

Flexor Tendon Repair

Description: When an outside sharp or blunt force is struck on the plantar surface of the hand, a complete or partial rupture of the flexor tendon and/or retinaculum can occur. With severe laceration, tendon exposure and swelling maybe observed. The involved digit will assume an extension posture while the wrist is in neutral position. Tenodesis functional grip may not occur. Injuries to Zone II of the hand has worse prognosis due to flexor sheath and vascular disruption to the FDS and FDP tendons.

Etiology: This can occur while holding a sharp object for cutting, falling onto a sharp object with outstretched hand, or a crush injury from heavy mechanical loading and other extensive trauma.

Non-operative versus Operative Management: Most patients will agree to surgery to restore hand function to highest level. Complications from non-operative plan can result in contractures and loss of hand function. Improved outcome results from surgery and conservative rehabilitation and splinting to ensure tendon healing and decreased risk of rupture. Immediate repair and delayed primary repair can improve prognosis pending on the goals and prior level function of patient. Alternative surgery such as grafting can involve less extensive operations, decreased disability, and improved tendon length. Contraindications include infections, loss of palmar skin over flexor organization, and damage of flexor retinaculum.

Surgical procedure: The degree of repair and procedure depends on the surgeon and the quality of the involved tendon(s). Operative assessment include the quality of the pulley system, damage of surrounding vascular and nervous supply, damage of tendon and edges of tendon, and indicative tendon suture techniques. The type of surgery and outcome depends on the zone classification and its structures involved. Primary repair of tendons include excision of frayed or damaged tendon edges and suturing the edges. Free grafting can also be used to extend the tendon. If severe adhesions result after 3 months of rehabilitation and a range of motion (ROM) plateau, tenolysis surgery can be utilized to excise the adhesions to increase tendon gliding. Also, stage I and II flexor reconstruction is necessary if severe pulley and tendon destruction occurred in zone I and II. The graft can be taken from palmaris longus or toe extensor tendons, with two stages for silicon implant for adherence and implantation. Three months is allotted between the stages, where rehabilitation can take up to 12 weeks.

Preoperative Rehabilitation:

- Bracing for support and decreased risk of contractures
- Edema and pain management
- Patient education and rehabilitation plan

Acute Stage / Severe Condition: Physical Examinations Findings (Key Impairments)

ICF Body Functions code: **b7101.3** SEVERE impairment of mobility of several joints

- Swelling and ecchymosis around the involved tendon and/or the entire hand
- Loss of isolated active mobility of the DIP and/or PIP joint flexion
- Loss of isolated passive mobility of the DIP and/or PIP joint flexion
- Severe tenderness to palpation of the flexor tendon

Sub Acute Stage / Moderate Condition: Physical Examinations Findings (Key Impairments)

ICF Body Functions code: b7101.2 MODERATE impairment of mobility of several joints

As above, except:

- Moderate swelling
- Moderate loss of isolated active / passive mobility of the DIP and/or PIP joint flexion
- Moderate tenderness to palpation of the flexor tendon

Settled Stage / Mild Condition: Physical Examinations Findings (Key Impairments)

ICF Body Functions code: b7101.1 MILD impairment of mobility of several joints

As above, except:

- Mild swelling
- Mild loss of isolated active / passive mobility of the DIP and/or PIP joint flexion
- Mild tenderness to palpation of the flexor tendon

Intervention Approaches / Strategies

Postoperative Rehabilitation

Acute Stage / Severe Condition: Weeks 0-3

Goals: Protect tendon repair and enable collagen synthesis

- Immobilization (for individuals with impaired cognition and under the age of 10 years)
- Early controlled passive ROM (pending on surgeon)
- Splinting: Wrist flexion 10-30° flexion, MP joints 40-60° flexion, and IP joints neutral with dorsal blocking position; removed at least once a week during therapy
- Therapy 1-5 times a week: Wound care, edema control, scar massage, active extension with passive supported flexion, Duran and Houser's controlled passive gliding technique

Sub Acute Stage / Moderate Condition: Weeks 3-5

Goals: Initiate active motion to achieve full range of motion

- Initiate active flexion - blocking exercises, differential tendon gliding

Settled Stage / Mild Condition: Weeks 6-8

Goals: Initiation of strengthening and functional activities to return to work

- Resistance exercises pending on adhesion quality (Lack of adhesions do not provide adequate support; severe adhesions indicate very light resistance)
- Light prehension, isometric strengthening, sustained grasp, ADL's with assist
- Dynamic extension splint prn
- After 8 weeks – grip, heavy resistance, and work hardening exercises

Selected References:

Coony W, Lin G. Improved tendon excursion following flexor tendon repair. *J Hand Surg* 12B:96, 1987.

Mackin E, Callahan A, Hunter J. Primary Care of Flexor Tendon Injuries. *Rehabilitation of the Hand and Upper Extremity*. St. Louis, Mosby, 2002.

Stanley B, Tribuzi S. *Tendon Injuries: Concepts in Hand Rehabilitation*. Philadelphia, Davis, 1992.

Strickland JW. Flexor Tendon Surgery. *J Hand Surg*. 1989;14B:368-382.

Verdan C. Primary and secondary repair of flexor and extensor tendon injuries. *Hand Surgery*. Baltimore, Williams & Wilkins, 1966