

# Exercise Therapy

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## Muscle Contractions: Types, Muscle Work, Range of Motion and Activities in Supine Position

Learn the types of muscle contractions, muscle work, range of motion, and therapeutic activities performed in the supine position. Complete physiotherapy notes for BPT students.

### TYPES OF MUSCLE CONTRACTION/MUSCLE WORK:

- Isometric
- Isotonic

**Isometric contraction** involves the development of force by an increase in intramuscular tension without any change in length of the muscle.

**Isotonic contraction** increases intramuscular tension accompanied by change in length of the muscle. It may either shorten or lengthen the muscle.

### Types of Muscle work:

Work is the product of force and distance through which the force acts

Types are

**i) Static Muscle work:** Muscles contract isometrically to balance opposing forces and maintain stability. Therefore no work is done.

**ii) Concentric Muscle Work:** The muscles contract isotonically in shortening to produce movement.

**iii) Eccentric Muscle Work:** The muscles contract isotonically in lengthening. The muscle attachments are drawn apart.

**Range of Muscle Work:** The amount of shortening or lengthening of muscle during contraction is about 50 percent of muscles maximum length.

### Types of Range

- Inner range – Muscle in its shortest position
- Outer range – Muscle in fully extended position
- Middle range – Muscle is neither fully shortened nor fully extended.

### USES OF LYING/ ACTIVITIES ON LYING OR THE MAT EXERCISES

**Rolling**—The roll over from lying supine to side lying

This requires a total flexion-with-rotation of the body which is initiated from and led by the head and neck. Strong limb activity is recruited to assist whenever it is available, e.g. to roll forward and to the left.

A reversal of the movement returns the body to the supine position. A push off with the arm or retraction of the right shoulder initiates the return, but to ensure control, the head remain forward until the final position is reached.

### **Purposes and use of the roll**

- a. To assist during nursing procedures. For bed-making, back inspection, etc.
- b. The patient gains a measure of independence as he knows that whenever the pleases, he can perform a movement which is useful to him. He has the freedom to make the decision as to when he shall rollover to get a different view of his surroundings, ease the pressure on his back or stiffness of his legs; maybe he can also reach and use a more comfortable sleeping posture.

The activity is suitable for use in bed once the patient is reasonably proficient and in no danger of failing out of bed.

Rolling can be safely practiced on a floor mat with minimal supervision. This roll is the first part of an integrated series of movements which leads directly to a sitting position and to getting out of bed.

**Rolling-** The rollover from lying supine through side lying to prone or to roll forwards and to the left (alternative method)

The arm initiates and gives direction to the movement which enables the patient to roll forwards to lie on the left side and when the movement is continued the prone position is reached.

### **Functional Re-education:**

Lying to Sitting possible even for those with flexor deformity of the hips or with limitation of extension in the spine. A reversal of the movement returns the patient to the supine position.

### **Purpose and use of the roll**

- a. The most important aspect of this activity and of the prone position, is that it helps to combat and counteract the effects of long-term recumbency in bed, sitting up in bed or reclining in a lounge chair. In all these circumstances the body posture is one of total flexion and most of the activities the patient needs to do are also flexor in character.
- b. For those unable to tolerate the final position this method may be easier or more suitable for turning onto one side than that described earlier. This total rollover provides another and different activity for patients who can roll right over to prone.

### **Bridging**

From the crook lying position the pelvis is lifted to form the keystone to an arch the supports of which are the shoulders and the feet. The stability of the shoulders presents no problem, as downward pressure of the arms can be used as a bracket and a factor in reinforcing the extensor activity of the trunk.

### **Purposes and use of bridging**

- a. For the bed-bound patient bridging makes bedpan routines easier for everyone concerned.
- b. By lifting the lower back from the bed, sensitive pressure areas are relieved of the body weight. When elements of rotation and side flexion are added to the lifting movement the weight can be transferred to one buttock or the other as it is lowered to the bed (preliminary training for transfers and ambulation).

- c. Extensibility of both hips and the lumbar region are combined to combat the long-term effects of flexor situations and the efficiency of the extensor muscles is maintained.
- d. The ability to bridge makes many dressing activities easier when they need to be carried out in bed, e.g. pulling up pants.
- e. This activity provides the patient with the experience of feeling firm pressure on the soles of the feet and of a situation which demands considerable leg activity to support the body weight.

### **Forearm support side lying**

This position is usually reached by rolling to one side and then pushing up with the elbow to support the upper trunk with

Functional Re-education: Lying to Sitting the whole forearm. A pause en route in side lying is sometimes more suitable. The position of the upper trunk is most stable when the supporting arm is vertical (from elbow to shoulder) and both shoulders lie on the same plane; stability of the pelvis is ensured by bending one leg.

### **Purpose and uses**

- a. The position is used en route from lying to sitting.
- b. Some find it convenient for reaching across to a bedside table without sitting up.
- c. It is a relatively relaxed position suitable for use on the floor or out of doors, possibly for reading or looking at the view.
- d. Pressure through the shoulder joint (approximation) stimulates activity in the whole of the shoulder region, therefore it may prove useful during the treatment of some shoulder conditions. Note that the reaction to pressure does not appear to be sustained for long periods.

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