



SUSPENSION THERAPY

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SYNOPSIS:

- Introduction
- Principles
- Suspension Instrument
- Procedure
- Types of Suspension
- Techniques





INTRODUCTION

- Suspension is defined as suspending a part of the body or whole body with the supported slings and pulleys.
- Suspension is the means whereby parts of the body are supported in slings and elevated by the use of variable length ropes fixed to a point above the body.
- Suspension frees the body from the friction of the material upon which body components may be resting and it permits free movement without resistance when the fixation is suitably arranged relative to the supported part.



PRINCIPLES OF SUSPENSION THERAPY

It is working under the principle of,

- (i) Friction,
- (ii) Pendulum, and
- (iii) Eliminating gravity movement.



FRICTION

- It occurs during a particular surface moves on another. It is the force, which restrict the movement of an object.
- If the surfaces are more smooth and slippery will have less friction, in that surface the movement will be more and will cause slippery.
- If the surfaces are hard or rough results in more friction and the movements are opposed by the friction force.
- The same principle is used in the suspension which has less friction causes the smooth and easy movement.



PENDULUM

- Pendulum is heavy material suspended by the weightless thread.
- If the force is applied on the pendulum it results in to and fro movement.
- One complete swing is called as oscillation.
- During the oscillation, the arc of movement of the pendulum forms a segment of base of the cone. The oscillation will be continued until the force comes down.
- The oscillatory distance may come down step by step, by the resistance of the air and gravity.



- In the human body the pendular motion occurs mainly in the shoulder and hip joints. Forward leg movement and the arm swing movement while walking is the simplest example.
- The simple muscular contraction is necessary to initiate the oscillation.
- The same mechanism is used in the suspension therapy to maintain the muscle property, increase the range of movement and strengthening the muscles.



ELIMINATING GRAVITY MOVEMENT

- If the person has the muscle power 2 (gravity eliminated movement), can go for the suspension exercises.
- If the muscle power is less than 2. It is difficult to perform the suspension therapy exercises by the patient himself.
- So, the patient should have minimal muscle power of 2 to undergo for suspension therapy exercise.
- If the muscle power is above 3, the patient can go for against the gravity exercises instead of suspension therapy exercises.



SUSPENSION INSTRUMENT

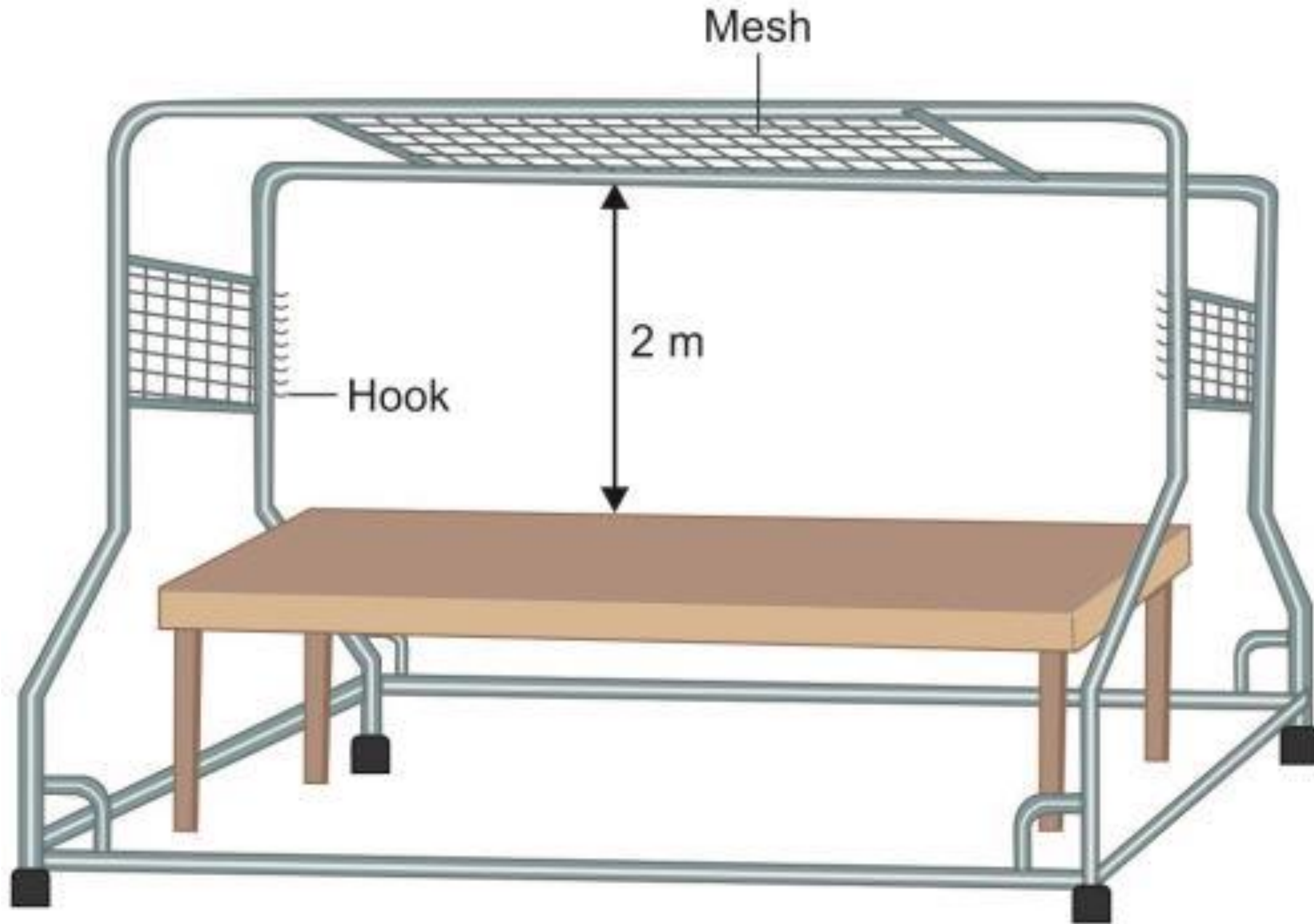


1. Suspension frame
2. Supporting ropes
3. Wooden cleat.
4. Pulleys
5. Slings
6. S-hook and dog clips



SUSPENSION FRAME

- It is made up of stainless steel or plastic coated steels. In the top and head end side presents the 5-centimeter metal mesh, and the remaining sides are kept open.
- The measurement of the frame is 1 m or 2 m width × 2 m length × 2 m height. In the middle of the frame 2 m length × 1 m width × 1 m height couch is placed for the patient's accommodation.



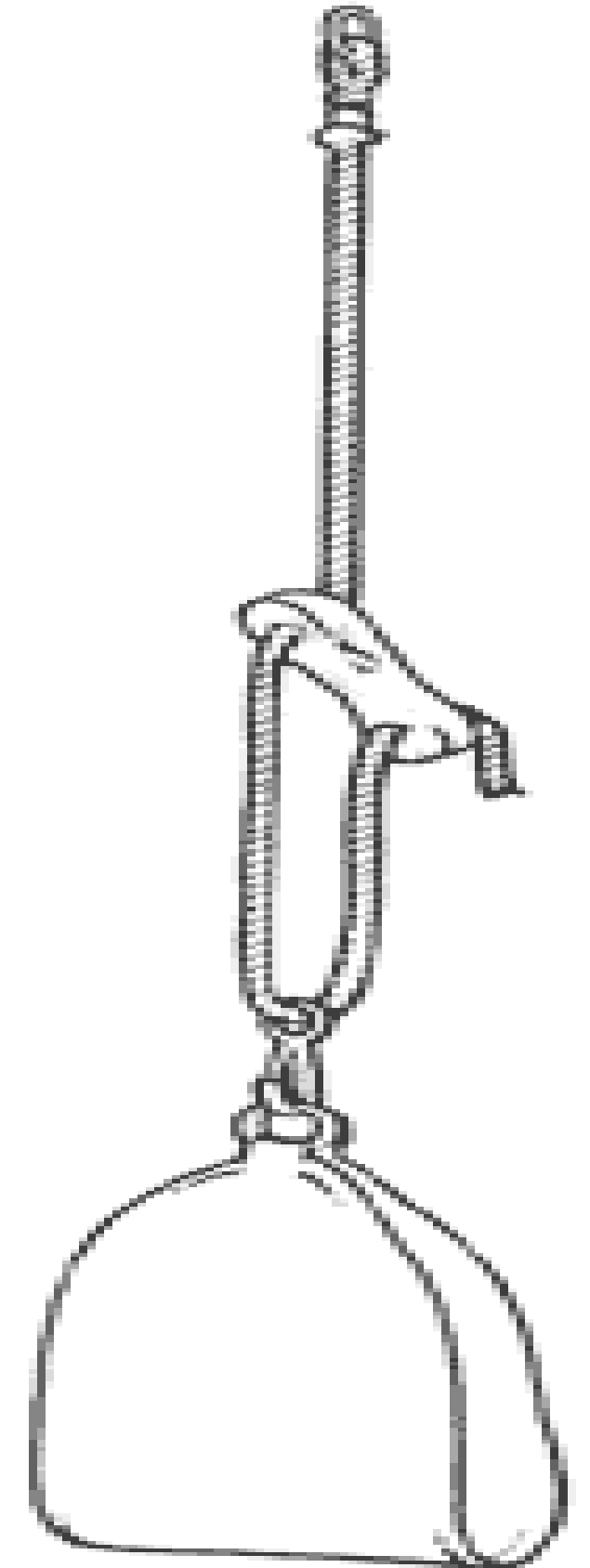


SUPPORTING ROPE

- It is 1.5 meters length and 3-ply hemp ropes are used for the suspension to avoid slipping.
- The Supporting ropes can be of three arrangements:
 1. A single rope,
 2. A pulley rope or a double rope.

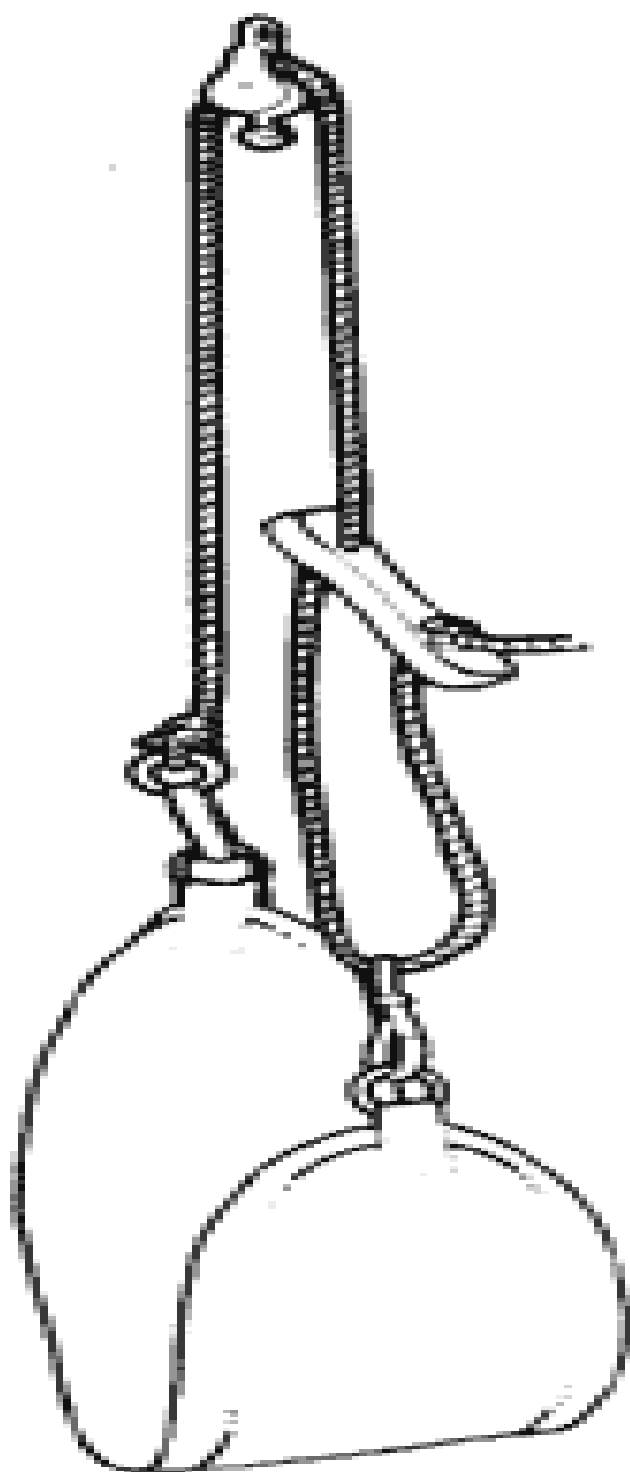
Single Rope

- A single rope has a ring fixed at one end, by which it is hung up.
- The other end of the rope passes through one end of a wooden cleat, through the ring of a dog clip and through the other end of the cleat and is then knotted with a half-hitch.
- The cleat is for altering the length of the rope and should be held horizontally for movement and pulled oblique when supporting



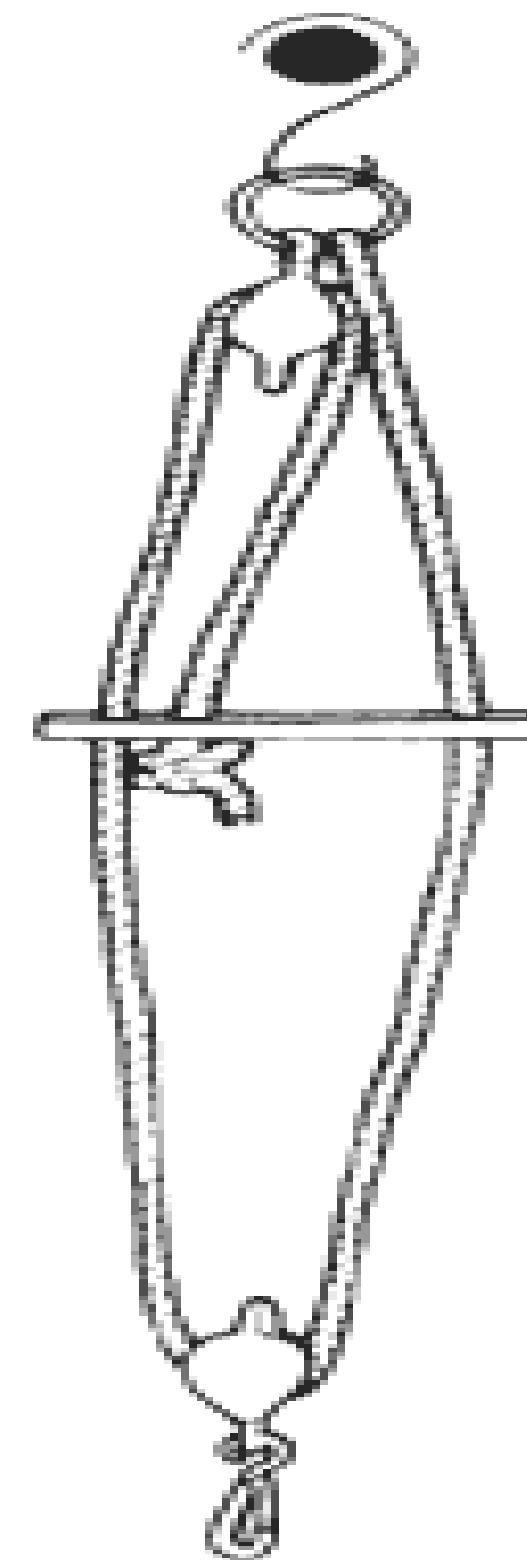
Pulley Rope

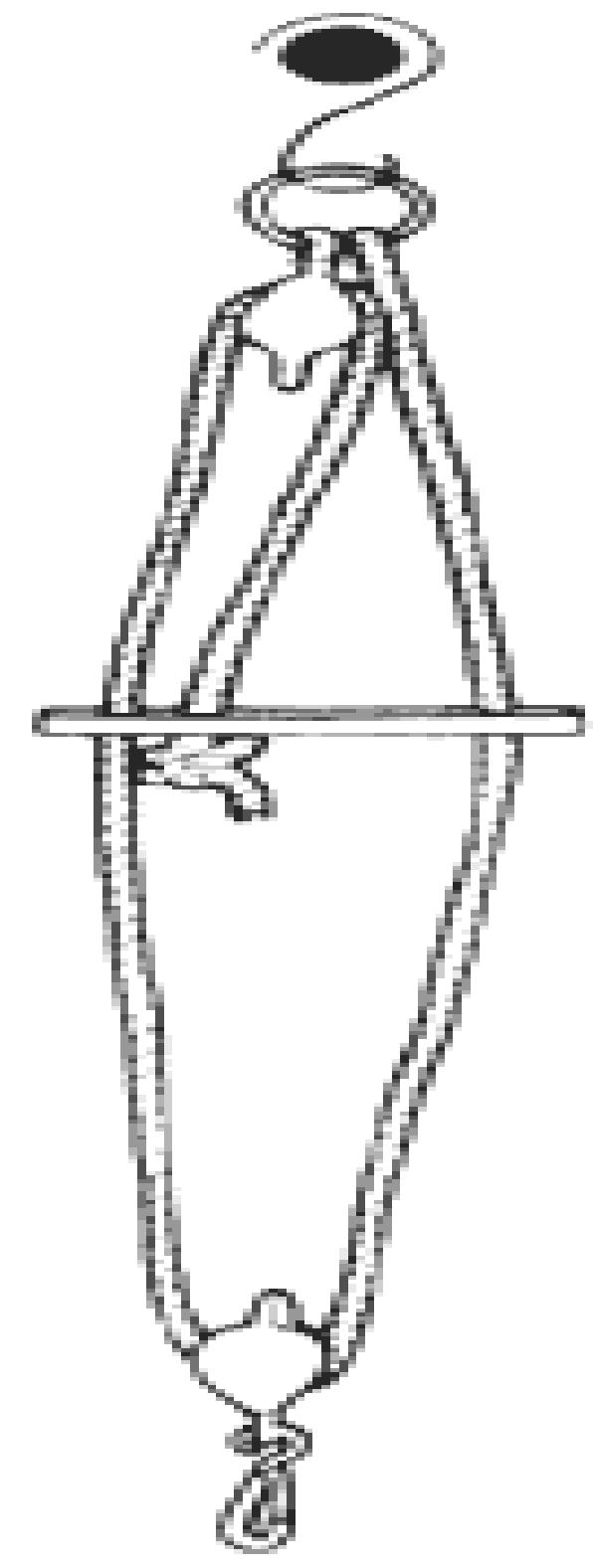
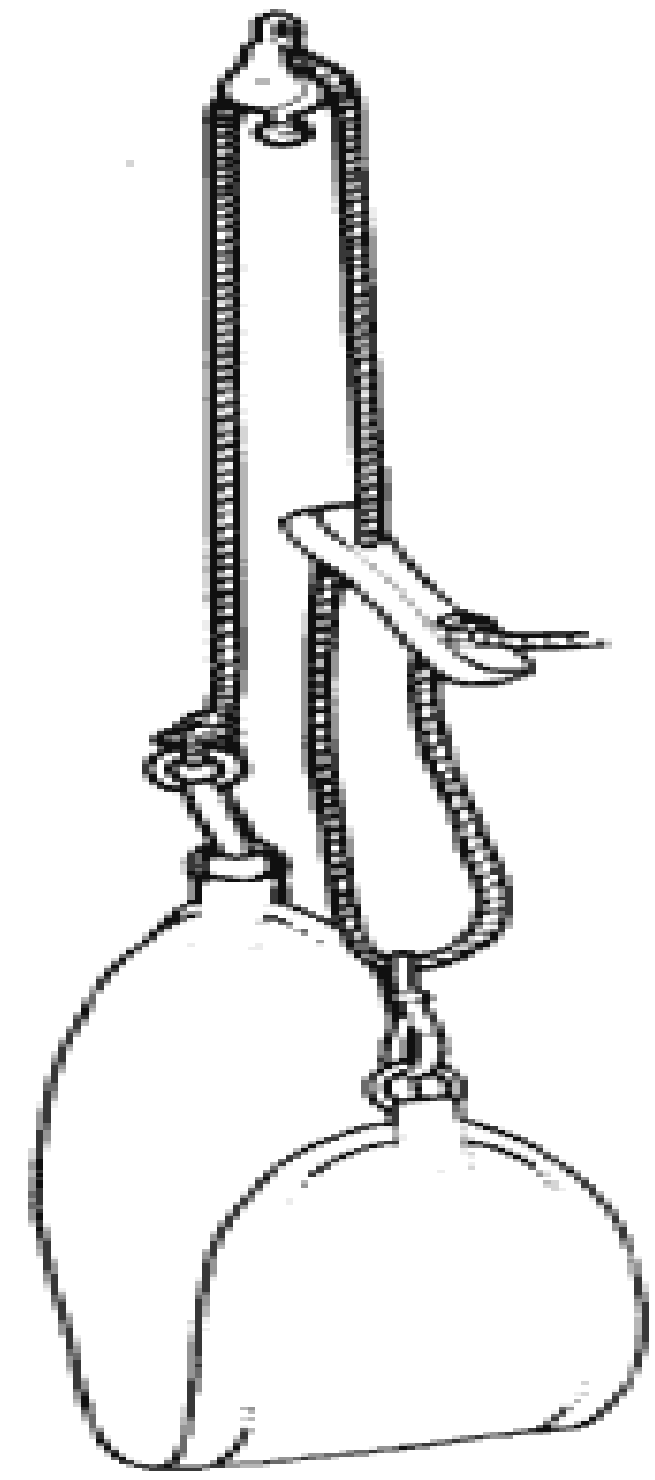
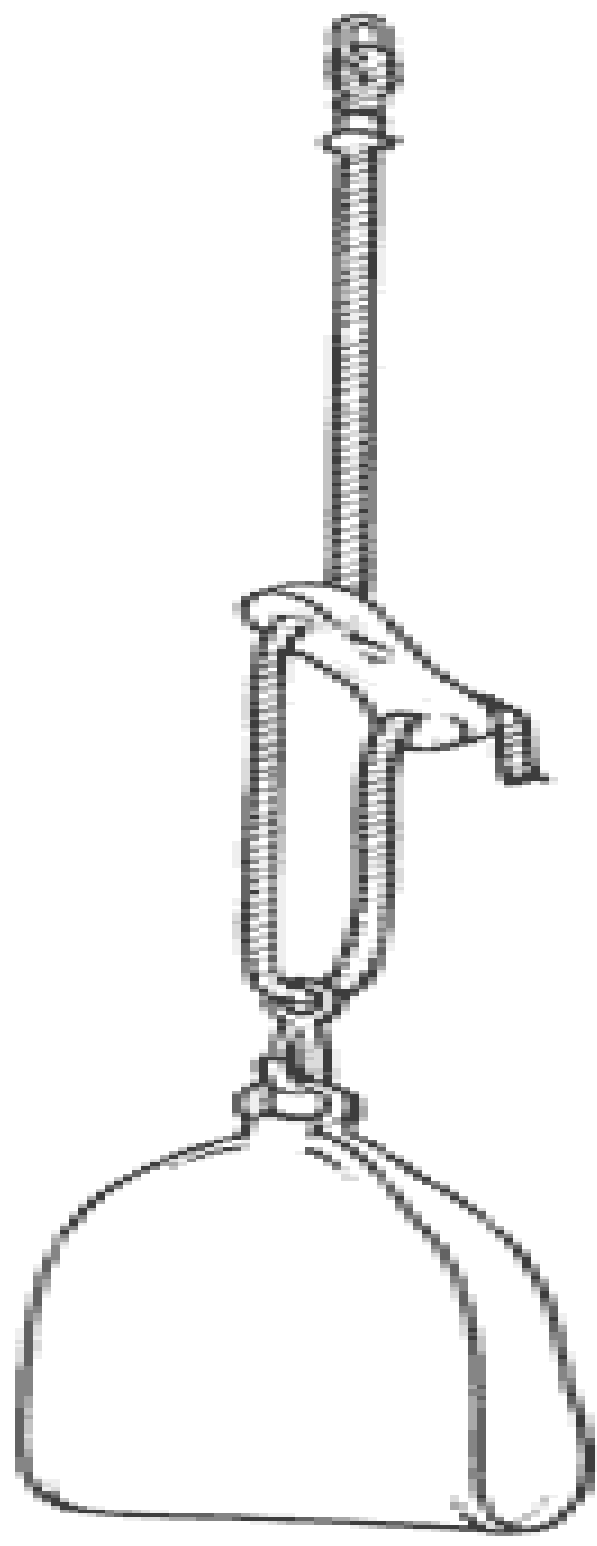
- A pulley rope has a dog clip attached to one end of the rope which then passes over the wheel of a pulley. The rope then passes through the cleat and a second dog clip as described above.
- Like the single rope this rope is 1.5 m long.
- This arrangement is used for reciprocal pulley circuits; with one sling supporting a limb, and the ends of the sling attached to the two dog clips

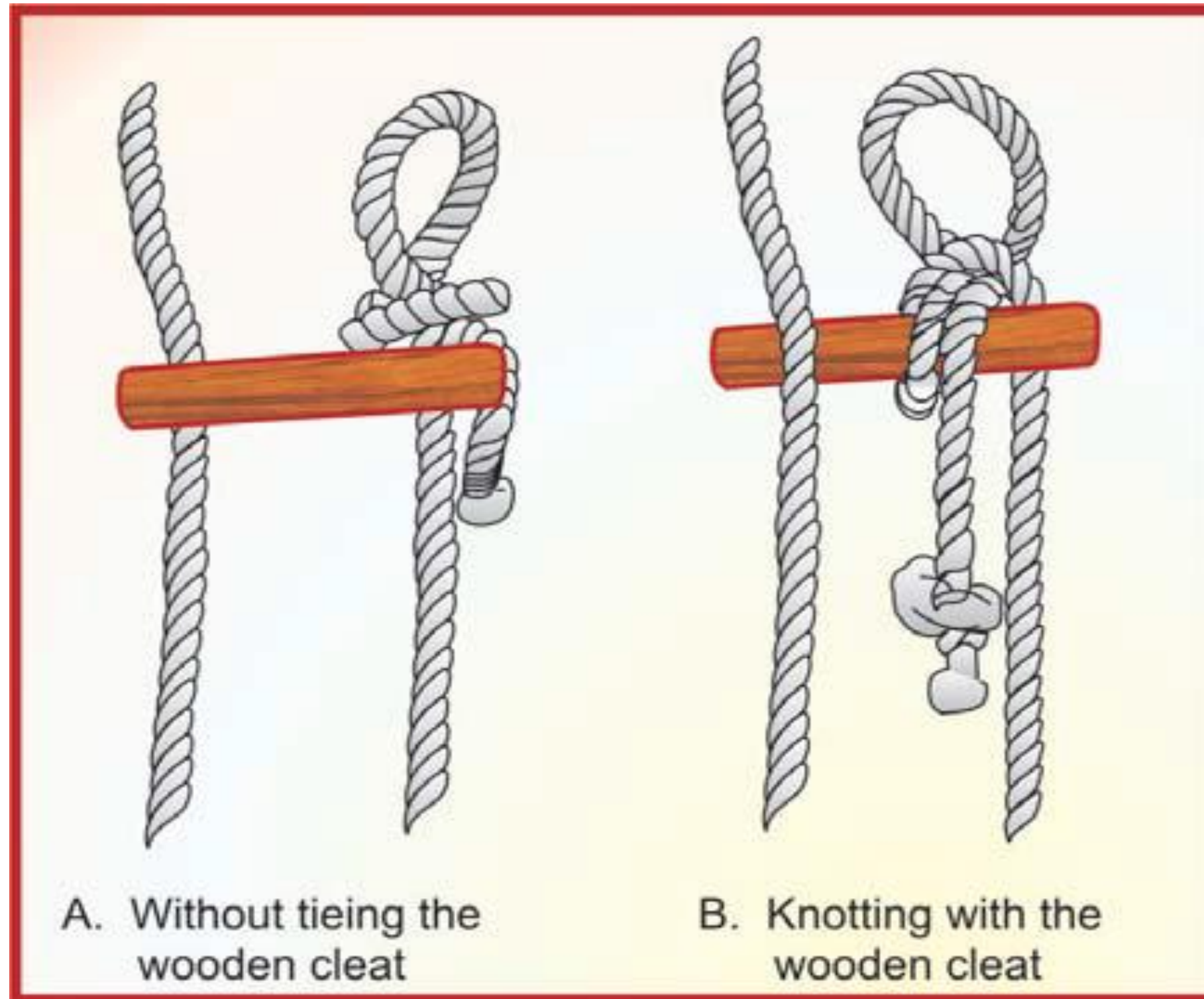


Double Rope

- A double rope consists of a ring and clip.
- The rope passes through one side of a cleat, round a pulley wheel at the lower end, to the case of which is attached a dog clip, through the other end of the cleat and over the wheel of an upper pulley which is attached to the compensating device.
- The rope then passes down again through a centre hole in the cleat where it is knotted

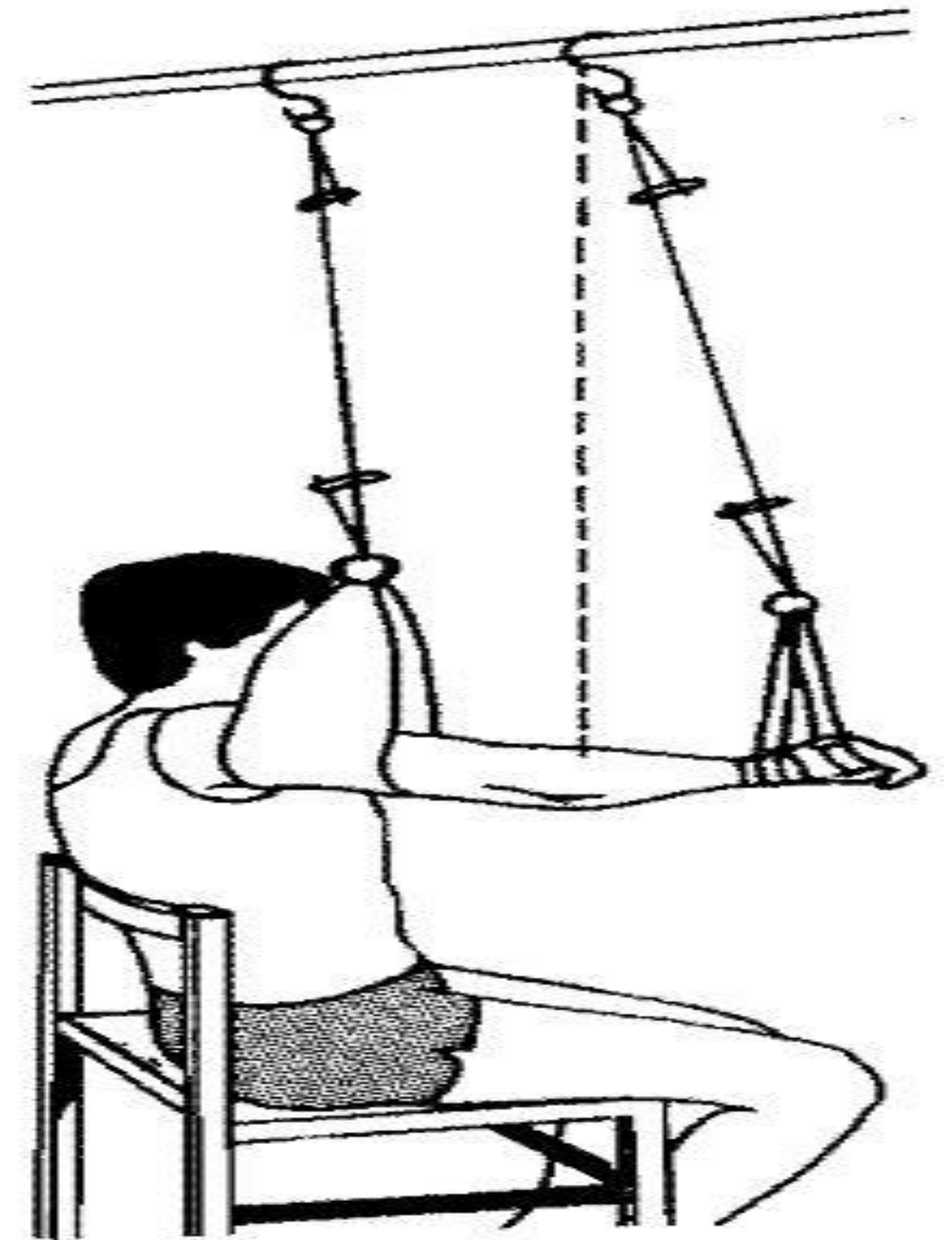
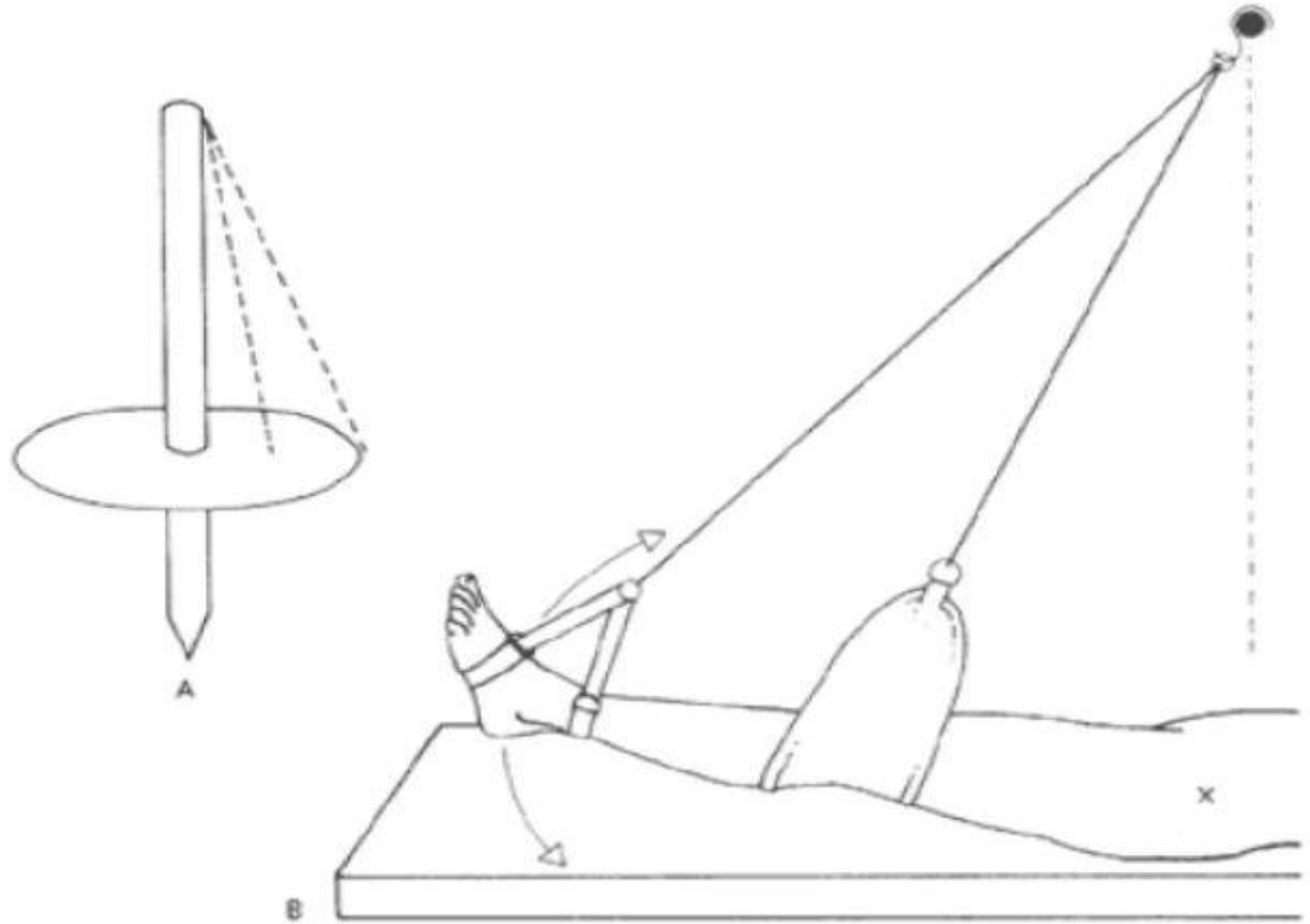








- Other 3 varieties of supporting ropes are used. 1. Primary supporting rope
2. Secondary rope 3. Vertical supporting rope.
- The primary rope, which is used to take the axis as the point of suspension and it supports the distal joint.
- The secondary rope is added with the primary supporting rope to support the proximal joint.
- Vertical ropes are used for vertical suspension and are supporting the mid-portion of the body segment.





WOODEN CLEAT

- It is made up of wood and is used for altering the length of the rope.
- It has two or three holes for the rope passage, the rope itself holds the cleat by friction resistance.
- Sometime the wooden cleat is placed horizontally, for adjusting the length of the rope and the oblique alignment of the cleat for friction resistance by the rope to avoid slippery.

PULLEY

- It gives the mechanical advantage.
- Pulleys are used to reduce the burden of lifting whole body or body parts.
- Sometime single or double pulleys are used depends on the situation. If the body part is big. For example, trunk, thorax, and thigh, double pulleys are used.





SLINGS

- The slings are made up of canvas. There are four varieties of slings are available.
 1. Single sling
 2. Double sling
 3. Three-ring sling
 4. Head sling.

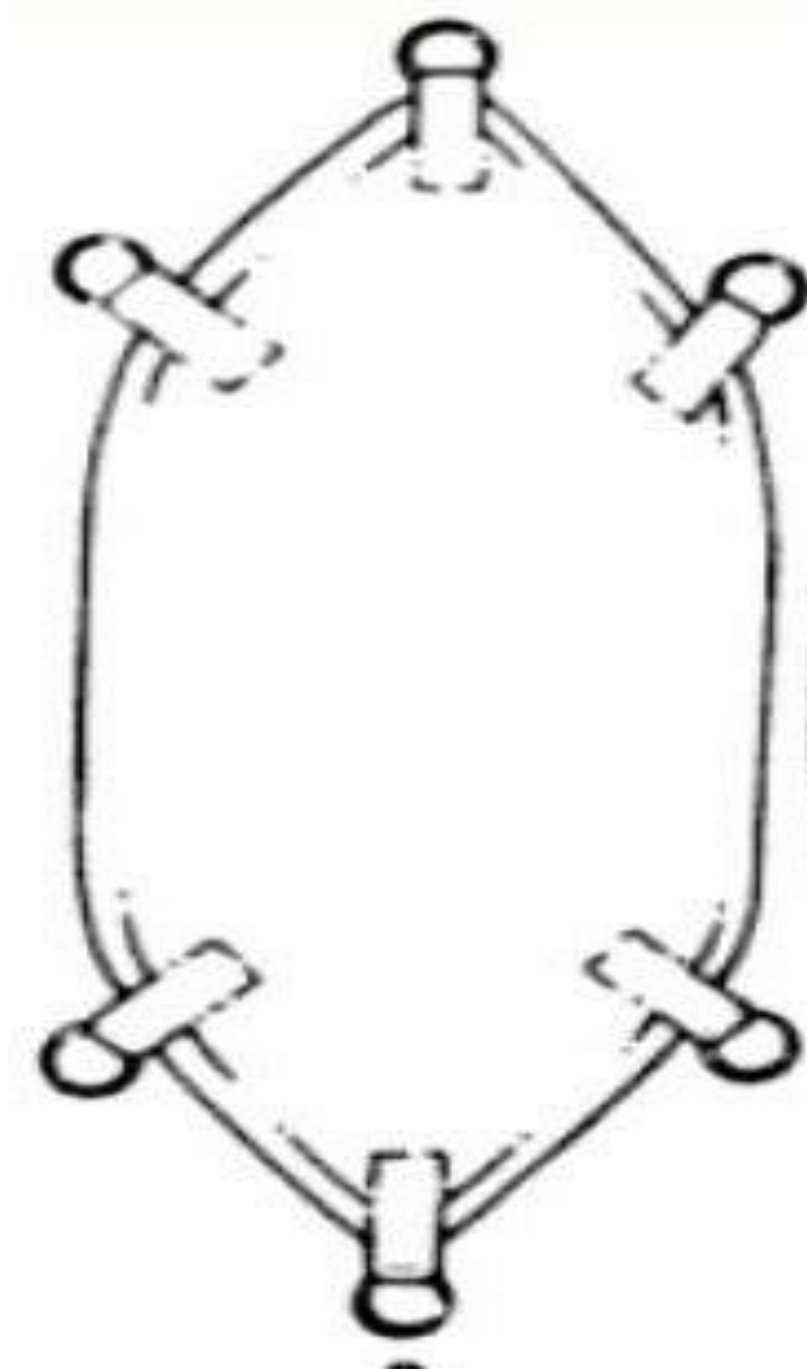
Single Sling

- It is 68 cm length and 17 cm width, both the ends are having the D-rings for the attachment with the dog clip or S-hook.
- These types of slings are used for the elbow and knee region.
- It is sometime folded in figure of 8 manner to support the wrist and ankle.



Double Slings

- Double slings are broad slings measuring 68 cm long by 29 cm wide with D rings at each end and are used to support the pelvis or thorax or the thighs together, especially when the knees are to be kept straight.



Three-ring Sling

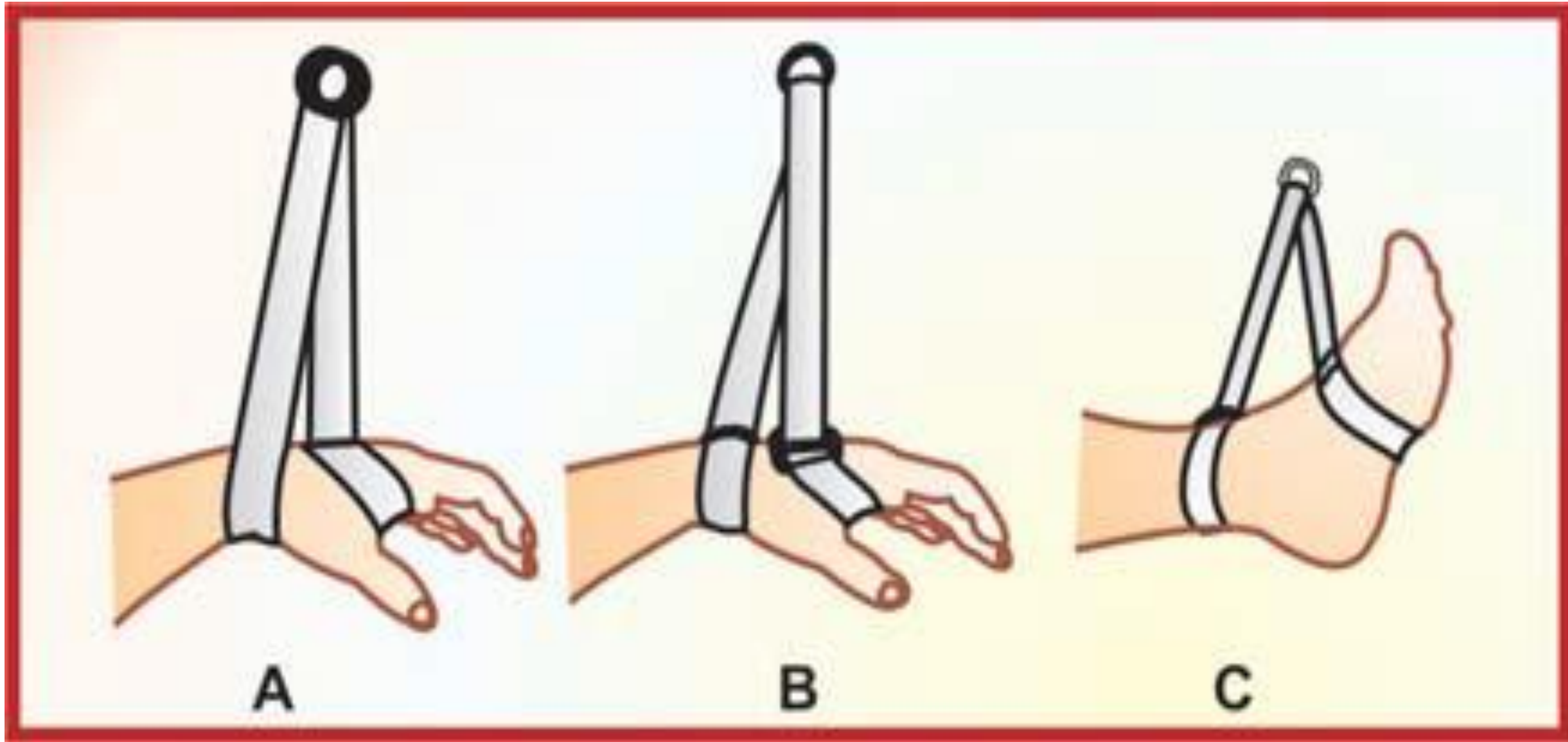
- It is 75 cm length and 3-4 cm width, it consists of three D-rings.
- Two at the both end of the sling and one in the middle kept moving. It is mainly used for wrist and ankle regions.



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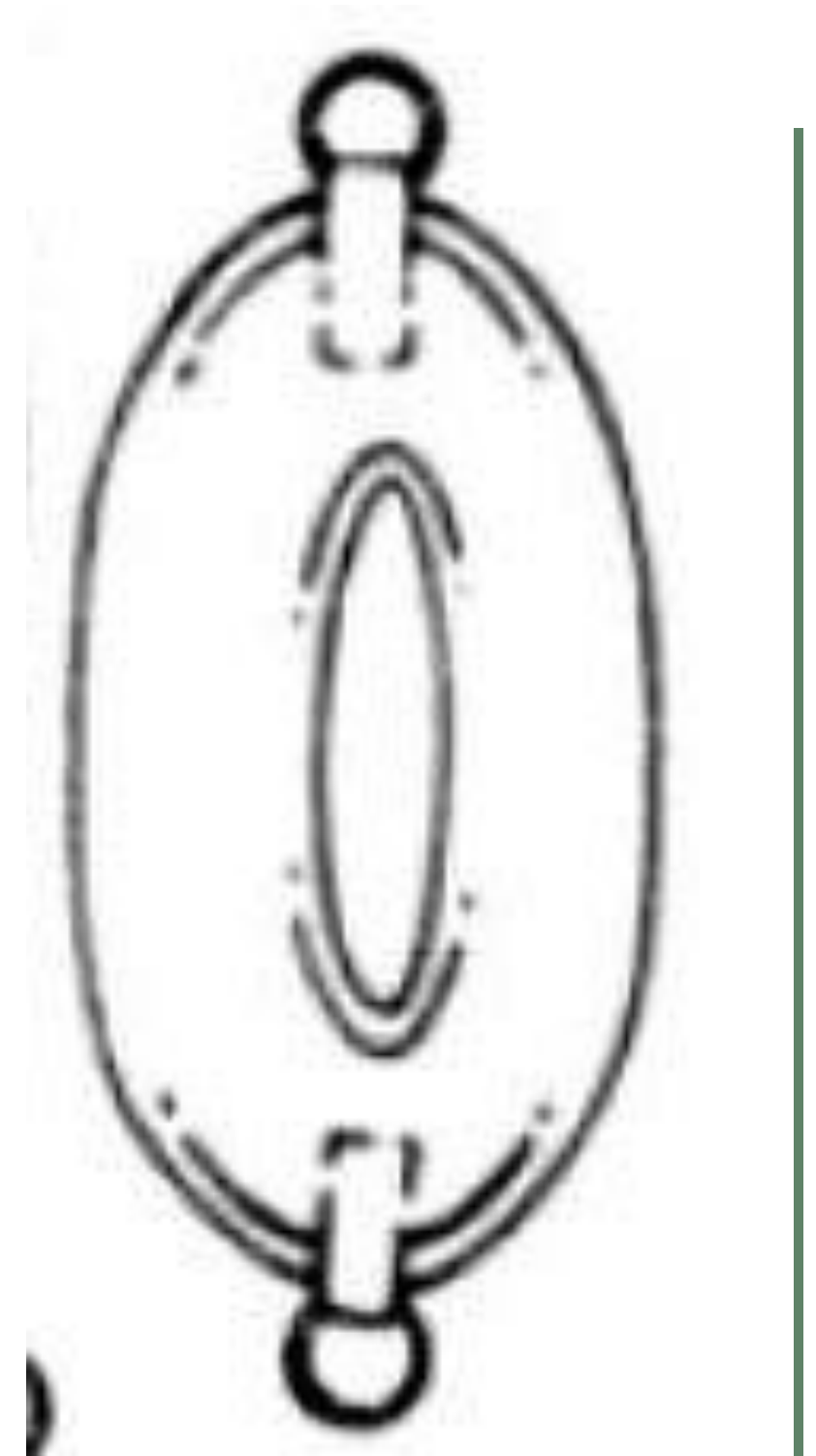


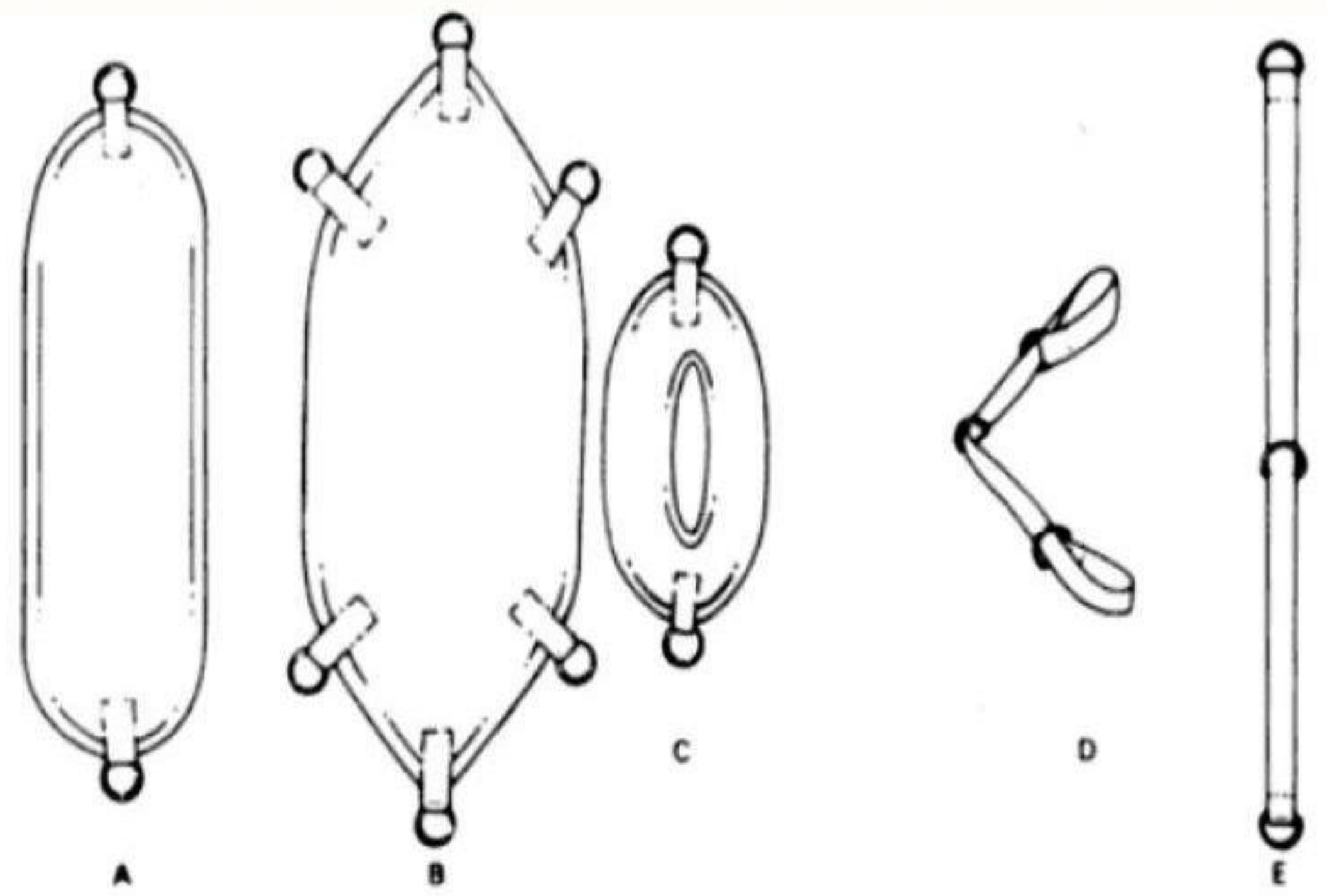
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Head Sling

- A head sling is a short, split sling with its two halves stitched together at an angle to create a central slit.
- This allows the head to rest supported at the back under the lower and upper parts of the skull, or in the side lying position leaves the ear free.





S-hook and dog clips

- The S-hook and dog clips are used:
 1. To attach the supporting rope with the mesh.
 2. To attach the sling with the supporting ropes

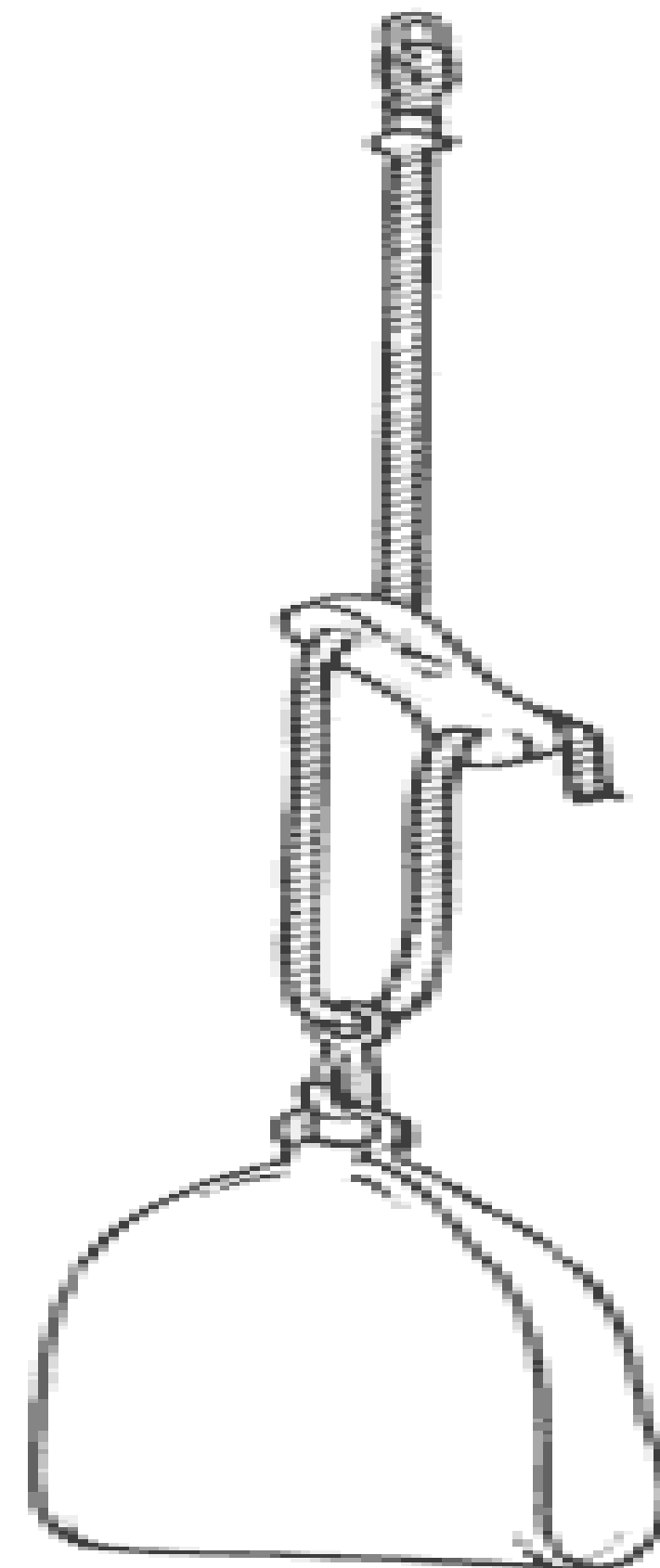




PROCEDURE

- One end of the supporting rope is attached by the S-hook with the mesh and another end is passes through the one hole of the wooden cleat, and taken out through another hole.
- The wooden cleat is used for adjusting the length of the rope, and another way of lengthening adjustment made by knotting the rope about the cleat.
- And the one more S-hook attaches the sling with the supporting rope in-between the two holes of the wooden cleat.

- The knotting should be half-hitched, so that it can be removed easily while altering the support or movement.
- Sometime padding is needed mainly for elbow and knee joint to avoid flexion movement.





TYPES OF SUSPENSION

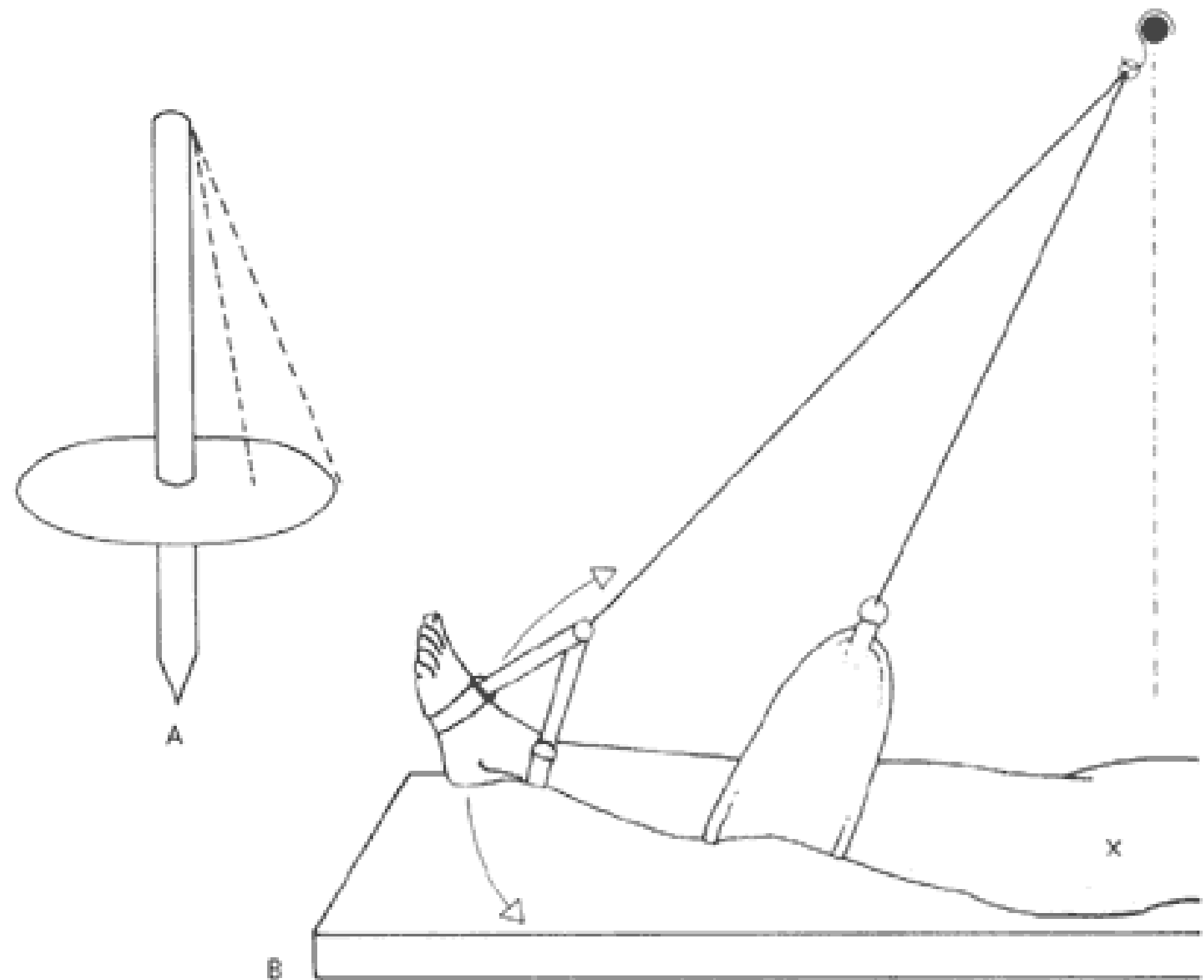
1. Axial suspension
2. Vertical suspension
3. Pendular suspension.

AXIAL SUSPENSION

- Joint axis is taken as the point of the suspension. The limb is supported by the slings above the axis of the joint.
- If the movement is initiated the limb moves both sides and the base of the swings shows the segment of the base of the cone shape. The part moves parallel to the floor.

Uses

1. Relaxation.
2. Maintain muscular property.
3. Increase the blood circulation.
4. Increase the venous drainage.
5. Increase the lymphatic drainage.



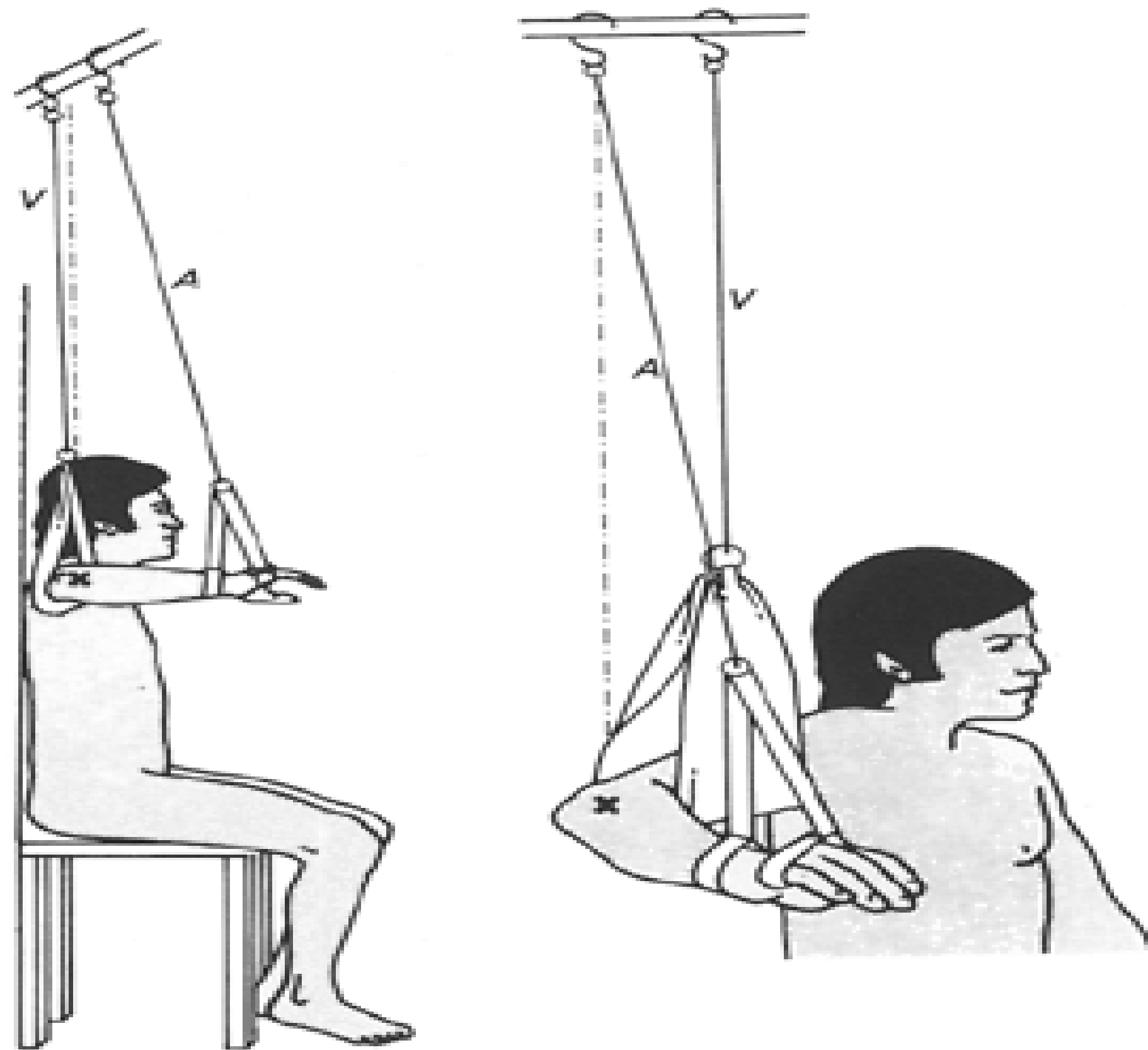


Vertical Suspension

- The center of gravity of the body part or the body is taken as the point of suspension.
- The body parts can be supported in these types of suspensions rather than strengthening or performing pendular movement of the limb.

Uses

1. To support the body part
2. To reduce the pressure sore.





Pendular Suspension

- Here at first the axis of the joint is taken as the point of suspension then depends on the strengthening of the muscle group, the axis is changing towards medially or laterally, anteriorly or posteriorly.
- The muscles will be getting resistance while movement if the axis is shifted opposite to that movement.

Uses

1. To strengthen the muscles.
2. To increase the muscle power.
3. To increase the endurance.



TECHNIQUES OF SUSPENSION THERAPY

SHOULDER FLEXION AND EXTENSION:

Position of the patient: Side lying.

Point of suspension: Greater tuberosity.

Needed accessories:

- S-hooks—3 nos.
- Three-ring sling & Single sling —1 no.
- Supporting-rope with wooden cleat—2 nos.



Procedure:

- Greater tuberosity is taken as the suspension point by primary supporting rope. Which is connected by the s-hook with the mesh.
- Secondary supporting rope attached in the same s-hook.
- Three-ring sling is used to support the wrist.
- Single sling is used to support the elbow.
- The primary supporting rope is attached with the wrist sling.
- Secondary supporting rope is attached with the elbow sling.

- Patient is instructed to perform the flexion and extension movement of the shoulder.
- For strengthening the flexor posterior shifting of the axis is carried out vice versa for extensor strengthening.





SHOULDER ABDUCTION AND ADDUCTION:

Position of the patient: Supine lying.

Point of suspension: One inch below the acromion process.

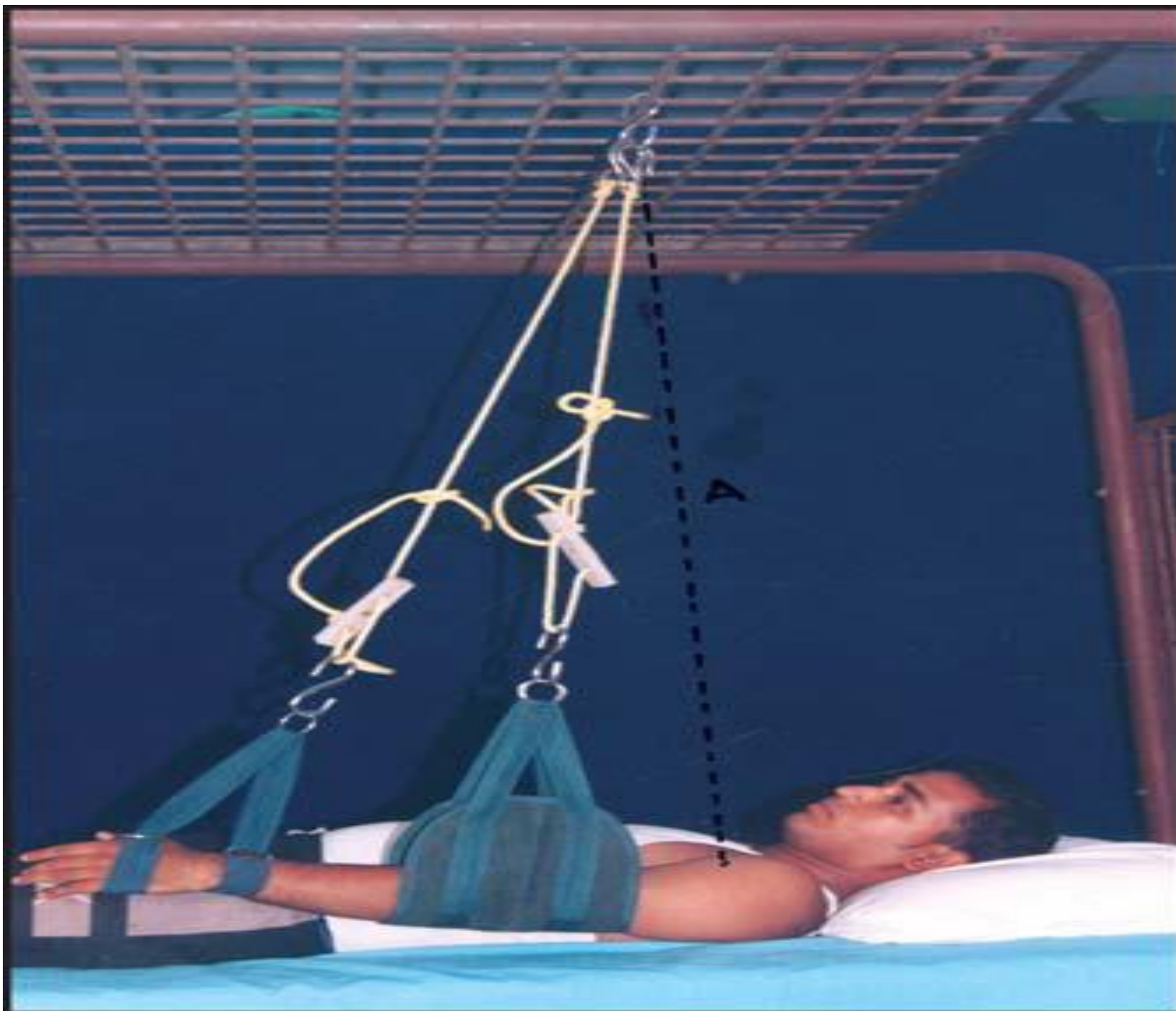
Needed accessories:

- S-hooks—3 nos.
- Three-ring sling—1 no.
- Single sling—1 no.
- Supporting-rope with wooden clit—2 nos.



Procedure:

- One inch below the acromion process is taken as the suspension point by primary supporting rope, which is connected by the s-hook with the mesh.
- Secondary supporting rope attached in the same s-hook.
- Three-ring sling is used to support the wrist.
- Single sling is used to support the elbow.
- The primary supporting rope is attached with the wrist sling.
- Secondary supporting rope is attached with the elbow sling.



- Patient is instructed to perform the abduction-adduction movement of the shoulder.
- For strengthening the abductor medial shifting of the axis is carried out, vice versa for adductor strengthening.



SHOULDER MEDIAL AND LATERAL ROTATION:

Position of the patient: Supine lying.

Point of suspension: Olecranon process.

Needed accessories:

- S-hook—4 nos.
- Three-ring sling—1 no.
- Single sling—1 no.
- Supporting-rope with wooden cleat—2 nos.



Procedure:

- Shoulder is flexed 90° with the elbow in 90° flexion the olecranon process is taken as the suspension point by primary supporting rope which is connected by the s-hook with the mesh.
- Secondary supporting rope attached with head side mesh by another s-hook in the vertical suspension.
- Three-ring sling is used to support the wrist. Single sling is used to support the arm.

- The primary supporting rope is attached with the wrist sling.
- Secondary supporting rope is attached with the arm sling.
- Patient is instructed to perform the medial and lateral rotation movement of the shoulder.
- For strengthening the medial rotator, lateral shifting of the axis is carried out vice versa for lateral rotator strengthening.





ELBOW FLEXOR AND EXTENSOR:

Position of the patient: Sitting.

Point of suspension: Lateral epicondyle of the humerus.

Needed accessories:

- S-hooks—4 nos.
- Three-ring sling—1 no.
- Single sling—1 no.
- Supporting-rope with wooden cleat—2 nos.



Procedure:

- Shoulder is abducted in 90° with the elbow in 90° position the lateral epicondyle is taken as the suspension point by primary supporting rope, which is connected by the s-hook with the mesh.
- Secondary supporting rope attached with the mesh by another s-hook in vertical suspension.
- Three-ring sling is used to support the wrist. Single sling is used to support the arm.

- The primary supporting rope is attached with the wrist sling.
- Secondary supporting rope is attached with the arm sling.
- Patient is instructed to perform the elbow flexion and extension movement.
- For strengthening the flexor lateral shifting of the axis is carried out vice versa for extensor strengthening.





HIP FLEXION AND EXTENSION:

Position of the patient: Side lying.

Point of suspension: Greater trochanter.

Needed accessories:

- S-hooks—3 nos.
- Three-ring sling—1 no.
- Single sling—1 no.
- Supporting-rope with wooden cleat—2 nos.



Procedure:

- Greater trochanter is taken as the suspension point by primary supporting rope which is connected by the s-hook with the mesh.
- Secondary supporting rope attached with the same s-hook.
- Three-ring sling is used to support the ankle.
- Single sling is used to support the knee.
- The primary supporting rope is attached with the ankle sling.
- Secondary supporting rope is attached with the knee sling.

- Patient is instructed to perform the flexion and extension movement of the hip.
- For strengthening the flexor posterior shifting of the axis is carried out vice versa for extensor strengthening.





HIP ABDUCTION AND ADDUCTION:

Position of the patient: Supine lying.

Point of suspension: Two inches below the ASIS.

Needed accessories:

- S-hooks—3 nos.
- Three-ring sling—1 no.
- Single sling—1 no.
- Supporting-rope with wooden cleat—2 nos.



Procedure:

- Two inches below the ASIS is taken as the suspension point by primary supporting rope, which is connected by the s-hook with the mesh.
- Secondary supporting rope attached with the same s-hook.
- Three-ring sling is used to support the ankle.
- Single sling is used to support the knee.
- The primary supporting rope is attached with the ankle sling.
- Secondary supporting rope is attached with the knee sling.

- Patient is instructed to perform the abduction and adduction movement of the hip.
- For strengthening the abductor medial shifting of the axis is carried out vice versa for adductor strengthening.





HIP MEDIAL AND LATERAL ROTATION

Position of the patient: Supine lying.

Point of suspension: Apex of the patella.

Needed accessories:

- S-hooks—4 nos.
- Three-ring sling—1 no.
- Single sling—1 no.
- Supporting-rope with wooden cleat—2 nos.



Procedure:

- Apex of the patella is taken as the suspension point by primary supporting rope. Which is connected by the s-hook with the mesh.
- Secondary supporting rope attached with the head side mesh by the another s-hook.
- Three-ring sling is used to support the ankle. Single sling is used to support the thigh.
- The primary supporting rope is attached with the ankle sling.



- Secondary supporting rope is attached with the thigh sling.
- Patient is instructed to perform the medial and lateral movement of the hip.
- For strengthening the medial rotator medial shifting of the axis is carried out vice versa for lateral rotator strengthening.



KNEE FLEXION AND EXTENSION:

Position of the patient: Side lying.

Point of suspension: Lateral joint line.

Needed accessories:

- S-hooks—4 nos.
- Three-ring sling—1 no.
- Single sling—1 no.
- Supporting-rope with wooden cleat—2 nos.



Procedure:

- Lateral joint line is taken as the suspension point by primary supporting rope. Which is connected by the s-hook with the mesh.
- COG of the thigh is taken as the suspension point by the secondary supporting rope, which is attached with the head side mesh by the another s-hook in vertical suspension.
- Three-ring sling is used to support the ankle.
- Single sling is used to support the thigh.

- The primary supporting rope is attached with the ankle sling.
- Secondary supporting rope is attached with the thigh sling.
- Patient is instructed to perform the flexion and extension movement of the knee.
- For strengthening the flexor posterior shifting of the axis is carried out vice versa for extensor strengthening.





WHOLE BODY SUSPENSION:

- The separate slings are suspending each and every limb in the vertical suspension with supporting ropes.
- The upper trunk, lower trunk, head, upper limb (right and left), lower limb (right and left) are suspended with separate supporting ropes in the vertical suspension to put the whole body suspension.