

Early Active Wrist Mobilization in Extensor Tendon Injuries in Zones 5, 6, or 7

Historically, flexor tendon injuries have been the focus of multiple treatment techniques, splinting approaches, and protocols. However, extensor tendon injuries can also have significant problems, such as extensor lag and wrist tenodesis. Because these deficits seem to have less of an effect on our daily functions, when compared to the flexors, less emphasis is seen in the literature. These authors have set up a splinting and exercise program that could help elevate our dealing with problems associated with healing extensor tendons.—PEGGY FILLION, OTR, CHT, Practice Forum Editor

EARLY ACTIVE WRIST MOBILIZATION IN EXTENSOR TENDON INJURIES IN ZONES 5, 6, OR 7

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This paper describes a rehabilitation program after extensor tendon repair in zones 5, 6 and 7, as used at the University Medical Centre Groningen, the Netherlands. Until recently, early controlled dynamic splinting after tenorrhaphy was only used to mobilize the fingers. Despite dynamic splinting of the fingers, complications such as wrist tenodesis and extensor lags arose. Early controlled active mobilization of the wrist is added to the treatment program to prevent adhesions and tendon gapping and functional limitations to occur.

There is no uniformity in the postoperative treatment of extensor tendon injuries and the extent of mobilization is still a controversial issue, especially in zones 5, 6, and 7. In recent

publications, both static immobilization therapy and early controlled active motion therapy are described.^{1,2} These treatment programs are based on the anatomical and physiological characteristics of the extensor tendons and their surroundings, like the layers of the fascia or the dorsal compartments, the healing process of the tendons or the nutritional pathway.^{3–5}

From the literature, it becomes clear that in zones 5, 6, and 7 complications occur frequently, which lead to functional limitations.^{4,6} At the University Medical Centre Groningen in the Netherlands, we also experienced complications like wrist tenodesis and extensor lags despite early controlled dynamic splinting of the fingers after a zone 5, 6, or 7 extensor tendon injury. As a consequence, we modified the treatment program by adding early active mobilization of the wrist.⁷ By mobilizing the wrist, local pressure to the dorsal extensor compartments is provided. As such, we believe that the nutritional pathway is stimulated and the organization of collagen is enhanced.

THE POSTOPERATIVE REHABILITATION PROGRAM

In our modified treatment program, which is summarized in Table 1, both the fingers and the wrist are mobilized. The treatment starts during the inflammatory phase of wound healing, within 3–5 days after tenorrhaphy.

Mobilization of the Fingers

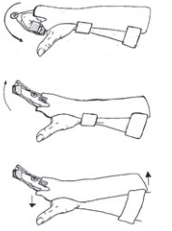
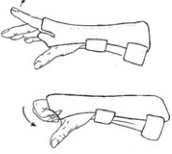
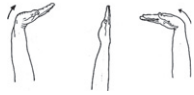
In the dynamic splint (Figure 1), the fingers are held in passive extension by the use of leather bands, fishing wire, and rubber bands. Hyperextension of the metacarpophalangeal joints

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TABLE 1. The Short Form of the Modified Treatment Program After Extensor Tenorrhaphy in Zones 5, 6, and 7

<p>0-3 ½ weeks*</p>	<ul style="list-style-type: none"> - dynamic extension splint, 24 hours/day, wrist 25° dorsal flexion, MP 0° (no hyperextension!) with flexion-ability to 30°, PIP and DIP maximum extension and full flexion - at night all fingers in static extension - every hour 10 x active flexion as far as the splint allows, after which passive extension (pictures) - in zones 5 and 6 active wrist flexion to 20°/ in zone 7 active wrist flexion to 15° and MP-, PIP- and DIP-joints in full passive extension (picture) 	
<p>3 ½ -5 weeks</p>	<ul style="list-style-type: none"> - dynamic extension splint as above with 50° MP flexion-ability - all as above - in zones 5 and 6 active wrist flexion to 20°/ in zone 7 active wrist flexion to 15° and MP-, PIP- and DIP-joints in full passive extension - start place-hold-exercises: extension of each individual finger(picture), all fingers simultaneously, hook fist (picture) 	
<p>5-6 weeks</p>	<ul style="list-style-type: none"> - dynamic extension splint as above with 70° MP flexion-ability - all as above - start active exercises: individual finger-extension, all fingers simultaneously, hook fist, full fist - start active wrist flexion and extension, full range of motion, with fingers in full passive extension 	
<p>after the 6th week</p>	<ul style="list-style-type: none"> - stop dynamic splinting - static splint during the night - continue the exercises - active wrist flexion and extension, full range of motion, combined with full active finger flexion and extension - increase the workload of the hand, starting with ½ kilo 	
<p>after the 10th week</p>	<ul style="list-style-type: none"> - full workload of the hand 	

MP = metacarpophalangeal joint; PIP = proximal interphalangeal joint; DIP = distal interphalangeal joint.

*An extensive manual on the rehabilitation of extensor tendons, written in Dutch, is available at the author's e-mail.

should be avoided to prevent shortening of the collateral ligaments. Traction is focused at the level of the distal phalanges to ensure full extension of all finger joints. The traction force aims to extend the fingers passively, while the patient is still able to

flex the fingers actively without much effort (Figure 2).

During the place-hold exercises, the wearing of the splint is continued. The patient is instructed to remove the leather bands from the fingers during

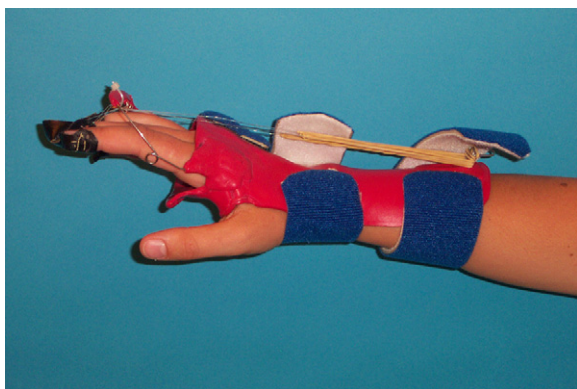


FIGURE 1. Passive extension of the fingers.

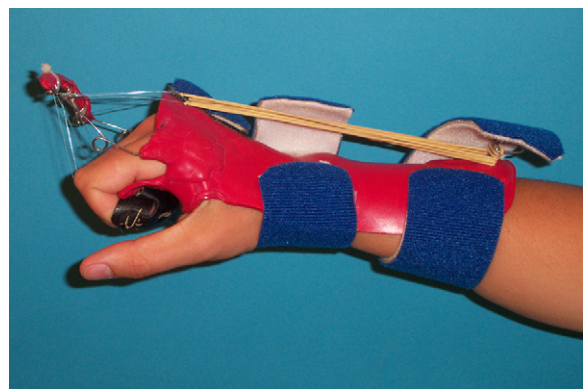


FIGURE 2. Flexion of the fingers.

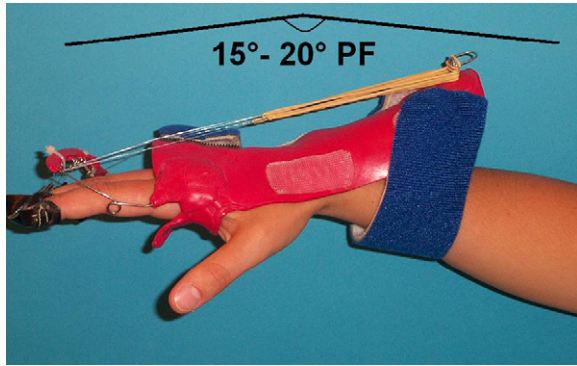


FIGURE 3. Flexion of the wrist 15°–20° until the bandage is reached.

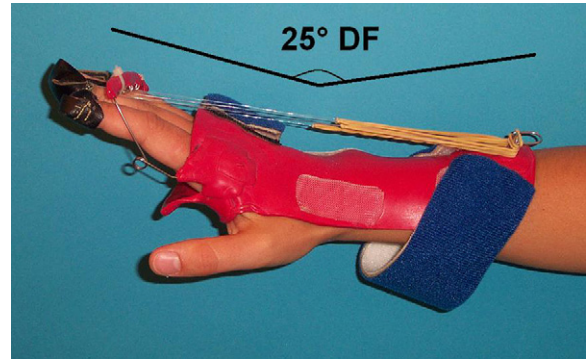


FIGURE 4. Active wrist extension as far as the splint allows.

exercising. When active mobilization exercises are allowed, the splint should be taken off during practice. However, when the patient is not exercising during this phase of treatment the splint must be worn.

Mobilization of the Wrist

The quantity of wrist mobilization is based on the minimal tendon gliding necessary to prevent adhesions.^{6,8,9} During mobilization of the wrist, the fingers are held in passive extension by the splint (Figure 1) or by the therapist's guiding of the patient's hand. In the latter way, the therapist is able to feel any resistance in tendon gliding.

By loosening the most proximal circumferential cuff of the splint to a fixed length, the patient is able to flex the wrist 15° maximally in zone 7 or 20° maximally in zones 5 and 6. During the exercises, the patient is asked to flex the wrist actively until the cuff is reached (Figure 3). Subsequently, the wrist is extended actively as far as the splint allows (Figure 4). When the patient is not exercising, the cuff is pulled tight to the forearm, as is visible in Figure 1. In our experience, a cooperative patient can be instructed to exercise safely at home.

Summary

We recommend adding early active wrist mobilization to the postoperative treatment program of

extensor tendon injuries in zones 5, 6, or 7. To date this advice is not evidence-based, but by sharing this clinical experience we would like to make a contribution to the improvement of functional outcomes after extensor tendon repairs. Eventually, a randomized clinical trial should provide the scientific evidence that early active wrist mobilization is beneficial for patients who sustain extensor tendon injuries.

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