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Hand Impairments

HAND THERAPY CONCEPTS:

1. Tissue Healing
2. Antideformity Positioning
3. The Myth of No Pain, No Gain
4. Passive Range of Motion Can Be Injurious
5. Isolated Exercise, Purposeful Activity, and Therapeutic Occupation

1. Tissue Healing

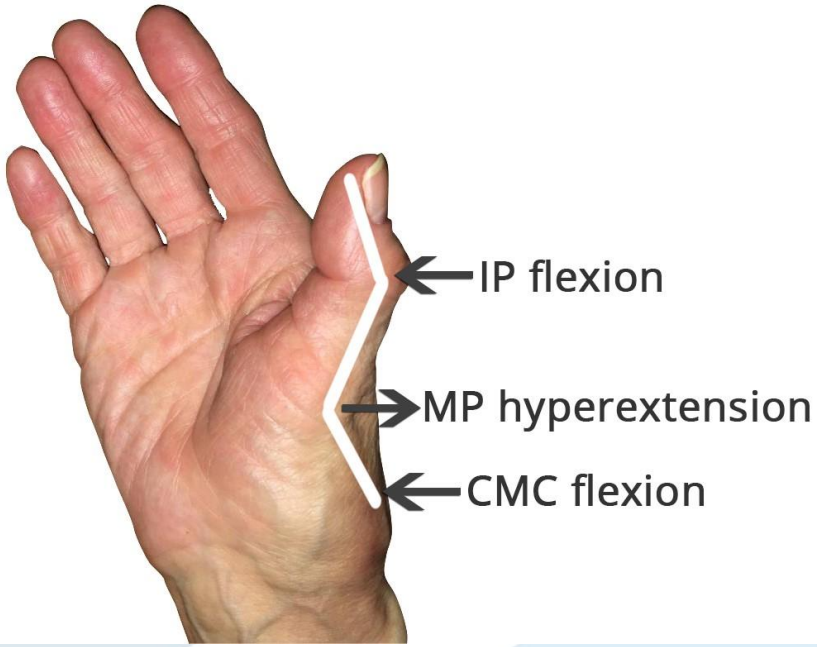
- Tissue heals in phases as follows: inflammation, fibroplasia, and maturation or remodelling.
- The inflammation phase lasts several days. It includes vasoconstriction followed by vasodilation.
- Depending on the diagnosis, immobilization to provide rest is often advised during the inflammation phase.

- The fibroplasia phase starts at approximately day 4 and continues for 2–6 weeks. In this phase, fibroblasts synthesize scar tissue.
- The wound's tensile strength increases gradually with the increase in collagen fibres.
- At this time, active range of motion (AROM) and orthotics may be appropriate to protect healing tissues and promote balance in the hand.

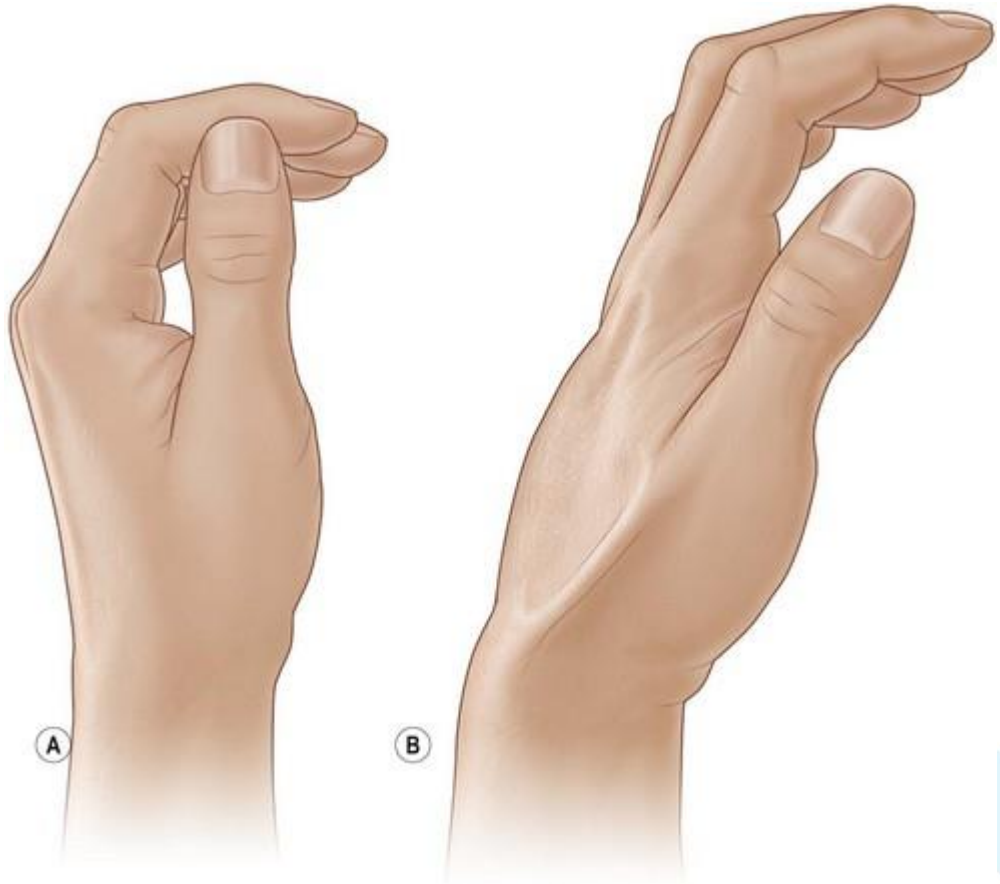
- The maturation, or remodelling, phase may last for years, but tissue is usually more responsive early rather than late in this period. The remodelling phase reflects the changing architecture and improved organization of collagen fibres and the associated increased tensile strength.
- Gentle resistive activity may be appropriate during maturation, but it may also generate inflammatory responses, which should be avoided. Gentle application of corrective dynamic or static orthoses may also be appropriate.
- Tolerance of tissues to controlled stress requires monitoring throughout all phases of intervention. As tissue continues to heal, the wound contracts, and the scar shrinks. Collagen continues to remodel, as it is constantly doing in uninjured tissue.

2. Antideformity Positioning

- Upper extremity injury and disuse are associated with predictable deforming hand positions. Oedema, which typically accompanies injury, creates tension on extrinsic extensor structures. This leads to a zigzag collapse with a resulting deformity position of flexed wrist, hyperextended metaphalangeals (MPs), flexed (IP), and adducted thumb.



Zig Zag Deformity of the Thumb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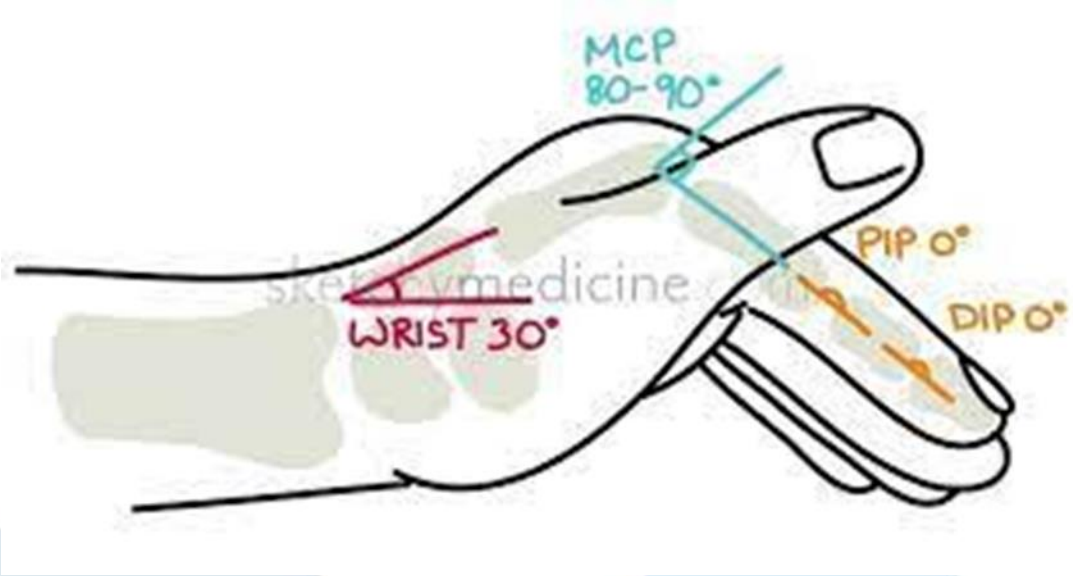
- Hand joints are anatomically destined to stiffen in predictable positions. Specifically, the MP joint is prone to stiffen in extension. This is because the protruding or cam shape of the metacarpal head causes the collateral ligament to be slack in MP extension and taut in MP flexion. Conversely, the interphalangeal (IP) joints are prone to become stiff in flexion because of shortening of the volar plate and collateral ligaments.

- When prolonged or constant immobilization is necessary and range of motion (ROM) is at risk, it is usually best to splint the patient's hand in the antideformity position , also called the intrinsic-plus position.
- This position places the wrist in neutral or extension, the MPs in flexion, the IPs in extension, and the thumb in abduction and opposition. The antideformity position allows the collateral ligaments at the MP joints and the volar plate at the IP joints to maintain their length, which counteracts the forces that promote zigzag collapse.

- Certain diagnoses, such as flexor or extensor tendon repair, are not compatible with antideformity positioning. The physician can assist in this determination.



3. The Myth of No Pain, No Gain

- Regarding tissue tolerances, the myth of “no pain, no gain” must be dispelled in hand therapy. A better mindset would be no pain, more gain.
- Well-intentioned therapists and overzealous family members of patients have too often caused irreversible damage by applying passive range of motion (PROM) forces beyond the tissues’ tolerances.
- Pain induced by therapy can also cause complex regional pain syndrome (CRPS).

- People with upper extremity problems often arrive at therapy prepared for painful intervention. Some patients do not tell the therapist when intervention hurts. It is essential to educate patients about this. In addition, watch the patient's body language and face for signs of pain.
- Wincing and withdrawing the upper extremity are obvious signals. Proximal guarding is another revealing response. Change the intervention accordingly, and if necessary, try a hands-off approach wherein the therapist coaches and instructs while the patient self-treats.

4. Passive Range of Motion Can Be Injurious

- PROM can be injurious to the delicate tissues of the hand. Specifically, PROM can disturb healing tissues and incite further inflammatory reactions, resulting in increased scar production. PROM can damage articular structures and can even trigger CRPS. A tissue's timeline for remodelling is maximized by non inflaming intervention and is cut short by intervention that is inflaming or provoking.
- For all of these reasons, if PROM is clinically appropriate, be sure it is done gently and in a pain-free manner. Low load, long-duration splinting is a safer and more effective method for remodelling tissue and increasing PROM

- The potential for harm may be compounded if PROM is performed following external application of heat. External application of heat, such as a hot pack, is a popular way to prepare tissues for stretching. Unfortunately, the clinical concerns of externally applied heat have received less attention than they deserve. Heat increases oedema, which acts like glue. Heat may degrade collagen and contribute to microscopic tears. Heat may also incur a rebound effect, with stiffening following its use.

- Safety Message: Do not use heat on patients who have oedema or sensory loss or whose limb appears inflamed. Overall, it is safer to use aerobic exercise to warm up the tissues of people with hand impairments.
- If external application of heat is used, elevate the upper extremity, be gentle with exercise, and promote active movement in conjunction with the heat. Continue to monitor for immediate and subsequent signs of inflammation.

5. Isolated Exercise, Purposeful Activity, and Therapeutic Occupation

- Technically, it is necessary to treat hand impairments with a structure-specific approach to isolate and care for the discrete components that are involved.
- Although some hand therapists do incorporate purposeful activity into intervention, more support is needed for an alternative approach to hand therapy that leads with concepts of therapeutic occupation. One way to achieve this is to integrate patient-directed goals and activities of daily living (ADL) into hand therapy intervention planning and implementation. Whenever possible, encourage upper extremity use in ordinary daily activities as appropriate to the diagnosis. Explore the capabilities in the clinic, and then teach patients to do activities at home. For example, folding socks and underwear can be upgraded to folding heavy towels and jeans, which require greater strength and endurance.

- Occupation elicits adaptive responses that do not occur with exercise alone. Compared to isolated exercise, purposeful activity or occupation promotes more coordination and better movement quality.
- An example of isolated hand therapy exercise to increase grip strength is gross grasp with therapy putty or exercise grippers. An example of purposeful activity to increase strength would be putting away groceries, starting with light items and progressing to heavier objects.
- The examples cited earlier become therapeutic occupation with the use of activity that is meaningful to the particular person to accomplish the therapeutic goal. If the patient enjoys baking, then rolling dough with a rolling pin would be a therapeutic occupation to promote grip function.

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Thank you