

Fig. 5.20 A, The grasp for both plantar- and dorsi-flexion of the ankle and for in- and eversion of the foot; B, An alternative grasp must be used to obtain a passive stretch on a shortened tendocalcaneus.

the calcaneum to stabilize the leg and proximal tarsal bones.

Metatarsophalangeal joints

Flexion, extension, abduction and adduction can be carried out on five joints simultaneously by using the left hand to grasp the metatarsals from the inside of the foot while the right hand grasps the toes (Fig. 5.21).



Fig. 5.21 The grasp for all movements of the metatarsophalangeal joints.



Fig. 5.22 The grasp for flexion and extension of the interphalangeal joints of the lateral four toes.

Interphalangeal joints

Flexion and extension may be performed by sliding the right hand grip on the toes to the tips (Fig. 5.22), but it is easier to deal with the lateral four toes together and the big toe separately. The grasp for the big toe is with both hands reaching over the foot to grasp adjacent to the joint and on the dorsal and plantar aspects (Fig. 5.23).

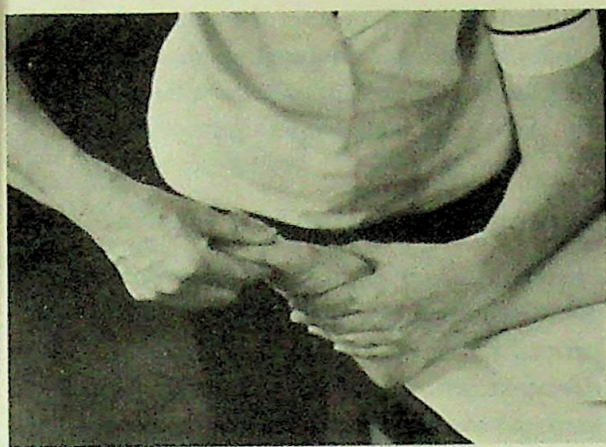


Fig. 5.23 The grasp for movements of the metatarsophalangeal and interphalangeal joints of the big toe.

Individual interphalangeal joints of the toes may be flexed and extended by grasping on the proximal bone at the sides and the distal bone either at the sides or on the dorsal and plantar aspects.

Combined movements of the lower limb

Flexion/adduction and lateral rotation of the hip may be alternated with extension/abduction and medial rotation and flexion/abduction and medial rotation with extension/adduction and lateral rotation. In each oblique pattern of such movements the limb should be supported just about the level of the knee and under the foot and ankle.

The above movements can be combined with knee and ankle movements, those of flexion of the hip combining more usually with flexion of the knee and dorsiflexion of the ankle. Under some circumstances it is necessary to perform an extension pattern of the hip with knee flexion, especially prior to retraining a walking pattern for the 'lift off' phase of the movement.

Foot and ankle movements often combine – dorsiflexion with inversion and plantarflexion with eversion, or dorsiflexion with eversion and plantarflexion with inversion.

Movements of the head

Head movements may be performed with the patient in lying with the head over the edge of the plinth and supported in the therapist's hands.

Flexion and extension

There are three alternative grasps:

- (1) One hand under the occiput, the other hand under the chin. The posterior hand performs the movements and gives traction. The hand on the chin keeps it 'tucked in' and controls any tendency of the head to wobble (Fig. 5.24A).
- (2) Both hands supporting the back of the head. The disadvantage of this grasp is that on full extension of the head there may be inadequate control (Fig. 5.24B).
- (3) The head is supported on the crossed pronated forearms and the finger tips rest on the front of the outer part of the patient's shoulders (Fig. 5.24C).

Side flexion

Grasps (1) and (2) above may be used. If the former grasp is used it may be necessary to change hands so that the head is supported at the back by the hand on the side towards which side flexion occurs.

Rotation

One hand crosses obliquely behind the head from above one ear to below the opposite ear, the other hand, at right angles to it, grasps the jaw line from in front with the fingers cupped round the chin. The head is rotated *away* from

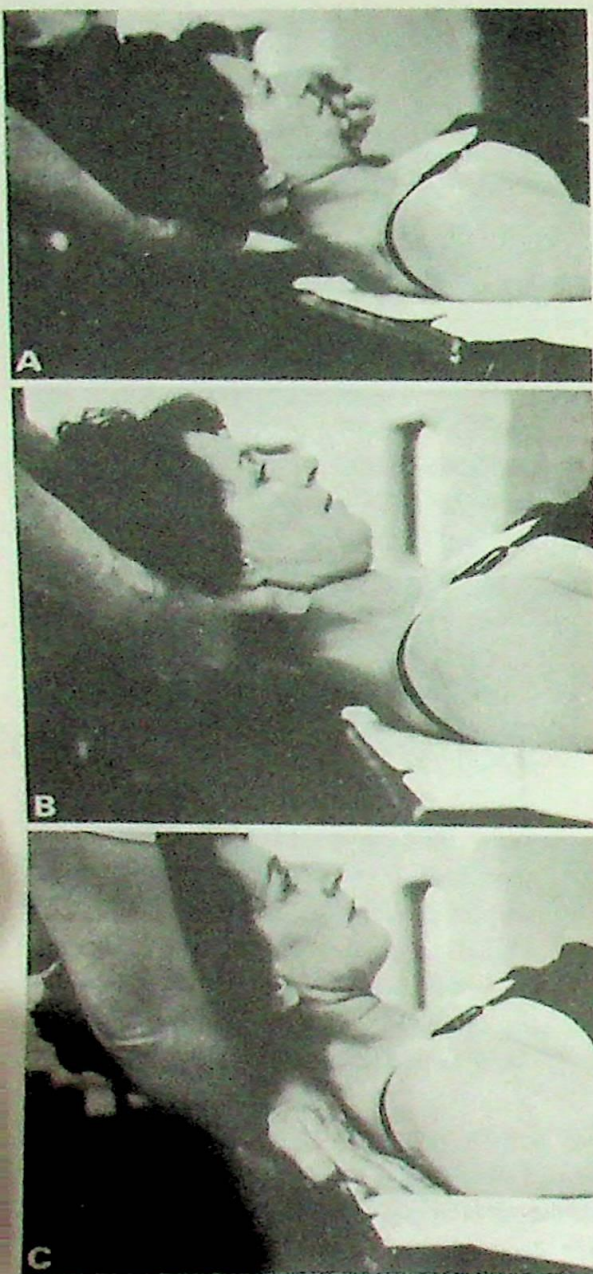


Fig. 5.24 For movements of the head. A, The occiput and chin grasp; B, The double-handed grasp on the occiput; C, The crossed forearm support.

the front hand. To rotate the opposite way the hands should be changed over, moving first the front hand to support at the back and then the back hand to the jaw line.

Movements of the trunk

Passive movements of the trunk are most easily given if half the body is suspended. The unsuspended part of the trunk is further fixed by the therapist who half kneels behind the patient, leans across and places her arm across the front of the trunk. She braces her standing leg and uses her free arm to swing the trunk into flexion, extension or side flexion as the case may be.

If suspension is not available then the patient should be on a high mat or plinth.

To move the lower trunk

Flexion

The patient is lying with knees fully bent and pressure is applied on the area of the tibial tuberosity with one forearm while the other hand, placed under the sacrum, lifts the lumbar spine into full flexion (Fig. 5.25).



Fig. 5.25 The grasp for lumbar flexion.

Side flexion

The patient is in crook lying. The therapist hooks one arm under the knees, lifts slightly and, counter-pressing on the waist, lifts the patient into side flexion.

Rotation

The patient is in crook lying, the therapist grasps both knees and flexing at the same time presses the knees towards first one shoulder and then to the other (Fig. 5.26A). Alternatively the therapist may press the bent knees to one side away from her while holding the shoulder of the opposite side still (Fig. 5.26B).

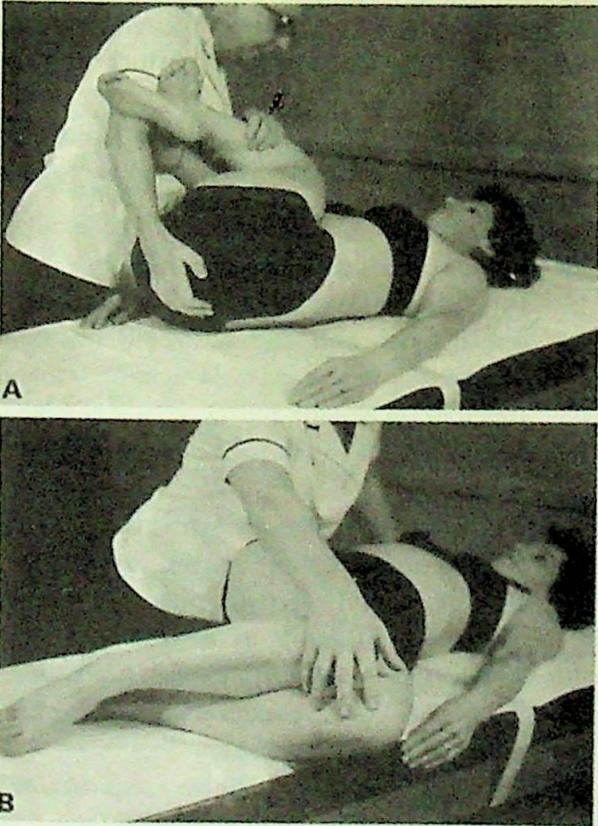


Fig. 5.26 Alternative grasps (A and B) for trunk rotation.

Extension

The patient may be in prone lying and the therapist places one arm under the thighs and the other hand on the lumbar spine and lifts the thighs backwards (Fig. 5.27). Alternatively the patient may be in side lying and the same manoeuvre may be performed by half kneeling behind the patient and carrying the thighs backwards, supporting with one hand across the front and under the lower thigh.

To move the upper trunk

The patient may be in stride sitting with his arms grasped behind his neck.

Rotation

The therapist stands behind and placing one hand in front of and one hand behind the shoulders, she applies opposing pressures. The thigh and pelvis should be supported at the back to prevent unwanted movements.

Flexion

A hand is placed on the occiput and the head, neck and upper trunk are flexed.

Extension

One hand is placed on the forehead and the other in mid-thoracic region and pressure is applied to the forehead while the lower hand



Fig. 5.27 The grasp for lumbar extension.

exerts counter pressure and also acts as the pivot.

Side flexion

The therapist stands at the back of the patient, hooks her arms from in front through his bent elbows and by levering on his grasped arms moves him from side to side.

Assisted active movements

Movements in which the patient participates but is helped by the therapist are assisted active movements. The disadvantage of such movements is that the amount of work being done by the patient is an unknown quantity and may vary considerably in the course of several repetitions or even in different parts of the range of movement.

However, in some circumstances it may be necessary to perform assisted active movements by:

- (1) Asking the patient to join in and perform some muscle action.
- (2) Initiating and completing the movement for the patient while allowing him to produce all the muscle effort he can for the easier middle range.

The grips for assisted active movement in which the patient is joining in are those for the passive movements as described earlier in this chapter.

For the second type of assisted active movement, i.e. help at the beginning and end, the same grips may be used, but for the middle range the therapist removes that half of her hand which would be the 'helping' part. Thus, the grip is maintained in the direction of the movement and sensory stimulation is only applied to the 'leading' surface.

Forced passive movements

A movement which is taken beyond the easily available range is a forced movement and there must be differentiation between over-pressure and forcing.

A forced movement to lengthen tight articular structures may be performed when the patient is anaesthetized and should only be done by a doctor who has already explored all other avenues of regaining joint range. Following this manipulative procedure the therapist may be required to maintain the required range and will have to do so in spite of the limitations of pain. The 'slow reversal hold relax' technique should be used until maximum active range has been gained and then at the limit of the present range a firm but quick extra pressure is given to regain the lost range. All the rules for giving passive movements must be obeyed in performing this technique.

Gradual stretching is another form of passive movement usually performed on either:

- (1) Babies with congenital deformity when the basic rules for grasp and support are obeyed and the corrected position of the deformed part is achieved three times in succession followed by attempted active muscle work by reflex skin stimulation or
- (2) Those with shortened structures due to adaptive shortening. Taking the joint to the limit and applying constant over-pressure will result in some lengthening under some circumstances and if associated with the application of appropriate serial plasters or splints.
- (3) Passive stretching. Those aspiring to greater length of muscular structures to facilitate movement. These are usually athletes who require greater length of

their muscular components to give a larger range of joint movement. It is most important to stress that length without power is very dangerous and under no circumstances should stretching be performed without the essential follow-up of increase in power by exercise of those muscles which maintain and control the range of new movement.

Passive stretching in itself is not a warm-up procedure prior to intense muscular activity. It is wiser to warm up the muscles to be stretched *either* by passive means – warm water, hot wet or dry packs, massage, dry (radiant heat), *or* by small range gentle swinging exercises. The passive stretching can then be performed on the desired muscle groups *either* by the therapist *or* by the patient/athlete himself. In either case the following rules apply:

- (a) First stretch the muscle with gentle force
- (b) Then apply greater stretch for a shorter duration
- (c) Increase the duration of the stretch before increasing the stretch
- (d) Remember the anatomy so that:
 - uni-axial muscles are stretched over the one joint over which they operate;
 - bi-axial muscles are stretched over each joint in turn over which they operate before being stretched over both joints simultaneously. It is better to achieve full length over one joint and apply stretch over the second joint only at any one time (e.g. hamstrings, quadriceps).
- (e) Check to ensure that if the patient is doing self stretching he is aware of the above rules and that he knows exactly how to take up and maintain a correct position to attain his own needs.

Finally do not encourage hypermobility – it sometimes produces joints prone to accidental damage (accident prone joints).

It is also important to be aware of the range of movement needed for efficient performance of the sport or activity. Some activities demand small range but greater power while others require the exact opposite. Only pentathletes need both!