Al-Mustaqbal University

Collage of Engineering

Prosthetics and Orthotics Engineering

Third Stage

ORTHOTICS II

Prof. Dr. Mohammed Hamzah Daham

1st term – Lecture 4

2025-2026

mohammed.hamzah.daham@uomus.edu.iq

UOMU0103054

Splints Acting on the Wrist

Eng. Hussein Dhameer Hussein

Introduction

- Maintaining the wrist in proper alignment is important because the wrist is key to the health and balance of the entire hand.
- During functional activities, the wrist is positioned in extension for grasp and prehension.
- Wrist immobilization splints usually maintain the wrist in either a neutral or a mildly extended position, depending on the protocol for a particular diagnostic condition and the person's treatment goals.
- A wrist immobilization splint immobilizes the wrist while allowing full metacarpophalangeal (MCP) flexion and thumb mobility. Thus, the person can continue to perform functional activities with the added support and proper positioning of the wrist the splint provides.
- Positioning the wrist in a splint in 0 to 30 degrees of wrist extension promotes functional hand patterns for completing functional activities.
- Therapists fabricate wrist immobilization splints to provide volar, dorsal, ulnar, circumferential forearm, wrist, hand, and (infrequently) radial support

Volar Wrist Immobilization Splints

- The volar wrist immobilization splint depends on a dorsal wrist strap to hold the wrist in extension in the splint.
- In cases in which the weight of the hand (flaccidity) must be held by the splint or in which the person is pulling against it (spasticity)
- The strap is not adequate to hold the wrist in the splint. However, a well-designed volar wrist splint with a properly placed wide wrist strap will support a flaccid wrist.
- The volar design is best suited for circumstances that require rest or immobilization of the wrist when the person still has muscle control of the wrist

Dorsal Wrist Immobilization Splints

- Some therapists fabricate dorsal splints with a large palmar bar that supports the entire hand.
- This large palmar bar tends to distribute pressure well and is necessary for the comfort and function of the splint.
- However, a large palmar bar does not free up the palmar surface as much for sensory input as a dorsal splint fabricated with a thinner palmar bar.
- Dorsal wrist splints designed with a standard strap configuration can be better tolerated by persons who have edematous hands because of the pressure distribution.
- Either the volar or the dorsal design may be used as a base for mobilization (dynamic) splinting. However, these designs can sometimes lead to splint migration and suboptimal splint performance.

A B

Ulnar Wrist Immobilization Splints

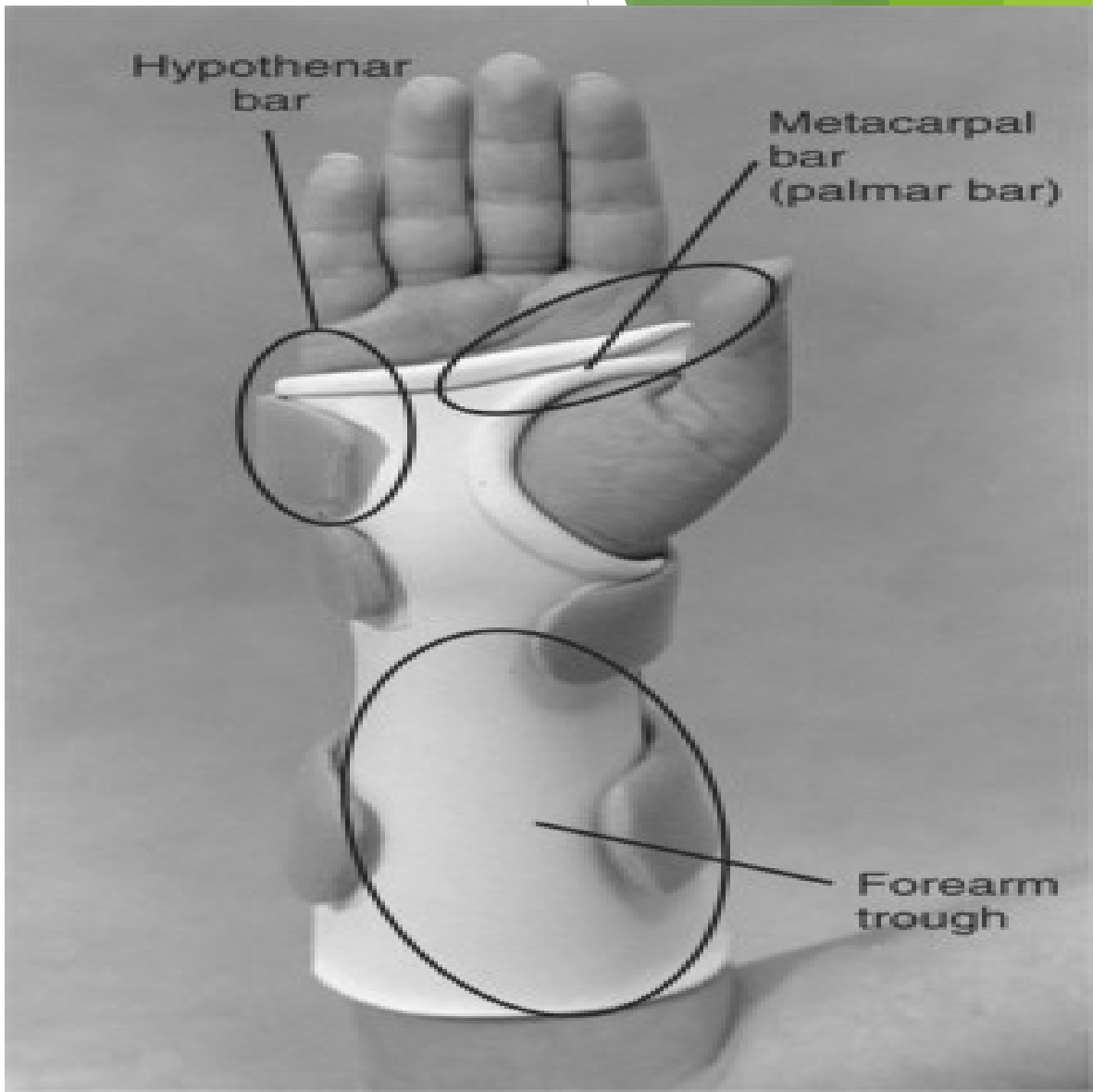
- The ulnar wrist splint is easy to don and doff and can be applied if the person warrants more protection on the ulnar side of the hand, such as with sports injuries.
- This splint design is sometimes used for a person who has carpal tunnel syndrome (CTS) or for ulnar wrist pain. It can also be used as a base for mobilization splinting.

Circumferential Wrist Immobilization Splints

- A circumferential splint is helpful in preventing migration, especially when used as a base for mobilization splints.
- It also provides good forearm support, controls edema, provides good pressure distribution, and avoids edge pressure.
- Some people may feel more confined in a circumferential splint.
- When fabricating a circumferential splint, the therapist is conscious of a possible pressure area over the distal ulna and checks that the fingers and thumb have full motion.
- One among many circumferential splint options is a “zipper” splint made out of perforated thermoplastic material.

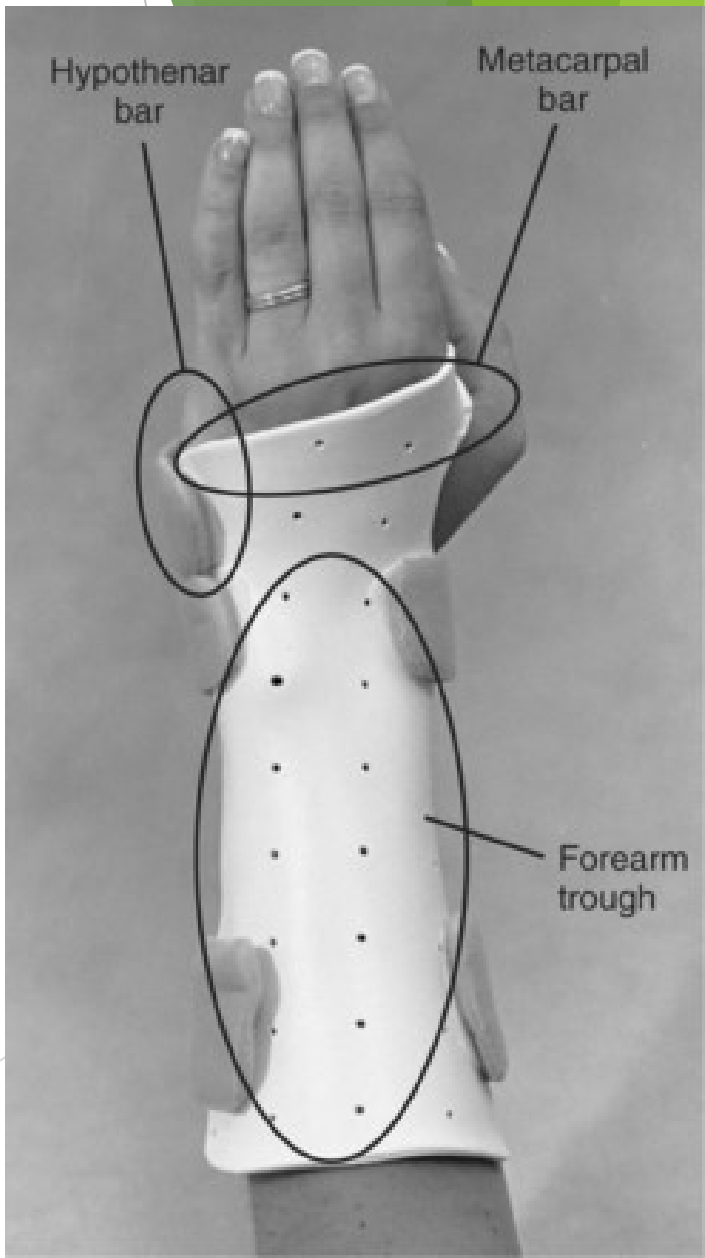
Features of the Wrist Immobilization Splint

- Understanding the features of a wrist immobilization splint helps therapists' splint appropriately.
- Whether fabricating a volar, dorsal, ulnar, or circumferential wrist splint, the therapist must be aware of certain features of the various components of the wrist immobilization splint—such as a forearm trough, metacarpal bar, and hypothenar bar.



Cont.

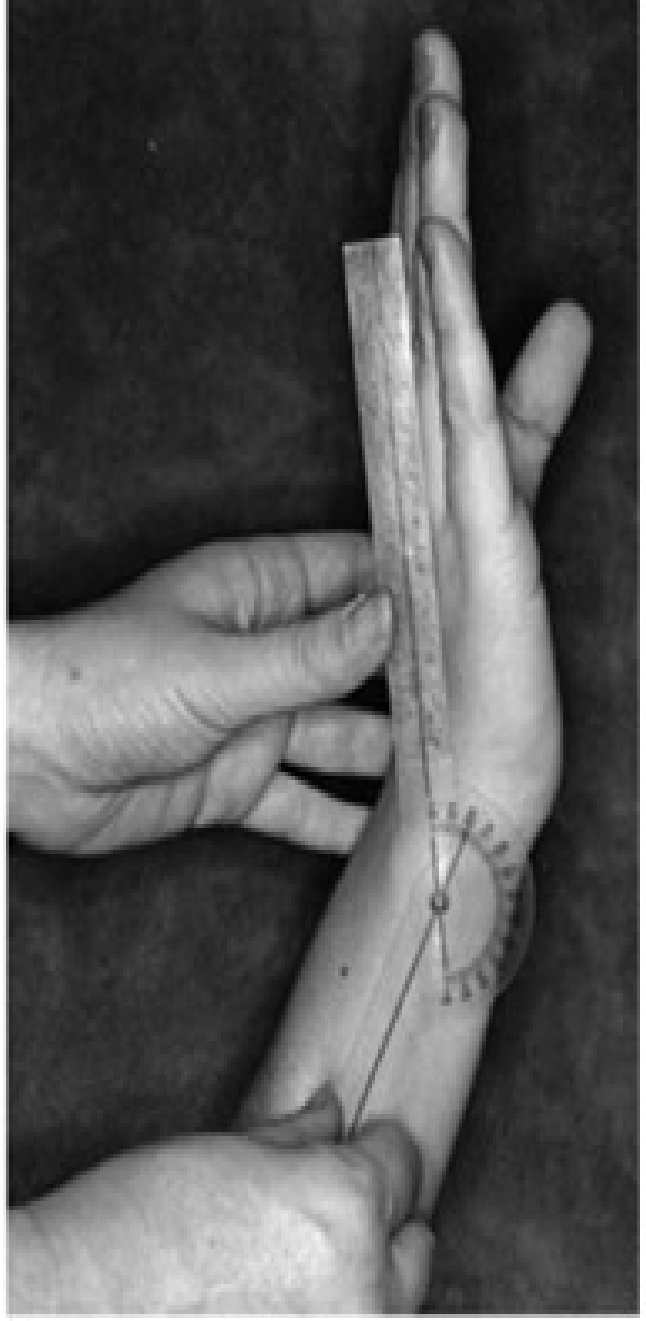
- With a volar or dorsal immobilization splint the forearm trough should be two-thirds the length of the forearm and one-half the circumference of the forearm to allow for appropriate pressure distribution. It is sometimes necessary to notch the area near the distal ulna on the forearm trough to avoid a pressure point.
- The hypothenar bar helps to place the hand in a neutral resting position by preventing extreme ulnar deviation. The hypothenar bar should not inhibit MCP flexion of the ring and little fingers.
- The metacarpal (MP) bar supports the transverse metacarpal arch. When supporting the palmar surface of the hand, the MP bar is sometimes called a palmar bar.



Cont.

- On the radial side, it is important to note the position of the MP bar below the distal palmar crease and distal to the thenar crease to allow adequate index and middle MCP flexion and thumb motions.
- On a dorsal wrist immobilization splint, the therapist positions this bar slightly proximal to the MCP heads on the dorsal surface of the hand when it winds around to the palmar surface.
- The same principles apply when positioning the MP bar on the volar surface of the hand (proximal to the distal palmar crease, and distal and ulnar to the thenar crease).

A

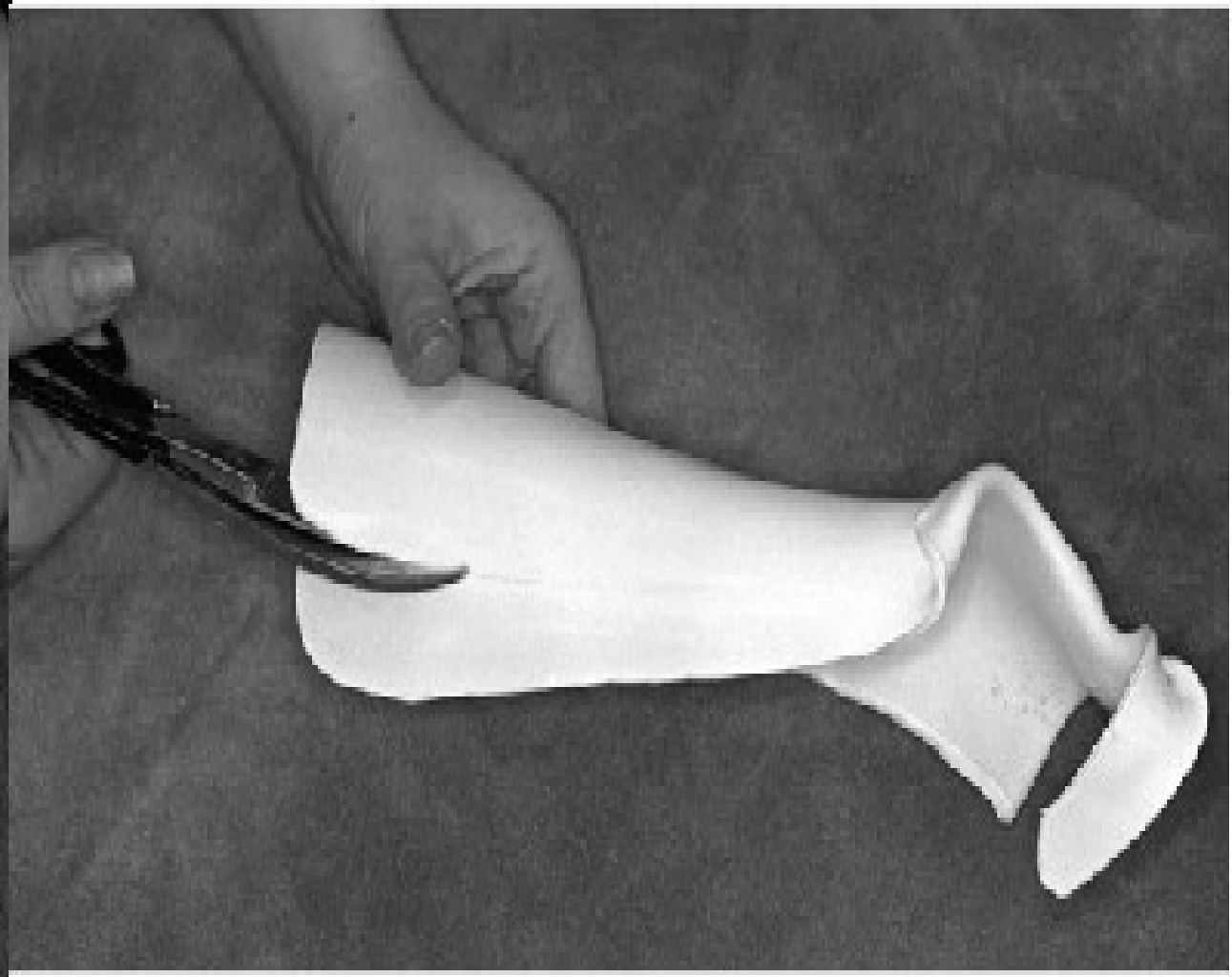


B

C

D

E



F

A

B

C

D