

Factors Causing Limitation of Joint Mobility, Methods of Increasing Joint Mobility

Introduction

Movement of a body segments takes place as a muscle or external forces moves the bones. Bones moves with respect to each other at the connecting joints. When moving a segment through its range of motion (ROM), all structures in the region is affected i.e. muscles, joints surfaces, capsule, ligaments, fascia, vessels and nerves. The total range of motion around a joint is highly specified and varies from one joint to another for e.g.- hip, trunk, shoulder etc, as well from one individual to the next. Range of motion activities are mostly described in term of joint range and muscle range. Ranges of available joint motion are usually measure with a Goniometer and recorded in degrees.

Definition of Joint mobilization

The passive movement of joints over their entire ROM, to expand the ROM and eliminate restrictions is known as Joint Mobilization.

Mobilization techniques are skilled hand movements intended to improve tissue extensibility; increase range of motion (ROM); induce relaxation; mobilize or manipulate soft tissue and joints; modulate pain and reduce soft tissue swelling, inflammation or restriction. The primary techniques included are mobilization and manipulation of joints and the associated soft tissues. Mobilizations are passive movements that are oscillatory or sustained stretch performed in such a manner that the patient can prevent the motion if so desired. These motions are performed anywhere within the available ROM.

Factors affecting limitation of joint mobility

There are many factors which affects the joint mobility

- 1. Pain
- 2. Injury eg; Ankle sprain
- 3. Disease eg; Osteo Arthritis, Rheumatoid Arthritis
- 4. Extra Fat or abnormal body mass
- 5. Body asymmetry
- 6. Abnormal tissue extensibility eg; contracture after burns
- 7. Body temperature
- 8. Joint shape
- 9. Age and gender

Principles of Joint mobilization

1. Physiologic and Accessory Motion

Physiologic motion is the normal active motion that is available at any synovial joint. Another way to describe physiologic motion is the motion that occurs in the cardinal planes. Examples include flexion, abduction and internal rotation. Accessory motions are movements that cannot be performed actively but can be performed passively. Examples are distraction, glides, spins, and rotations of a joint. Accessory motions must be present for full physiologic motion to be present.

2. Concave and Convex Relation of Joints

All synovial joints have a concave-convex relation. When the examiner is passively moving a joint, caution should be made to move the joint in a manner similar to how it moves when the joint is being actively moved by the person. Osteokinematics is defined by how the bone is being moved through space (ie, flexion, abduction). Arthokinematics is defined by how the joint surfaces are moving as the bone is being moved (ie, rolling, sliding, spinning). When the joint surface is convex with respect to the other side of the joint, the articular surface moves in the opposite direction of the shaft of the bone. When the shoulder joint is being flexed (as in the swing phase of gait) by moving the humerus on the scapula, the convex surface of the proximal humerus is sliding and spinning on the concave glenoid of the shaft of the bone. When the joint surface is concave, the articular surface moves in the same direction of the shaft of the bone. When the shaft of the bone. When the distal radius is being moved on the stationary carpals (as in the stance portion of gait), the concave surface of the radius is rolling and sliding on the convex proximal row of carpal bones. Manual therapists strive to move joint surfaces physiologically to avoid injuries, such as joint subluxations and sprains.

Methods of increasing joint mobility.

1. Passive mobilization

It is the movement within the unrestricted ROM for a segment that is produced entirely by an external force and there is no voluntary muscle contraction.

There are 5 grades in this type of mobilization

Grade I- To relief pain, small amplitude at beginning ROM

Grade II- To relief pain, large amplitude through mid ROM

Grade III- To decrease joint stiffness, large amplitude from mid-range to normal limit of motion.

Grade IV- To decrease joint stiffness, small amplitude at normal limit of motion.

Grade V- Manipulation, small amplitude beyond end range.

2. Active mobilization.

Movement within the unrestricted ROM for a segment that is produced by an active contraction of the muscle crossing the joint.

3. Active-assisted mobilization.

A type of active mobilization in which assistance is provided by an outside force, either manually

or mechanically, because the prime mover muscle need assistance to complete the motion.

How to choose the appropriate mobilization technique and grades

When ROM is decreased because of pain:

- If the pain is treated, ROM increases.
- Grade I and II mobilizations should be performed in the pain-free range for

30 seconds. Function should be assessed after mobilization to determine

Whether any change has been achieved.

When ROM is decreased because of stiffness:

Grade III and IV mobilizations should be performed in the direction of the stiffness for 60 seconds if possible. Function should be assessed after mobilization to determine whether any change has been achieved.

If pain and stiffness are present, the therapist must decide what the primary problem is. Does the pain limit ROM, or does the stiffness cause the pain? The sequence of pain and resistance can contribute to the treatment plan. For example:

• If pain occurs before resistance, use techniques to control the pain before progressing to more aggressive treatment.

• If pain occurs with resistance, mobilizations may be used with caution. It is

customary to treat the pain and then the stiffness, however.

_ If pain occurs after the resistance, vigorous mobilization may be used to treat the stiffness, followed by techniques for pain.

Effects of Joint Mobilization

Passive joint mobilization effects

I. Maintains joint and soft tissue integrity.

II. Minimize the effect of the formation of contractures.

III. Maintain mechanical elasticity of muscles.

IV. Assist circulation and vascular dynamics.

V. Enhance synovial movement for cartilage nutrition and diffusion of materials in the joint.

VI. Decrease or inhibit pain.

Active or self mobilization effects

I. Maintain physiological elasticity and contractility of the participating muscle.

II. Provide sensory feedback from the contracting muscle.

- III. Provide a stimulus for bones and joint tissue integrity.
- IV. Increase circulation and prevent thrombus formation.
- V. Develop coordination and motor skill for functional activities.

Precaution and Contraindications of joint mobilization.

Although both passive and active mobilization are contraindicated under any circumstance when motion to a part is disruptive to the healing process, but complete immobility leads to adhesion and contracture formation, sluggish circulation and prolonged recovery time. Mobilization has been contraindicated immediately following acute tears, fracture and surgery, but because of benefits of controlled mobilization is used as long as the person's tolerance is monitored.

Some of the contraindications can be mentioned as

- 1. Fracture
- 2 Ligament rupture
- 3. Herniated disc with nerve compression in spinal mobilization.
- 4. Joint effusion
- 5. Joint replacement
- 6. Hyper mobile joint
- 7. Inability to relax.

Limitation of mobilization technique

- 1. Passive Mobilization will not
 - a. Prevent muscle atrophy
 - b. increase strength or endurance
 - c. assist circulates to the extent that active or voluntary muscle contraction does
- 2. Active mobilization
 - a. For a strong muscle, it will not maintain or increase strength
 - b. It will not develop skill or coordination except in the movement pattern used.

Procedure for applying Mobilization technique

A. Based on the evaluation of the patient's impairments and level of function, determine whether passive, active-passive or active mobilization will meet the goal.

B. Place the patient in a comfortable position that will allow moving the segment through the available ROM. Be sure the patient has proper body alignment.

- C. Free the joint from restrictive clothing, linen, splint and dressings.
- D. The therapist should be positioned so that proper mechanics can be used.

E. to control movements, grasp the extremity around the position. If the joints are painful, modify the grip still providing support necessary for control.

F. Support the areas of poor structural integrity such as hypermobile joint, recent fracture site or paralyzed limb segment.

G. Move the segment through its complete pain free range. Do no force beyond the available range. If more force is applied it becomes stretched.

H. Perform the motion smoothly and rhythmically 5 to 10 repetitions. The number of repetitions depends on the objective of the program and the patient's condition and response to the treatment.

I. If the plan of care includes the passive mobilization then

1. No active resistance or assistance is given by the patient's muscle crossing the joint. If so, it became an active exercise.

2. The motion is carried out within the free range of motion. That is the range is available without forced motion or pain.

J. If the plan of care is the use of active-assisted or active mobilization

1. Demonstrate to the patient the motion desired using passive range of motion, then ask the patient to perform the motion.

2. Assistance is given only as needed for smooth motion. When there is weakness assistance may be required only at the beginning or end of the motion.

3. The motion is performed within the available range of motion.

K. Monitor the patient's general condition during and after the procedure. Note any changes in vital sign, any change in warmth and colour of the segment and any change in the range of motion, pain or quality of movement.

L. Document observable and measurable reaction to the treatment.

M. Modify or progress the treatment as necessary.

Side Effects of mobilization technique

Mobilization and manipulation are generally very safe. Side effects are very rare. The patient will be fully screened for any contraindications before undergoing treatment. During treatment we need to be aware that in a small number of patients:

• Local discomfort and post treatment soreness occurs. This should last no longer than a couple of days at most.

- Light headiness occasionally occurs in patients who receive neck manipulation
- Pain during treatment occurs which is momentary and passes off quickly after treatment.
- Existing symptoms can get worse temporarily after treatment

Conclusion

To maintain normal range of motion, the segment should be moved through their available range periodically, whether it be the available joint range or muscle range. It is recognized that many factors can lead to decrease range of motion, such as systemic, joint, neurologic or muscular disease, surgical or traumatic or simply inactivity or immobilization for any reason. Therapeutically mobilization techniques are administered to maintain existing joint and soft tissue mobility, which will minimize the effect of contracture formation.