Therapists have traditionally used both orthotic intervention and passive range of motion to improve joint motion before focusing on active motion. Since injury to a finger usually creates greater stiffness in one joint, the looser joint/s move the most and the stiffer joint/s moves the least. This is obviously detrimental to the stiffer joint/s regaining motion.

An alternative way to improve PIP joint motion is to restrict motion at the MP joint so it can neither hyperextend nor hyperflex. In other words, the force for extension or flexion is diverted to the PIP joint because it cannot be taken up by the hyper-mobile MP joint. (In the case of the little finger the motion at the CMC joint must also be restricted.)

It is my belief that this “active redirection” can mobilize a stiff joint without additional passive modalities as long as the active redirection occurs for prolonged periods of time. The focused duration of active redirection causes a change in the resistance of the stiff joint while also retraining the motor cortex to activate finger motion in a different pattern. Retraining is the key to a patient’s ability to retain the motion gained.

In recent years the use of a small orthosis that holds one MP joint in a position relative to the adjacent MP joints has become the standard of treatment for extensor tendon injuries in zone 5 & 6. This orthosis is referred to by a variety of names: relative motion orthosis, ICAM (Immediate Controlled Active Motion), yoke orthosis and Merritt orthosis (after one of the original authors). (1)

Active redirection to mobilize a stiff PIP joint uses the same orthotic design, but the purpose is to control the MP joint of the stiff finger. At times this includes a relative position of the adjacent MP joint/s, but not always.

FACILITATING PIP JOINT EXTENSION

If you place a pencil/pen over the dorsum of your proximal phalanx and under the two adjacent fingers, you will block the MP joint of the finger in the middle in greater flexion. This blocked position of the MP joint assures that the force of the extensor digitorum communis (EDC) is not allowed to act at the MP joint but is diverted to act along with the interosseous and lumbrical muscles at the PIP joint to gain extension. The orthosis is constructed to block the MP joint.

This design works well for the two middle fingers when only 3 fingers need be included, but the border digits cannot be adequately stabilized unless all fingers are included. (See below.)

FACILITATING PIP JOINT FLEXION

Holding the MP joint of a finger with a stiff PIP joint in extension will assure that powerful extrinsic flexor force is directed toward the PIP joint, preventing the intrinsic muscles from overpowering by hyperflexing the MP joint. This can easily be achieved by positioning one of the two middle fingers MP joints...
in more extension than the adjacent joints, but it becomes more challenging on the border digits.

ORTHOTIC DESIGN

The purpose of the active redirection orthosis is to control the position of the MP joint. Often it is trial and error with the orthotic design to determine what is required to adequately stabilize the MP joint. Someone who is hypermobile may need a design that is different from someone who has more limited normal joint motion.


Below are some suggestions to use as a starting point; the orthosis for your patient may need to be different. The drawings are cross sections of the right hand. See what design works best for the balance of motion in your patient!!!