Rehabilitation of extensor tendon injury Zone V VI VII

**Early phase**

1- **Immobilization protocol:**

3-4 weeks immobilization within static volar splint or POP (wrist in 30 degrees of extension, MCPs in 30-45 degrees of flexion and IPj extended.
Followed by an intensive exercise regime to regain ROM.
It has good outcome for tendon healing, reducing incidence of rupture (Crosby and Wehbe 1996)
But it has higher rate of adhesion and joint tightness (Daragan 1969, Evans & Buckhalter 1986)

2- **Immediate passive extension protocol:**

Used for complex injury.1

**Splint:**

Extension outrigger that support the wrist in extension and the injured fingers in full extension at rest, allowing 30 degree of MCPs flexion during exercise.
The splint is worn full time for the first 3 weeks.

**Exercises** are 10-20 rep/hr of active finger flexion and passive finger extension.
After 3 weeks, remove the volar block from the splint and allow tolerable flexion of the finger, with extension continuing to be assisted by the dynamic slings for another 2-3 weeks.
It had less incidence of extension Lag compared to static regime, improve tendon glide and less therapeutic input at later stage as ROM is maintained.
But it has poor patient satisfaction with bulky outrigger and cosmesis, patient education and compliance is crucial to prevent over exercise and rupture.4

**Intermediate phase:**

After 4 weeks
Reduce splint to work and heavy activities.
If extension is limited use night resting pan splint.
For immediate passive or active protocol dynamic splint complete for 6 weeks.

**Exercises:**

MCP flexion with IP extension
IP flexion with MCP extension
Wrist flexion with finger extension.
5-6 weeks composite flexion of the fingers
Gentle passive flexion.

**Late phase:**

After 6 weeks
Add exercises to maximize proximal and distal gliding of the extension tendon
Grip strength
Functional upper extremity exercises.
For deficits in flexion add dynamic or static progressive flexion splinting intermittently during the day beginning at 6 to 8 weeks.
3-Early active mobilization with static splint

**Splint:**
volar thermoplastic splint maintain the wrist in 45 degree of extension and MCP joint in 20-30 degree of flexion
The IP maintain free, add distal component of the splint to maintain IP in extension during night and between exercise sessions.

1 week:
Active IP joint flexion 10 rep/2hrs
Passive IP joint extension with hold.
2-3 week:
If the patient hold extension without lag to start active ROM exercise for MPJ with IPJ relaxed in flexion.
4 week:
Wrist and finger tenodesis exercise
End the splint during day and wear at night.
5 week:
Gentle composite flexion.
6 week:
To start light resistance exercise, grip activities and PROM.
Weaned splint.
8 week:
Passive flexion, Dynamic flexion splint if needed.
12 week:
Retain to full function.

If an extension lag of greater than 30 degrees is present at 4 weeks then the splint should be worn for a further two weeks, delay composite flexion until the end of the sixth week.
Advantages are simple and less cumbersome splint for the patient than dynamic regime, fewer adhesions. But wrist discomfort with 45 degrees of extension (Pratt et al 2002 suggests 30 degrees).

Although strong evidence was found for the short term superiority of early controlled mobilization over immobilization for extensor tendons, no conclusive evidence was found regarding the long term effectiveness of the different rehabilitation regimes.
1- Immobilization protocol

**Early phase (1-4 weeks)**

*Splint:* dorsal blocking cast or splint with wrist 20-30 degrees of flexion, MCP joints 50-60 degrees of flexion IP joints in neutral.

*Exercises:* passive flexion by therapist or parents or the patient if referred early.

**Intermediate phase (4-6 weeks)**

Adjust dorsal blocking splint for wrist neutral, remove it only for exercises.

*Exercises:* passive flexion
- Active extension with wrist flexed
- Wrist tenodesis
- Gentle active tendon gliding
- Assess tendon gliding at 3 weeks if adherent, begin blocking exercises

**Late phase (6-12 weeks)**

No splint. Only splint for extension at night if needed.

*Exercise:* add full active flexion and extension.
- Blocking, light resistance.
- Return to full function.

This protocol used for young children less than 12 yrs old, patient with cognitive limitation and in case of severe loss of skin and concomitant fracture.

2- Immediate passive flexion protocol:

**Early phase (1-4 weeks)**

*Splint:* dorsal blocking splint keeps the wrist in 20-30 degrees of flexion. MCP joints 50-60 degrees of flexion and IP joints straight. Add elastic traction to fingertips during day.

*Exercises:* passive flexion, active interphalangeal extension.

**Intermediate phase (4-6 weeks)**

Remove splint for bathing and exercises

*Exercises:* wrist tenodesis
- Place/ active hold flexion
- Finger extension with wrist flexed, gradual wrist to neutral.
- Assess tendon gliding if adherent, add gentle blocking and tendon gliding.

**Late phase (6-12 weeks)**

No splint
- Add night extension splint if loss of extension.

*Exercises:* add finger extension with wrist neutral
- Light resistance if adherent; if minimal adhesions, delay resistance until 8-10 weeks.
- Passive interphalangeal extension if needed.

3- Immediate Active flexion protocol:

**Early phase (1-4 weeks)**

*Splint:* dorsal blocking splint with wrist in neutral -20 degrees of flexion, MCPj in 70 degrees of flexion and allow full IPj extension with or without elastic traction.
Exercises: wrist tendodesis, passive flexion, active IPj extension with MCPj flexed, place and active hold in flexion.

Intermediate phase (4-6 weeks)
Continue splint wear to 6 weeks; discontinue elastic traction if used.
Exercises: add gentle active flexion, straight fist, composite fist, blocking if adhesions present, passive IPj extension if needed.

Late phase (6-12 weeks)
No splint, or hand-based dorsal blocking splint during heavy activities and work Dynamic IPj extension splinting after 10 weeks if IPj flexion contracture is present.
Exercise: add hook fist, light gripping at 8 weeks if adhesions present, 10 to 12 weeks if good to excellent tendon gliding.

This protocol for client who had strong enough surgical repair, it needs patient compliance and it depend on the level of edema and joint stiffness.

Stricland (1989) stressed that it would be totally inappropriate to employ a cook book recipe for all flexor tendon repairs, a view supported by Peck et al (1998) who suggests that every patient must be managed according to their individual needs and the variable characteristics of injury, surgical findings and lifestyles.

Controlled mobilization regimens are widely employed in rehabilitation after flexor tendon repair in the hand. This review found insufficient evidence from randomized controlled trials to define the best mobilization strategy.

References:
1) Fundamentals of hand therapy (clinical reasoning and treatment guidelines for common diagnoses of the upper extremity)
3) Rehabilitaion after surgery for flexor tendon injuries in the hand. Corane database of systematic reviews 2004; issue4
4) B.A.H.T level 1, Cardiff hand therapy. February 2010.