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Third Stage

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Splinting for the Fingers

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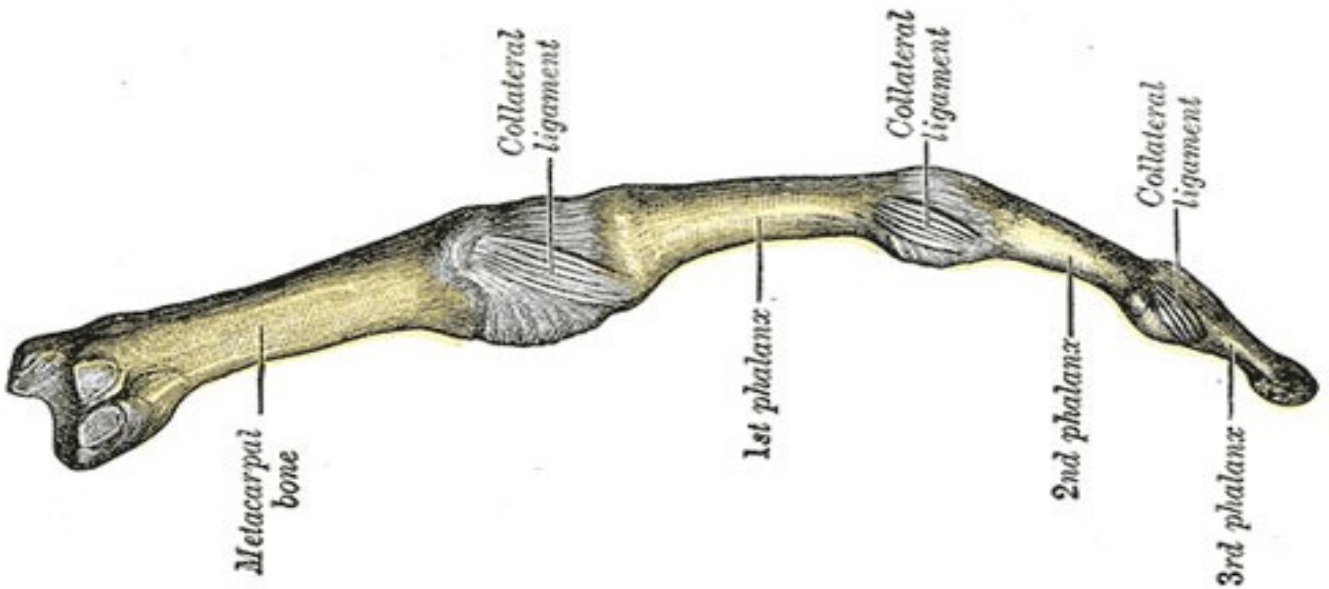
Introduction

- Depending on the diagnosis, finger problems may require splints that cross the hand and wrist—or they may be treated with splints that are smaller.
- This lecture describes the smaller splints that are finger based, crossing the proximal interphalangeal PIP and/or distal interphalangeal (DIP) joint—leaving the metacarpophalangeal (MCP) joint free.
- The PIP and DIP joints are hinge joints.

Functional and Anatomic Considerations for Splinting the Fingers:

- The PIP and DIP joints have collateral ligaments on each side that provide joint stability and restraint against deviation forces.
- The radial collateral ligament protects against ulnar deviation forces, and the ulnar collateral ligament protects against radial deviation forces.
- On the palmar (or volar) surface is the volar plate, which is a fibrocartilaginous structure that prevents hyperextension.



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- For any finger problem, it is always important to prioritize edema control.
- Treatment for edema can often be incorporated into the splinting process. Examples of this would be the use of self-adherent compressive wrap under the splint or to secure the splint on the finger.
- For diagnoses that require splint use 24 hours per day but permit washing of the digit, it may be appropriate to fabricate one splint for shower use and another for use during the rest of the day.
- Because finger splints are so small, there is an increased possibility of them being pulled off in the covers during sleep or during activity.
- It is often necessary to tape them into place in addition to using Velcro straps. Be careful not to apply the tape circumferentially so as not to cause a tourniquet effect. An alternative solution is to use a long Velcro strap to anchor the splint around the hand or wrist.

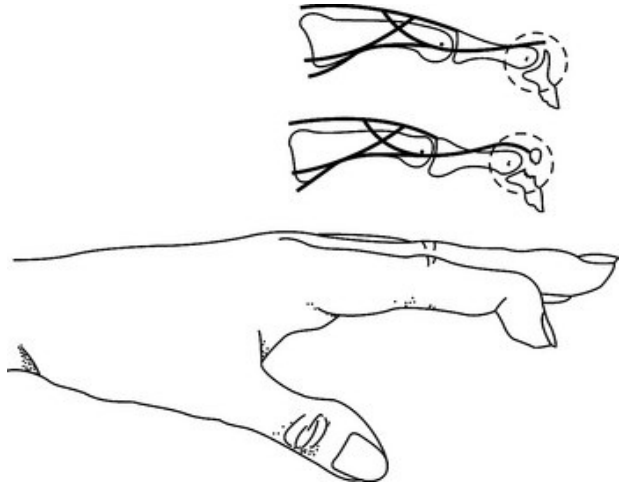
Diagnostic Indications

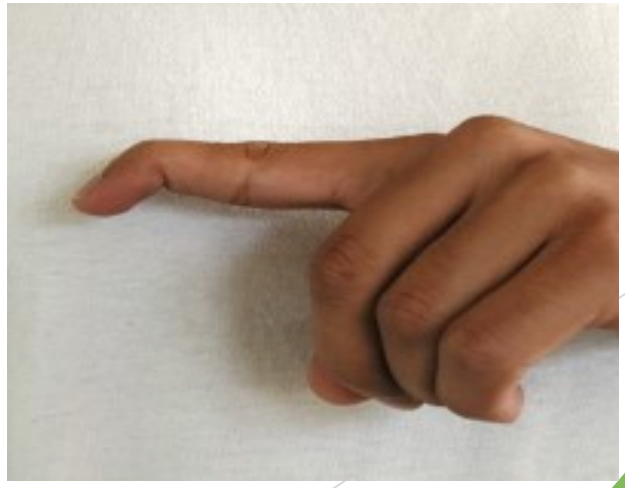
- Commonly seen diagnoses that require finger splints are:

1. mallet fingers
2. boutonniere deformities
3. swan-neck deformities
4. finger sprains.

Mallet Finger

- A mallet finger presents as a digit with a drop of the DIP joint.
- This posture often occurs as a result of axial loading with the DIP flexion force to the fingertip.
- The terminal tendon is avulsed, causing a drop of the DIP. A laceration to the terminal tendon may also cause this problem.
- With a mallet injury, the DIP joint can usually be passively extended to neutral—but the client is not able to actively extend it himself.
- This is called a DIP extensor lag. If the DIP joint cannot be passively extended, this is called a DIP flexion contracture. It is unlikely the DIP joint will develop a flexion contracture early on, but this can be seen in more long-standing cases.





Splinting for Mallet Finger

- The goal of splinting for mallet finger is to prevent DIP flexion.
- Some physicians prefer the DIP joint to be splinted in slight hyperextension, whereas others prefer a neutral DIP position.
- It is good to clarify this with the doctor. If hyperextension is desired, care must be taken not to excessively hyperextend because this may compromise blood flow to the area.

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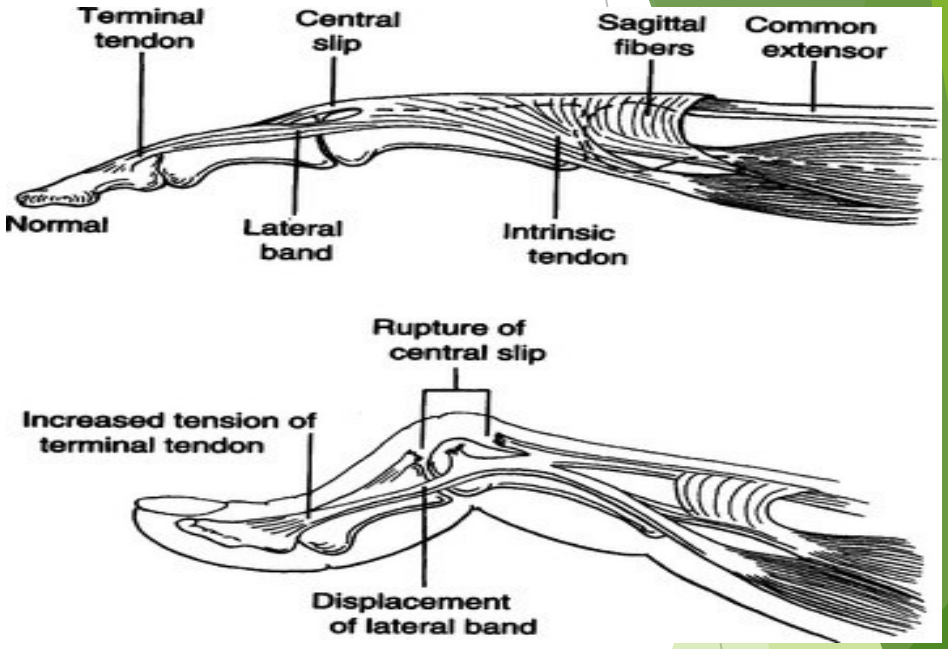
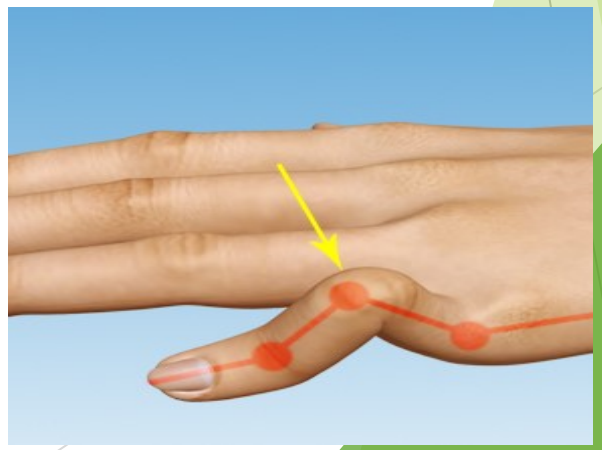
- The DIP joint should be splinted for about 6 weeks to allow the terminal tendon to heal.
- This terminal tendon is a very delicate structure, and for this reason the joint should not be left unsupported or be allowed to flex for even a moment during this 6-week interval.
- It can be challenging to achieve this continuous DIP support because there is also the need for skin care and air flow. Practice with the client so that there is good understanding of techniques to support the DIP joint while performing skin hygiene and when applying and removing the splint.
- After about 6 weeks of continual splinting and with medical clearance, the client is weaned off the splint. It is usually still worn at night for several weeks. At this time, it is very important to watch for the development of a DIP extensor lag. If this is noticed, resume use of the splint and consult the physician

Boutonniere Deformity

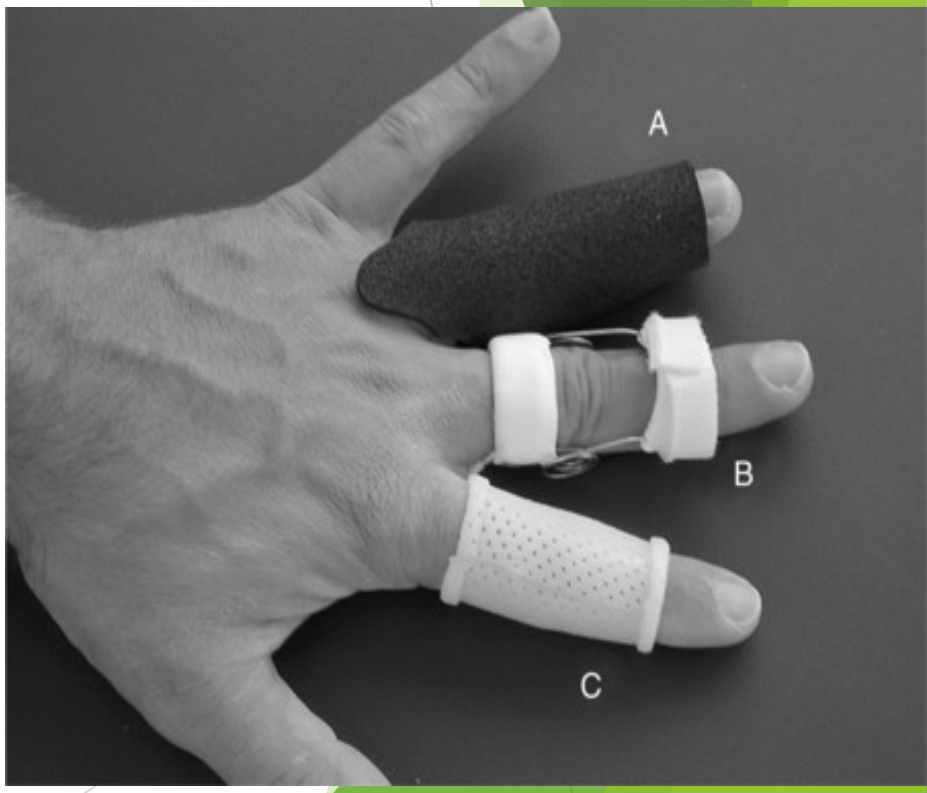
- A boutonniere deformity is a finger that postures with PIP flexion and DIP hyperextension.
- This deformity can result from axial loading, tendon laceration, burns, or arthritis.
- The central extensor tendon (also called the central slip) is disrupted, which leads to the imbalance of the extensor mechanism as the lateral bands displace volarly.
- If not treated in a timely manner, the PIP joint extensor lag may become a flexion contracture. In addition, the DIP joint may lose flexion motion due to tightness of the oblique retinacular ligament (ORL), also called the ligament of Landsmeer.





Splinting for Boutonniere Deformity

- The goal of splinting for boutonniere deformity is to maintain PIP joint extension while keeping the MCP and DIP joints free for about 6 to 8 weeks.
- If there is a PIP flexion contracture, a prefabricated dynamic three-point extension splint might be used—or a static splint can be adjusted serially with the goal of achieving full passive PIP extension.
- There are various types of splints for boutonniere deformity, including simple volar gutter splints, depicts some common options for splinting the PIP joint in extension while keeping the DIP joint free.
- In some cases, including the DIP joint in the splint may be preferable because this will increase the mechanical advantage. It is usually acceptable to do this if the ORL is not tight.



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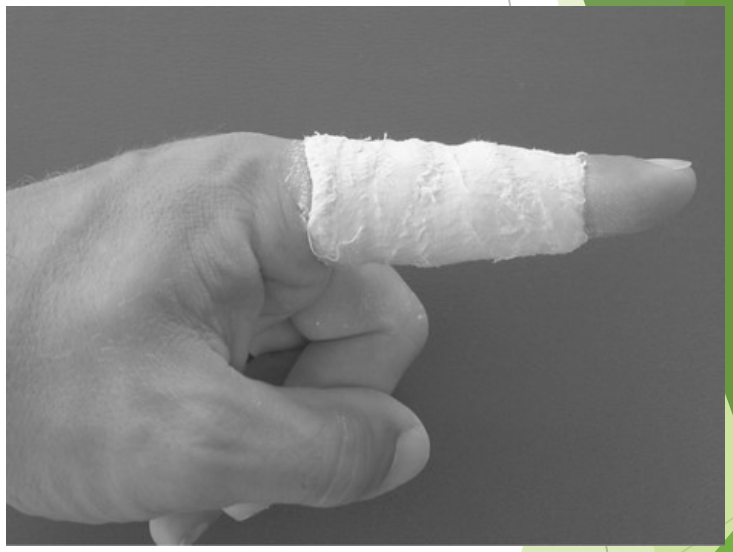
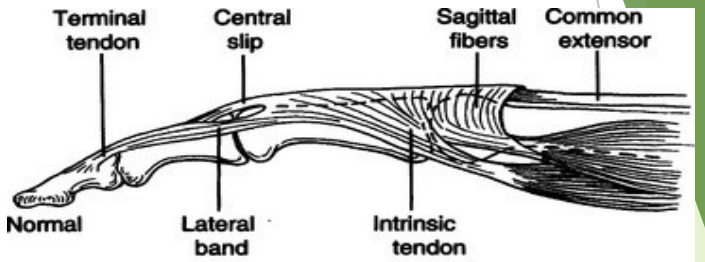
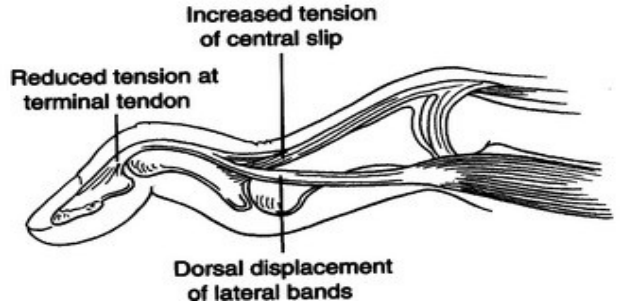
- Serial casting is also an option with this diagnosis.
- This technique requires training and practice before being used on clients.
- After 6 to 8 weeks of splinting and with medical clearance, the client is weaned off the splint.
- At this time, it is important to watch for loss of PIP extension. If this is noted, adjust splint usage accordingly.

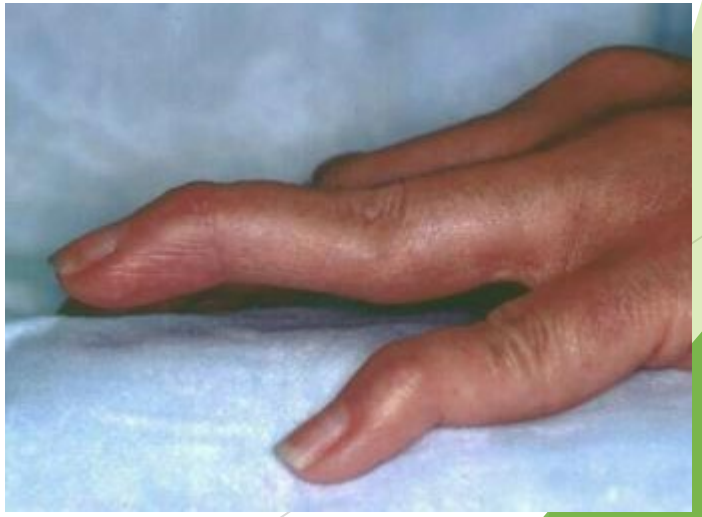


Swan-neck Deformity

- A swan-neck deformity is seen when the finger postures with PIP hyperextension and DIP flexion.
- Positionally, the swan-neck deformity at the PIP and DIP is displace dorsally. In addition to other traumatic causes, it is not uncommon for people with rheumatoid arthritis to demonstrate swan-neck deformities.

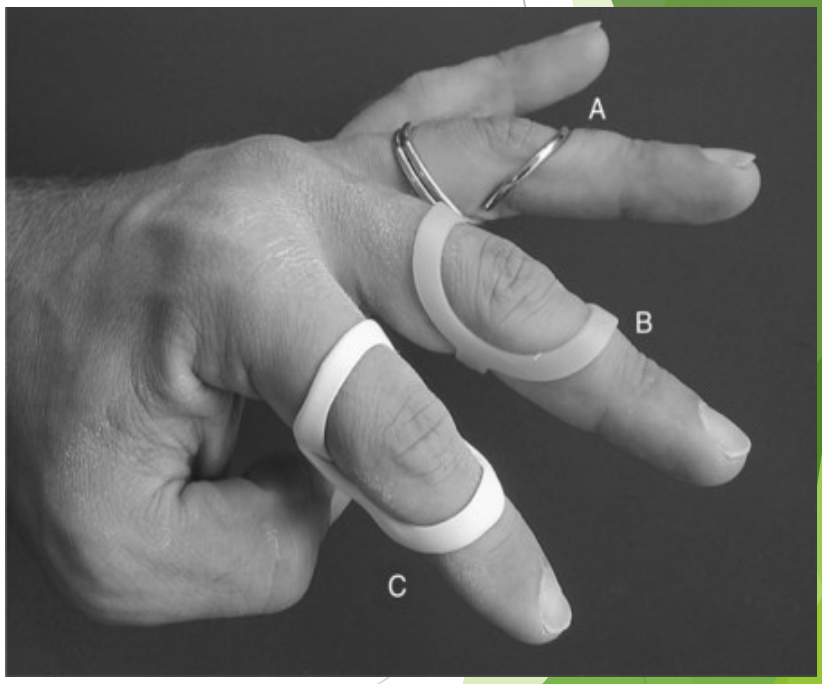






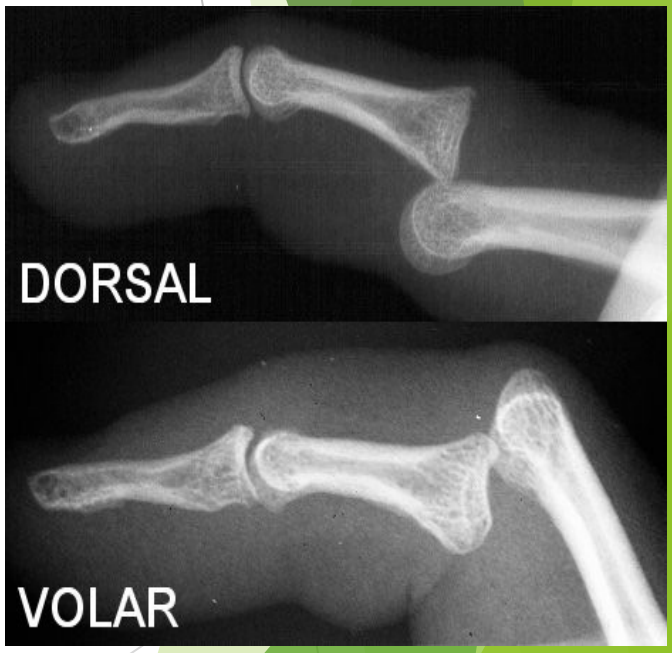
Splinting for Swan-neck Deformity

- The goal of splinting for swan-neck deformity is to prevent PIP hyperextension and to promote DIP extension while not restricting PIP flexion.
- A dorsal gutter with the PIP joint in slight flexion (about 20 degrees) can be made.
- If the DIP demonstrates an extensor lag, the splint can cross the DIP and a strap can be added to support the DIP in neutral.
- Less restrictive styles of splints are shown in Figure. These are three-point splints that prevent PIP hyperextension but allow PIP flexion. They can be either custom formed or prefabricated.



Finger PIP Sprains

- Finger sprains may be ignored by clients as trivial injuries, but they can be very painful and functionally debilitating—with the potential for chronic swelling and stiffness and surprisingly long recovery time.
- Uninjured digits are at risk of losing motion and function, which further complicates the picture.
- Prompt treatment can favorably affect the client's outcome and expedite return to occupations impacted by the injury. PIP sprains are graded in terms of severity, from grade I to grade III.
- PIP joint dislocations are also described in terms of the direction of joint dislocation (i.e., dorsal, lateral, or volar).
- PIP joint sprains are associated with fusiform swelling, which is fullness at the PIP joint and proximal and distal tapering. Edema control is critical with this diagnosis.



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Mild Grade I Sprain

- No instability with active or passive ROM; macroscopic continuity with microscopic tears. The ligament is intact but individual fibers are damaged.
- Treatment: Immobilize the joint in full extension if comfortable and available. Otherwise, immobilize in a small amount of flexion.

Grade II Sprain

- Abnormal laxity with stress; the collateral ligament is disrupted. ROM is stable but passive testing reveals instability.
- Treatment: Immobilize the joint in full extension for 2 to 4 weeks. The MD may recommend early ROM, but avoid any lateral stress.

Grade III Sprain

- Complete tear of the collateral ligament along with injury to the dorsal capsule or the volar plate. The finger has usually dislocated with injury.
- Treatment: Early surgical intervention is often recommended.

Splinting for Finger PIP Sprains

- The goal of splinting finger PIP sprains is to support the PIP joint and promote healing and stability.
- Splinting options for the injured PIP joint with extension limitations are similar to those used for boutonniere deformities.
- If there is a PIP flexion contracture, dynamic or serial static PIP extension splinting is used—or serial casting may be considered.
- If there has been a volar plate injury, a dorsal gutter is fabricated to block about 20 to 30 degrees of PIP extension while allowing PIP flexion