

WHY I AVOID PASSIVE FLEXION OF THE DIP JOINT

At every splinting course I teach, one or more participants ask about construction of a composite finger flexion splint. My answer is always the same: I have made one of these in my career and cannot imagine making another!!!! Many of you will be shocked by my statement...let me see if I can explain.

DIP Joint: Intrinsic Extension versus Extrinsic Flexion

Extension of the distal interphalangeal (DIP) joint is primarily driven by intrinsic finger muscles via a complex blending of tendinous fibers as they cross the metacarpophalangeal (MP) and proximal interphalangeal (PIP) joints before reaching the DIP joint. Extension is an intricate coordinated movement, without significant force. Unlike intrinsically powered DIP joint extension, DIP joint flexion is powered by a strong extrinsic flexor: the flexor digitorum profundus (FDP). The FDP provides both a robust muscle belly and an unrestrained single tendon which passes under a mechanically efficient pulley system. Simply stated: Force available for DIP joint flexion is much greater than the force available for DIP joint extension. So why favor the stronger motion with splinting? The FDP has the power to mobilize the DIP joint into flexion.

Normal Coordinated Motion of PIP and DIP Joints

The complex anatomy of the dorsal apparatus mandates that two adjacent distal joints of different sizes move in a coordinated manner. The lateral/volar movement of the lateral bands at the PIP joint during flexion provides enough length to allow DIP joint flexion. Therefore, working to gain isolated DIP joint flexion is illogical since it does not reflect normal coordinated joint motion. (A clear exception is DIP joint

flexion with PIP joint extension to resolve a chronic boutonniere deformity.)

Composite Flexion Splinting

Splints which pull both finger IP joints into flexion simultaneously always move the joint with less resistance before moving the more resistive joint. So the joint most needing mobilizing gets the least influence!!! In my opinion a better way to regain flexion of the IP joints is to block the MP joints in extension (preventing flexion) so the extrinsic flexor muscles can more effectively move the IP joints actively (active hook). Even if the DIP joint is stiff in extension and DIP joint flexion is initially impossible, if the FDP can be actively recruited it will in time mobilize the DIP joint.

The effect of FDP muscle contraction at the DIP joint can be enhanced by taping a small exercise splint on the dorsum of the DIP joint to hold the DIP joint in slight flexion while allowing full flexion. (See figures.) With this splint in place, the patient more easily focuses on initiating active finger flexion at the DIP joint. (This is also a useful exercise when working to regain excursion of FDP in zone 1 & 2 and maximum FDP/FDS differential excursion in zone 2.) Gains in passive DIP joint flexion can be made by recruiting the FDP actively, although therapists do not commonly think active motion can compel passive gains.

If one feels passive DIP and PIP joint flexion (splinting) is required, applying a specific passive force to the tighter joint while holding the other joint flexed with a static line will provide more precise flexion mobilization of the more limited joint. Holding the MP joints in extension will still be helpful in mobilizing the IP joints actively.

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WHY I AVOID PASSIVE FLEXION OF THE DIP JOINT- ...continued



A small splint applied to block the DIP joint in flexion but allow further flexion encourages active flexion of that joint when the PIP joint flexes.



The blocking splint encourages active DIP joint flexion when the other DIP joints are flexing.

The Hidden Restraint: Interosseous Muscle Tightness

Any finger with limited IP joint motion easily develops adaptive shortening of the interosseous muscles (commonly called intrinsic tightness) and may develop lumbrical muscle adaptive shortening. This muscle tightness will continue to prevent full active IP joint flexion even when the IP joints have regained full passive flexion. This tightness (often subtle) must be addressed before full finger flexion can be regained. Elongation of both the interosseous and lumbrical muscles is achieved by blocking the MP joints in extension and encouraging active IP joint flexion (hook fist).

Conclusion

Harnessing the power of the FDP can mobilize the DIP joint into flexion and passive flexion/splinting of the DIP joint is not needed. Regaining the active hook is the best way to regain full active finger flexion, including the DIP joint.