

### IMMOBILIZING THE MP JOINT IN EXTENSION?

It is well known that the collateral ligaments of the metacarpophalangeal (MP) joint of the fingers must span a greater distance when the MP joint is in flexion than when in extension. Although many tissue planes must move relative to one another to allow MP joint motion, blame for stiffness at the MP joint has historically been placed specifically on the collateral ligaments. It is plausible that the paranoia commonly taught about immobilization of the MP joint in extension results from the time before antibiotics and safe positioning, when infections were rampant and most hand injuries resulted in permanent MP joint extension contractures. In current Western cultures with proper positioning, antibiotics, and early active motion, perhaps this paranoia is no longer warranted.

When teaching about treating the stiff hand I often advocate blocking/immobilizing the MP joint in extension (see below). Many seem to assume I mean the MP joint should always be positioned in extension. Hopefully these comments will clarify.

#### **Positioning Acute Injuries**

If the MP joint is positioned in flexion post-injury/post-operatively, neither the interosseous nor lumbrical muscles can experience their maximum elongation. Thus immobilization in the "safe position" (MP joint flexion and relative interphalangeal [IP] joint extension) supports adaptive shortening of the interosseous muscles and may also create adaptive shortening of the lumbrical muscles. Therefore, patients immobilized in this position must periodically extend their fingers and achieve an active hook position to prevent this adaptive

shortening (unless the injury contraindicates this). Early active motion programs are designed to maintain a balance of motion and thus we appropriately immobilize many acute hand injuries with the MP joints in flexion.

Historically, clean extensor tendon injuries proximal to zone V were immobilized with the MP and wrist joints in extension to protect the repair/s. This clinical experience demonstrated that patients with such an injury easily regain MP joint flexion. It is only when the injury is within the joint or there is a significant soft tissue injury to the dorsum of the hand that it is challenging to regain MP joint flexion.

#### **Treating the Stiff Hand**

Injured hands which have not been successfully re-mobilized usually display limited finger flexion of both the MP and IP joints. Because we have been taught to be paranoid about losing MP joint flexion, many therapists focus on first regaining MP joint flexion. This approach unfortunately reinforces one of the core problems: tight interosseous muscles.

The inability to successfully regain full finger flexion is usually related at the MP joint to unresolved edema and at the IP joints to tight interosseous muscles.

- **MP Joint Edema**

The MP joint is the loosest joint in the hand with excessive joint play available when in extension. Therefore, when edema is present and fills the spaces within the hand, the MP joint capsule is an available space for edema to accumulate.

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Edema within the MP joint capsule creates mechanical resistance to full flexion. Only as the edema subsides can MP joint flexion be successfully achieved. It should be noted that the hand may not appear significantly edematous, but before one can “see” edema all internal spaces must first be filled.

When the MP joint is blocked in extension, active IP joint flexion and extension initiates lymphatic pumping in the fingers and palm. This active motion significantly reduces MP joint edema, providing the potential for full MP joint flexion.

- **Interosseous Muscle Tightness**

In a hand with limited MP and IP joint flexion, the goal is to regain full finger flexion. But without the ability to achieve an active hook position to elongate the interosseous muscles (MP joint in neutral or hyperextension and full IP joint flexion), full finger flexion cannot be regained!

A typical example is the patient who has sustained a distal radius fracture and has developed limited finger motion following wrist immobilization. The pattern of active motion usually observed is finger flexion starting at the MP joint followed by limited IP joint flexion. When carefully examined, all stiff hands such as this demonstrate significant interosseous muscle tightness (see Clinical Pearls 19-21) and may also exhibit lumbrical muscle tightness (see Clinical Pearl 22).

If the treatment focus is to first regain MP joint flexion, the tightness of these muscles is reinforced. Therefore, to regain full finger flexion, one must position the MP joints in extension to al-

low the extrinsic flexors to actively 1) mobilize the stiff IP joints, 2) initiate lymphatic pumping in the fingers and palm (reducing resistance to MP joint flexion), and simultaneously 3) elongate the interosseous (and lumbrical) muscles.

- **Immobilizing the MP Joint in Extension**

The pattern of normal finger flexion shows a considerable range of interphalangeal joint flexion before any significant MP joint flexion. In other words, MP joint flexion is the last part of normal full finger flexion. Patients who have developed chronic hand stiffness and have repeated the maladapted pattern of dominate MP joint flexion (initiating flexion at the MP joint) for many months have re-patterned the motor cortex. Therefore the MP joints must be held in extension long enough to allow re-patterning of the motor cortex while the local tissue change is occurring. The best way to do this in the chronically stiff hand is a non-removable cast. (See discussion of the CMMS treatment technique in *Therapist's Management of the Stiff Hand from Rehabilitation of the Hand and Upper Extremity*, Ed. 6. Downloadable PDF available on [www.HandLab.com](http://www.HandLab.com).)

If your patient initiates finger flexion at the MP joints, your patient needs time with the MP joints blocked in extension to experience the initiation of flexion with the extrinsic muscles instead of the dominant interosseous muscles (the primary MP joint flexors). The key element is prolonged positioning, allowing frequent repetitions over time to enable motor cortex re-patterning so flexion is then spontaneously initiated at the IP rather than



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the MP joints.

Positioning or blocking the MP joints in extension allows active IP joint motion to both elongate the interosseous muscles (maximum elongation: active hook with MP blocked in extension) and tone them (contraction during full IP and MP joint extension). Improving the elasticity and tone of the interosseous muscles enables them to more effectively regain MP joint flexion. (The potential is also greater because the edema is reduced.)

When MP joint extension immobilization is discontinued, the MP joints will temporarily be stiff in extension. In a short time patients easily regain MP joint flexion if they could fully extend before the immobilization. (The exception would be sig-

nificant soft tissue injury to the hand.)

### Conclusion

In the acute hand, the position of MP joint immobilization is determined by the injury. Balanced motion is regained by early active motion when allowed by the injury.

In the chronically stiff hand, MP joint extension immobilization/blocking allows active mobilization of tight interosseous and/or lumbrical muscles and stiff interphalangeal joints. Simultaneously the active hook reduces digital and hand edema. Reducing intrinsic muscle tightness, digital/hand edema and stiffness in the IP joints converts the pattern of finger flexion and increases the range of motion.