

Arthroscopic Management of Triangular Fibrocartilage Complex Peripheral Injury



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KEYWORDS

• TFCC injury • TFCC repair • TFCC suture • Arthroscopic technique • Arthroscopic repair

KEY POINTS

- Triangular fibrocartilage complex (TFCC) is the most important stabilizer of the distal radioulnar joint.
- Injury of the TFCC may cause ulnar-sided wrist pain.
- The TFCC may be detached from the capsule or avulsed from the fovea.
- TFCC capsular reattachment could be performed with an arthroscopically assisted technique, providing good long-term results.

INTRODUCTION

As we gradually have come to understand more about the anatomy and biomechanics of the distal radioulnar joint (DRUJ), we have also learned the importance of preserving a well-functioning triangular fibrocartilage complex (TFCC). The stabilizing structures around the DRUJ include, among others, the dorsal and palmar distal radioulnar ligaments, the ulnocarpal ligaments, the joint capsule, and the subsheath of the extensor carpi ulnaris tendon.^{1,2} The TFCC is the primary stabilizer of the DRUJ,^{3,4} and is formed by the discus articularis proper, the ulnocarpal ligaments, the soft tissue, and the distal radioulnar ligaments that converge from separate origins on the radius to attach onto the ulna at the foveal region at the base of the ulnar styloid and along the ulnar styloid process itself^{2,5} (Fig. 1). From a vascular injection

study of the TFCC, we know that the peripheral margin of the TFCC is well-vascularized.⁶

According to Nakamura and colleagues,¹ the TFCC consists of 3 components, a hammock structure, with a distal, stable part suspending the ulnar carpus, the ulnotriquetral ligament, and the proximal part representing the true radioulnar ligaments. Palmer and Werner classified the disorders of the TFCC and divided the lesions into traumatic (class I) and degenerative (class II).^{3,7} Degenerative changes of the TFCC develop with aging⁸ and central defects of the TFCC are not considered repairable. However, for the traumatic lesions (class I), surgical repair has been performed. Repair of a meniscal tear in the knee is today considered a standard procedure with good outcomes, and over the last decades, several reports have also shown good results after

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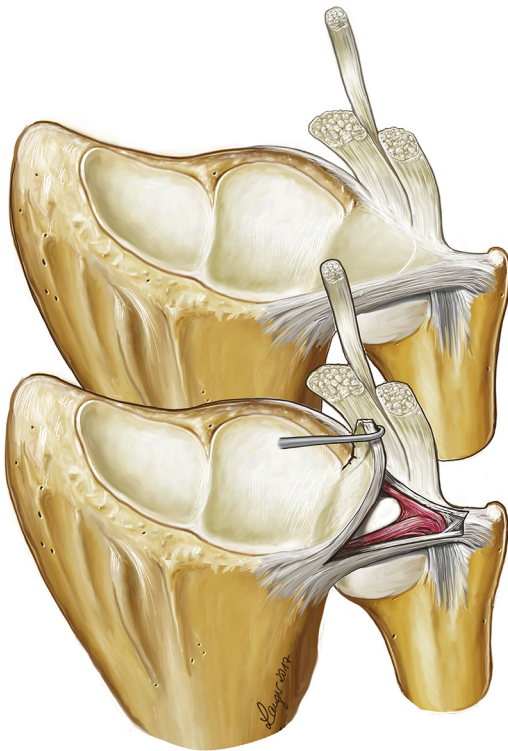


Fig. 1. The major stabilizer of the distal radioulnar joint is the triangular fibrocartilage complex (TFCC). The upper part of the figure displays a dorsal view of the TFCC with the distal radioulnar ligaments inserting into the styloid and the palmar distal radioulnar ligament in close relationship to the ulnocarpal ligaments. In the lower part of the figure, the disc articularis proper is elevated and the foveal insertion of the distal radioulnar ligaments, the ligamentum subcrucium, is shown. (Courtesy of J.R. Haugstvedt, MD, PhD, Graalum, Norway.)

open or arthroscopic repair of peripheral TFCC tears.⁹⁻¹³

CLASSIFICATION OF PALMER TYPE I-B TRIANGULAR FIBROCARILAGE COMPLEX INJURIES

Biomechanical studies have suggested that the foveal insertion of the distal radioulnar ligaments is the most important of the 2 distal radioulnar ligament insertions for stability of the DRUJ.¹⁴ This knowledge has helped us to understand that, although there is an intact distal part of TFCC, the DRUJ may still be unstable owing to rupture of the foveal ligament insertion. Based on this understanding a new classification of the Palmer type I-B injuries has been established.¹⁵ The new classification considers injuries of the distal component of the TFCC as well as injuries of the

proximal component (Fig. 2). As an alternative to the hammock structure, it has been suggested to look at the TFCC as an iceberg: the emerging tip of the iceberg is the distal component of the TFCC and the submerged part is the proximal component of the TFCC.¹⁶

SYMPTOMS AND FINDINGS

In patients with an intra-articular distal radius fracture, an associated TFCC tear was found in 78% of cases.¹⁷ Unless there is gross instability of the DRUJ, these patients suffer from pain from the distal radius fracture, and the TFCC injury is not diagnosed unless a diagnostic wrist arthroscopy is performed at the same time as a treatment of the distal radius fracture. If not diagnosed at the time of the injury, we have found that patients return with painful clicking of the wrist 6 months to 5 years after the trauma. Some also report ulnar-sided tenderness and a locking sensation; a few have reported instability of the DRUJ.^{9,18}

A positive fovea sign—tenderness or pain with pressing the examiner's thumb distally and deep into the interval between the ulnar styloid process and flexor carpi ulnaris tendon, between the volar surface of the ulnar head and the pisiform—has been shown to indicate pathology of the TFCC and/or the ulnotriquetral ligament with a sensitivity of 95.2% and a specificity of 86.5%.¹⁹ Stability of the DRUJ should be assessed in neutral, supinated, and pronated forearm rotation, and should always be compared with the contralateral forearm. Normal DRU ligaments will reveal a stable joint with a distinct endpoint; if no such endpoint is found, an avulsion of the foveal attachment of the DRU ligaments, the proximal component, should be suspected.

MRI may be helpful in the diagnosis of a peripheral tear of the TFCC and many patients bring the results of such an examination to the clinic. We do not, however, obtain MRI routinely in our preoperative planning, because we consider arthroscopy to be the gold standard for examination of the TFCC; an MRI that has been read as negative does not, in our experience, rule out a peripheral TFCC injury.

Although clinical examination and/or an MRI might arouse suspicion of a TFCC injury, an arthroscopic assessment is needed to confirm the diagnosis. If the patient suffers from an acute injury, we immobilize the patient in a cast for several weeks. If the patient has an older injury (several months) and suffers from ulnar-sided wrist pain and discomfort, we discuss treatment options with the patient. If the patient has a positive foveal sign, has long-lasting pain and symptoms that

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