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Case Report

Arthroscopic Treatment of Bucket-Handle Triangular Fibrocartilage Complex Injury

João Carlos Nakamoto, MD, PhD, *[†] Marcela dos Santos Martins, MD, * André Gustavo Pires, MD *

* Instituto Vita, São Paulo, Brazil

† Hand and Microsurgery Division, the University of Campinas, São Paulo, Brazil

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Bucket-handle injury to the triangular fibrocartilage complex is a rare and poorly described condition in the literature that is not included in the Palmer classification. A young man presented with right wrist torsional trauma while playing sports. He progressed with local pain and limited range of motion with a supination block. Magnetic resonance imaging revealed a bucket-handle injury to the central portion of the triangular fibrocartilage complex with a volar flap, measuring 0.6 cm × 0.6 cm. The patient underwent wrist arthroscopy with debridement, removal of a loose body, and resection of the bucket-handle lesion. In the postoperative period, pain alleviation and a considerable gain in range of motion occurred. The patient was able to resume his participation in sporting activities 3 months after surgery. There is no consensus about the treatment of bucket-handle injuries to the triangular fibrocartilage complex because of the small number of cases described in the literature.

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The triangular fibrocartilage complex (TFCC) is located between the radius, ulna, lunate, and triquetrum and is formed by 5 components: central disc, dorsal and volar radioulnar ligaments, extensor carpi ulnaris tendon sheath, and meniscal homologue.¹ Primary functions of the TFCC include providing stability to the ulnocarpal joint and the distal radioulnar joint (DRUJ) and distributing forces between the ulna and the carpals, allowing the performance of harmonic rotation movements of the wrist and forearm.¹

Triangular fibrocartilage complex injury is one of the most common causes of pain along the ulnar side of the wrist. Clinical history and physical examination may assist in the diagnosis. Patient complaints include pain; limited range of motion (ROM), particularly in pronation and in supination; loss of grip strength; and difficulty in performing daily activities.² However, since other injuries may cause similar symptoms, hand surgeons often choose to order magnetic resonance imaging.¹ Arthrography,

arthroresonance, and arthroscopy may also be useful tools for diagnosis and potential treatment.³

Triangular fibrocartilage complex alterations may be congenital or acquired.³ It is important to recognize these variations to guide treatment. Meniscoid articular disc and congenital perforations are highlighted among the anatomical variations of TFCC described in the literature, and the latter is the most common form.⁴ Acquired alterations may be traumatic or degenerative and are classified according to the Palmer classification system.⁵

Bucket-handle TFCC injury is characterized by tissue disruption with a vertical or oblique tear with longitudinal extension. The central part forms a free disc fragment that dislocates toward the central portion of the DRUJ, causing a mechanical movement block. Few cases in the literature describe this rare type of injury. Furthermore, this injury pattern is not included in the commonly used Palmer classification system.

This case report describes a patient diagnosed with traumatic bucket-handle TFCC injury.

Case Report

A 35-year-old right-handed male polo player sustained a right wrist torsional injury during a game. While swinging the mallet, the wrist received a load with ulnar deviation and progressive force

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Corresponding author: João Carlos Nakamoto, MD, PhD, Instituto Vita, Rua Mato Grosso 306, 1° andar, São Paulo 01239-040, Brazil.

E-mail address: joao@vita.org.br (J.C. Nakamoto).

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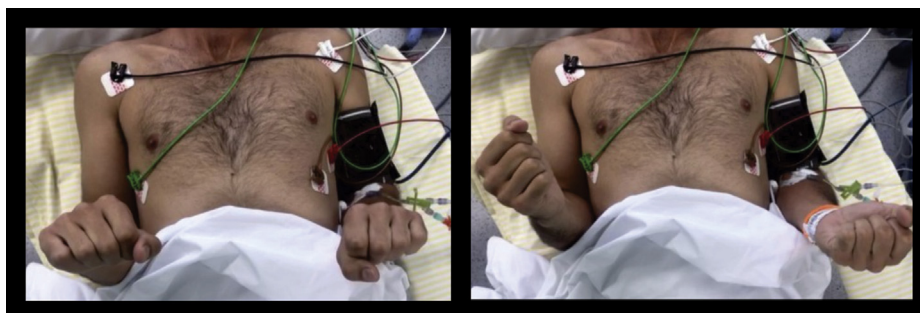


Figure 1. Presence of limited supination on physical examination.

in pronation. He developed acute right ulnar-sided pain accompanied by local swelling. He remained at rest after the event and sought medical attention 3 weeks following the trauma because of persistent pain. He had a prior history of ulnar-sided wrist pain dating from 2 years back, treated conservatively with rehabilitation.

On physical examination, he presented with mechanical block to supination (Fig. 1), swelling along the ulnar border of the wrist, pain on palpation of the TFCC region, pain on application of a shear force to the DRUJ, and weakness in grip.

The initial radiographs did not demonstrate any fractures. Magnetic resonance imaging showed a complex TFCC lesion, represented by central rupture of the triangular fibrocartilage in the most volar portion, with a rotated flap insinuating into the volar portion of the DRUJ, measuring approximately 0.6 cm × 0.6 cm. The distal TFCC insertion into the styloid process was preserved. The dorsal and radioulnar ligaments were intact (Fig. 2).

Arthroscopic intervention was the procedure of choice because of the mechanical block of the wrist, which persisted even after pain relief with anesthesia and because of the patient's wish to resume sporting activities as soon as possible.

The patient underwent wrist arthroscopy using the conventional 6R portals (from radial to ulnar extensor of the carpus) and three-fourths portal (between the third and fourth extensor). During the procedure, the presence of loose articular bodies was observed (Fig. 3A), in addition to central perforation (Fig. 3B). The periphery of the TFCC was intact. After the removal of the loose body and debridement, eversion of the bucket-handle lesion was performed with a probe introduced through the perforation (Fig. 3C), which enabled its resection (Fig. 3D). Immediately, the ROM of the wrist was tested, observing a gain in supination and maintenance of articular stability. Chondral lesions were observed both in the triquetrum (Fig. 3E) and the ulnar head (Fig. 3F), suggesting ulnocarpal impaction. The procedure of choice was debridement with microfracture of the chondral lesions.

A postoperative orthosis was indicated for pain control for 3 weeks. In the first week after surgery, rehabilitation was initiated to reduce swelling, with active/passive wrist ROM and control of scarring adhesions. Isometric strengthening of the forearm and intrinsic musculature was initiated. At 1 month after surgery, joint angles of protection were introduced to increase muscle strength. Exercises were performed with ROM in the second month (Fig. 4). At 3 months after surgery, the patient reported no pain, with a symmetric ROM to the contralateral side, and was allowed to resume sporting activities. At the 9-month follow-up, the patient reported a *Quick-DASH* score of 0 of 100.

Discussion

Surgical treatment for TFCC injuries is classically indicated in cases of DRUJ instability, in which there is avulsion of TFCC insertion in the ulnar fovea.⁶ The peripheral portion of the TFCC is highly vascularized, and injuries to the peripheral zone have good healing potential after surgical suturing with the re-establishment of TFCC function and prevention of the development of degenerative changes in the radiocarpal joint and DRUJ.⁵

The central portion of the TFCC is poorly vascularized, limiting the ability of that region to heal when subjected to surgical repair. Therefore, arthroscopic debridement is the preferred treatment for central lesions to remove loose bodies and irregularities, creating a homogeneous surface.² A biomechanical study has shown that up to 80% of the TFCC disc substance may be removed without resulting in iatrogenic instability.²

The management of acute, traumatic, central TFCC injury is dependent on DRUJ stability. In the absence of DRUJ instability, conservative treatments such as rest, withdrawal from sporting activities, the use of orthosis, physical therapy, and corticosteroid joint injections are indicated.²

It is believed that bucket-handle TFCC injury evolves from an injury to the central part where a detached flap blocks the DRUJ. It occurs in a manner similar to bucket-handle injury to the meniscus of the knee.² The Palmer classification system does not include bucket-handle TFCC injuries. Furthermore, few TFCC cases have been described in the literature. As a result, there is no consensus on optimal treatment for this type of injury. Some authors prefer surgical repair as long as this injury is in the peripheral and better vascularized portion.⁷

In the current study, the patient underwent debridement and resection of the bucket-handle lesion. The choice for resection of the lesion and its debridement over the repair was because the lesion was located in the central portion of the TFCC. The potential for local healing would be low, and there would be a high chance of recurrence. Another reason was that the patient did not have joint instability. Procedures such as shortening of the ulna or wafer could also be performed, but they have greater patient morbidity.

Since the patient had chondral lesions, suggesting the presence of ulnocarpal impaction despite neutral ulnar variance, the bucket-handle injury was probably due to aggravation of a central lesion that had occurred during forceful twisting of the wrist.

In the postoperative period, the patient progressed well with no complications due to the TFCC injury. Pain relief and complete improvement in supination were observed.

Limitations of the current study are the lack of initial radiographs for analysis and correlation with the other findings and the short follow-up period after surgery, which do not enable the evaluation of long-term surgical efficacy and potential late complications, such as degenerative arthritis.

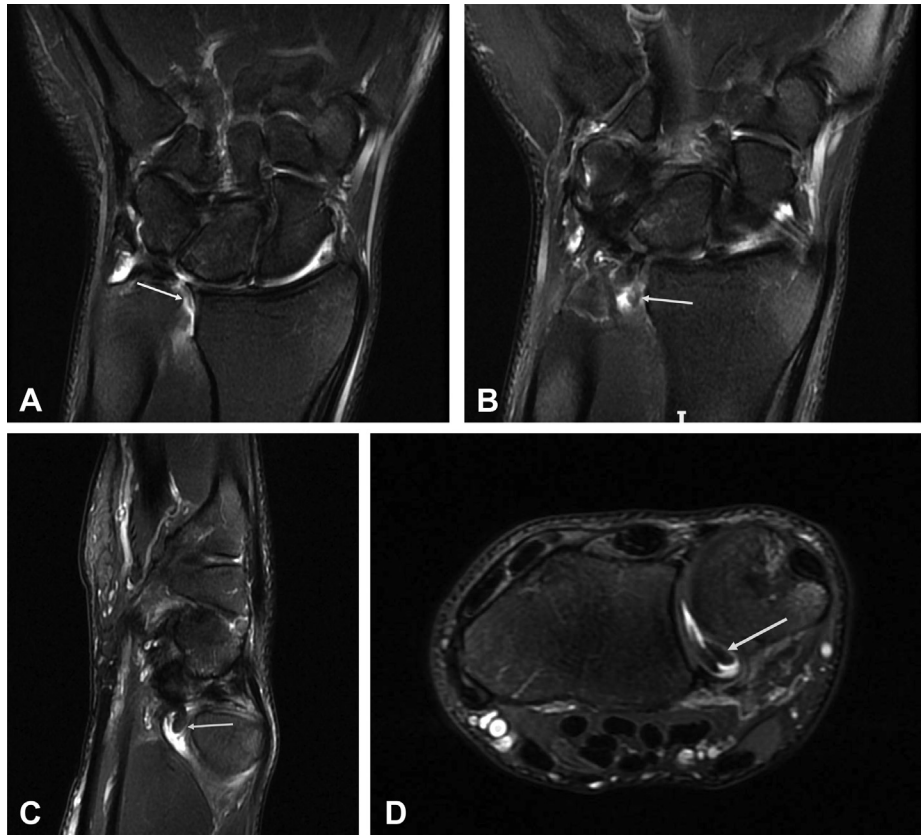


Figure 2. Magnetic resonance T2-weighted fat-saturated slices showing bucket-handle TFCC injury. **A, B** Coronal images that reveal a rotated flap (arrows) insinuating into the volar portion of the DRUJ. **C** Sagittal image showing the flap (arrow). **D** Axial image showing the flap (arrow) and its relation to the DRUJ.

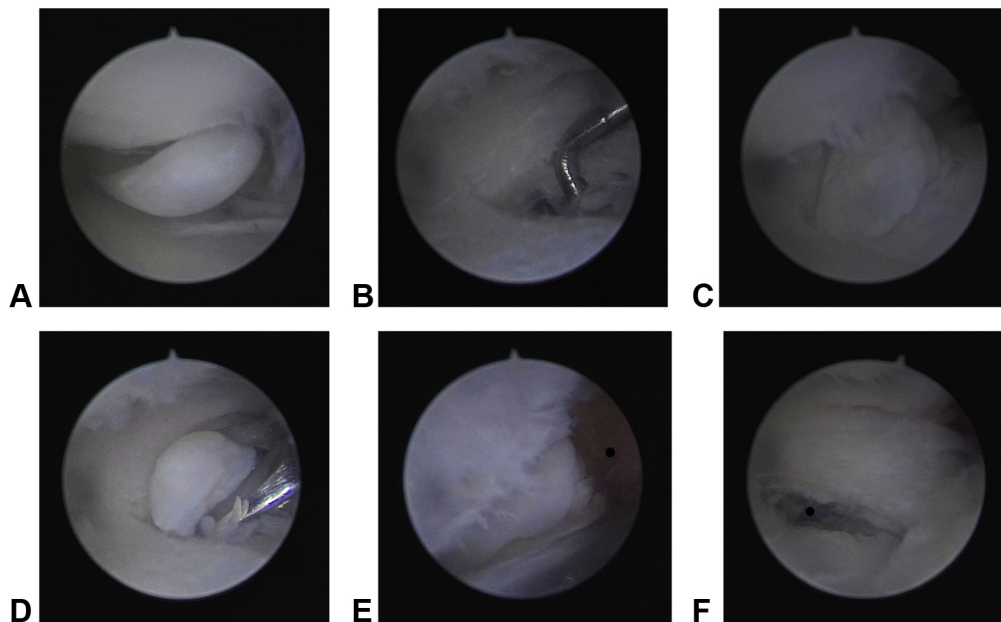


Figure 3. Wrist arthroscopy imaging showing debridement of bucket-handle injury of the TFCC. **A** Loose articular body. **B** Central perforation. **C** Eversion of bucket-handle lesion. **D** Bucket-handle resection. **E** Chondral lesion in the triquetrum. **F** Chondral lesion of the ulnar head.

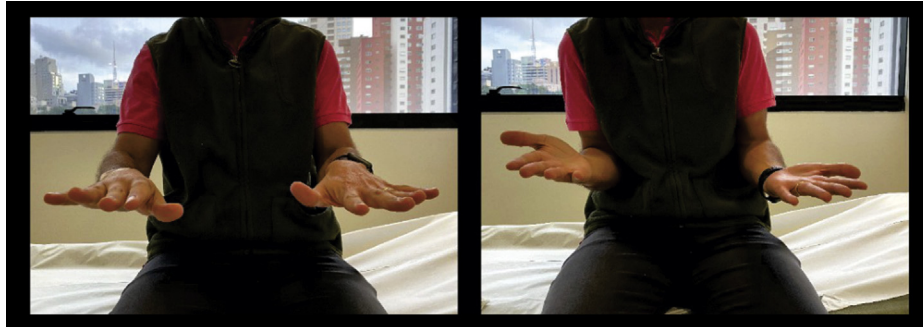


Figure 4. Postoperative patient progress. An improvement in ROM, mainly in supination, can be seen.

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