Zone IV-V: Flexor Tendon Repair

This protocol is intended to provide the clinician with a guideline for the postoperative rehabilitation course of a patient who has undergone ***Flexor tendon repair zone IV-V***. General time frames are given for reference to the average, but individual patients will progress at different rates depending on their age, comorbidities, pre-surgical range of motion, strength, health/functional status, rehabilitation compliance, learning barriers and complications. Specific time frames, restrictions and precautions are given to protect healing tissues and surgical reconstruction.

Zone IV-V: Flexor Tendon Repair

Phase I (3 to 5 days to 3 weeks after surgery)

	Conservative	Early Active
Rehabilitation appointments	• Twice per week for the first 4-6 weeks	• Twice per week for the first 4-6 weeks
Rehabilitation goals and priorities	• Remove post op dressings and fabricate orthosis • Activities of daily living (ADLs) per restrictions • Wound care • Edema management • Protected ROM	• Remove post op dressings and fabricate orthosis • Activities of daily living (ADLs) per restrictions • Wound care • Edema management • Protected ROM
Suggested therapeutic exercises	• Passive digit flexion with active digit extension • Passive MCP flexion with A/PROM IP extension • Passive (or gravity assisted wrist flexion, followed by active extension to orthotic limits (tenodesis exercise) • Isolated active FDS glide of unaffected fingers Exercises should be performed every 2 hours, 10-15 repetitions	• Passive digit flexion with active digit extension • Passive MCP flexion with A/PROM IP extension • Passive (or gravity assisted wrist flexion, followed by active extension to orthotic limits (tenodesis exercise) • Progressive active fisting starting with 1/3 fist. Each week for progress active fisting • Isolated active FDS glide of unaffected fingers Exercises should be performed every 2 hours, 10-15 repetitions
Precautions	• Wound precautions • No passive wrist extension and composite finger extension • No functional use of the involved upper extremity	• Wound precautions • No passive wrist extension and composite finger extension • No functional use of the involved upper extremity

Orthotic management	• Custom thermoplastic dorsal blocking WHFO with wrist in 20-30 degrees of flexion, MCPs at 60 degrees flexion, and IPs in full extension • Wear all the time • If the ulnar and/or median nerve is repaired, position wrist in 30 degrees of wrist flexion. Increase by 10 degrees of extension each week stopping at neutral wrist. • If the ulnar nerve is repaired block MCP joints of the ring and small finger from hyperextension. • If the median nerve is repaired, a night first webspacer is recommended	• Custom thermoplastic dorsal blocking WHFO with wrist in 20 -30 degrees of extension, MCPs at 30 degrees flexion, and IPs in full extension • Wear all the time • If the ulnar and/or median nerve is repaired, position wrist in 30 degrees of wrist flexion. Increase by 10 degrees of extension each week stopping at neutral wrist. • If the ulnar nerve is repaired block MCP joints of the ring and small finger from hyperextension. • If the median nerve is repaired, a night first webspacer is recommended
Progression criteria	• Strickland's percentage	• Strickland's percentage • Progress active exercises in a pain/tension-free manner

Zone IV-V: Flexor Tendon Repair

Phase II (3 weeks after surgery)

	Conservative	Early Active
Rehabilitation appointments	• Twice per week or per therapist discretion	• Twice per week or per therapist discretion
Rehabilitation goals and priorities	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management • Initiated non-thermal US at 2-3 weeks	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management • Initiated non-thermal US at 2-3 weeks • NMES may be initiated to enhance excursion of long flexors
Suggested therapeutic exercises	• Initiate active tendon glides	• Active ¾ fist or full composite fist • Initiated active tendon glides • Initiated active full finger extension with tendon glides out of orthosis • Initiated gentle IP blocking • Initiated gentle wrist AROM out of orthosis with fingers relaxed • If median and/or ulnar nerve is repair, limit active wrist extension to 30 degrees
Precautions	• No passive wrist extension and composite finger extension • No functional use of the involved upper extremity	• No passive wrist extension and composite finger extension • No functional use of the involved upper extremity
Orthotic management	• Modify orthosis to position the wrist in neutral or slight extension. • Wear all the time except for bathing. Do not use the hand while bathing.	• Wear all the time except for bathing and exercises. Do not use the hand while bathing
Progression criteria	• Strickland's percentage • Progress active exercises in a pain/tension-free manner	• Strickland's percentage • Progress active exercises in a pain/tension-free manner

Zone IV-V: Flexor Tendon Repair

Phase III (4 weeks after surgery)

	Conservative	Early Active
Rehabilitation appointments	• Twice per week or per therapist discretion	• Twice per week or per therapist discretion
Rehabilitation goals and priorities	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management • NMES may be initiated to enhance excursion of long flexors	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management • Initiate light functional activities with the hand
Suggested therapeutic exercises	• Initiated active full finger extension with tendon glides out of orthosis • Initiated gentle IP blocking • Initiated gentle wrist AROM out of orthosis with fingers relaxed • If median and/or ulnar nerve is repair, limit active wrist extension to 30 degrees	• If median/ulnar nerve, repair perform AROM wrist extension to 45 degrees with full flexion
Precautions	• No passive wrist extension and composite finger extension • No functional use of the involved upper extremity	• No passive wrist extension and composite finger extension • No lifting, pushing, or pulling more than 1-2 pounds with the involved upper extremity
Orthotic management	• Wear all the time except for bathing and exercises. Do not use the hand while bathing.	• Wear all the time except for bathing, exercises, and light activities. • Initiate light activities that are thoughtful and safe within weight restriction.
Progression criteria	• Strickland's percentage • Progress active exercises in a pain/tension-free manner	• Strickland's percentage • Progress active exercises in a pain/tension-free manner

Zone IV-V: Flexor Tendon Repair

Phase IV (5 weeks after surgery)

	Conservative	Early Active
Rehabilitation appointments	• Twice per week or per therapist discretion	• Twice per week or per therapist discretion
Rehabilitation goals and priorities	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management • NMES may be initiated to enhance excursion of long flexors	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management • Continue light functional activities with the hand
Suggested therapeutic exercises		• Initiated passive finger extension and wrist extension as needed
Precautions	• No passive wrist extension and composite finger extension • No functional use of the involved upper extremity	• No lifting, pushing, or pulling more than 1-2 pounds with the involved upper extremity
Orthotic management	• Wear all the time except for bathing and exercises. Do not use the hand while bathing.	• Wear all the time except for bathing, exercises, and light activities. • Continue to wean from orthosis and use of hand with light functional activities
Progression criteria	• Strickland's percentage • Progress active exercises in a pain/tension-free manner	• Strickland's percentage • Progress active/passive exercises in a pain/tension-free manner

Zone IV-V: Flexor Tendon Repair

Phase V (6 weeks after surgery)

	Conservative	Early Active
Rehabilitation appointments	• 1x/week or per therapist discretion	• 1x/week or per therapist discretion
Rehabilitation goals and priorities	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management
Suggested therapeutic exercises	• Initiated passive finger extension and wrist extension as needed	• Initiate wrist isometrics
Precautions	• No lifting, pushing, or pulling more than 1-2 pounds with the involved upper extremity	• No lifting, pushing, or pulling more than 2-5 pounds with the involved upper extremity
Orthotic management	• Wear all the time except for bathing, exercises, and light activities. • Wean from orthosis and use of hand with light functional activities	• Discontinue orthosis • Can transition to wrist orthosis at night • Continue median and/or ulnar nerve orthoses prn
Progression criteria	• Per pain tolerance and ROM	• Per pain tolerance and ROM

Zone IV-V: Flexor Tendon Repair

Phase VI (7 weeks after surgery)

	Conservative	Early Active
Rehabilitation appointments	• 1x/week or per therapist discretion	• 1x/week or per therapist discretion
Rehabilitation goals and priorities	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management
Suggested therapeutic exercises	• Initiate wrist isometrics	• Progressive strengthening of the hand and wrist
Precautions	• No lifting, pushing, or pulling more than 1-2 pounds with the involved upper extremity	• No lifting, pushing, or pulling more than 2-5 pounds with the involved upper extremity
Orthotic management	• Wear all the time except for bathing, exercises, and light activities. • Continue to wean from orthosis and use of hand with light functional activities	
Progression criteria	• Per pain tolerance and ROM	• Per pain tolerance and ROM

Zone IV-V: Flexor Tendon Repair

Phase VII (8 weeks after surgery)

	Conservative	Early Active
Rehabilitation appointments	• 1x/week or per therapist discretion	• 1x/week or per therapist discretion
Rehabilitation goals and priorities	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management	• Activities of daily living (ADLs) per restrictions • Edema management • Scar management
Suggested therapeutic exercises	• Progressive strengthening of the hand and wrist	• Progressive strengthening of the hand and wrist
Precautions	• No lifting, pushing, or pulling more than 2-5 pounds with the involved upper extremity	• No lifting, pushing, or pulling more than 2-5 pounds with the involved upper extremity
Orthotic management	• Discontinue orthosis • Can wear wrist orthosis at night • Continue median and/or ulnar nerve orthoses prn	
Progression criteria	• Per pain tolerance and ROM	• Per pain tolerance and ROM

Zone IV-V: Flexor Tendon Repair

Phase VIII (10-12 weeks after surgery)

	Conservative	Early Active
Rehabilitation appointments	• As needed	• As needed
Rehabilitation goals and priorities	• Return to all activities with the involved hand • Progressively get back to heavy work and leisure activities	• Return to all activities with the involved hand • Progressively get back to heavy work and leisure activities
Suggested therapeutic exercises	• Strengthening to address heavy work and/or leisure activities	• Strengthening to address heavy work and/or leisure activities
Precautions	• No restrictions	• No restrictions
Orthotic management	• Discontinue orthosis • Continue median and/or ulnar nerve orthoses prn	
Progression criteria	• Per pain tolerance and ROM	• Per pain tolerance and ROM

Additional Notes

Scar management is very important in Zone IV-V. These zones have a high risk of scar adherence. Performing exercises every two hours or every hour is recommended as well as early scar management.

If nerve injury present:

*If ulnar nerve is involved, when fabricating the orthosis, included MCPJ of ring and small finger blocked at 45 degrees of flexion.

*If the median nerve is repair, a web spacer or C-bar orthosis should be worn at night until thenar function has returned. Initially a web spacer orthosis is not needed due to the thumb opponens orthosis positioning the thumb in abduction.

*Sensory re-education is very important to perform early in the rehabilitation process. Mirror therapy has been shown to be a sensory re-education intervention. It can be performed early or late in sensory re-education phase. Functional sensory tasks and activities are important to implement to help the hand relearn functional tasks.

*Due to poor sensory input, patient and therapist must monitor skin closely. Patient may develop pressure sores due to orthosis without knowing.

*NMES is recommended to stimulate thenar muscles. Intrinsic muscles in the hand may not return and tendon transfers will need to be performed.