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Prosthetics and Orthotics Engineering

Third Stage

ORTHOTICS II

Prof. Dr. Mohammed Hamzah Daham

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mohammed.hamzah.daham@uomus.edu.iq

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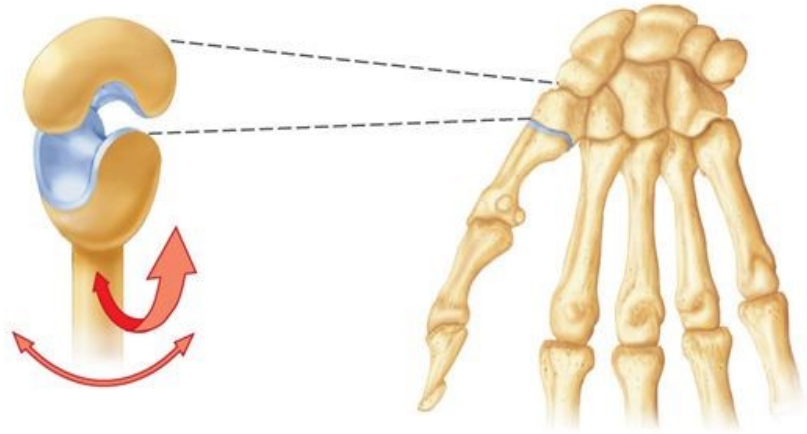
Thumb Immobilization Splints

Eng. Hussein Dhameer

Introduction

- The thumb is essential for hand functions because of its overall importance to grip, pinch, and fine manipulation.
- The thumb's exceptional mobility results from the unique shape of its saddle joint, the arrangement of its ligaments, and its intrinsic.
- The thumb provides stability for grip, pinch, and mobility because it opposes the fingers for fine manipulations.
- A thorough understanding of the anatomy and functional movements of the thumb is necessary before the therapist attempts to splint the thumb.



e Saddle joint (carpometacarpal joint of thumb)

Splints

- A commonly prescribed splint in clinical practice is the thumb palmar abduction immobilization splint.
- Other names for this splint are the *thumb spica splint*, the *short or long opponens splint* and the *thumb gauntlet splint*.
- The purpose of this splint is to immobilize, protect, rest, and position one or all of the thumb carpometacarpal (CMC), metacarpophalangeal (MCP), and interphalangeal (IP) joints while allowing the other digits to be free.

Fig: Short opponens splint

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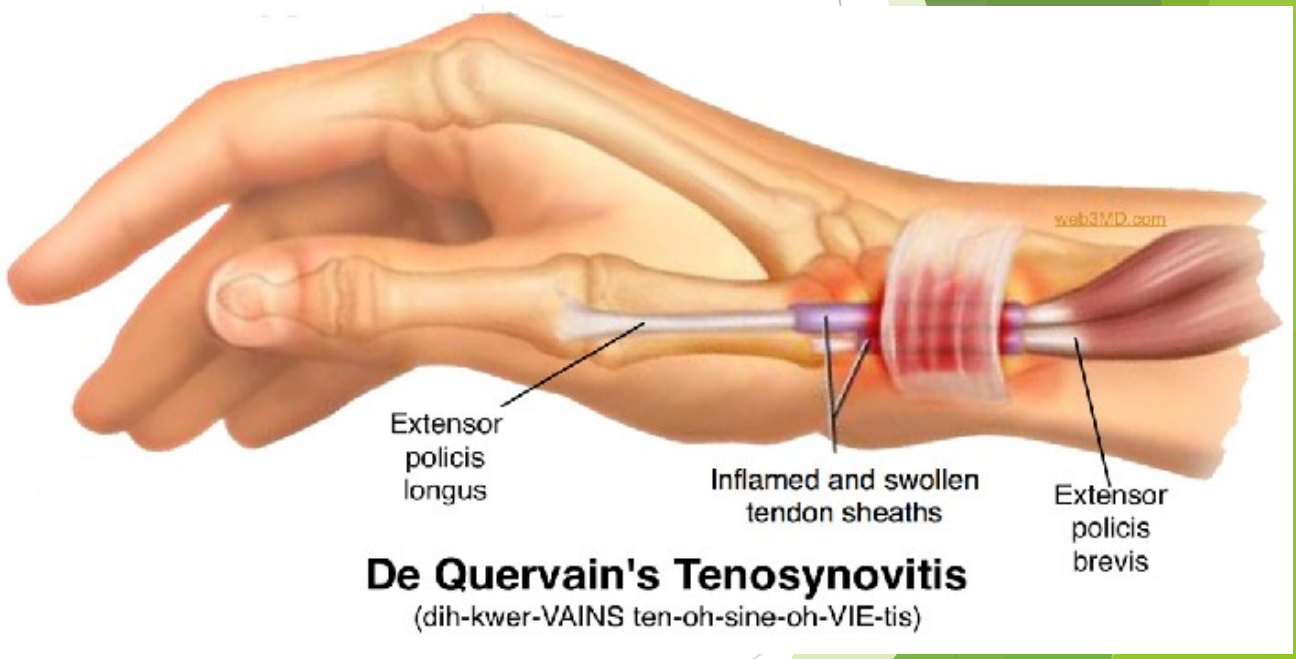
- Thumb immobilization splints can be divided into two broad categories:

1. forearm based: Forearm-based thumb splints stabilize the wrist as well as the thumb. Stabilizing the wrist is beneficial for a painful wrist as the splint provides support.
2. hand based: The hand-based immobilization splints provide stabilization for the thumb while allowing for wrist mobility.

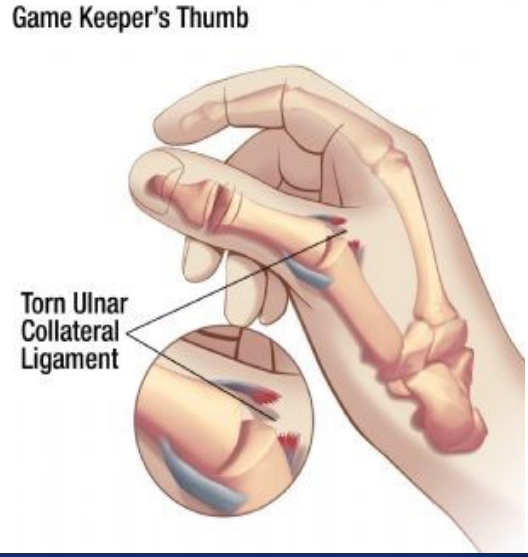
Forearm-based thumb splint

- Forearm-based or hand-based thumb immobilization splints are often used to help manage different conditions that affect the thumb's CMC, MP, or IP joints.
- For people who have **de Quervain's tenosynovitis** a forearm-based thumb splint provides rest, support, and protection of the tendons that course along the radial side of the wrist into the thumb joints.
- The therapist also applies a forearm-based thumb immobilization splint to splint **postoperatively** for control of motion in persons with rheumatoid arthritis after a joint arthrodesis or replacement.



Hand-based thumb immobilization

- With the resulting muscle imbalance from a median nerve injury, the therapist may apply a hand-based thumb immobilization splint to keep the thumb web space adequately open.
- In addition, the thumb immobilization splint can position the thumb before surgery. The splint provides support and positioning after traumatic thumb injuries, such as *sprains, joint dislocations, ligament injuries, and scaphoid fractures*.
- Frequently a hand-based thumb immobilization splint is applied to persons with gamekeeper's thumb, which involves the ulnar collateral ligament of the thumb MCP joint.



Features of the Thumb Immobilization Splint

- The thumb immobilization splint prevents motion of one, two, or all of the thumb joints. The splint has numerous design variations. It can be a volar, dorsal, or radial gutter.
- The splint may be hand based or wrist based, depending on the person's diagnosis, the anatomic structures involved, and the associated pain at the wrist.
- If the wrist is included, the wrist position will vary according to the diagnosis. For example, with de Quervain's tenosynovitis the wrist is commonly positioned in 15 degrees of extension to take the pressure off the tendons.

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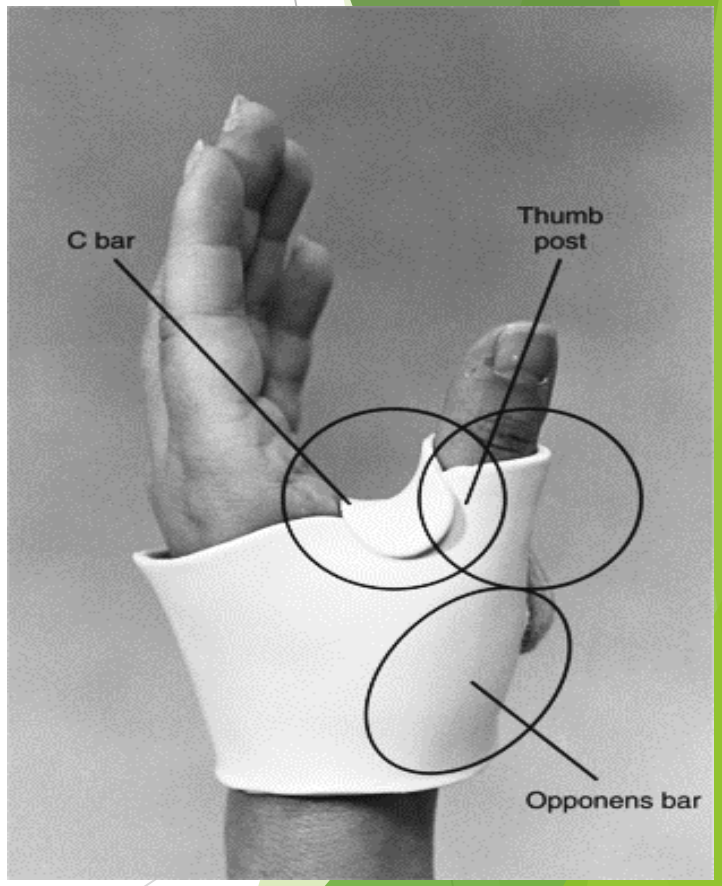
- Central to most thumb immobilization splints are the opponens bar, C bar, and thumb post.
- The opponens bar and C bar position the thumb, usually in some degree of palmar abduction.
- The thumb post, which is an extension of the C bar, immobilizes the MP only or both the MP and IP joints.



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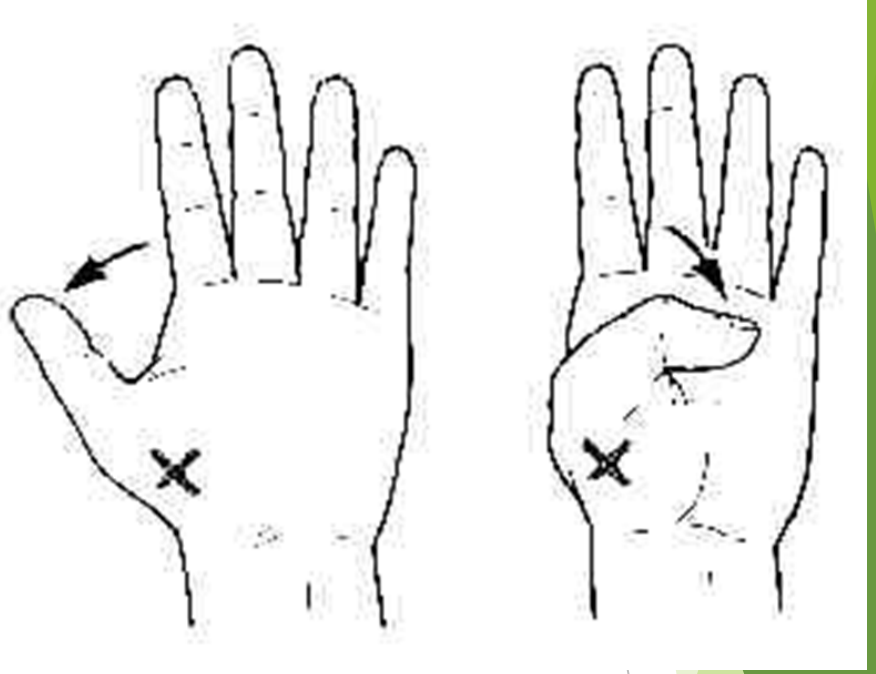
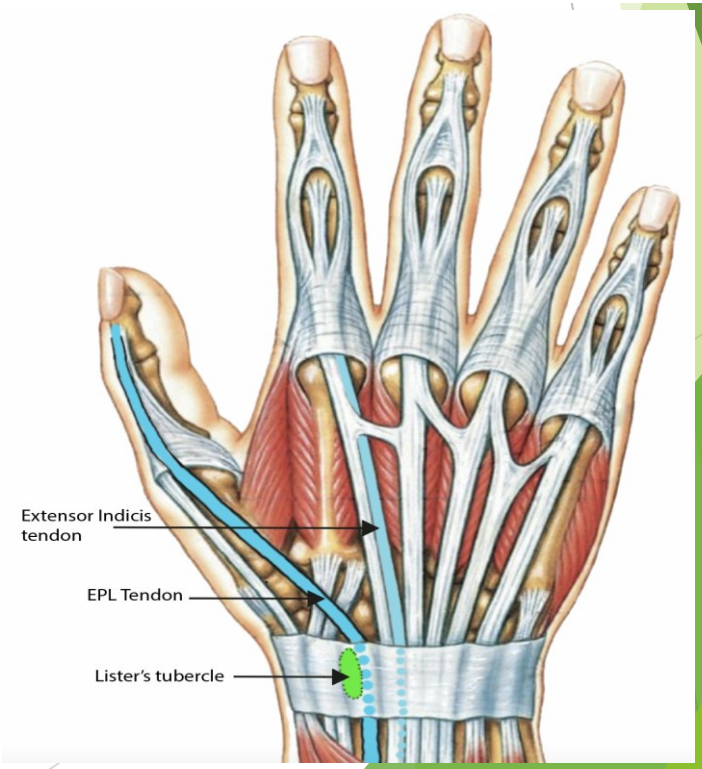
- The position of the thumb in a splint varies from palmar abduction to radial abduction, depending on the person's diagnosis.
- With some conditions, such as arthritis, the therapist can assist prehension by stabilizing the thumb CMC joint in *palmar abduction* and opposition.
- Certain diagnostic protocols—such as those for extensor pollicis longus (EPL) repairs, tendon transfers for thumb extension, and extensor tenolysis of the thumb—require the thumb to have an extension and a *radial abducted position*.





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- The physician's order may specify which thumb joints to immobilize in the splint. In some situations, the therapist may be responsible for determining which joints the splint should stabilize.
- The therapist uses diagnostic protocols and an assessment of the person's pain to make this decision.
- If the therapist deems it necessary to limit thumb motion and to protect the thumb, the IP may be immobilized.
- Certain diagnostic protocols (such as those for thumb re-plantations, tendon transfers, and tendon repairs) often require the inclusion of the IP joint in the splint.
- Overall, the therapist should fabricate a splint that is the most supportive and least restrictive in movement.