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## Original Article

# Short-term evaluation of arthroscopic outside-in repair of ulnar side TFCC tear with vertical mattress suture



Maysara Abdelhalim Bayoumy<sup>\*</sup>, Hesham A. Elkady, Hatem G. Said,  
Amr El-Sayed, Waleed Riad Saleh

Orthopaedic and Traumatology Department, Assiut University Hospital, Assiut 71111, Egypt

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## ABSTRACT

**Background:** There has been controversy regarding the pathogenesis and treatment of TFCC tear. Different surgical techniques for the treatment of TFCC are prescribed. The purpose of this study was to evaluate the short-term outcomes of arthroscopic outside-in repair of the ulnar side TFCC tear with vertical mattress suture.

**Methods:** In this study, arthroscopic outside-in repair of the ulnar side TFCC tear was done. 37 patients with TFCC tear with failure of conservative treatment for a minimum of 6 months had surgery. Outcomes were assessed using modified Mayo wrist score (MMWS), the Disability of the Arm, Shoulder, and Hand (DASH), visual analog scale (VAS) for pain and satisfaction criteria, and patient-related wrist evaluation score (PRWE), in addition to the range of motion and grip strength.

**Results:** After arthroscopic surgery, overall satisfaction was extremely positive, and out of the 37 patients, 91.9% of the patients are satisfied. The mean score for pain improved from 7.6 to 2.9 points. The mean MMWS was improved from 62.1 to 91.2 points. DASH score also improved from 29.9 to 10.2 points and PRWE improved from 60 to 33 points. The ROM was improved from 85.8% to 92% of the normal side. The grip strength of the affected side improved from 82.5% to 89% of the normal side. All improvements are statistically significant ( $P < 0.05$ ).

**Conclusion:** Arthroscopic outside-in repair of ulnar side TFCC tear with mattress suture is a reproducible method with a marked improvement in function within a short period.

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<sup>\*</sup> Corresponding author.

E-mail address: [mysarahalim2010@gmail.com](mailto:mysarahalim2010@gmail.com) (M.A. Bayoumy).

**Abbreviations:** TFCC, triangular fibrocartilage complex; NSAIDS, non-steroidal anti-inflammatory drugs; DRUJ, distal radio-ulnar joint; MMWS, modified Mayo wrist score; DASH, Disability of the Arm Shoulder and Hand; VAS, visual analog scale; PRWE, patient related wrist evaluation; ROM, range of motion; ECU, extensor carpi ulnaris.

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## 1. Introduction

Triangular fibrocartilage (TFC) injuries are increasingly recognized as a cause of ulnar-sided wrist pain. Palmer grouped these tears into either traumatic or degenerative with various subclassifications.<sup>1</sup>

The traumatic lesions (class I) were grouped into four types. Type A is a central tear in the TFCC disk. Type B is peripheral tear from the ulnar side. Type C is a tear in the palmar side of the TFCC. Type D is a radial avulsion of the TFCC. Degenerative tears of the TFCC (type II) are caused by normal aging or arthritis.<sup>2</sup> The central area of fibrocartilage disk is avascular, and is therefore called the debridement zone (60% of TFCC). 10–40% of the peripheral area of the TFCC has an extensive blood supply, and is therefore called the repair zone. This vascularity enables the surgeon to effect arthroscopic suture repair of peripheral Palmer type IB and ID TFCC tears which yielded encouraging results in many studies.<sup>3</sup>

Conservative treatment for TFCC injury generally includes compresses, long arm splints or elastic bandages, and NSAIDs. Many patients experience relief of symptoms with such conservative treatment.<sup>3</sup> When the response to conservative treatment is poor, and in cases of wide rupture of the TFCC, surgical treatment is recommended due to the risk of DRUJ instability.<sup>4</sup>

Acute type IB peripheral tears have been shown to be amenable to suture repair if they fail non-operative management. Both open and arthroscopic series have shown good improvement in pain, grip strength, and function with repair of peripheral tears.<sup>5</sup>

Several arthroscopic methods have been described, including inside-out, outside-in, and all-arthroscopic techniques.<sup>6</sup>

The “outside-in” repair, which involves piercing the TFCC via the ulnar side of the wrist, has been described by several authors.<sup>7</sup> The “outside-in” techniques vary among authors with instrumentation and subtle surgical modifications.<sup>8</sup>

The purpose of this study was to evaluate the short-term outcomes of arthroscopic outside-in repair of the ulnar side TFCC tear with vertical mattress suture, using different validated scores. Authors also attempted to identify socio-demographic factors and that may be associated with the outcomes after arthroscopic surgery for type 1B TFCC tear.

## 2. Materials and methods

### 2.1. Patients

Our study consisted of 37 consecutive arthroscopic outside-in TFCC repair for type 1B TFCC tear performed in 37 patients between February 2011 and March 2013. There were 29 male (29 wrists, 78.4%) and 8 female (8 wrists, 21.6%). The average patient age at the time of surgery was 23.3 years (range: 18–34 years). 17 patients (45.9%) were involved in heavy manual labor, 11 patients (29.8%) were house wives, 5 patients (13.5%) were employed, and 4 patients (10.8) not working at the time of surgery. 26 (70.2%) of the 37 wrist involved the dominant arm. All of these TFCC tears were treated non-operatively before undergoing arthroscopic release. Non-operative measures

used were rest, activity modification, splint, physical therapy, non-steroidal anti-inflammatory medication, and corticosteroid injection. The mean duration of this treatment was 11.1 months (range: 5–36 months). Clinically, the predominant symptoms were pain that increased with ulnar deviation and grasping. On physical examination, patients consistently had point tenderness distal to the ulnar styloid as well as positive TFCC stress test and TFCC stress test with compression. A neutral rotation posteroanterior radiograph and a pronated grip view to detected ulna positive showed 21 wrists with ulna neutral and 13 wrists with ulna minus and 4 wrists with ulna positive. MRI detected the lesion in 33 of the affected wrists.

All patients underwent an examination and evaluation preoperative and at 1.5, 3, 6, 12, 18, and 24 months postoperatively. Patients' assessment consisted of evaluating the range of motion (ROM) and grip strength (grip strength data are reported as percentage of strength compared with the contralateral healthy wrist). Health-related quality of life outcomes were assessed using two different scores including the Disability modified Mayo wrist score (MMWS) of the Arm, Shoulder, and Hand (DASH), Visual Analog Scale (VAS), and Patient Reported Wrist Evaluation (PRWE).

### 2.2. Operative procedure

The operation is performed under general anesthesia. The patient is positioned supine with the shoulder abducted and the involved extremity on an arm board. A non-sterile tourniquet is used. The hand and forearm are draped freely after being prepared and 10–15 lbs of traction are applied to the long and ring fingers through the finger traps and placed into the wrist traction tower (Linvatec) (Fig. 1).

A standard 3–4 portal just distal to Lister's tubercle is used as the viewing portal for the 2.7-mm arthroscope throughout the TFCC repair process (Fig. 2). We routinely make a 6-R portal under needle localization just radial to the ECU as the working portal during the repair. After completing a standard diagnostic arthroscopy, the morphology of the TFCC tears had been closely examined. The tear pattern most amenable to the repair technique described here is type IB tear of the TFCC without any clinical or arthroscopic evidence of DRUJ instability (Fig. 3). Such a tear will often have a positive trampoline test or loss of elastic recoil when the articular disk is depressed with a probe, suggestive of loss of tension to the ulnar capsule.

Once the tear has been identified and clearly visualized with the assistance of a probe (Fig. 4), the scar tissue is removed with a synovial shaver, allowing for a new bleeding surface for new scar tissue formation.

2 cm longitudinal incision is made on the ulnar side of the wrist just volar to ECU. Blunt dissection with a right-angled clamp is used to identify and protect any branches of the dorsal sensory branch of the ulnar nerve within the field, and dissection is carried down to the retinaculum.

The instrument set for repair composed from 2 of 24 gauge needle is used for outside-in repair and 3-0 proline suture as a loop (as the set of the meniscus is of large caliber and can injure the disk). The following steps pertain to each repair suture placed. The typical tear will accommodate between 1 and 2 mattress stitches, with the most volar stitch placed first.

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