Should all superficial peripheral triangular fibrocartilage complex tears be arthroscopically repaired?

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Background
Superficial peripheral triangular fibrocartilage complex (TFCC) tears are commonly encountered during diagnostic wrist arthroscopy done for other causes of wrist pain. The authors hypothesized that debridement of these tears in symptomatic post-traumatic superficial tears may be a sufficient alternative to arthroscopic repair.
Patients and methods
The authors conducted a prospective study including 29 patients with superficial peripheral TFCC tears (with no distal radioulnar joint instability) treated arthroscopically between 2011 and 2014. There were 26 males (89.7%) and three females (10.3%), with a mean age of 32.90 years (range: 21–59 years). The dominant hand was affected in 19 patients (65.5%) and the nondominant in 10 patients (34.5%). Patients were divided into two groups. The first group included 14 patients to whom arthroscopic shaving and debridement (debridement group) were done. The second group included 15 patients for whom arthroscopic repair (repair group) was done using the outside-in technique. Patients were evaluated with the visual analog scale (VAS) for pain, the quick score disability arm shoulder hand (DASH) score, and Mayo modified wrist score.
Results
There were no statistically significant differences in pain, disability, and functional scoring between both groups in the short-term follow-up. In the first group, the mean follow-up period was 21.87 months. The mean VAS improved from 3.53 to 1.07, the mean quick DASH score improved from 36.33 to 21.60, and the mean Mayo modified wrist score improved from 71.33 to 85.33. In the second group, the mean follow-up period was 19.71 months. The mean VAS improved from 3.86 to 1, the mean quick DASH score improved from 34.43 to 19.79, and the mean Mayo modified wrist score improved from 77.14 to 90.
Conclusion
Arthroscopic debridement gives comparable short-term results to repair in symptomatic superficial tear of the TFCC presenting with pain and no instability. Debridement group showed less complication and reoperation rate.

Keywords:
arthroscopic repair, superficial peripheral, triangular fibrocartilage complex

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Introduction

The triangular fibrocartilage complex (TFCC) is a critical component of wrist mechanics, serving important functions in both load transmission and distal radioulnar joint (DRUJ) stability [1–3]. A TFCC disruption can cause DRUJ instability [4–6] and functional impairment due to ulnar-sided wrist pain and decreased grip strength [7–12]. Recommended treatment of TFCC tears is variable, depending on the location and chronicity of the tear [13], and concomitant pathology.

Recent histology and functional anatomy research demonstrates that the ulnar side of the TFCC is arranged in a complex three-dimensional manner and separated into three components: the proximal triangular ligament, the distal hammock structure, and the ulnar collateral ligament [14].

The distal hammock structure and the ulnar collateral ligament are considered to make up the 'distal component of the TFCC (dc-TFCC),' opposite to the 'proximal component (pc-TFCC),' represented by the proximal triangular ligament (Fig. 1). The proximal triangular ligament originates from the fovea ulnaris and spans to the ulnar corners of the distal radius with two limbs, palmar and dorsal. It is considered to be the true radioulnar ligament that stabilizes the DRUJ [16].

The purpose of this study was to compare the results of arthroscopic repair versus arthroscopic debridement of

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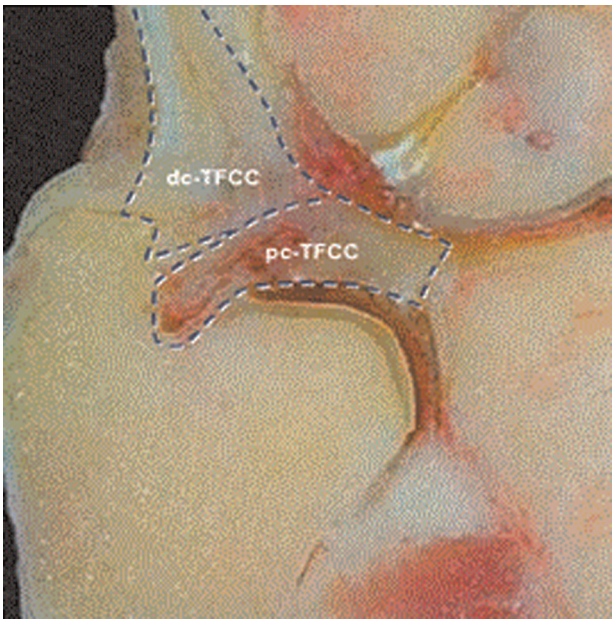
Figure 1



Coronal slice of the ulnar wrist. The triangular fibrocartilage complex is outlined [15].

superficial peripheral TFCC tears with the deep fibers intact and not causing DRUJ instability.

Patients and methods

We recruited 29 patients with superficial peripheral TFCC tears (with no DRUJ instability) and treated them arthroscopically between 2011 and 2014. The study was approved by the institutional ethics committee in the Orthopedic Department of Orthopaedic Surgery, Cairo University, Cairo, Egypt. We included patients with post-traumatic ulnar side wrist pain that failed a 3-month physical therapy program. Upon systematic physical examination of the wrists, all patients had foveal tenderness and stable DRUJ with negative ballottement and clinical exclusion of other causes of ulnar side wrist pain like lunotriquetral instability, pisotriquetral arthritis, hook of hamate nonunion, radioulnar osteoarthrosis, and FCU or FCR tendinitis. Radiographs of both wrists were examined to exclude previous ulnar styloid and other fractures, as well as DRUJ asymmetry of patients with ulna plus variation. MRI of all patients confirmed the diagnosis and excluded other pathologies.

There were 26 males (89.7%) and three females (10.3%), with a mean age of 32.90 years (range: 21–59 years). The dominant hand was affected in 19 patients (65.5%) and the nondominant in 10 patients (34.5%). Patients were divided into two groups. The first group included 14 patients, for whom arthroscopic shaving and debridement were done. The second group included 15 patients, for whom arthroscopic repair was done using the outside-in technique. Patients were evaluated with visual analog scale (VAS) for pain, the quick score disability arm shoulder hand (DASH) score, and Mayo modified wrist score.

Technique

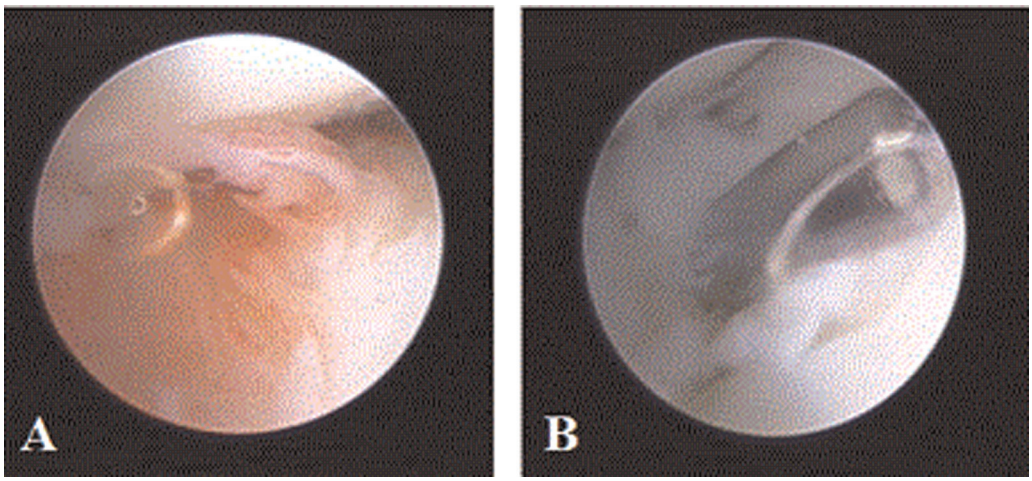
(1) Setup: patients were placed supine with a padded pneumatic tourniquet applied to the upper arm. Chinese finger traps were applied to index, ring, and little fingers for traction. Weight of 10–15 lbs was applied at the tourniquet level as a counter traction.
(2) Technique: a standard 3–4 portal just distal to Lister's tubercle was used as the viewing portal for the 2.7-mm arthroscope. We routinely made a 6-R portal under needle localization just radial to the extensor carpi ulnaris (ECU) initially as an outflow portal and later as the working portal. The forearm was wrapped with a compressive elastic bandage, and continuous saline solution irrigation is instilled by gravity infusion from an elevated bag to minimize fluid extravasation. Standard diagnostic wrist arthroscopy was performed for exclusion of associated pathology. Midcarpal portals were not routinly performed unless necessary. After completing a standard diagnostic arthroscopy, the morphology of the TFCC tear was closely examined. Usually the TFCC tear was overlied with synovitis, which is shaved by 2.5 shaver to properly evaluate the tear (Fig. 2). The TFCC tear was examined with a probe to identify its boundaries and document its location (Fig. 3). All tears were peripheral with loss of their trampoline effect but intact radial and distal attachments and no central perforations. Hook test was performed to make sure that the deep part of TFCC was intact.

In the first group, arthroscopic shaving and debridement were only done. After surgery, wrist bandage was applied, and physiotherapy was started immediatelly postoperaative.

In the second group, arthroscopic repair was done

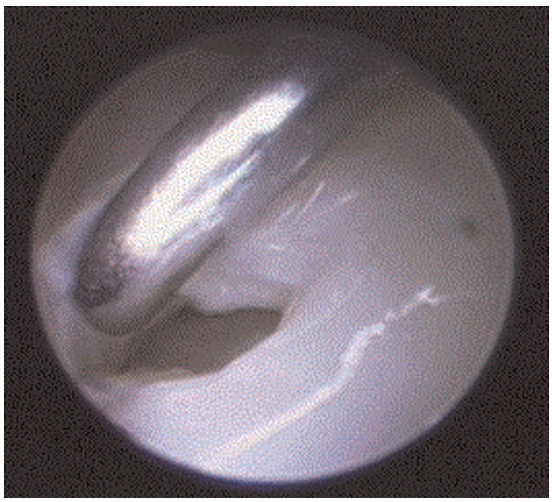
The ulnar part of the TFCC is vascular and amenable to repair. Repair was done using the outside-in technique. The edges of the tear were debrided. A 1–2-cm longitudinal skin incision was made ulnar to the ECU tendon. The dorsal branch of ulnar nerve was identified and protected (Fig. 4).

Figure 2



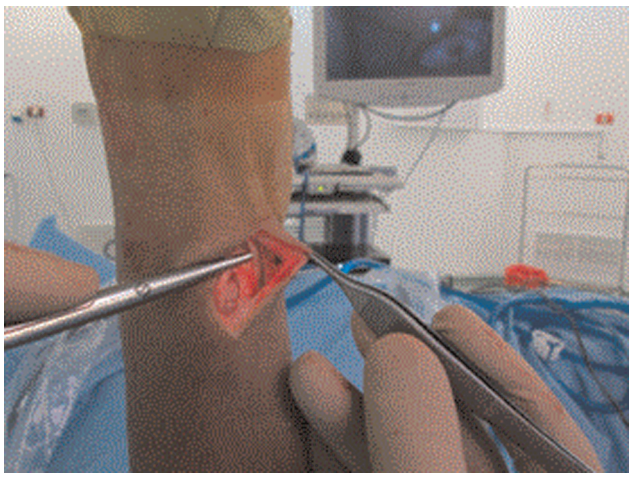
(a) Synovitis overlying the triangular fibrocartilage complex tear. (b) Shaving is done.

Figure 3



Identifying the triangular fibrocartilage complex tear with a probe.

Figure 4



The dorsal branch of ulnar nerve is identified and protected.

Protecting the ECU tendon radially, a needle was passed through the floor of the sheath and across the tear under arthroscopic visualization (Fig. 5). A 2-0 PDS, ethibond, or prolene suture was passed through the needle (Fig. 5). The suture was grasped and retrieved through the 6-R portal and then the suture was passed under the ECU tendon to avoid a knot over the tendon (Fig. 6).

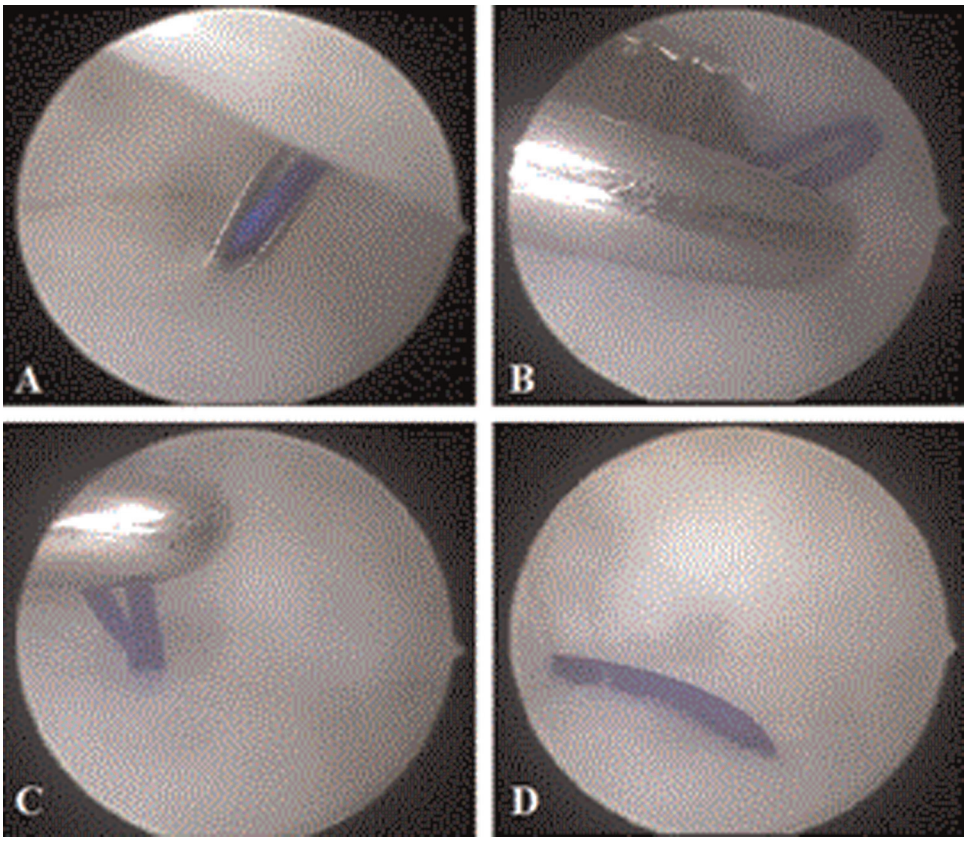
The needle was removed, the tear was re-approximated, and the suture was tied over the ulnar wrist capsule (Figs. 5–11). Multiple sutures may be necessary. The tightness of repair was examined arthroscopically by checking the resilience of the TFCC and restoration of its trampoline property. After surgery, the wrist is immobilized in an above-elbow cast for 2 weeks and then Monster cast blocking pronation and supination for 4 more weeks.

Results

Between 2011 and 2014, we performed arthroscopic management for 29 patients with superficial peripheral TFCC tears without DRUJ instability. There were 26 males and three females, and the average age was 32.90 years (range: 21–55 years) and average duration of symptoms was 8.9 months (range: 4–23 months).

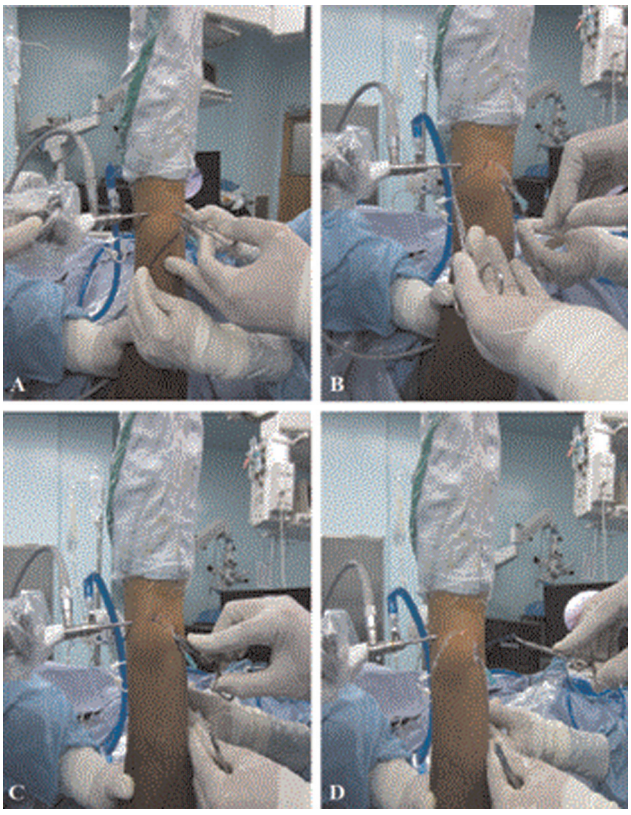
The first group included 14 patients for whom arthroscopic shaving and debridement were only done. The group included 12 males and two females, with an average age of 32.36 years (range: 22–52 years), and the average duration of symptoms was 9.07 months (range: 4–23 months). The preoperative mean VAS score was 3.86 (range: 2–6), the mean quick DASH score was 34.43 (range: 20–48), and the mean Mayo modified wrist score was

Figure 5



Repair of ulnar triangular fibrocartilage complex tear using the outside-in technique.

Figure 6

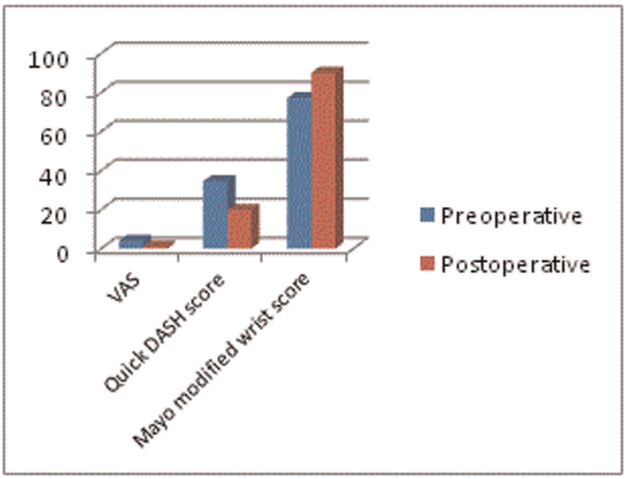


Suture retrieval during the outside-in repair.

77.14 (range: 70–85). The mean follow-up period was 19.71 months (range: 16–24 months). No PO immobilization was seen. The mean PO rehabilitation period was 6 weeks (range: 4–8 weeks). The mean postoperative VAS score was 1 (range: 0–4) (P=0.001), the mean quick DASH score was 19.79 (range: 11–29) (P<0.01), and the mean postoperative Mayo modified wrist score was 90 (range: 80–95) (P<0.01). Only one patient had persistent pain, and one patient developed transient irritation of DBUN, which resolved in 3 months.

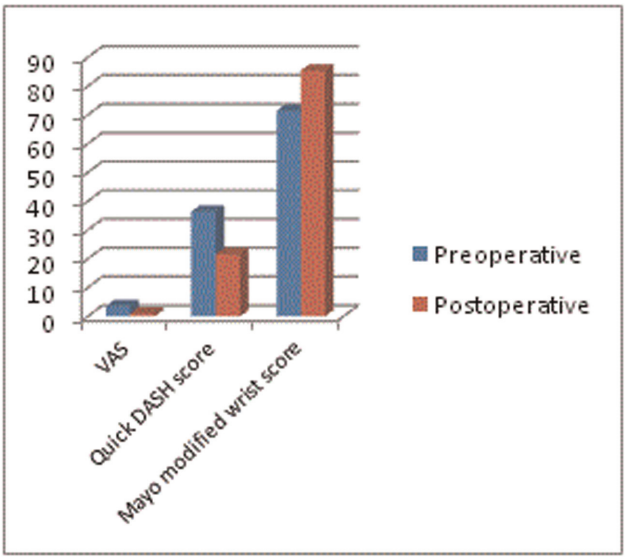
The second group included 15 patients, for whom arthroscopic outside-in repair to the ulnar capsule was done. The group included 14 males and one female, and the average age was 33.40 years (range: 21–55 years), and the average duration of symptoms was 8.80 months (range: 4–22 months). The preoperative mean VAS score was 3.53 (range: 2–6), the mean quick DASH score was 36.33 (range: 22–48), and the mean Mayo modified wrist score was 71.33 (range: 60–85). The mean follow-up period was 21.87 months (range: 18–30 months). The mean postoperative immobilization was 5 weeks (range: 4–6 weeks). The mean postoperative rehabilitation period was 20.27 weeks (range: 16–24 weeks). The mean postoperative

Figure 7



Mean results of the first group.

Figure 8



Mean results of the second group.

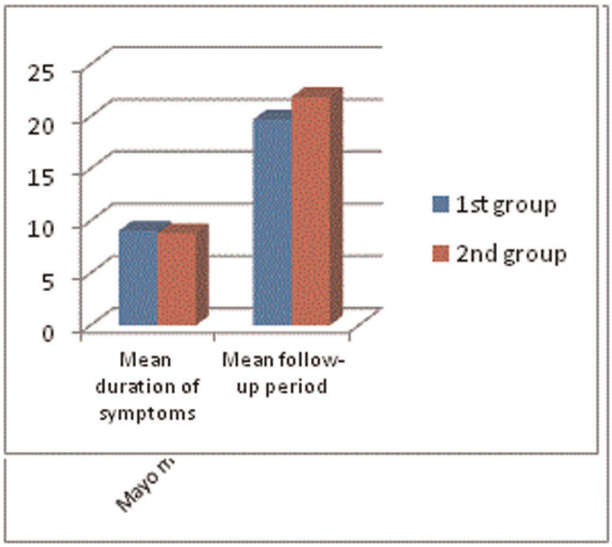
VAS score was 1.07 (range: 0–4) (P=0.001), the mean quick DASH score was 21.60 (range: 11–35) (P<0.01), and the mean postoperative Mayo modified wrist score was 85.33 (range: 80–95) (P<0.01).

Four patients had persistent pain. Two patients had irritation of DBUN. Four patients had stitch irritation, and two of them had second surgery for stitch removal.

Discussion

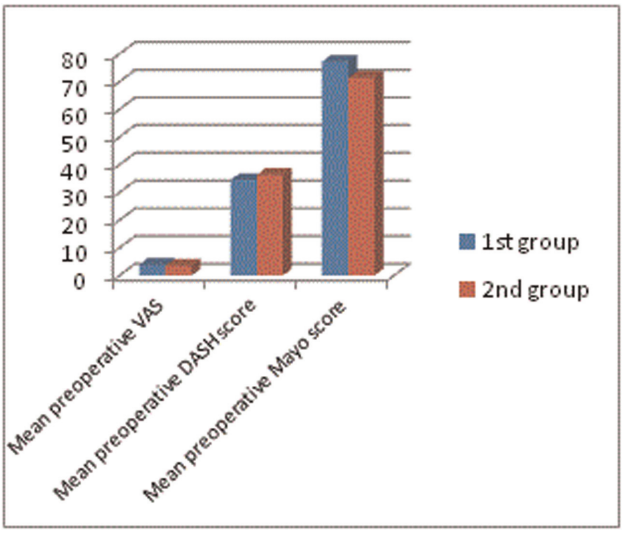
Injuries to the TFCC are becoming more recognized within athletics, and it is critical that appropriate history, physical examination, and diagnostic studies be used to not only differentiate TFCC tears

Figure 9



Mean duration of symptoms and follow-up in both groups.

Figure 10

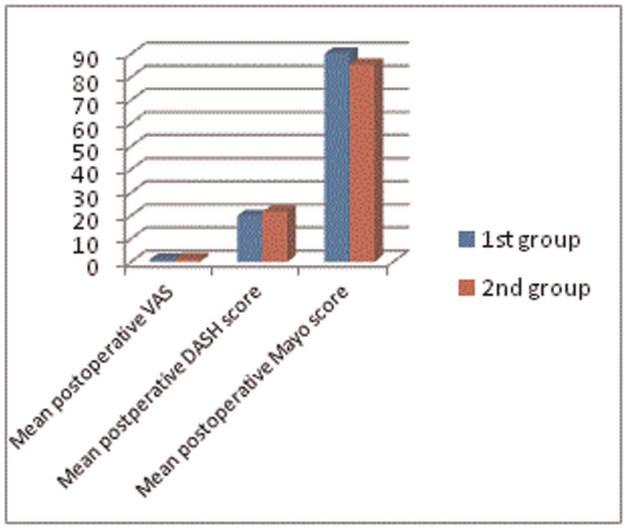


Mean preoperative scores for both groups.

from other sources of ulnar-sided wrist pain but carefully assess for any DRUJ instability or ulnar impaction [17].

Palmer's original classification divides TFCC tears into traumatic (type I) and degenerative (type II), with type IB representing an avulsion of the TFCC from its insertion on the distal ulna, with or without a concomitant ulnar styloid fracture, which Palmer noted that it was usually associated with DRUJ instability. Atzie and colleagues later noted that some peripheral tears affects the superficial part only with no effect on the DRUJ stability [13,15].

Figure 11



Mean postoperative scores for both groups.

Debridement of TFCC tears has shown good results with debridement of central and radial tears [9,18–20]. Repair of peripheral tears, whether open or arthroscopic, has demonstrated excellent outcomes, with improvement in pain, grip strength, and function [10,21–23].

Arthroscopic treatment has been gaining favor, owing to the ability to easily address other intra-articular pathology as well as improve visualization of the tear, and the results suggest improved range of motion and grip strength over open techniques [24–26].

Several series have shown good results of arthroscopic repair of peripheral TFCC tears with the outside-in technique [17].

Tunnerhoff and Haussmann reported on 23 arthroscopic repairs of type IB tears, with improvement in Mayo wrist score noted. However, 38% of their cohort had preoperative DRUJ instability, and instability was a predictor of poorer outcome [27].

In a study by Wysocki and colleagues, 29 wrists were treated arthroscopically for peripheral TFCC tears with outside-in suture repair of the TFCC to the ulnar capsule. A total of 25 patients (90%) were available for follow-up at a mean of 31 months. The mean VAS score improved from a preoperative score of 5.4 to a score of 0.9 at the final follow-up. Of 11 high-level athletes in the total cohort, 64% were able to return to sports; however, athletes who bore weight through their hands were unable to return to their sporting activity [28].

Our study is the first to attack superficial peripheral TFCC tears (without DRUJ instability) with arthroscopic shaving and debridement only without repair and to compare the results with those of arthroscopic repair. The average follow-up period for all patients in the study was 20.83 months (range: 16–30 months).

In the first group, there was no PO immobilization, with shorter period of rehabilitation (average 6 weeks) than the second group (average 20.27 weeks). The mean PO scores were slightly better in the first group. Complications were less in the first group in comparison with the second group, in which stitch irritation occurred in four patients, with second surgery for stitch removal.

Conclusion

Arthroscopic debridement of superficial peripheral TFCC tears without DRUJ instability gave good statistically significant results, with less complication rate and earlier rehabilitation than the arthroscopic repair.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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