

Another Light in the Dark: Review of a New Method for the Arthroscopic Repair of Triangular Fibrocartilage Complex

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The triangular fibrocartilage complex (TFCC) is an anatomically and biomechanically important structure. Repair of radial-sided TFCC tear has previously been challenging. We designed a new method of radial-sided TFCC tear repair and found that it was also applicable for ulnar-sided TFCC tear repair. From October 2006 to December 2010, 10 patients underwent this operation and were reviewed: 9 men and 1 woman, with a mean age of 33.9 years. Average postoperative follow-up was 8 months. We graded results according to the Mayo modified wrist score. We rated 2 of the 10 patients (20%) as “excellent,” 3 (30%) as “good,” and 5 (50%) as “fair.” The 5 patients who were rated as “fair” returned to regular jobs or had restricted employment. Based on this small sample, we recommend that this technique be considered an alternative method for TFCC repair. (*J Hand Surg* 2012;37A:1263–1268. Copyright © 2012 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Triangular fibrocartilage complex, repair, arthroscopic.

PALMER AND WERNER¹ first described the triangular fibrocartilage complex (TFCC). Palmer² classified TFCC tears as traumatic (type 1) and degenerative (type 2). Type 1 was subdivided according to the anatomical site of tissue disruption, whereas type 2 was based on the extent of the degenerative process (Table 1).

There are various methods of TFCC repair. For arthroscopic suturing of Palmer class 1B TFCC tear, the most common method is the outside-inside technique described by Zachee et al,³ in which 2 sutures are introduced into the joint by a needle and pulled out of the joint using forceps. A knot is tied into the sutures and drawn back into the joint. The other ends of sutures are then secured to each other subcutaneously. Corso et al⁴ reported another method of arthroscopic suturing.

Under arthroscopic guidance, edges of the tear are debrided with a power shaver. A curved cannulated suture passer is then inserted through the floor of extensor carpi ulnaris sheath through the peripheral edge of the torn TFCC. A loop suture retriever is placed over the end of the suture passer and the suture retriever is then pulled back out of the joint, bringing the end of the suture with it. The sutures are then tied down over the floor of the sixth extensor compartment.

Small vessels supply the TFCC of the wrist and penetrate it in a radial fashion from the palmar, ulnar, and dorsal attachments of the joint capsule. The inner portion and the radial attachment have a paucity of blood vessels.⁵ This has clinical meaning in that peripheral ulnar-sided TFCC tears are more likely, whereas radial-sided TFCC tears are less likely to heal after repair,^{5,6} even though with bone preparation of the distal end of the sigmoid fossa, the radial-sided TFCC tear can heal.⁷ Moreover, because the sigmoid fossa of radius has a relatively larger diameter than the distal ulna bone, it will be more difficult for the transosseous needle to target the radial insertion of TFCC from outside. This makes the radial-sided TFCC tear more difficult to repair using the outside-inside techniques. All of these above reasons make radial-sided TFCC tear

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Received for publication June 18, 2011; accepted in revised form March 23, 2012.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

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0363-5023/12/37A06-0032\$36.00/0
http://dx.doi.org/10.1016/j.jhsa.2012.03.037

TABLE 1. Classification of TFCC Tears

Class of TFCC Tear	Feature
1A	Isolated central TFCC articular disk perforation
1B	Peripheral ulnar-sided TFCC tear (with or without ulnar styloid fracture)
1C	Distal TFCC disruption (disruption from distal ulnocarpal ligaments)
1D	Radial TFCC disruption (with or without sigmoid notch fracture)
2A	TFCC wear
2B	TFCC wear with lunate and/or ulnar chondromalacia
2C	TFCC perforation with lunate and/or ulnar chondromalacia
2D	TFCC perforation with lunate and/or ulnar chondromalacia and with lunotriquetral ligament perforation
2E	TFCC perforation with lunate and/or ulnar chondromalacia, lunotriquetral ligament perforation, and ulnocarpal arthritis

challenging to repair. There are only a few published descriptions of this repair.^{7–10} Long-term clinical improvement after repair of radial-sided TFCC tear was reported in the 1990s (Cooney WP, Sagerman SD, Short WH, presented at the 49th Annual Meeting of the American Society of Surgery of the Hand, 1994). Since then, repair of radial-sided TFCC tear has gained more attention: Sagerman and Short¹⁰ described a method for arthroscopic repair of radial-sided TFCC tear in 1996.

We used a new TFCC repair technique for radial-sided TFCC tears. We found that this technique could also be applied to repair of ulnar-sided TFCC tears.

INDICATIONS AND CONTRAINDICATIONS

Candidates for arthroscopic TFCC repair include those who have TFCC injury with persistent or worsening ulnar wrist pain, or notable power grip loss after a period of nonoperative treatment.

Contraindications include patient improvement after nonoperative treatment and patient refusal to have surgery.

SURGICAL ANATOMY

Anatomically, the TFCC of the wrist consists of articular disc, dorsal and volar radioulnar ligaments, meniscus homologue, ulnar collateral ligament, and the sheath of the extensor carpi ulnaris. Biomechanically, it

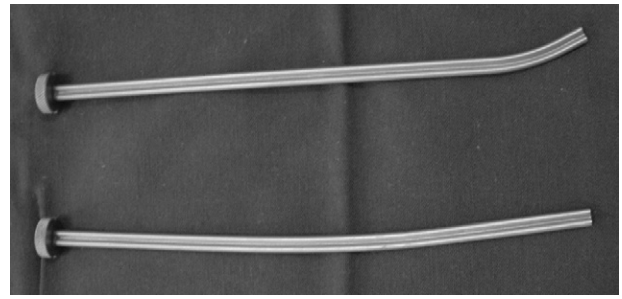


FIGURE 1: Meniscal-double-barrel cannula. The cannula with a curved tip is used for ulnar-sided TFCC tear repair.

functions as a force absorber for the ulnar carpus,¹¹ stabilizes the distal radioulnar joint (DRUJ),^{12–14} and stabilizes the ulnar carpus through the ulnar carpal ligament complex. Untreated TFCC tear is associated with arthritic changes in the lunate, ulna, and triquetrum, and loss of motion and grip strength in the wrist.¹⁵

SURGICAL TECHNIQUE

The operation is performed under regional or general anesthesia with the patient in a supine position. An upper-arm tourniquet is applied at 100 mm Hg above systolic blood pressure. Finger traps are applied to the index, middle, and ring fingers. The fingers are suspended with 10 lb traction by a sterile upright traction tower; a 3–4 portal, 4–5 portal, and 6U portal are created. Wrist arthroscope is inserted for exploration to locate the TFCC tear. A probe is inserted via the 6R portal (for an ulnar-sided TFCC tear) or the 4–5 portal (for a radial-sided TFCC tear). The articular disk is then examined by the probe with the so-called trampoline test. Loss of tension and absence of disk rebound indicates detachment from the insertion sites. The 6U portal is used as an outflow.

To repair an ulnar-sided TFCC tear, a meniscal-double-barrel cannula (Figs. 1, 2) is inserted through the 4–5 portal, targeting the fovea. The curve at the tip of the cannula makes targeting of the fovea simpler. We avoid the 3–4 portal because it is relatively more distant from the ulnar-sided TFCC. Insertion via this portal could cause iatrogenic cartilage injury more easily. Two Kirschner wires (size 1.0 mm in diameter [0.04 in]) are drilled via the double-barrel instrument, through the ulnar TFCC and distal ulna bone, and exit on the ulna aspect of ulna. We then use a double-armed straight needle (2 straight needles sharing a common threaded suture) (Fig. 3). One of the needles is passed through the barrel and ulna bone, all the way through the skin. The other needle is then passed through the other barrel

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