Triangular Fibrocartilage Complex (TFCC) Repair and Rehabilitation

Surgical Indications and Considerations

Anatomical Considerations: The triangular fibrocartilage complex (TFCC) is a structure found between the distal ulna and the ulnar carpals. It is composed of the articular disc, the meniscus homologue, the ulnar collateral ligament, the volar and dorsal radioulnar ligaments, and the sheath of the extensor carpi ulnaris. It arises from the ulnar aspect of the lunate fossa of the radius and extends to the base of the ulnar styloid. Blood supply is from the dorsal and palmar radiocarpal branches of the ulnar artery, dorsal and palmar branches of the anterior interosseous artery, and from the ulnar head itself. The central 80% of the TFCC is essentially avascular, thus tears in this region are thought to have poor healing potential. Additionally, some authors report that no blood vessels cross the radial attachment of the TFCC.

Pathogenesis: Disruptions of the TFCC can occur with trauma or as the result of degeneration, and asymptomatic, age-related TFCC lesions are fairly common. Traumatic injuries usually result from a fall on an outstretched, pronated hand; an acute rotational injury to the forearm; or an axial load and distraction injury to the ulnar border of the forearm. It has been shown that, with neutral ulnar variance, approximately 20% of the axial load is transmitted from the carpals to the ulna is through the TFCC. As the ulnar length increases, the force that is transmitted through the TFCC increases. Thus, positive ulnar variance may predispose a person to developing TFCC problems. Degeneration may result from hypovascularity and associated poor nutrition, particularly in the central portion of the TFCC, or repetitive loading to the TFCC.

Epidemiology: TFCC tears tend to occur in the dominant wrist. A large number of ruptures occur with radius fractures. Athletic activities that require upper extremity weight bearing, especially with the wrist in a hyperextended position, are more likely to cause TFCC disruption.

Diagnosis:

- Classic symptoms are ulnar sided wrist pain that is associated with popping or clicking
- Palpable tenderness over the TFCC
- Combined ulnar deviation and pronation/supination will produce popping or clicking and reproduce the patient's pain
- "Press Test" in which the patient is asked to lift himself out of a chair bearing weight on extended wrists has been shown to have 100% sensitivity for detecting tears
- Arthrography and MRI can be used for diagnosis, but this is being replaced by arthroscopy, as this has been found to be superior in detecting degenerative TFCC lesions

Nonoperative Versus Operative Management: Conservative management of TFCC injuries includes splinting for a period of time to reduce the symptoms – followed by progressive ROM and strengthening. However, if the patient's symptoms are not alleviated in 4-6 weeks, surgical repair or debridement is suggested. Conservative management tends to be ineffective for chronic (>6 mo.) and symptomatic injuries. Injuries to the central or radial portions of the disc are not

amenable to repair as these regions are avascular. However, debridement in these areas has been shown to be successful in several studies. Tears that occur peripherally can be directly repaired. In patients with positive ulnar variance additional surgical procedures may be required. These may include a wafer resection or ulnar shortening to decrease the variance.

Surgical Procedure: The surgical procedure that is chosen depends on the location of the lesion as well as preference of the surgeon. Central tears must be debrided as their poor vascularity precludes healing. Palmer et al found that removal of the central third of the fibrocartilage does not significantly alter the load placed on the ulnar wrist. Debridement can be performed via open dissection or arthroscopy. Lucio et al advocate arthroscopy with the use of a suction radial shaver to create a smooth, oval window in the TFCC. Peripheral tears can be directly repaired. The TFCC will initially be examined via arthroscopy, then an incision will be made over the ulnocarpal joint with care taken to protect the dorsal cutaneous branch of the ulnar nerve. The avulsed portion of the TFCC will be debrided, the ulnar fovea is roughened, and the torn border of the TFCC is then sutured down to the fovea.

Preoperative Rehabilitation: Prior to surgery patients may be educated in plans for post-operative rehabilitation including but not limited to: edema control techniques, guidelines for weight/use restrictions immediately post-op, and stages of tissue healing.

POSTOPERATIVE REHABILITATION

Note: The following guidelines arise from the Indiana Hand Therapy Protocols and Lucio et al. Please refer to these publications for additional information.

Phase I for Central Debridement: Days 3-5

Goals: Control edema and pain
Protect repair
Minimize deconditioning

Intervention:

- Bulky post-op dressing is removed
- Edema control begun with light compressive dressing to hand and forearm
- Active ROM exercises for wrist and forearm are begun 4-8 times a day
- A wrist splint is fabricated to wear between exercises and at night

Phase II for Central Debridement: Days 10-14

Goals: Control edema and pain
Continue to protect repair
Continue to minimize deconditioning
Begin scar management

Intervention:

- Scar management begun within 48 hours of suture removal
- Initiation of active-assist ROM for wrist and forearm

Phase III for Central Debridement: Weeks 3-4

Goals: Control edema and pain
Improve ROM

Intervention:

- Passive ROM of wrist and forearm may be initiated
- Dynamic wrist splinting may be begun to improve ROM
- Weighted wrist stretches may be initiated – also to increase ROM

Phase IV for Central Debridement: Week 6

Goals: Continue with ROM gains
Begin strengthening

Intervention:

- Progressive strengthening may be begun using putty or a hand exerciser
- The wrist immobilization splint may be discontinued if the patient is asymptomatic

Phase I for Peripheral Repair: Week 1

Goals: Edema control
Protect repair

Intervention:

- Patient remains in bulky post-op dressing
- Instructions in edema control

Phase II for Peripheral Repair: Week 2

Goals: Edema and pain control
Continue to protect repair
Limit deconditioning

Intervention:

- Removal of bulky dressing
- Edema control with retrograde massage, Isotoner glove, and/or coban wrapping
- Daily pin care as needed
- Long arm cast with 90° elbow flexion and wrist in neutral or wrist cock-up splint fabricated
- Active and passive ROM for wrist and digits, include tendon glides (lumbrical grip, hook fist, full fist)
- Isometric exercises for forearm/hand: 10 repetitions 4 times/day
- Low-grade isotonic exercises can be initiated if edema is not present (i.e., lightest putty)
- Light ADLs with 5 pound limit

Phase III for Peripheral Repair: Weeks 3-6

Goals: Edema and pain control
Increase ROM
Scar management
Improve strength

Intervention:

- Scar management with scar massage, scar pad
- Discontinue splint (unless patient is still symptomatic)
- Increase isotonic exercises up to 10 pounds maximum for upper arm, forearm
- Wrist mobility/weighted stretches with less than 5 pounds 3-4 times/day
- ADLs with less than 10 pounds

Phase IV for Peripheral Repair: Weeks 8 - Discharge

Goals: Continue to improve ROM
Continue to increase strength
Simulate work requirements

Intervention:

- Dynamic splinting as necessary to increase ROM
- Progress strengthening with putty, hand exerciser, free weights
- Simulate work tasks as able

Note: It is important to remember that the goal of the surgery is to eliminate the patient's wrist pain, therefore, aggressive PROM or strengthening that increases pain is not appropriate - working through pain associated with wrist stiffness or extrinsic tightness is appropriate, increasing ulnar-sided wrist pain is not.

If the patient has undergone an ulnar shortening in addition to the TFCC repair or debridement, the course of post-operative therapy will be altered.

Selected References:

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