

SUSPENSION

It is the means whereby parts of the body are supported in slings & elevated by the use of variable length ropes fixed to a point above the body.

SUSPENSION APPARATUS

It is also known as Guthrie Smith apparatus as it was designed by Mrs. Guthrie Smith. It is a device where suspension exercises are given. A steel frame is required for this purpose. The patient is supported by ropes & slings. Resistance may be applied in several ways manually & mechanically by springs, weight & by pulley.

CONSTRUCTION

- The frame is constructed of light weight steel tubing of one & half inch diameter .
- It is made in 5 parts:
 - A roof unit consist of steel mesh.
 - Two side units.
 - Two loose bars which unite later near the feet.

- For suspending a body part it also requires:
- **1. Ropes:** Ropes should be of 3-ply hemp so that they will not slip.
- **2. Slings:**
- **Single sling:** Single slings are made of canvas bound with soft webbing & with a D-ring at each end. They are used to support the limbs or folded as figure of 8 to support the hand or foot.
- **Double sling:** These are broad slings with D-ring at each end & are used to support the pelvis or thorax or the thigh together.

- **Three ring sling:** These are webbing slings with 3-D rings one at each end and one free in the middle. These slings are used to support the wrist and hand or ankle and foot.
- **Head sling:** It is short, split sling used to support the head.

- **Wooden cleat** - Through which the rope passes for altering the length of the ropes. The cleat should be hold horizontally for movement & pulled oblique to hold when supporting. The ropes then hold on the cleat by frictional resistance.
- **S-Hook** – It may be used either end according to the size of the fixed point.
- **Plinth** – To support the body part which are free from suspension.

TYPES OF SUSPENSION

1. Axial suspension
2. Vertical suspension

1. **Axial suspension** – In this suspension the rope is fixed from a point vertically above the joint to be moved i.e. the point of suspension is vertically above the axis of movement.

- **Movement in axial suspension:**

- Angular movement –**

- Here all the ropes supporting a part are attached to one S-hook which is fixed to a point immediately above the center of joint to be moved.

- In such fixation when the limb is relaxed it will rest with the joint in the neutral position & when movement is initiated it will swing freely to either side of this resting position on a plane which is horizontal . In this way a pure angular movement is obtained.

- **Advantage:**

- The limb can remain fully supported throughout a wide range of motion.
- It relieves the physiotherapist from the necessity of supporting the heavy limb of the body.
- Easy to perform more accurate movement.

Effects and uses:

- To give passive movement.
- To increase circulation in the region of the joint which is moved.
- To encourage the patient to do free active movement of the limb in gravity eliminated position.
- To promote reciprocal relaxation.

2. Pendular movement (Pendular suspension):

- If some resistance to muscle work is required then the whole fixed point is moved away from the muscle which require resistance.
- In these circumstances the limb no longer rests in neutral position of the joint but falls to a new resting position towards the the vertical plane.
- Movement on either side of resting position causes the COG of the limb to rise making possible pendular movement.

Effects & uses:

- To re educate the movement.
- To increase the strength of the muscles.

2. Vertical suspension:

In this suspension the rope is fixed so that it hangs above the COG of the part to be suspended. The COG of each part of the body is on the whole at the junction of upper & middle third.

Movement –

Vertical suspension limits the movement of the part to a small range pendular movement on each side of the central resting position so that it is primarily used to support the part.

For example, in the abducted upper limb when the elbow axial fixation is used over the elbow for forearm movement.