

Peripheral joint mobilization

It is the use of skilled graded forces to mobilize a joint to improve motion and normalize joint dysfunction.

Uses of mobilization techniques:

- -Treat joint dysfunction as stiffness and reversible joint hypo mobility.
- -Reduce pain.
- -Improve and restore motion.
- -Improve joint nutrition.
- -Improve muscle spasm and tension.

Mobilization is a passive technique performed by the therapist at a slow speed, so that the patient can stop it at any time.

Manipulation : is a passive technique that uses physiological or accessory motion. It may be applied with a thrust or under anaesthesia.

A-Thrust: a sudden movement performed with a high velocity, short amplitude motion that the patient can not prevent it or stop it. The motion is performed at the end of the pathologic limit. (restricted range). It snaps adhesions and stimulates joint receptors.

B- Manipulation under anaesthesia: is a medical procedure used to restore full range of motion by breaking adhesions around a joint, while the patient is anaesthetized. It is performed through rapid thrust or passive stretch using physiologic or accessory movements.

Types of movements:

- a- Physiologic movements
- b- Accessory movements
- c- Component motions
- d- Joint play (arthrokinematic)

a- Physiologic movements: is the voluntary movements that a person can perform like flexion, extension, adduction, abduction and rotation.

b- Accessory movements: are movements within the joint and surrounding tissue that are necessary for normal range of motion, but can not be performed by the patient

c- Component motions are motions that accompany active motion, but are not under voluntary control. Motions as upward rotation of the scapula and clavicle which occur with joint flexion are component motions.

d- Joint play (arthrokinematic) : motions that occur in the joint

and dispensability or give in the joint scapula, which allow the joint to move. The movements are necessary for normal joint functioning through the range of motion, it can be demonstrated passively but can not be performed actively by the patient.

The movements include distraction, compression, sliding (gliding), rolling and spinning of the joint surfaces.

- 1. Gliding (Sliding):** one bone slides across another. For pure sliding, the surface must be congruent either flat or curved. There is no pure slide as the joint's surfaces are not completely congruent.

The same point on one surface comes into contact with new points on the opposing surface.

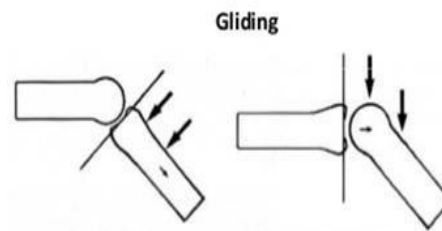


Figure 1: Gliding of the joint surface

- The direction of slide depends on whether the surface is concave or convex.
- Sliding is in the opposite direction of angular movement, if the moving surface is convex.
- Sliding is in the same direction of angular movement, if the moving surface is concave.
- This mechanical relationship is known as the convex-concave rule. It determines the direction of the mobilization force, when joint's mobilization gliding techniques are used.

- 2. Rolling** occurs when one bone rolls on another. The surfaces are incongruent. New points on one surface meet new points on the opposing surface.

Rolling results in angular motion. It is always in the same direction, whether the surface is convex or concave. When rolling occurs, there is compression of the surface on the side to which the bone is angulating and separation on the other side.

In normal functioning joints, pure rolling doesn't occur alone, but in combination with sliding and spinning.

- 3. Spinning** is rotation of one bone segment about a stationary mechanical axis. Spinning rarely occurs alone, but in combination with rolling and sliding.

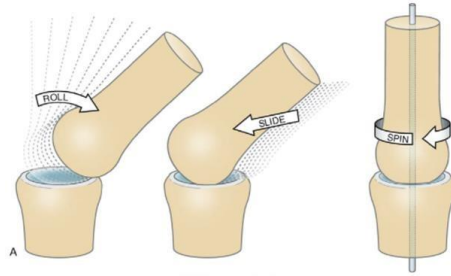


Figure 2: Rolling, sliding and spinning in A: convex on concave

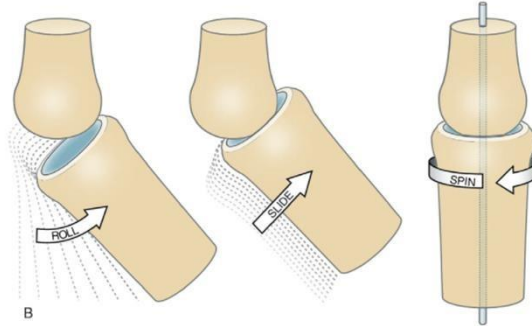


Figure 2: Rolling, sliding and spinning in B: concave on convex

- 4. Compression** is the decrease in the joint space. It occurs naturally with weight bearing. Normal intermittent compression loads help in moving the synovial fluid and maintain the cartilage health. Abnormal high compression stress or load causes changes and deterioration of the articular surface.

Compression

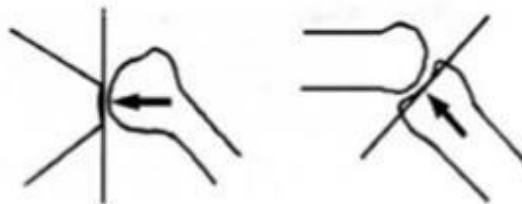


Figure 3: Compression of the joint surface

- 5. Traction** is the distraction or separation of joint surface. The surfaces are pulled apart pulling on the long axis of one bone. Distraction is used to control or relieve pain, when applied gently. It is also used to stretch the capsule, when applied with stretching force.

Traction

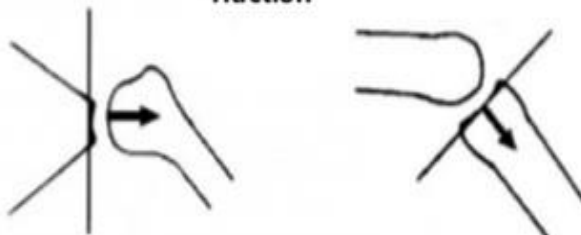


Figure 4: Traction of the joint surface

Effect of joint mobilization:

- 1- Moves the synovial fluid** and increases nutrients to the articular cartilage of the joint surfaces and intra-articular fibro cartilage of the menisci.
- 2- Maintains extensibility** and strength of the articular and periarticular tissues.
- 3- Provide proprioceptive feedback** (awareness of position and movement senses).

Indications:

- **A- Reversible joint hypomobility**
 - **B- Progressive limitation (due to disease)**
 - **C- Functional immobility**
 - **D- Pain, muscle guarding and spasm**
- Painful joints, reflex muscle guarding and muscle spasm can be treated with gentle joint play techniques to stimulate neuro- physiological and mechanical effects.

Neuro-physiological effect:

Small amplitude oscillatory movements are used to stimulate the mechanoreceptors that inhibit the transmission of nociceptive stimuli at the spinal cord and brain stem level.

Mechanical effects:

Small amplitude distraction or gliding movement, causes synovial fluid motion, which brings nutrients to the avascular portions of the articular cartilage. Gentle joint play, help maintain nutrient exchange and thus prevent the painful and degenerating effects of stasis, when a joint is swollen or painful and can't move through a range of motion.

Note: Mobilization doesn't change the disease process as rheumatoid arthritis or inflammatory process of injury. It minimizes pain, maintain available joint play and reduce the effect of mechanical limitation.

Contraindications:

- Hyper mobility
- Joint effusion
- Inflammation

Precautions:

- Bone disease
- Unhealed fracture
- Excessive pain
- Total joint replacement.

Methods of application of mobilization:

- A)- Graded oscillation technique.
- B)- Sustained joint play technique.

A)- Graded oscillation technique.

-Grade I: Small amplitude rhythmic oscillations performed at the beginning of the range. They are usually rapid oscillations, like manual vibration.

-Grade II: Large amplitude rhythmic oscillations performed within the range, not reaching the limit. They are usually performed at 2 or 3 per second for 1 to 2 minutes.

-Grade III: Large amplitude rhythmic oscillations performed up to the limit of the available motion and are stressed into the tissue resistance. They are usually performed at 2 or 3 per second for 1 to 2 minutes.

-Grade IV: Small amplitude rhythmic oscillations performed at the limit of the available motion and stressed into the tissue resistance. They are usually rapid oscillations.

-Grade V: Small amplitude high velocity thrust technique performed to snap adhesions at the limit of the available motion. Thrust techniques require advanced training and high skills.

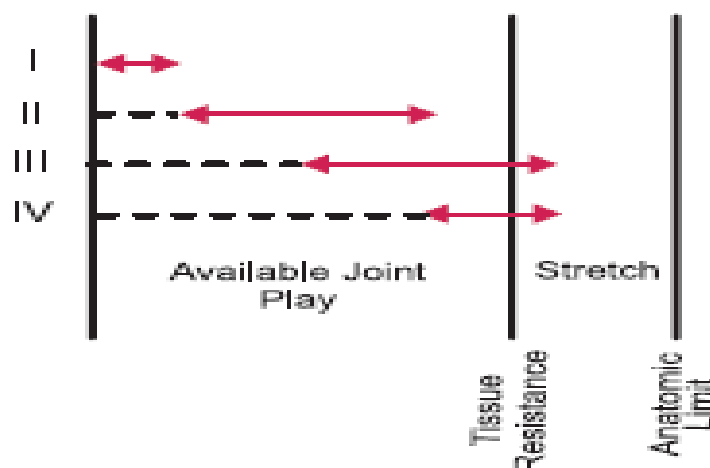


Figure 5: oscillatory technique

Uses of oscillatory technique:

- Grades I and II are used for treating joints limited by pain.
- The oscillations may have an inhibitory effect on perception of pain stimuli by repetitively stimulating mechanoreceptors that block nociceptive pathways at the spinal cord or brain stem levels.
- It also help improve synovial fluid movement and increase nutrition to the cartilage.
- Grades III and IV are used as stretching maneuvers. To increase range of motion and break down adhesions.

B)- Sustained joint play technique:

- This technique describes only joint play techniques that separate (distract) or glide (slide or translate) the joint surface.
- The application is slow and sustained for several seconds followed by partial relaxation then repetition.

-Grade I (loosen): Small amplitude distraction is applied when no stress is placed on the capsule. It equalizes cohesive forces, muscle tension, and atmospheric pressure.

-Grade II (tighten): enough distraction or glide is applied to tighten the tissues around the joint. It is like taking up the slack.

-Grade III (stretch): A distraction or glide is applied with an amplitude large enough to place stretch on the joint capsule and the surrounding periarticular structures.

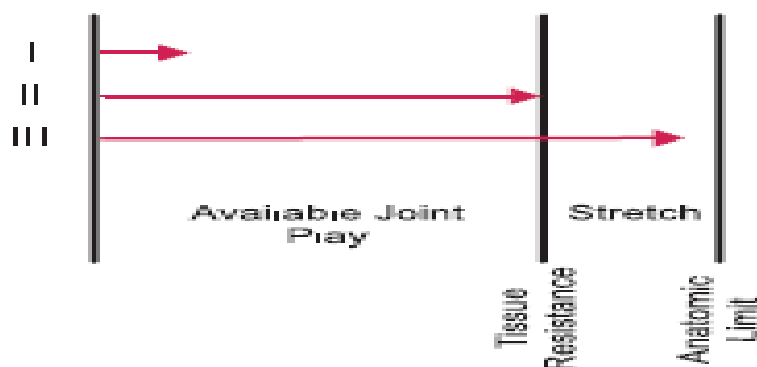


Figure 6: Sustained joint play technique

Uses of sustained joint play technique:

- Grade I distraction is used with all gliding motions and may be used to relief pain.
- Grade II distraction is used for the initial treatment to determine how sensitive the joint is. And to determine whether to increase or decrease the dose.
- Grade II glide is used to maintain the joint play when ROM is not allowed.
- Grade III distraction or glide are used to stretch the joint surface and increase joint play.

Direction of application of mobilization:

- The treatment force is applied as close to the opposing joint surface as possible.
- The larger the contact surface, the more comfortable the patient will be, so use the flat surface of your hand instead of the thumb.
- The direction of movement of the treatment is either parallel or

perpendicular to the treatment plan.

Note: Treatment plane is a plan perpendicular to a line running from the axis of rotation to the middle of the concave articular surface. Treatment plan is determined by the concave bone.

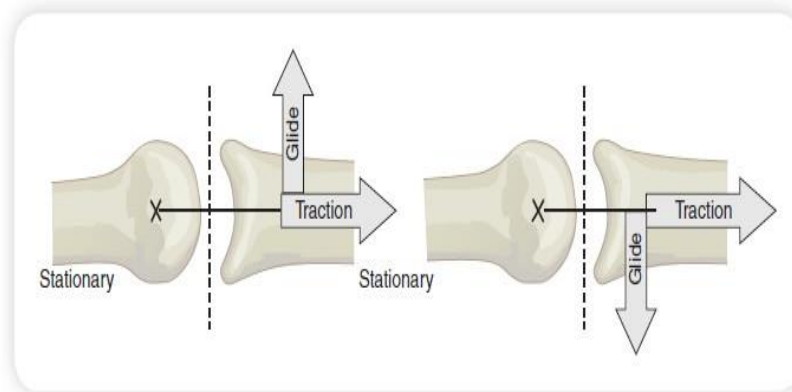


Figure 7: treatment plane in traction & gliding

- Distraction techniques are applied perpendicular to the treatment plan. The entire bone is moved so the joint surfaces are separated.
- Gliding techniques are applied parallel to the treatment plane. The direction of gliding is determined by using the convex- concave rule.

Convex-concave rule:

- If the surface of the moving bone is convex the treatment glide should be opposite to the direction in which the bone swings.
- If the surface of the moving bone is concave the treatment glide should be in the same direction.

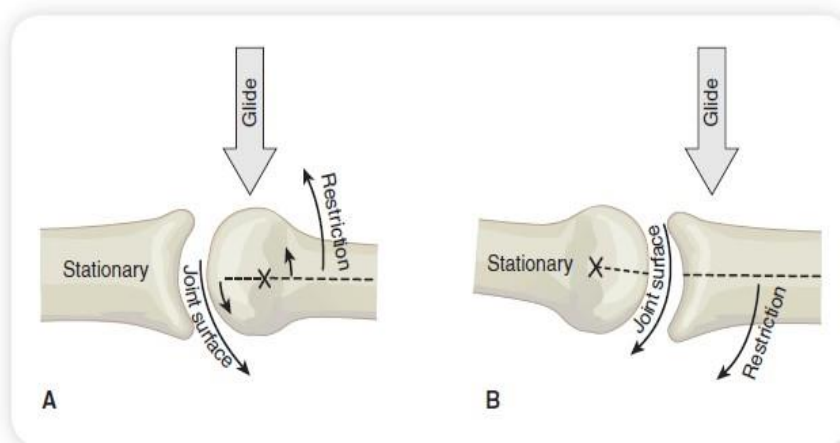


Figure 8: convex-concave rule:

- The entire bone is moved causing gliding of one joint surface on the other.
- Varying the speed of oscillation is used for different effects such as:
 - -low amplitude and high speed is used to inhibit pain.
 - -slow speed is used to relax muscle guarding.