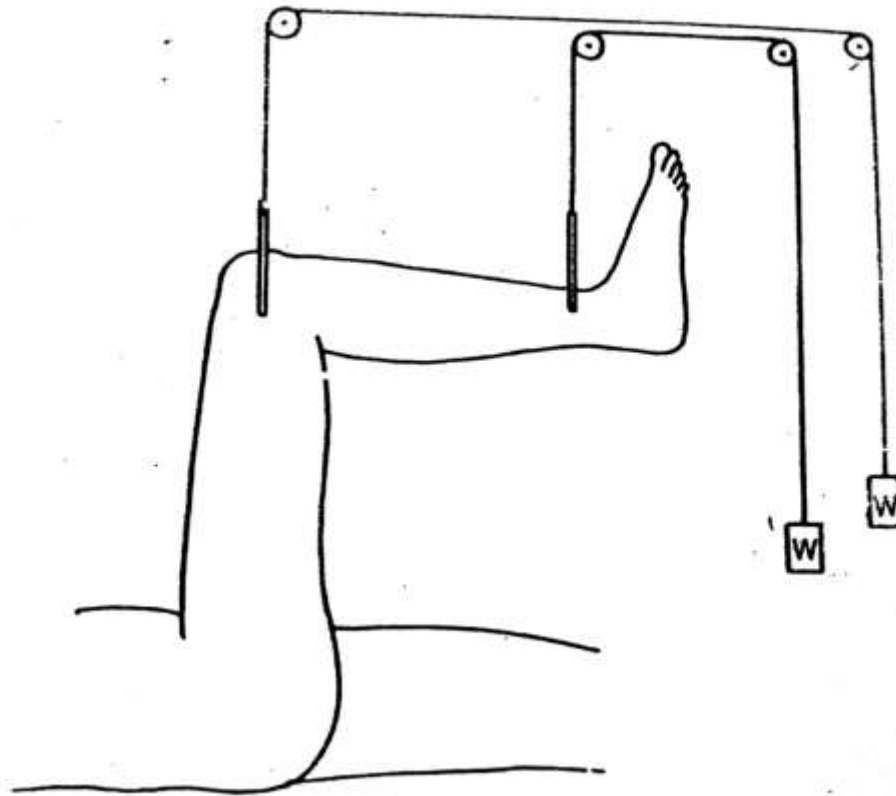


Fig. 4.9 90/90 traction using a second Steinmann through the lower end of the tibia.

USING TULLOCH BROWN U LOOP

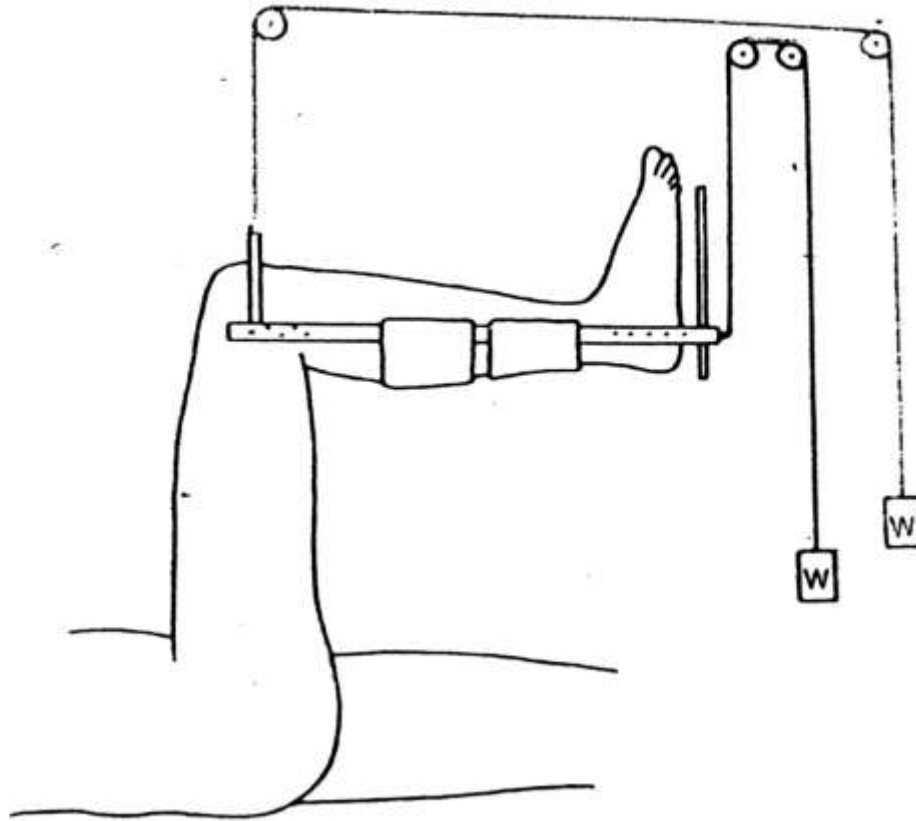


Fig. 4.8 90/90 traction using Tulloch Brown U-loop.

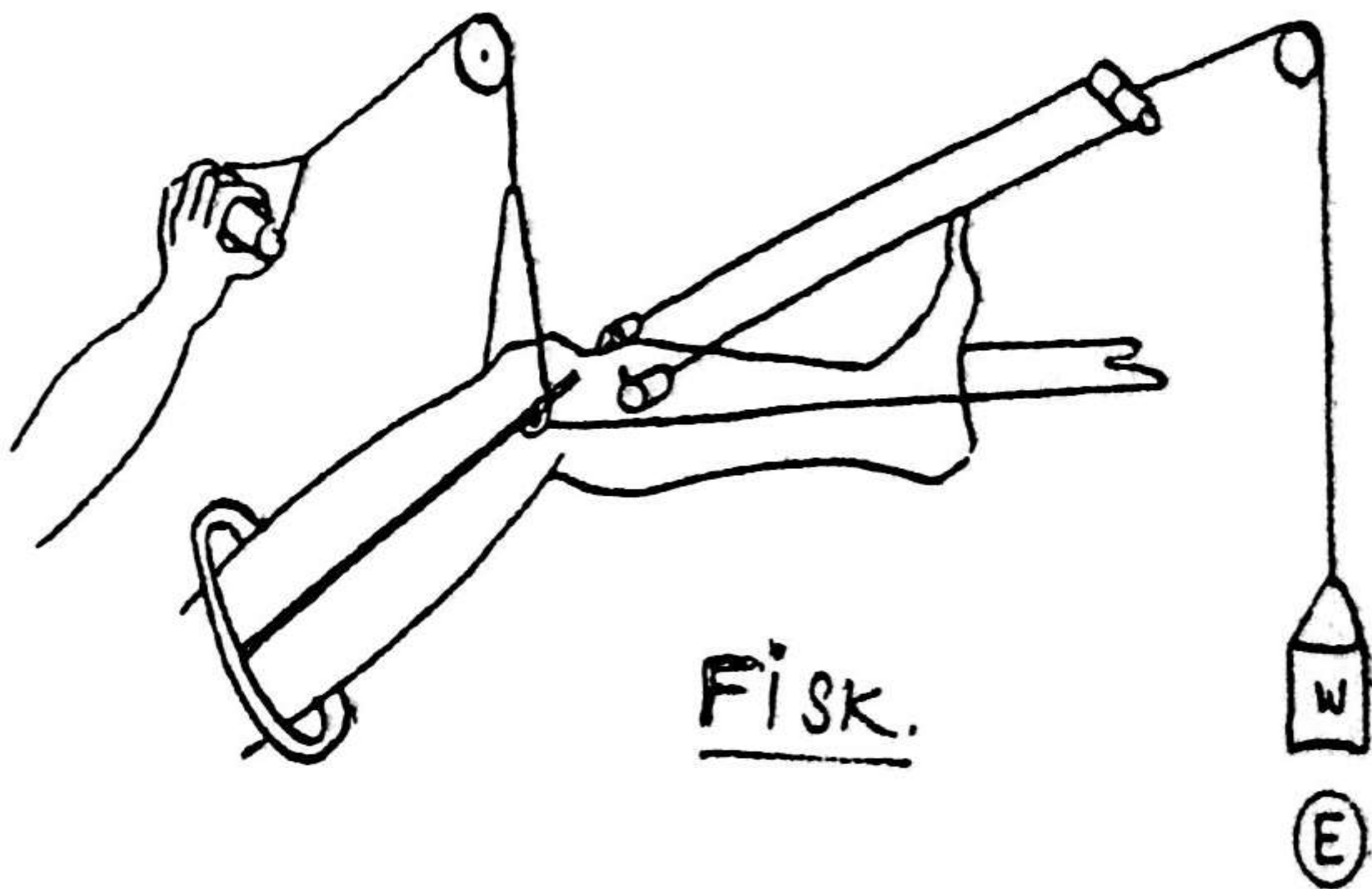
- Varus /valgus angulation at fracture site is controlled by moving the pulley,over which the traction cord passes,in a plane across the width of the bed.
- Rotation is controlled by the knee being flexed.
- As the union of fracture occurs, encourage active hip and knee exercise-extension , gradually lower the limb into a more horizontal position.

DANGERS OF 90/90 TRACTION

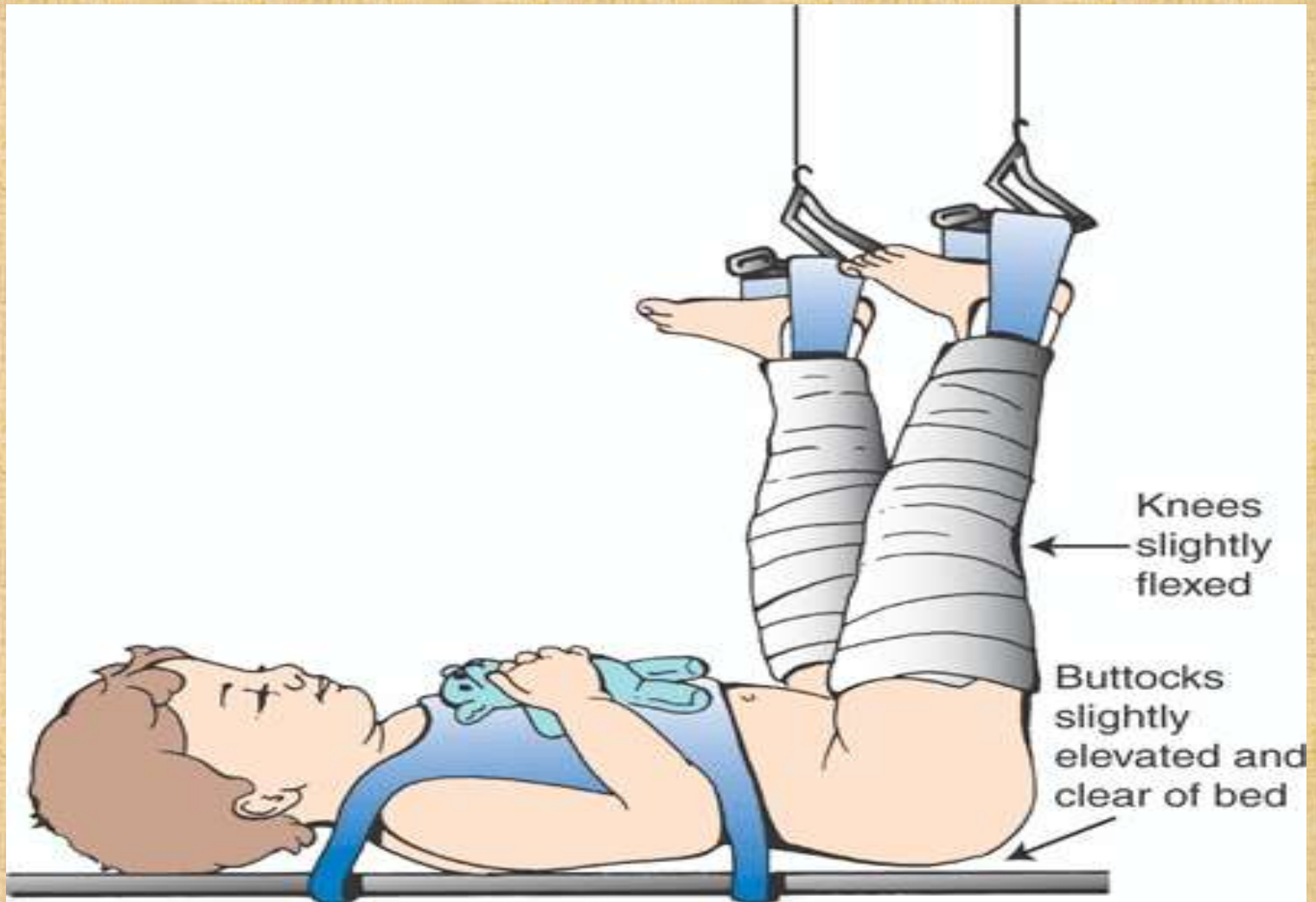
1. Those of skeletal traction.
2. Stiffness and loss of extension of the knee.
3. Flexion contracture of hip.
4. Injury to the lower femoral or upper tibial epiphyseal growth plates in children.
5. Neuro vascular damage.

Sliding Traction in a Fisk Splint

- It is a modification of Thomas splint where in a knee flexion piece is attached to Thomas splint.
- Active flexion and extension of the knee is possible, but little movement occurs at the hip
- The patient as soon as possible begins assisted movement of the lower limb which is moved as one unit as though the patient were walking.
- Uses: In femoral shaft fractures and tibial condyle fracture.



BRYANT'S TRACTION(GALLOWS)



- Used in # Shaft of femur in children <2 yrs
- Apply adhesive strapping to both lower limbs
- Tie traction cords to an over head beam
- Tighten the traction cord to raise the buttocks just clear the mattress
- Counter traction obtained by weight of pelvis

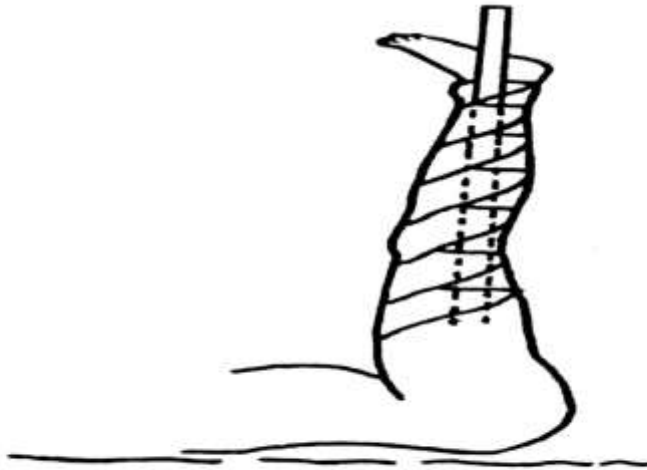


Fig. 4.13 Bryant's (gallows) traction. Note that the child's buttocks are lifted just off the bed. The knees can be kept slightly flexed by applying posterior gutter splints (not illustrated).

- Vascular complication of Bryants traction may occur in either the injured or normal limb.
- A careful check must be done in both limbs during first 24-72 hrs.
 - By checking color and temp of limbs.
 - Dorsiflexion of both ankle passively.
- Bryants traction in children :
 - ❖ under 2yrs - safe
 - ❖ 2-4yrs - vascular complications more(can be prevented by using posterior splint).
 - ❖ Over 4yrs - absolutely contraindicated.

Modified Bryant's traction

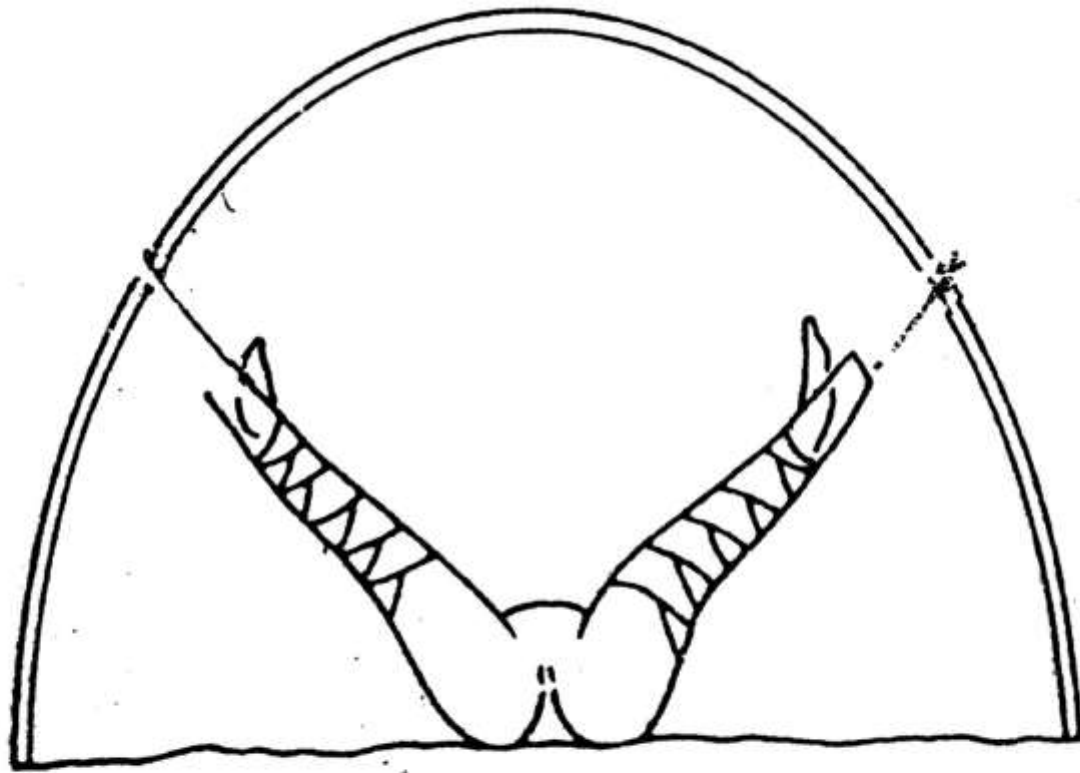


Fig. 4.14 Modified Bryant's traction. The legs initially are vertical. The hips are abducted about 10 degrees on alternate days.

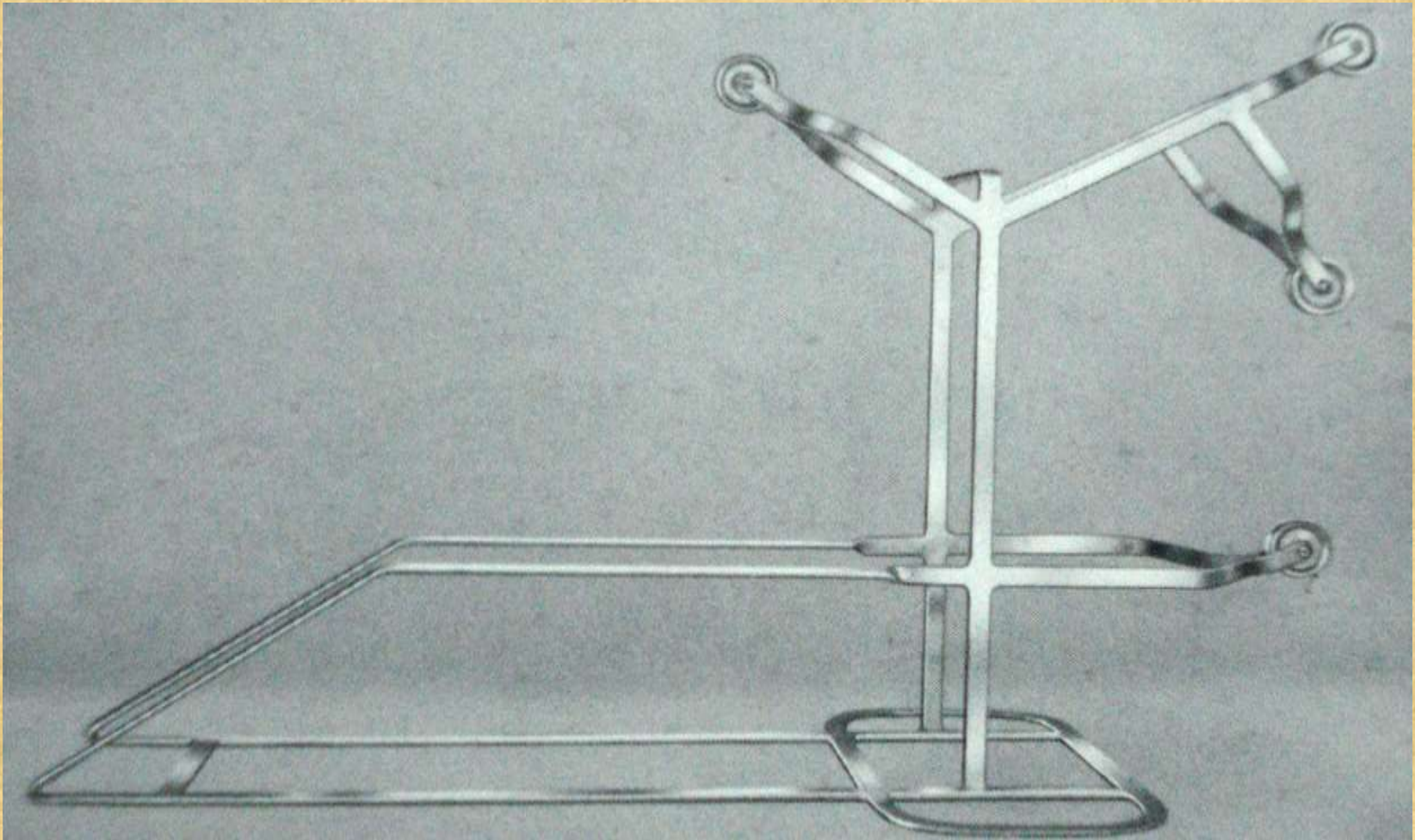
- In the initial management of CDH when diagnosed over the age of 1 year.
- After 5 days abduction of hip is started
- Abduction is increased by 10° on alternate days
- By 3wks hips should be fully abducted

COMPLICATIONS:

- The child will become restless and scream repeatedly with pain.
- The pain is due to stretching of capsule and impingement of femoral head on superior lip of acetabulum.

SLIDING TRACTION IN BOHLER-BRAUNFRAME

- In management of tibia and femoral fractures.

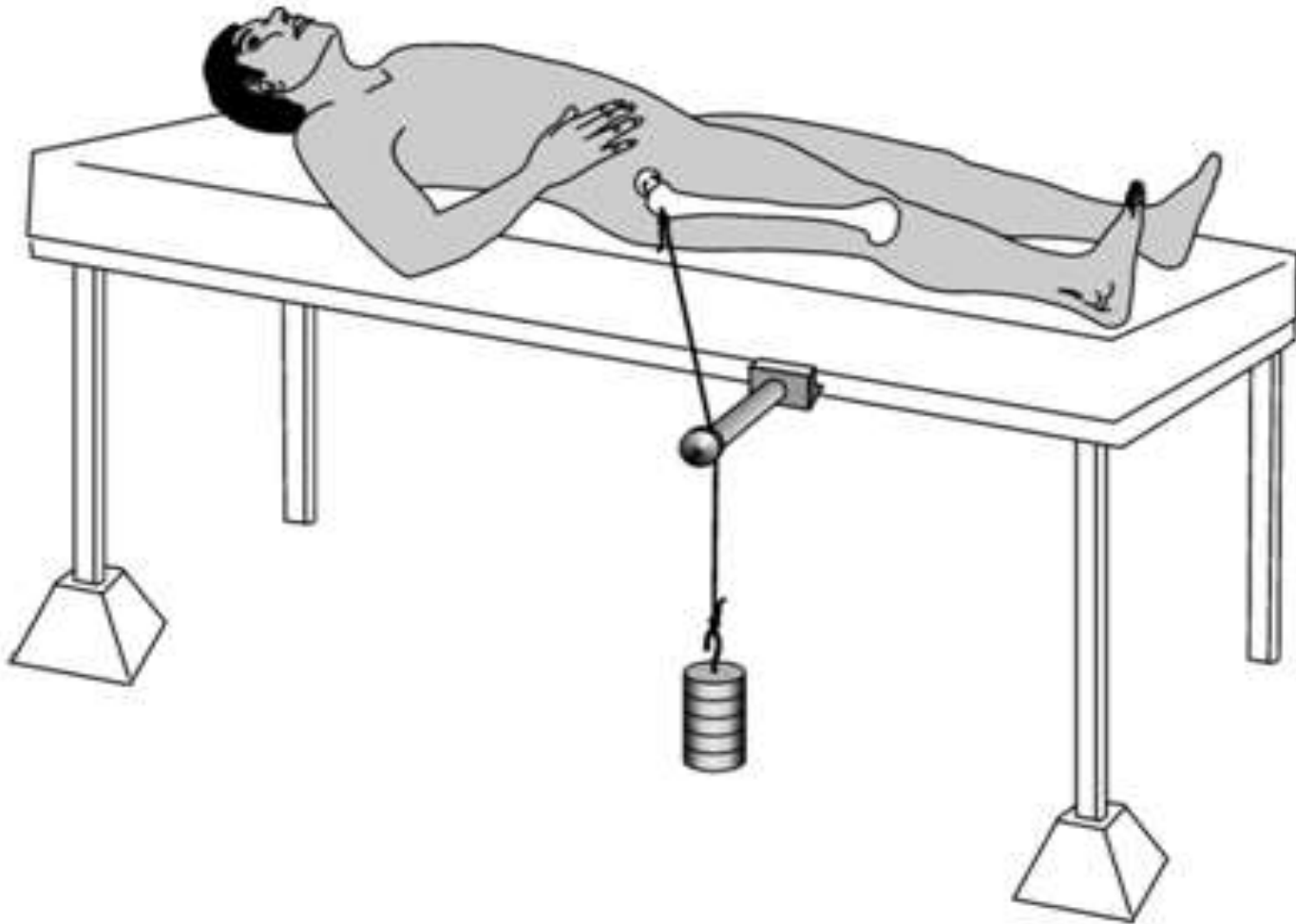


- Most proximal pulley-to prevent foot drop.
- 2 nd pulley-to apply traction in line of Femur.
- 3 rd pulley-to apply traction in line of supracondylar area of femur and high tibial traction.
- 4 th pulley-to apply traction in line of leg as in low tibial or calcaneal traction.

DISADVANTAGES:

1. Bohler Braun frame rests on pts bed and cannot move with the patient.
2. Nursing care is more difficult.
3. Movement of proximal #fragments in relation with distal fragment which is cradled in the splint.
4. This predisposes to deformity.

Lateral upper femoral traction



- Used alone or along with traction in long axis of femur in management of central fracture-dislocation of Hip.
- If only superior rim of acetabulum is fractured - combined with Buck's OR Russell traction
- If posterior rim of acetabulum is fractured and if reduction of dislocated femoral head is unstable, combined with vertical skeletal traction in lower end of femur or upper end of tibia.
- Maximum attachable weight - 4.5-9kg

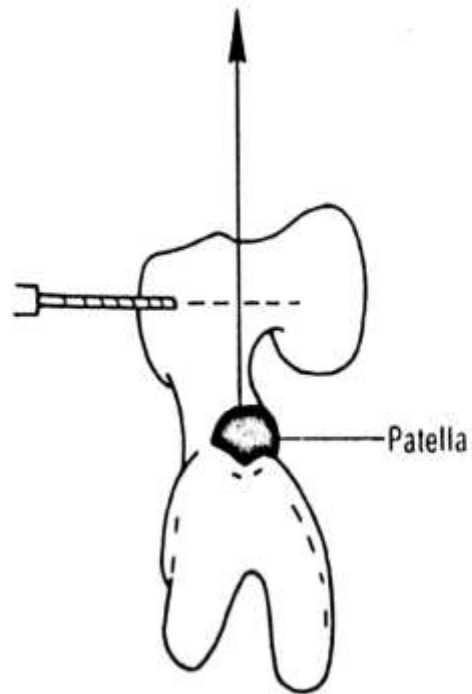
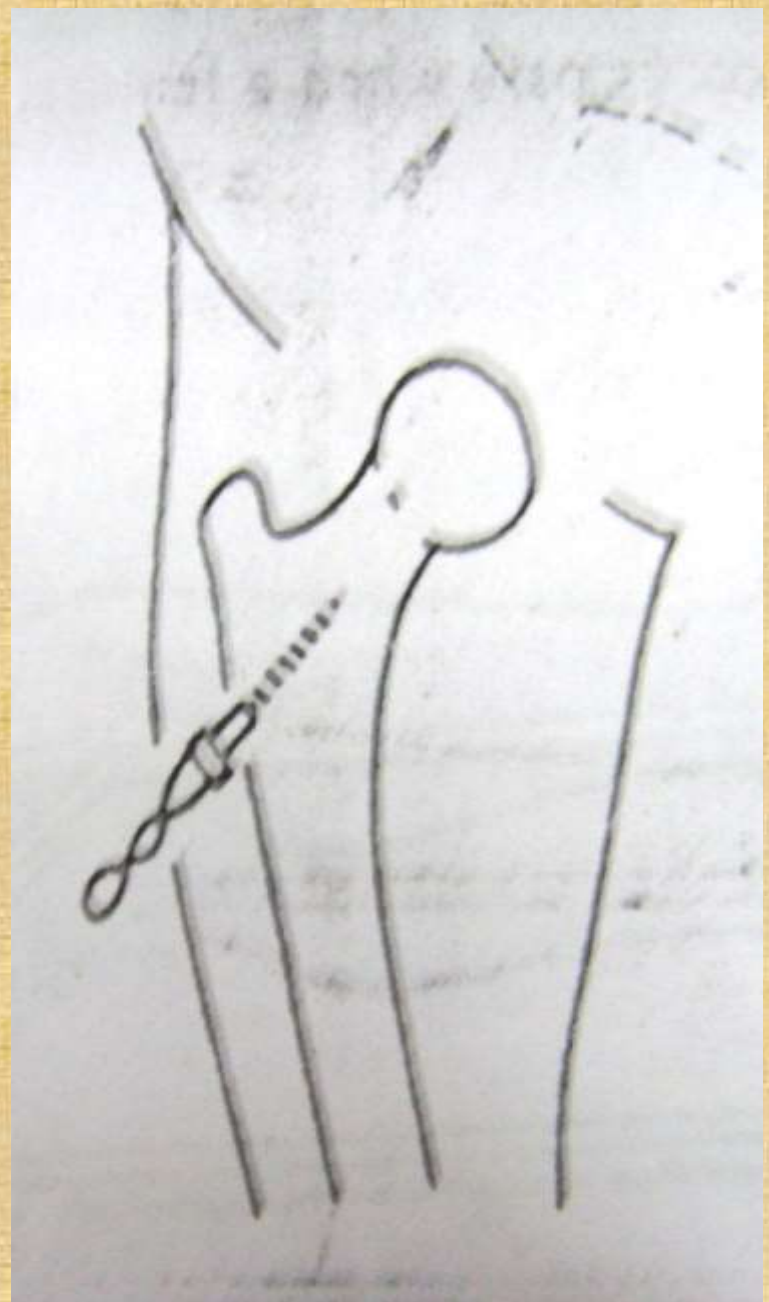


Fig. 4.17 With the patella pointing vertically upwards, anteversion of the femoral neck is eliminated.



Fig. 4.18 Screw eye (Zimmer pelvic traction screw).



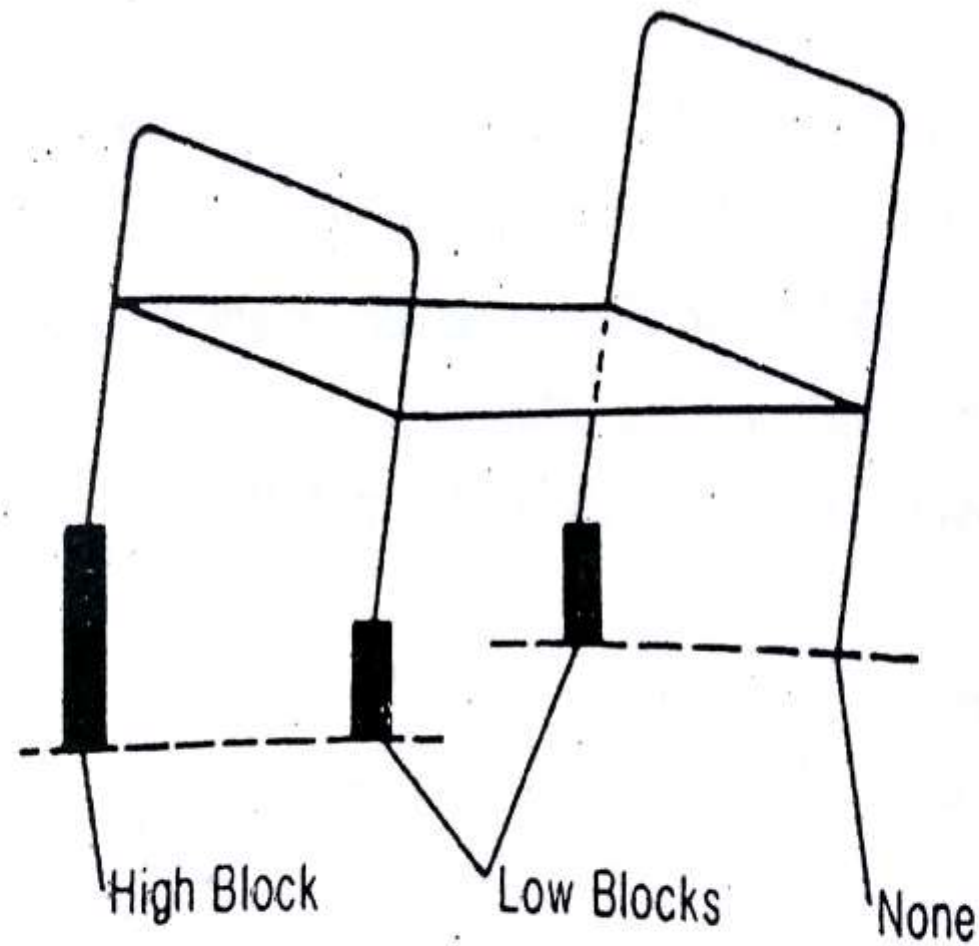


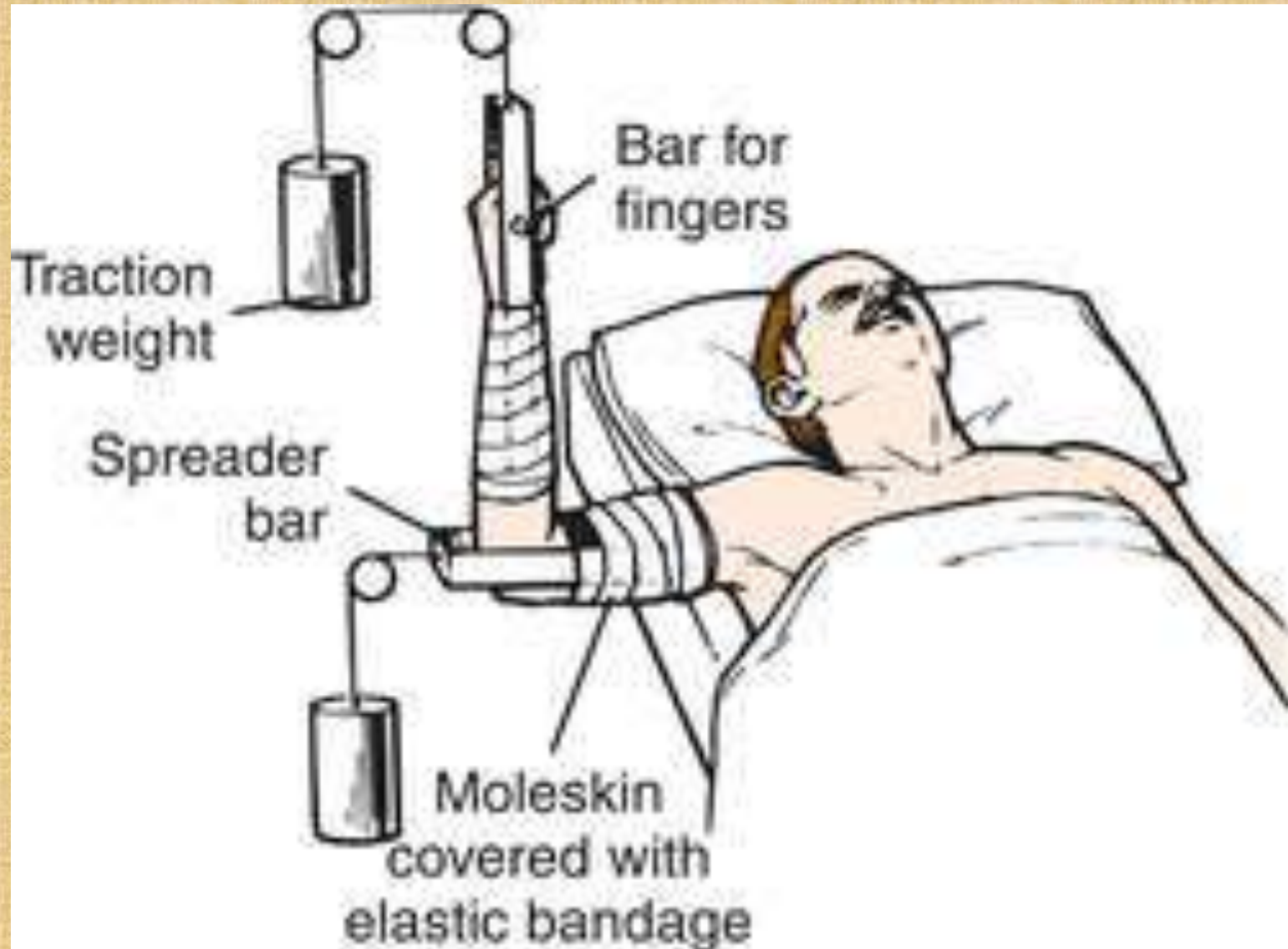
Fig. 4.20 Method of obtaining tilt of the bed in two planes when lateral upper femoral traction is combined with traction in the long axis of the femur.

PELVIC TRACTION



- In pelvic traction special canvas harness is buckled around the patients pelvis.
- Long cords attach the harness to the foot of the bed.
- Foot end of the bed raised-provides sliding traction.
- Used in conservative management of IVDP. To ensure that the pt lies quietly in bed rather than to distract the vertebral bodies.
- Buck`s traction may also be employed

Dunlop's traction



- Used in management of Supracondylar and transcondylar fractures of Humerus in children.
- This method is useful if flexion of the elbow causes circulatory embarrassment with loss of radial pulse

- Apply skin traction to fore arm
- Place the pt supine
- Abduct the shoulder to 45°
- Pass the traction cord over a pulley so that elbow flexed to 45°
- Place padded sling over distal humerus
- Attach 1-2 lb wt to traction cord and padded sling
- Elevate same side of bed
- Check circulation

DUNLOP TRACTION (Fig. 4.22)

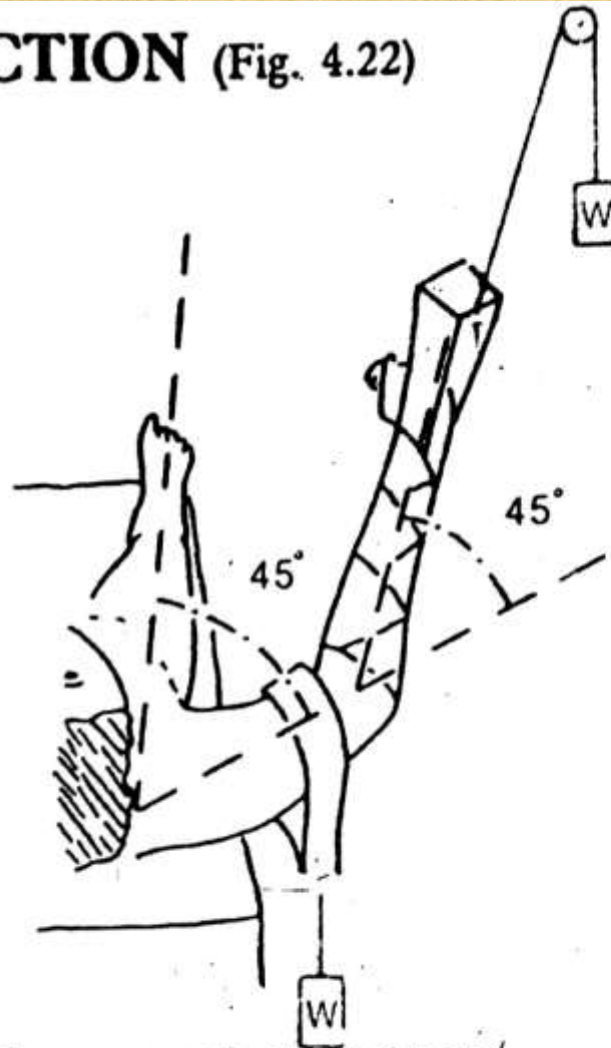
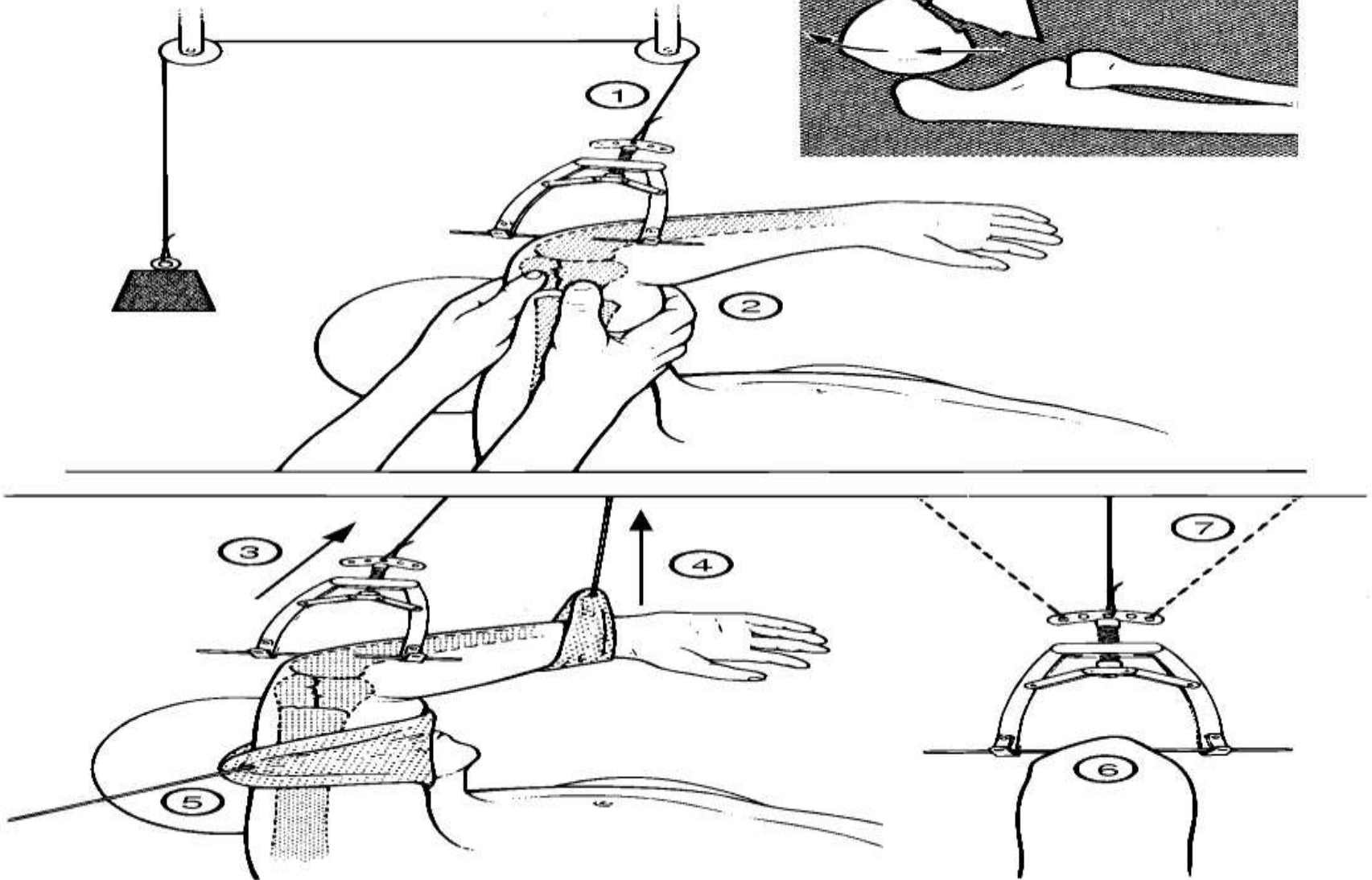
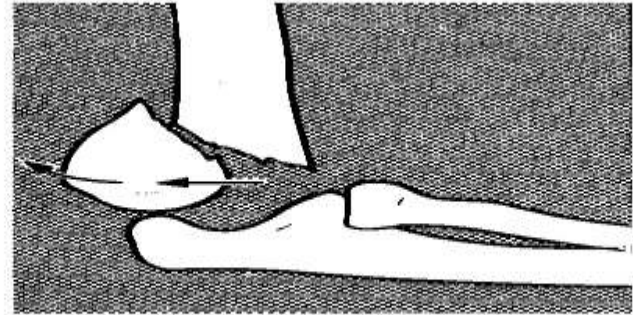


Fig. 4.22 Dunlop traction. The upper arm is abducted 45 degrees, and the elbow is flexed 45 degrees.

OLECRANON TRACTION

OLECRANON TRACTION



Indications:

- Supracondylar fracture of humerus
- Comminuted fracture of lower end of the humerus
- Unstable fracture of the shaft of the humerus
- Weight – 1.3- 1.8 kg

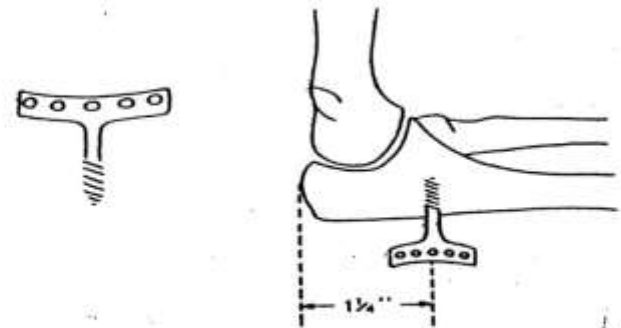


Fig. 4.23 Olecranon traction. Screw eye and its site of insertion into the ulna.

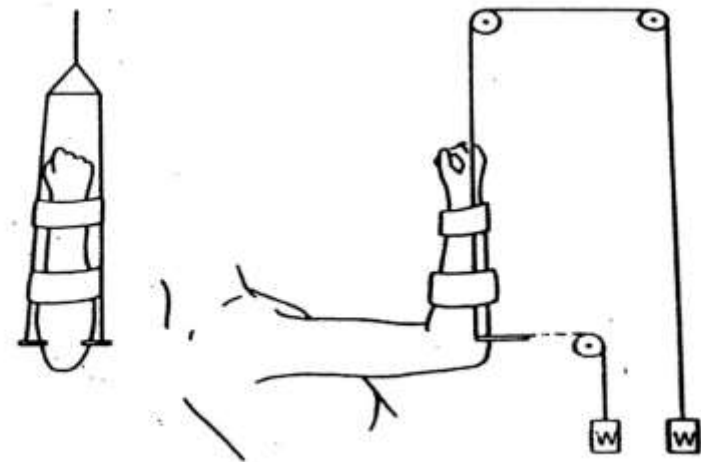


Fig. 4.24 Olecranon traction.

METACARPAL PIN TRACTION

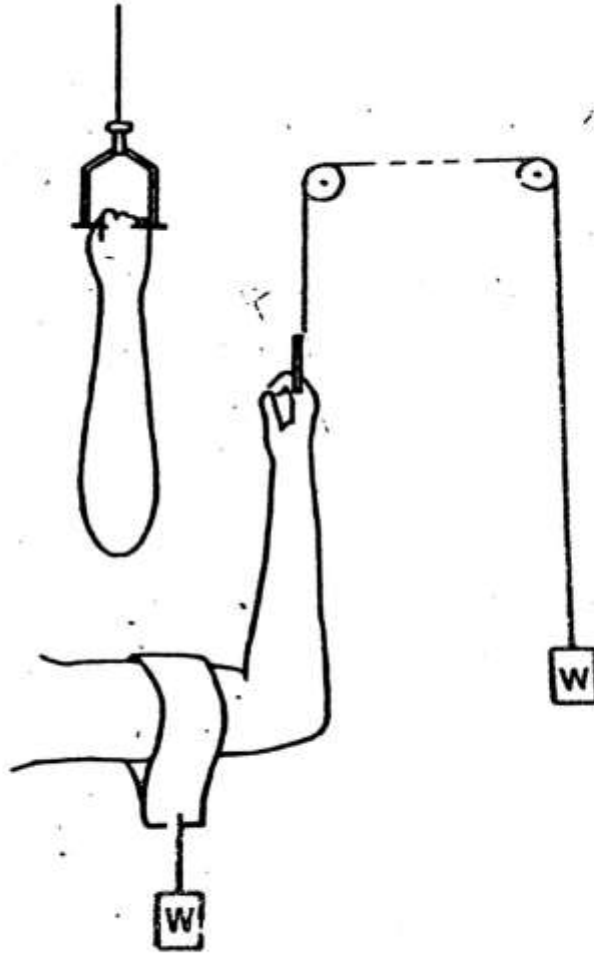


Fig. 4.26 Metacarpal pin traction, using a Kirschner wire strainer, and a canvas sling over the upper arm to provide counter-traction.

Indications

- Comminuted fracture of forearm bones - especially for a comminuted # of lower end of the radius
- Maximum attachable weight is - 1.3-1.8kg

Complications:

- Fibrosis in the interosseous muscles causing stiffness of fingers.
- General complications of skeletal traction.

SPINAL TRACTION

- Cervical spine
 - skeletal traction(skull traction)
 - Crutchfield tongs
 - Cone/Barton tongs
 - Halo splint
 - non skeletal traction(halter traction)

Halters Traction

Indications:

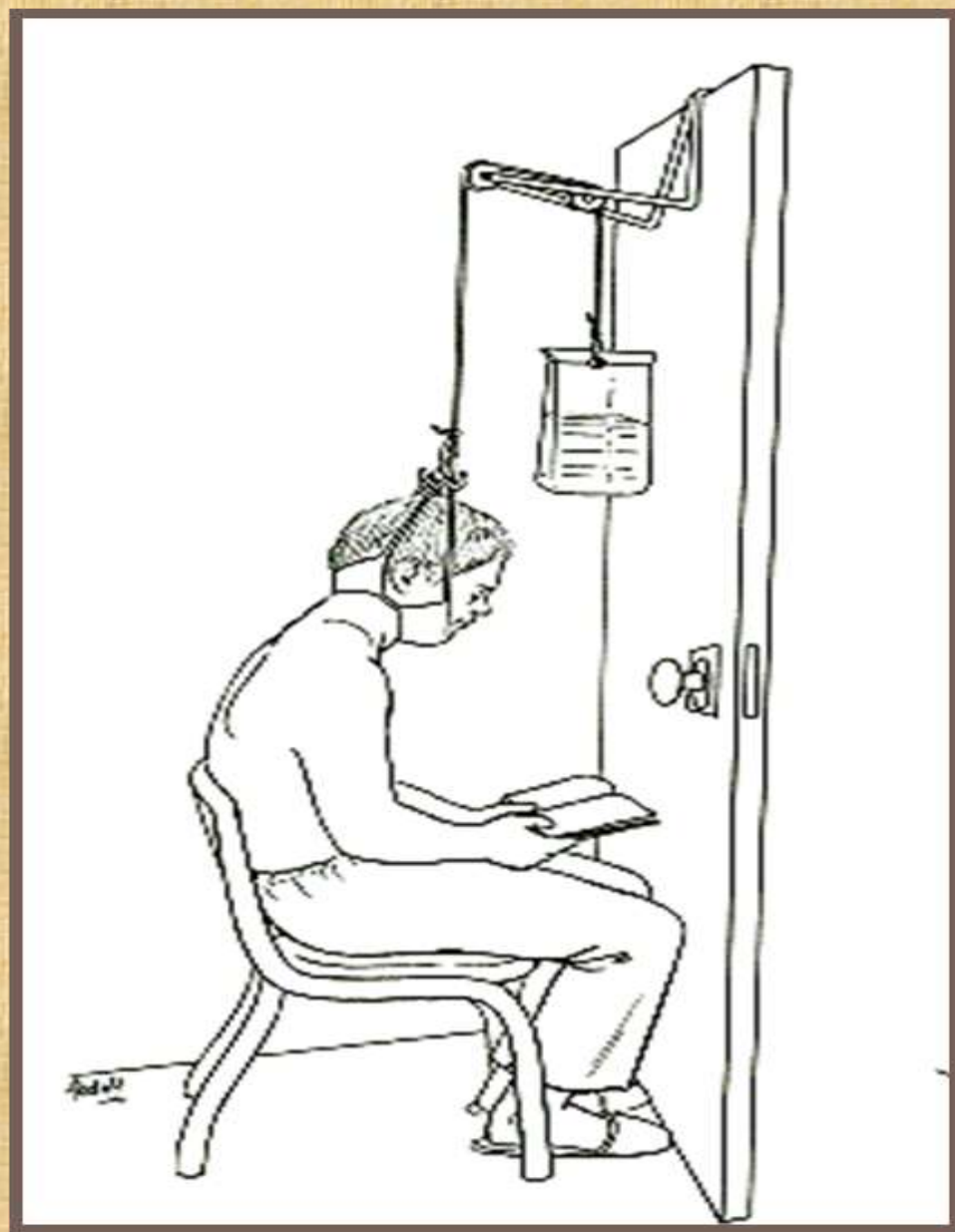
- Treatment of Cervical Spondylosis as an out patient
- Maximum weight is 1.4 to 2.3 kgs
- Two types – Canvas & Crile head halter
- Head end of bed should raised to provide counter-traction



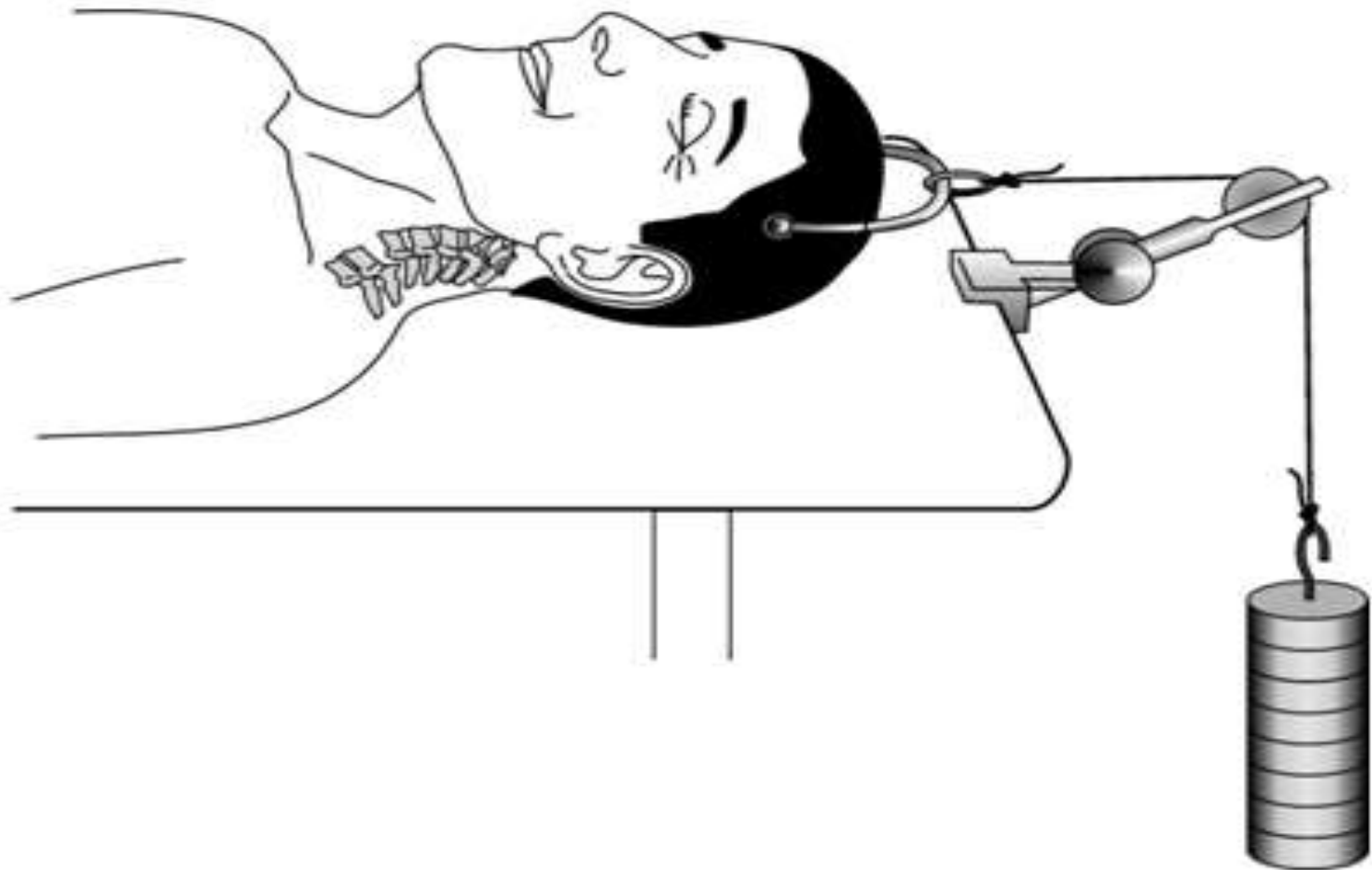
Fig. 6.1 Canvas head halter.



Fig. 6.2 Crate head halter.



Skull Traction



Applied by gaining purchase on the outer table of the skull with metal pins

Used in the serious injuries of cervical spine like

- To reduce a dislocation or fracture dislocation - in both case with traction the dislocation is under control and injury to spine does not occur
- To maintain the position of c- Spine before and after operative fusion
- For the treatment of cervical spondylosis with severe nerve root compression
- Maximum applicable weight is 9.1 to 18.2kg

- For skull traction use
 - a) Crutch field tongs
 - b) Cone or Barton tongs
 - c) Halo splint

CRUTCHFIELD TONGS:

- Fits in to parietal bone
- A special drill with a shoulder is used to enable an accurate depth of hole to be drilled

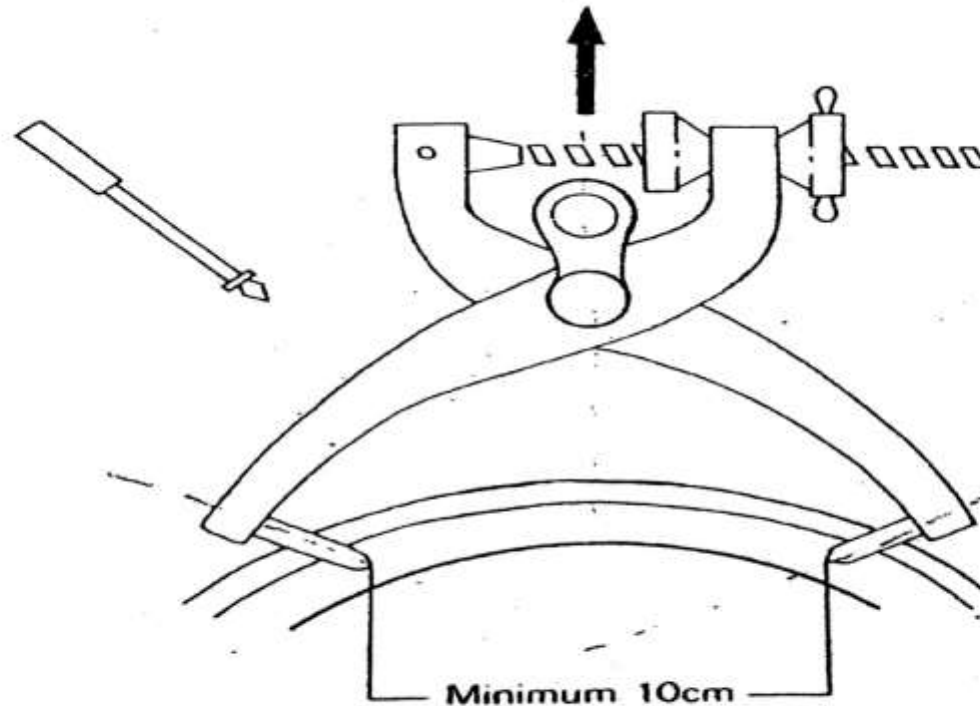


Fig. 6.3 Crutchfield tongs. Note that the points of the tongs are almost at right angles to the line of traction. The insert shows the special drill point with a shoulder which is used.

CONE OR BARTON TONGS

- A drill is not required for their insertion. The threaded steel points are screwed into the parietal bones behind the ears

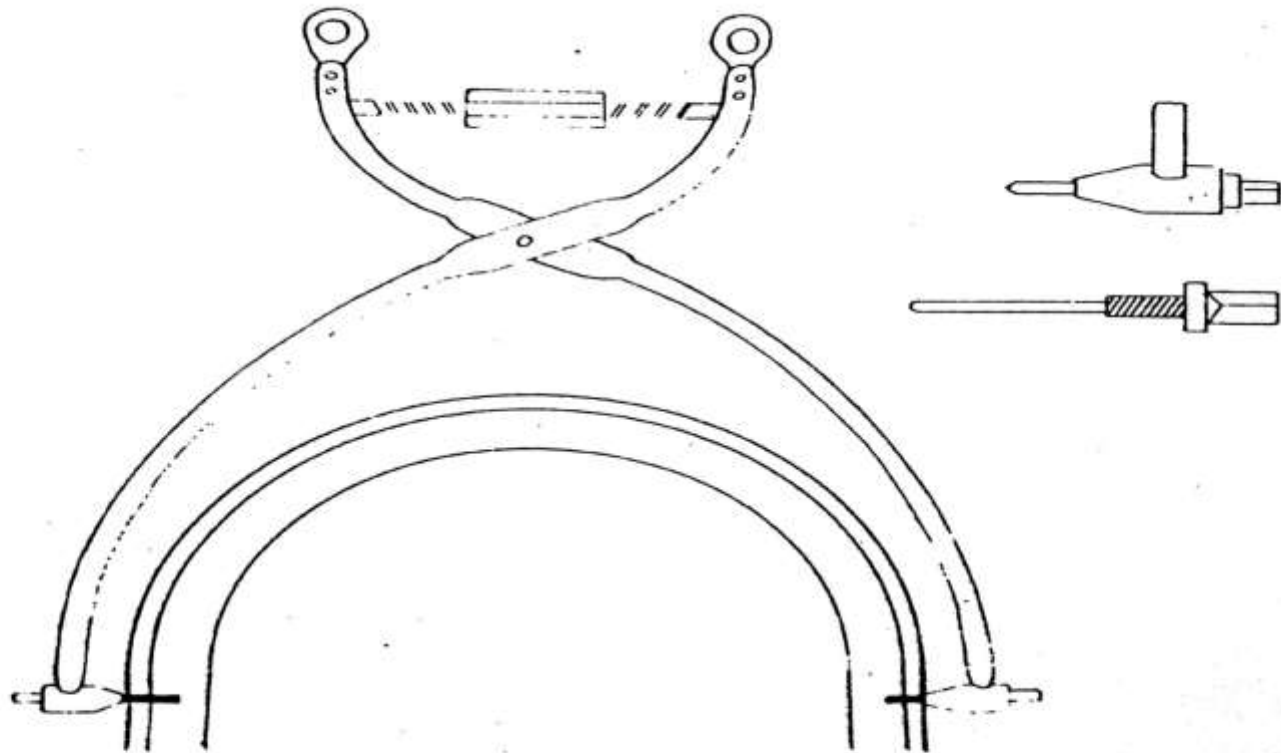
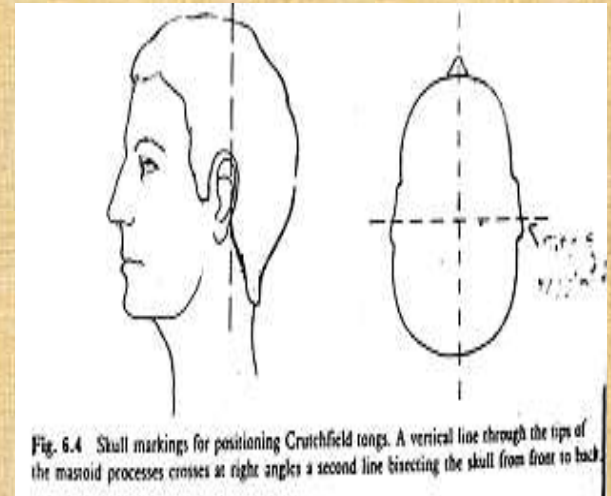


Fig. 6.6 Cone (Barton) tongs. No separate drilling is required. The special steel points are inserted into the conical ends of the tongs and tightened alternately.

Application:

- Sedate the patient.
- Shave the scalp only locally.
- Draw a line on the scalp, bisecting the skull front to back.
- Draw a second line joining the tips of mastoid process, it crosses the 1st line at right angle.
- Fully open out the tongs.
- With the fully open tongs lying equally on each side of Anteroposterior line, press the tongs into the scalp making dimples on the 2nd line.
- Infiltrate the areas of dimples down to and including the periosteum, with local anaesthesia.
- Make small stab wound in scalp at dimples.
- Using special drill point, drill the outer table of the skull in a direction parallel to the points of the tongs. The drill point is inserted to a depth of 3mm in children and 4mm in adults.



Failure of procedure:

- The use of faulty instrument
- Pins that are not long enough to prevent the arms of the tongs from crushing the scalp must not be used.
- Placing the drill holes too close together in the skull.
- Insufficient penetration of the skull.
- Failure to keep the tongs tight.

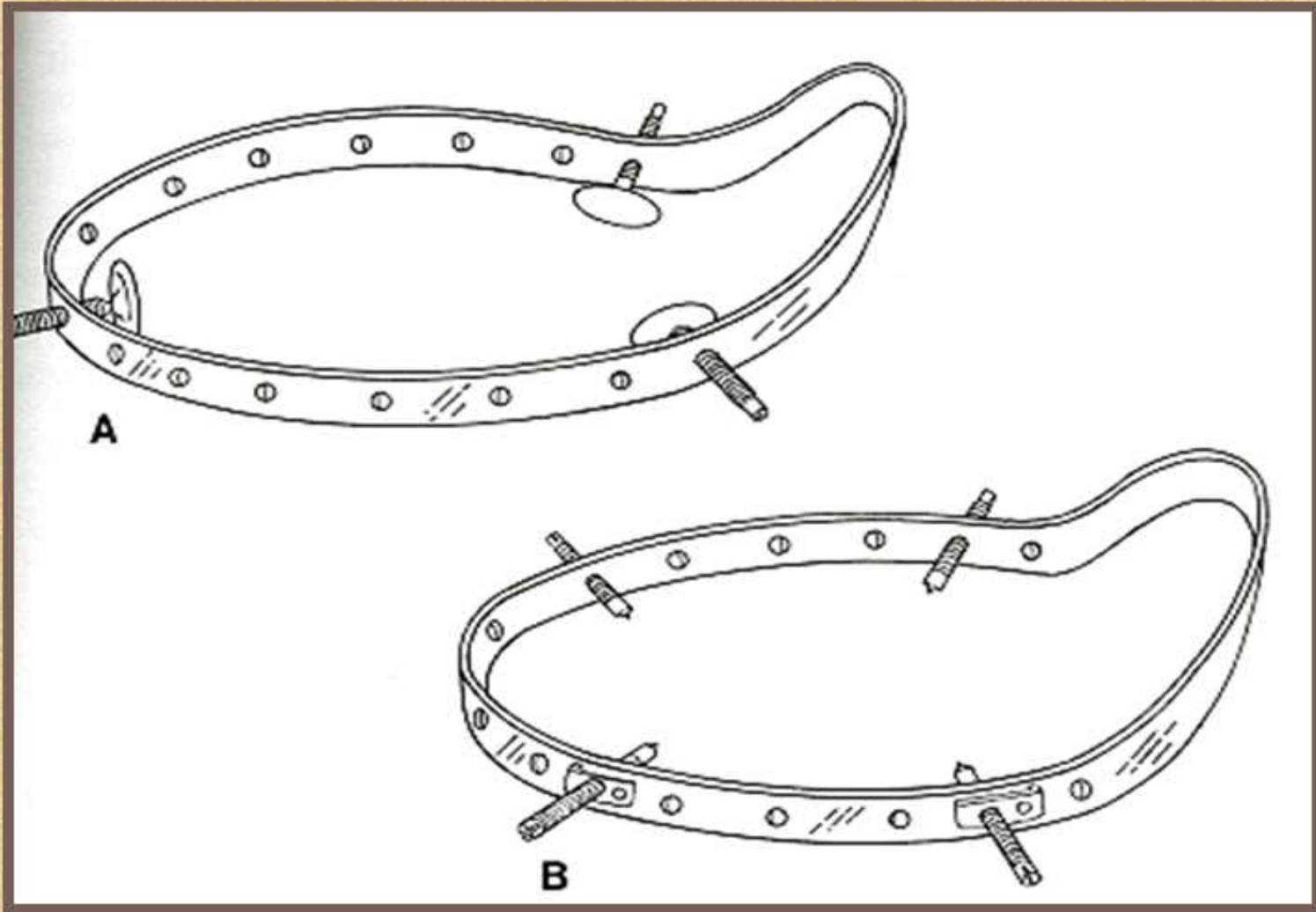
Goals of cervical traction in cervical spine injury

- To realign spine
- To prevent loss of function of undamaged neurological tissue
- To improve neurological recovery
- To obtain and maintain spinal instability
- To obtain early functional recovery

Recommended traction weights

Level	Minimum weight	Maximum weight
C1	2.3 kg	4.5 kg
C2	2.7 kg	4.5 to 5.4 kg
C3	3.6 kg	4.5 to 6.7 kg
C4	4.5 kg	6.7 to 9.0 kg
C5	5.4 kg	9.0 to 11.3 kg
C6	6.7 kg	9.0 to 13.5 kg
C7	8.2 kg	11.3 to 15.8 kg

Halo splint



- It is an oval metal band available in different sizes.
- It arches up posteriorly to clean the occiput.
- It has number of threaded holes at 2, 4, 8, and 10 clock positions through which Fixing pins are screwed into the outer table of the skull.
- The pins have sharp points which rapidly flare out into the broad shoulders, creating a large area of impact against the skull with the minimum of penetration.

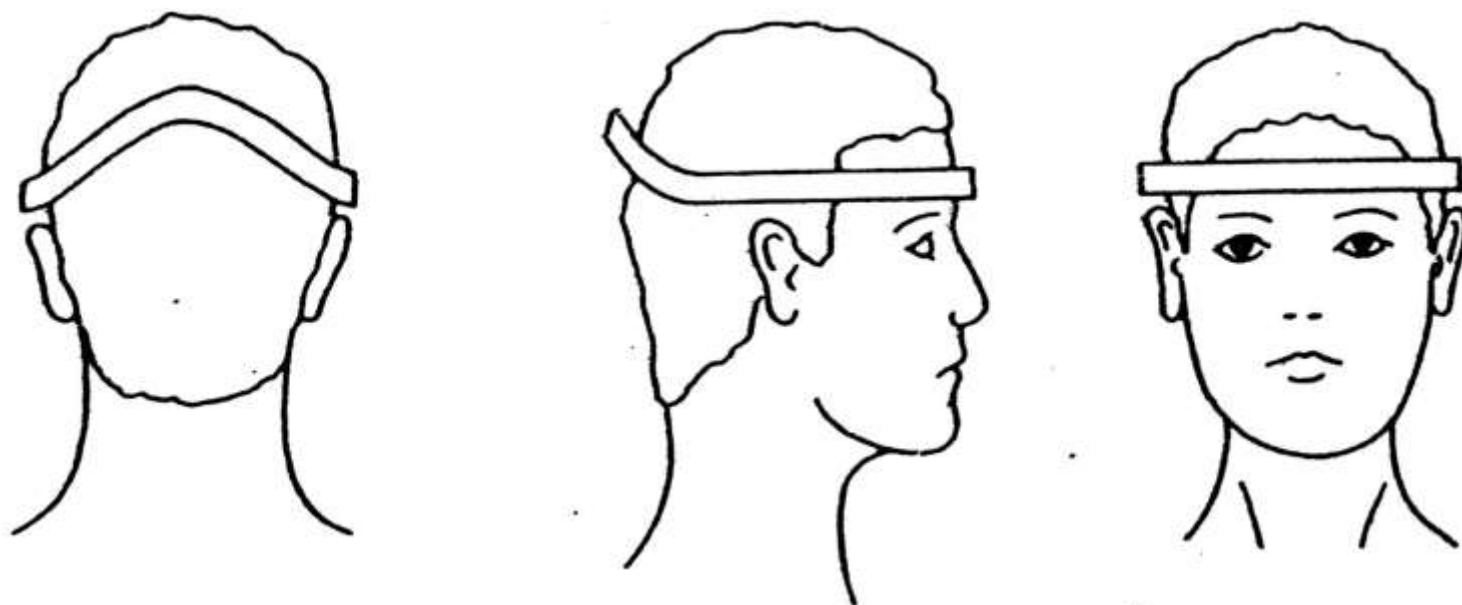


Fig. 6.8 The Ace halo splint.

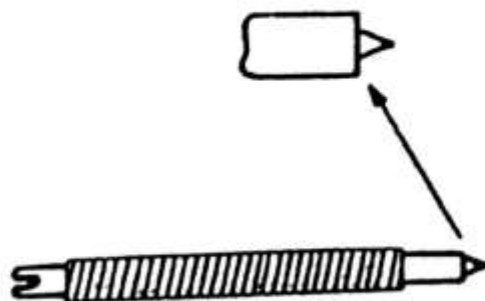
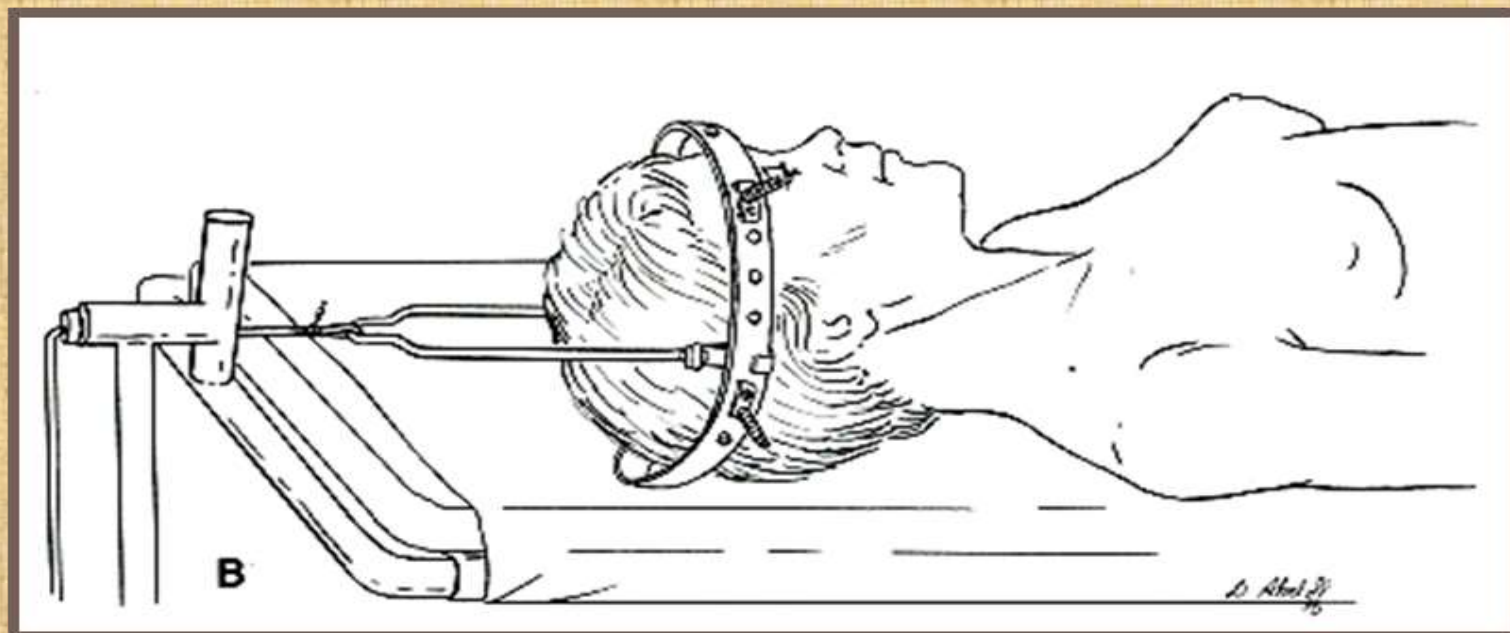
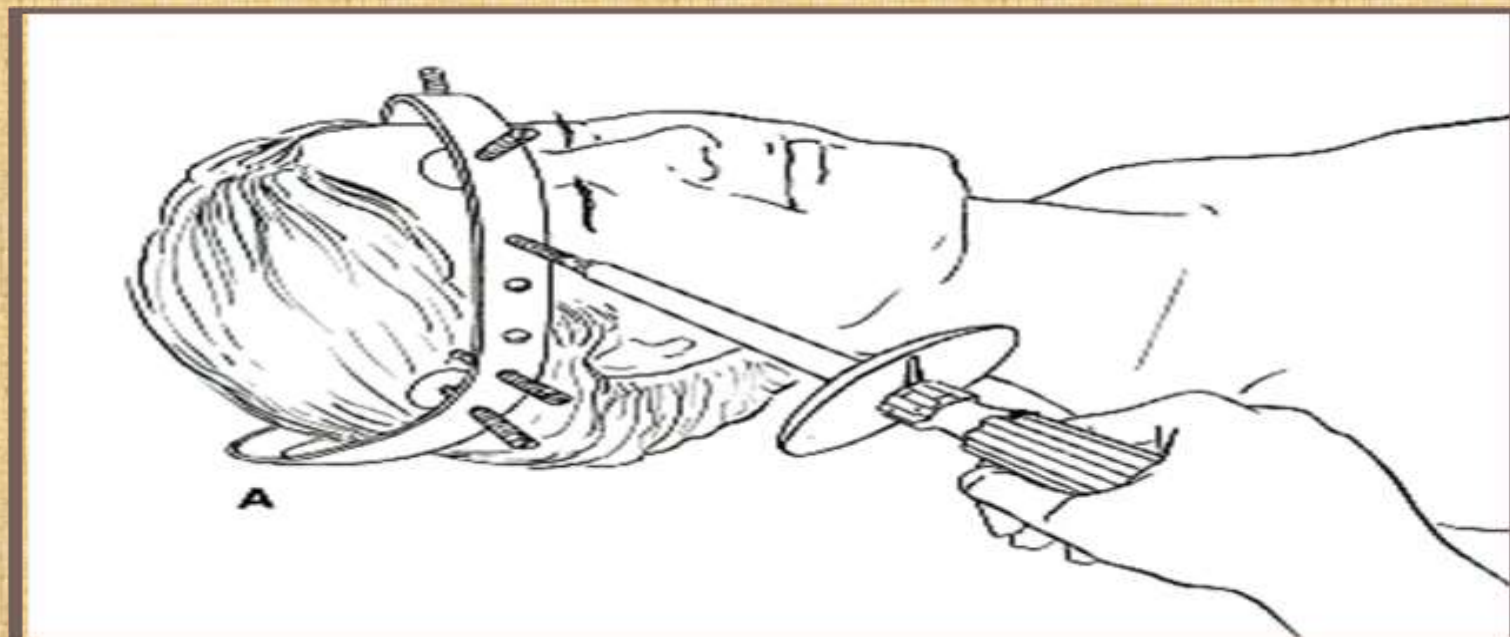


Fig. 6.9 The fixing pins used with the halo splint. Note the broad shoulders.



Method of application of halo splint

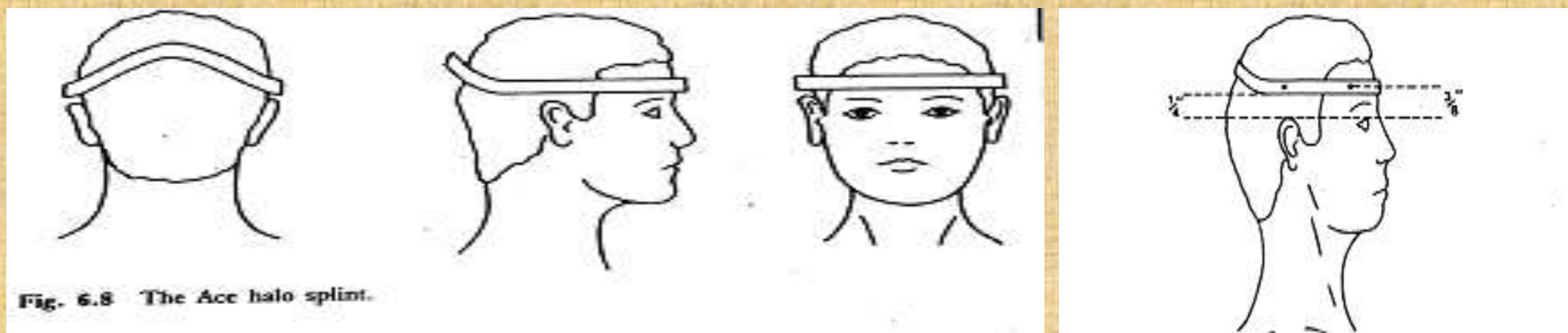


Fig. 6.8 The Ace halo splint.

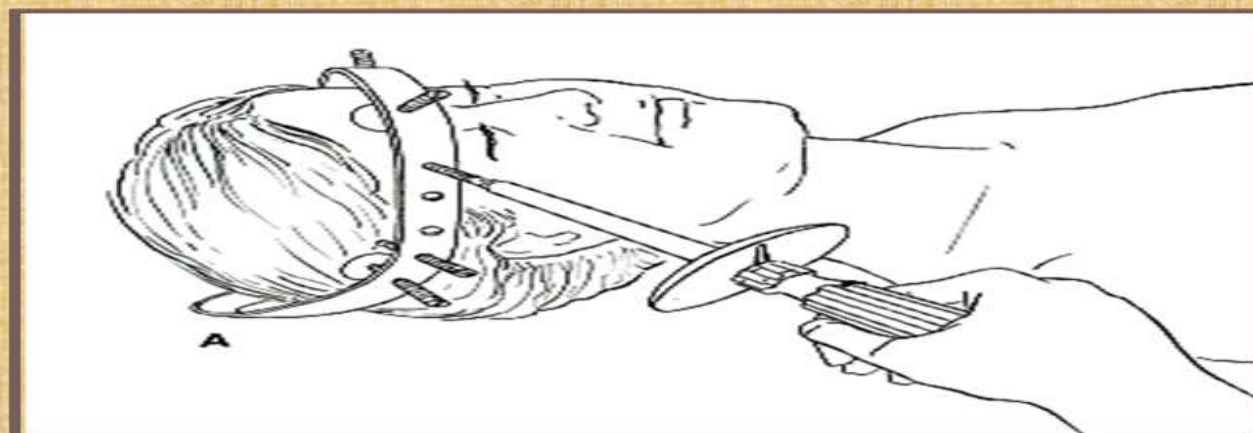


Fig. 6.11 The halo bail which is used if traction is to be applied to the halo splint.

Complications

- Tongs may pull out of skull
- Tongs may penetrate inner table
- Osteomyelitis
- Extradural hematoma
- Extradural abscess
- Subdural abscess
- Cerebral abscess

Halo pelvic traction

Indications:

- To immobilize the spine.
- To slowly correct or reduce deformities of spine such as scoliosis and tuberculosis - before surgery is carried out.

Materials:

- Halo splint connected by four vertical spring loaded distraction rods, to a steel pelvic hoop.
- The pelvic hoop in turn is attached to two long threaded steel rods, each of which passes through one wing of the ilium. There should be allowed gap of 2.5-3.8cm between patient skin and hoop.
- Patient in halo pelvic traction may remain ambulant.

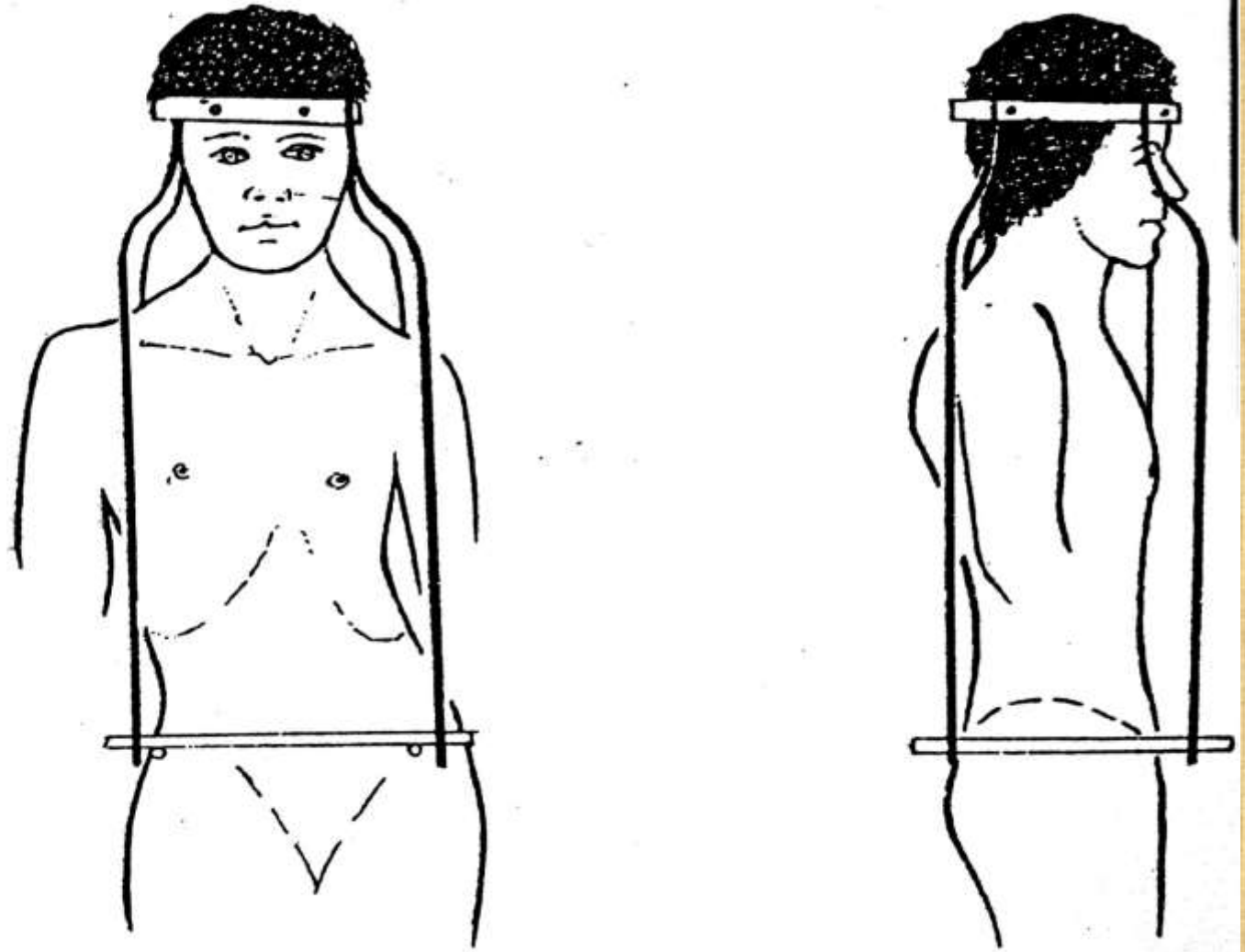
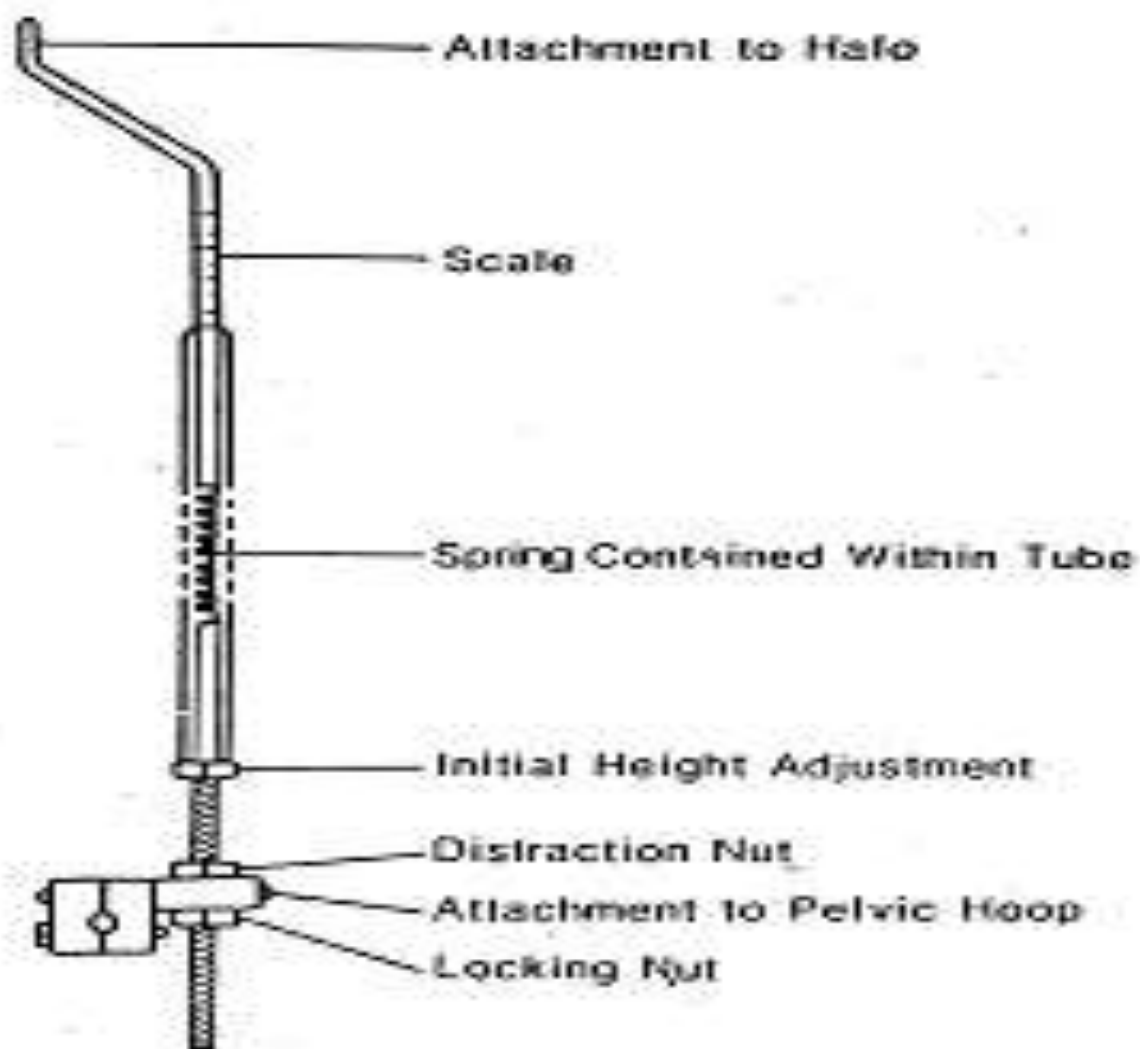
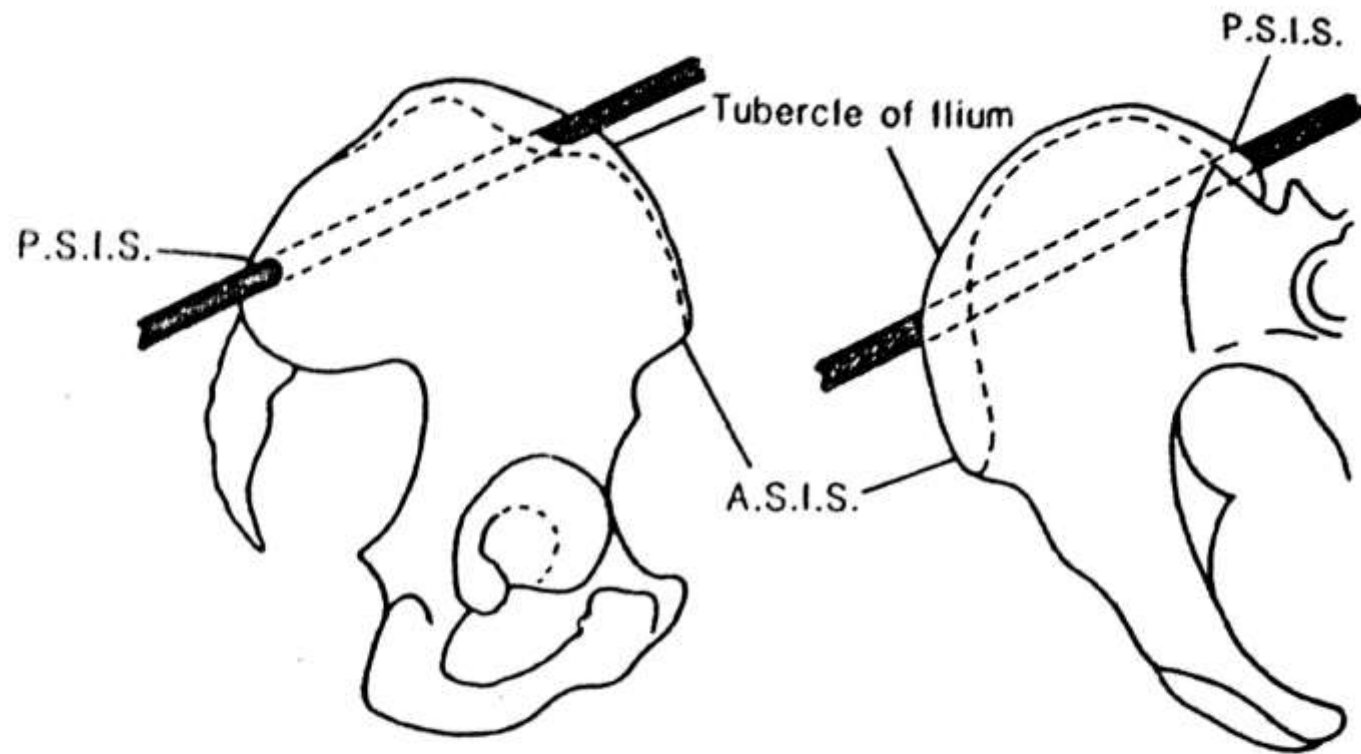


Fig. 6.14 Halo-pelvic traction.



6.16 Spring-loaded distraction rod for halo-pelvic traction.



Lateral Aspect of Pelvis

Hemi Pelvis Seen From Above

Fig. 6.15 Halo-pelvic traction. Each threaded rod transfixes one wing of the ilium, passing from the tubercle of the iliac crest to the posterior superior iliac spine (PSIS) on the same side

METHOD OF APPLICATION OF HALO- PELVIC TRACTION

Complications of Halo Pelvic traction

A. Cranial Screws

1. Superficial infection
2. Cerebral abscess
3. Loosening
4. Pain
5. Penetration of inner table

B. Pelvic rods

1. Vague aches and pains
2. Peritoneal penetration
3. Superficial infection
4. Loosening
5. Hip contracture from iliopsoas fibrosis

C. Neurological

1. Cranial nerve palsies
2. Brachial plexus palsy
3. Paraplegia

Removal of traction

- Continue traction until # is stable and then change to another method of supporting the # until union is achieved
- Traction is continued for
 - elbow # with olecranon pin-3wks
 - tibial # with calcaneal pin-3 to 6 wks
 - trochanteric # - 6wks
 - # NOF -6 to 12 wks

THANK YOU