

EVIDENCE SUMMARY

TFCC Injury

title: "TFCC Injury" slug: tfcc-injury region: wrist audience: patient mesh_terms: ["Triangular Fibrocartilage", "Wrist Injuries", "Wrist Joint", "Ligaments, Articular", "Radius Fractures", "Ulna", "Radius", "Hand Strength"]
article_count: 759 model_used: Qwen3.6-35B-A3B-Q8_0.gguf generated_at: '2026-06-13T11:34:16+00:00'
key_articles: - title: "Early Results of Surgical Treatment of Triangular Fibrocartilage Complex Tears in Children and Adolescents" ref_num: 1 evidence_tier: paper evidence_level: 4 doi: 10.1016/j.jhsa.2019.06.019 year: 2020
- title: "The Natural Course of Traumatic Triangular Fibrocartilage Complex Tears in Distal Radial Fractures: A 13–15 Year Follow-up of Arthroscopically Diagnosed but Untreated Injuries" ref_num: 2 evidence_tier: paper evidence_level: 2 doi: 10.1016/j.jhsa.2012.05.032 year: 2012
- title: "Association between imaging parameter changes and triangular fibrocartilage complex injury after distal radius fractures" ref_num: 3 evidence_tier: paper evidence_level: 3 doi: 10.1186/s13018-023-04438-5 year: 2023
- title: "Clinical, Radiographic, and Arthroscopic Outcomes After Ulnar Shortening Osteotomy: A Long-Term Follow-Up Study" ref_num: 4 evidence_tier: paper evidence_level: 4 doi: 10.1016/j.jhsa.2012.09.011 year: 2012
- title: "WITHDRAWN: Arthroscopic-Assisted Repair of the Triangular Fibrocartilage Complex" ref_num: 5 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.jhsg.2025.100857 year: 2025
- title: "Editorial Commentary: Arthroscopic Capsular Repair of Wrist Triangular Fibrocartilage Complex Tears: Beware That Apparent Isolated Atzei Class 1 (Isolated Distal Component) Tears May Include a Proximal Component" ref_num: 6 evidence_tier: commentary evidence_level: 5 doi: 10.1016/j.arthro.2022.01.019 year: 2022
- title: "Open and Arthroscopic Triangular Fibrocartilage Complex (TFCC) Repair" ref_num: 7 evidence_tier: paper evidence_level: 4 doi: 10.5435/jaaos-d-20-00998 year: 2021
- title: "Arthroscopic ligament-specific repair for triangular fibrocartilage complex foveal avulsions: a minimum 2-year follow-up study" ref_num: 8 evidence_tier: paper evidence_level: 4 doi: 10.1177/1753193420957901 year: 2020
- title: "The Presence and the Location of an Ulnar Styloid Fracture Associated With Distal Radius Fracture Predict the Presence of Triangular Fibrocartilage Complex 1B Injury" ref_num: 9 evidence_tier: paper evidence_level: 4 doi: 10.1016/j.arthro.2020.05.025 year: 2020
- title: "Sensory Innervation of the Triangular Fibrocartilage Complex: A Cadaveric Study" ref_num: 10 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.jhsa.2014.03.007 year: 2014
- title: "Arthroscopic Assisted Resection of Triangular Fibrocartilage Complex Lesions: A 19-Year Follow-up" ref_num: 11 evidence_tier: paper evidence_level: 4 doi: 10.1177/1558944717708029 year: 2017
- title: "Radial Side (1D) Tears" ref_num: 12 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.hcl.2011.05.013 year: 2011
- title: "Central TFCC Tears in Baseball Players" ref_num: 13 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.hcl.2012.05.019 year: 2012
- title: "Current rehabilitation recommendations following primary triangular fibrocartilage complex foveal repair surgery: A survey of Australian hand therapists" ref_num: 14 evidence_tier: paper evidence_level:

4 doi: 10.1016/j.jht.2023.08.009 year: 2023 - title: "What Is the Effect of the Ulnar-Plus Variance on the Outcomes of Arthroscopic Repair of the Peripheral Ulnar-Side Triangular Fibrocartilage Complex Tear?" ref_num: 15 evidence_tier: paper evidence_level: 4 doi: 10.1016/j.arthro.2020.05.012 year: 2020 - title: "Foveal triangular fibrocartilage complex pathology: a potentially under-recognized injury" ref_num: 17 evidence_tier: paper evidence_level: 4 doi: 10.1177/17531934231206426 year: 2023 - title: "Imaging of Ulnar-Sided Wrist Pain" ref_num: 18 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.csm.2006.02.008 year: 2006 - title: "Diagnostic value of MRI in traumatic triangular fibrocartilage complex injuries: a retrospective study" ref_num: 19 evidence_tier: paper evidence_level: 4 doi: 10.1186/s12891-023-07140-z year: 2024 - title: "Incidence and diagnosis of 'the double lesion' of the triangular fibrocartilage complex" ref_num: 20 evidence_tier: paper evidence_level: 4 doi: 10.1177/1753193413479479 year: 2013 - title: "Results after arthroscopic treatment of central traumatic lesions of the triangular fibrocartilage complex" ref_num: 21 evidence_tier: paper evidence_level: 4 doi: 10.1007/s00402-018-2910-4 year: 2018 - title: "Update TFCC: histology and pathology, classification, examination and diagnostics" ref_num: 22 evidence_tier: paper evidence_level: 5 doi: 10.1007/s00402-015-2153-6 year: 2015 - title: "MR Arthrography of the Wrist: Controversies and Concepts" ref_num: 23 evidence_tier: paper evidence_level: 4 doi: 10.1007/s11552-008-9149-4 year: 2008 - title: "Efficacy of Magnetic Resonance Imaging and Clinical Tests in Diagnostics of Wrist Ligament Injuries: A Systematic Review" ref_num: 24 evidence_tier: paper evidence_level: 2 doi: 10.1016/j.arthro.2015.04.090 year: 2015 - title: "Open Versus Arthroscopic Repair of 1B Ulnar-Sided Triangular Fibrocartilage Complex Tears: A Systematic Review" ref_num: 25 evidence_tier: paper evidence_level: 4 doi: 10.1177/1558944718815244 year: 2019 - title: "Arthroscopic Management of Triangular Fibrocartilage Complex Peripheral Injury" ref_num: 26 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.hcl.2017.06.005 year: 2017 - title: "Radioulnar laxity and clinical outcome do not correlate after a distal radius fracture" ref_num: 27 evidence_tier: paper evidence_level: 2 doi: 10.1177/1753193411403690 year: 2011 - title: "Wrist and forearm range of motion commencement time following primary triangular fibrocartilage complex foveal repair surgery: A scoping review" ref_num: 28 evidence_tier: paper evidence_level: 4 doi: 10.1016/j.jht.2021.10.004 year: 2023 - title: "Stabilization of the distal radioulnar joint by reconstructing the interosseous membrane's distal oblique bundle: Cadaver study" ref_num: 29 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.otsr.2020.03.041 year: 2020 - title: "Pathomechanics of the wrist following fractures of the distal radius" ref_num: 31 evidence_tier: paper evidence_level: 3 doi: 10.1177/1758998315574352 year: 2015 - title: "The Effect of Rotational Malalignment on X-rays of the Wrist" ref_num: 32 evidence_tier: paper evidence_level: 4 doi: 10.1177/1753193408090393 year: 2009 - title: "Performance of the Aptis distal radioulnar joint implant: kinematic and geometric analysis" ref_num: 33 evidence_tier: paper evidence_level: 4 doi: 10.1177/17531934241274142 year: 2024 - title: "Arthroscopic Repair of Triangular Fibrocartilage Complex Tears" ref_num: 35 evidence_tier: paper evidence_level: 4 doi: 10.1016/j.arthro.2007.01.026 year: 2007 - title: "Force Variations in the Distal Radius and Ulna: Effect of Ulnar Variance and Forearm Motion" ref_num: 36 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.jhsa.2014.10.001 year: 2015 - title: "Stability of the distal radioulnar joint with and without activation of forearm muscles" ref_num: 37 evidence_tier: paper evidence_level: 4 doi: 10.1177/17531934231168299 year: 2023 - title: "In Vivo Contact Characteristics of Distal Radioulnar Joint With Malunited Distal Radius During Wrist Motion" ref_num: 38 evidence_tier: paper evidence_level: 4 doi: 10.1016/j.jhsa.2015.07.027 year: 2015 - title: "Changes in Contact Site of the Radiocarpal Joint and Lengths of the Carpal Ligaments in Forearm Rotation: An In Vivo Study" ref_num: 41 evidence_tier: paper evidence_level: 5 doi: 10.1016/

j.jhsa.2013.01.021 year: 2013 - title: "The effect of intercarpal arthrodeses on wrist kinematics during radial and ulnar deviation: a cadaveric study using four-dimensional CT" ref_num: 42 evidence_tier: paper evidence_level: 5 doi: 10.1177/17531934231176004 year: 2023 - title: "Ligament-Sparing Volar Radiocarpal Arthrotomy During Distal Radius Fracture Repair: Biomechanical Implications on Wrist Stability in a Cadaveric Model" ref_num: 43 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.jhsa.2022.08.028 year: 2024 - title: "Dorsal Wrist Extrinsic Carpal Ligament Injury Exacerbates Volar Radiocarpal Instability After Intra-Articular Distal Radius Fracture" ref_num: 44 evidence_tier: paper evidence_level: 5 doi: 10.1177/1558944719851210 year: 2019 - title: "Forearm Instability: Anatomy, Biomechanics, and Treatment Options" ref_num: 45 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.jhsa.2016.10.017 year: 2017 - title: "Effect of Radial Lengthening on Distal Forearm Loading Following Simulated In Vitro Radial Shortening During Simulated Dynamic Wrist Motion" ref_num: 46 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.jhsa.2019.03.017 year: 2019 - title: "Reconstructed animation from four-phase grip MRI of the wrist with ulnar-sided pain" ref_num: 47 evidence_tier: paper evidence_level: 4 doi: 10.1177/1753193413476979 year: 2013 - title: "Long-term outcome after arthroscopic debridement of Palmer type 2C central degenerative lesions of the triangular fibrocartilage complex" ref_num: 49 evidence_tier: paper evidence_level: 4 doi: 10.1007/s00402-021-03918-9 year: 2021 - title: "The Value of Plain X-Rays in Predicting TFCC Injury after Distal Radial Fractures" ref_num: 50 evidence_tier: paper evidence_level: 3 doi: 10.1177/1753193408090106 year: 2008 - title: "Arthroscopic Treatment of Triangular Fibrocartilage Wrist Injuries in the Athlete" ref_num: 51 evidence_tier: paper evidence_level: 4 doi: 10.1177/0363546508325921 year: 2008 - title: "Arthroscopic Treatment of Peripheral Triangular Fibrocartilage Complex Tears With the Deep Fibers Intact" ref_num: 52 evidence_tier: paper evidence_level: 4 doi: 10.1016/j.jhsa.2011.12.023 year: 2012 - title: "Arthroscopic one-tunnel transosseous reconstruction of chronic triangular fibrocartilage complex foveal tears: outcomes in 12 patients" ref_num: 53 evidence_tier: paper evidence_level: 4 doi: 10.1177/17531934211056854 year: 2021 - title: "Triangular fibrocartilage complex injuries – limitations of the current classification systems and the proposed new 'CUP' classification" ref_num: 54 evidence_tier: paper evidence_level: 5 doi: 10.1177/17531934221121931 year: 2022 - title: "Structurally intact and functionally incompetent foveal triangular fibrocartilage complex injuries" ref_num: 55 evidence_tier: paper evidence_level: 5 doi: 10.1302/0301-620x.105b1.bjj-2022-0908.r1 year: 2023 - title: "Diagnostic Comparison of 1.5 Tesla and 3.0 Tesla Preoperative MRI of the Wrist in Patients With Ulnar-Sided Wrist Pain" ref_num: 56 evidence_tier: paper evidence_level: 3 doi: 10.1016/j.jhsa.2008.02.028 year: 2008 - title: "Regarding 'Efficacy of Magnetic Resonance Imaging and Clinical Tests in Diagnostics of Wrist Ligament Injuries: A Systematic Review'" ref_num: 57 evidence_tier: letter evidence_level: 2 doi: 10.1016/j.arthro.2015.08.001 year: 2015 - title: "Outcomes of surgically treated distal radial fractures with associated triangular fibrocartilage complex injury" ref_num: 58 evidence_tier: paper evidence_level: 2 doi: 10.1016/j.jht.2017.09.002 year: 2019 - title: "Etiology and Diagnostic Challenges of Ulnar Wrist Pain in Pediatric and Adolescent Patients" ref_num: 59 evidence_tier: paper evidence_level: 2 doi: 10.1016/j.jhsa.2024.04.015 year: 2024 - title: "Evaluation of radiological instability signs in the distal radioulnar joint in children and adolescents with arthroscopically-verified TFCC tears" ref_num: 60 evidence_tier: paper evidence_level: 3 doi: 10.1007/s00402-020-03470-y year: 2020 - title: "Editorial Commentary: Outcomes of Arthroscopic Triangular Fibrocartilage Complex Repair: Can We Predict Who Will Benefit or Not?" ref_num: 62 evidence_tier: paper evidence_level: 5 doi: 10.1016/j.arthro.2019.04.022 year: 2019 - title: "Load-Bearing Radioulnar Distances to Evaluate an Unstable Distal Radioulnar Joint in Patients With Triangular Fibrocartilage Complex Tears" ref_num: 63 evidence_tier: paper evidence_level: 2 doi: 10.1016/j.jhsa.2022.01.008 year: 2022 - title: "Longitudinal Radioulnar Dissociation:

Overview

- Surgical treatment of TFCC tears and concomitant pathology in the pediatric and adolescent population results in decreased pain, improved motion and stability, and excellent functional outcomes in the majority of patients [1].
- There is no evidence that a TFCC injury influences long-term outcome, though trends suggested complete tears might have inferior outcomes [2].
- Most TFCC disc tears identified at the initial surgery had healed by long-term arthroscopic follow-up [4].
- Arthroscopic-assisted repair techniques provide detailed visualization and facilitate the repair of TFCC injuries and associated pathologies with minimally invasive techniques [5].
- Most acute Atzei class 1 tears spontaneously heal without surgical repair [6].
- In cases of sustained pain and distal radioulnar joint instability even after successful Atzei class 1 repair, an unrecognized proximal component TFCC tear may exist and appropriate treatment for the proximal component should be combined [6].
- Arthroscopic ligament-specific repair of the TFCC offers significant improvements in wrist motion, grip strength, pain, and patient-reported outcomes at a minimum 2-year follow-up [8].
- Sensory innervation data provides an initial step in planning an operative partial TFCC denervation for recalcitrant TFCC IA injuries that fail nonsurgical treatment and possibly also arthroscopic debridement [10].
- Arthroscopic assisted resection for lesions of the TFCC demonstrates persisting satisfactory subjective and functional outcomes at 19 years of follow-up [11].
- There are no outcome studies specifically examining results of TFCC debridement or repair in baseball players [13].
- Further prospective research is recommended to explore whether patient-related or rehabilitation factors influence outcomes following TFCC repair [14].
- There is a current lack of high-quality evidence required to draw firm conclusions on the merits of arthroscopic versus open repair of 1B TFCC tears [25].
- TFCC rehabilitation protocols were poorly reported and varied widely between the included studies [28].

Anatomy & Pathophysiology

- The distal oblique bundle of the interosseous membrane contributes to stabilization of the distal radioulnar joint [29].

- The effectiveness of stabilization provided by the interosseous membrane's distal oblique bundle is altered by the wrist's position and the direction of radial translation [29].
- Fractures of the distal radius interfere with the biomechanical integrity of the wrist [31].
- Distal radius fractures limit range of motion [31].
- Distal radius fractures affect hand muscle strength [31].
- Rotational malalignment of the wrist significantly affects carpal measurements [32].
- Rotational malalignment of the wrist significantly affects distal radial measurements [32].
- Rotational malalignment of the wrist significantly affects distal radioulnar joint measurements [32].
- Distal radioulnar joint arthroplasty considerably alters forearm kinematics [33].
- All wrists exhibit similar loading across the distal ulna regardless of ulnar variance [36].
- Pronation relatively increases loading across the distal ulna [36].
- The flexor carpi ulnaris muscle serves as a dynamic stabilizer of the distal radioulnar joint [37].
- The extensor carpi ulnaris muscle serves as a dynamic stabilizer of the distal radioulnar joint [37].
- The contact area of the distal radioulnar joint increases during wrist flexion [38].
- The contact area of the distal radioulnar joint decreases during wrist extension [38].
- The contact area of the distal radioulnar joint decreases during ulnar deviation [38].
- During forearm rotation, the contact site of the scaphoid on the distal radial articular surface changes minimally [41].
- During forearm rotation, the contact site of the lunate on the distal radial articular surface changes minimally [41].
- Intercarpal kinematic modifications after intercarpal arthrodeses make constant radiocarpal and midcarpal congruence during radioulnar deviation impossible [42].
- A volar ligament-sparing radiocarpal arthrotomy does not cause biomechanical radiocarpal instability [43].
- Injury to the dorsal wrist extrinsic carpal ligaments exacerbates volar radiocarpal instability after intra-articular distal radius fracture [44].
- Disruptions in forearm structures may lead to forearm instability with consequences at the remaining structures [45].
- Radial lengthening beyond the native length is not detrimental to radial loading [46].
- Radial lengthening further reduces distal ulnar loading [46].
- Achieving at least native ulnar variance appears appropriate to restore normal biomechanical loading [46].
- Four-phase grip MRI can demonstrate impairment of the articular disc and longitudinal instability of the distal radioulnar joint simultaneously [47].
- Each ligament stabilizing the distal radioulnar joint contributes to joint stability depending on the direction (palmar or dorsal) [48].
- Each ligament stabilizing the distal radioulnar joint contributes to joint stability depending on different positions of the wrist and forearm [48].

Classification

- The Palmer classification does not completely classify all peripheral TFCC tears, particularly dorsal tears [35].
- The Melone classification system does not predict the presence of TFCC lesions [50].
- Frykman Type VI and VIII fractures show a significantly higher incidence of TFCC tears [50].
- 1B TFCC injury is most common in patients with distal radius fractures (DRF) and concomitant TFCC injury [3].
- The presence of an ulnar styloid fracture associated with distal radius fracture predicts the presence of frequently occurring traumatic TFCC injury and TFCC 1B injury [9].
- A small percentage of arthroscopically validated TFCC injuries involve two tears in one wrist, with the most common pattern being a slit tear coexisting with an ulnar styloid tear [20].
- In more detailed classification of TFCC injuries, such as pc-TFCC tears classified by Atzei's classification, the diagnostic accuracy of MRI remains lower compared to wrist arthroscopy [19].
- Most acute Atzei class 1 tears spontaneously heal without surgical repair [6].
- In cases of sustained pain and distal radioulnar joint instability even after successful Atzei class 1 repair, an unrecognized proximal component TFCC tear may exist [6].
- The authors propose a new 'CUP' classification system for TFCC injuries based on anatomical location (central, ulnar, peripheral) and severity [54].
- The proposed 'CUP' classification aims to address limitations of existing systems like Palmer and Atzei by focusing exclusively on TFCC lesions and providing specific treatment recommendations for each subtype [54].

Clinical Presentation

- TFCC tears in pediatric and adolescent populations present with pain, motion limitations, and stability issues that are improved by surgical treatment [1].
- Complete TFCC tears may have inferior long-term outcomes compared to other tear types, though TFCC injury generally does not influence long-term outcome after distal radial fractures [2].
- TFCC 1B injury is the most common type of TFCC injury in patients with distal radius fractures (DRF) [3].
- Most TFCC disc tears identified at initial surgery heal by long-term arthroscopic follow-up [4].
- Arthroscopic-assisted repair techniques provide detailed visualization for managing TFCC injuries and associated pathologies [5].
- Most acute Atzei class 1 tears (isolated distal component) spontaneously heal without surgical repair [6].
- Sustained pain and distal radioulnar joint (DRUJ) instability after successful Atzei class 1 repair may indicate an unrecognized proximal component TFCC tear [6].

- Careful history and physical examination are required to determine if a TFCC tear is symptomatic and to quantify symptom severity for surgical decision-making [7].
- Arthroscopic ligament-specific repair of TFCC foveal avulsions improves wrist motion, grip strength, pain, and patient-reported outcomes at minimum 2-year follow-up [8].
- The presence of an ulnar styloid fracture associated with DRF predicts the presence of traumatic TFCC injury, specifically TFCC 1B injury [9].
- Operative partial TFCC denervation is a potential planning step for recalcitrant TFCC IA injuries that fail nonsurgical treatment and possibly arthroscopic debridement [10].
- Acute TFCC tears generally provide better results when addressed in the acute phase, while degenerative lesions are typically treated with debridement [12].
- A stable DRUJ upon clinical examination and normal MRI findings do not rule out foveal TFCC injury [17].
- High clinical suspicion is needed when managing patients with ulnar-sided wrist pain to identify foveal TFCC pathology [17].
- Imaging approaches for ulnar-sided wrist pain include discussion of anatomy, pathophysiology, and radiographic appearance of TFCC tears, DRUJ disorders, and ECU tendon disorders [18].
- A small percentage of arthroscopically validated TFCC injuries involve two tears in one wrist (“double lesion”) [20].
- The most common “double lesion” pattern is a slit tear coexisting with an ulnar styloid tear [20].
- Central traumatic TFCC lesions can be treated by arthroscopic debridement, resulting in sustained pain relief, improved quality of life (DASH score), improved wrist motion, and high patient satisfaction [21].
- Wrist arthroscopy remains the gold standard for diagnosing TFCC pathologies [22].
- MR arthrography (MRA) is the preferred imaging modality for internal derangements of the wrist due to superior contrast resolution, joint distention, and contrast flow facilitating diagnosis of TFCC and intrinsic ligament lesions [23].
- A negative MRI result is unable to rule out clinically relevant injury to the TFCC, scapholunate (SL) ligament, or lunotriquetral (LT) ligament [24].
- Arthroscopic debridement or repair of wrist TFCC injury provides predictable pain relief and return to play in competitive athletes [51].
- Tears of the TFCC superficial fibers with deep fibers intact present with ulnar-sided wrist pain but without DRUJ instability [52].

Investigations

- TFCC 1B injury is the most common type of TFCC injury in patients with distal radius fractures [3].
- The presence of an ulnar styloid fracture associated with a distal radius fracture predicts the presence of traumatic TFCC injury, specifically TFCC 1B injury [9].

- A high index of clinical suspicion is required for foveal TFCC injury when managing patients with ulnar-sided wrist pain, as normal MRI findings and a stable distal radioulnar joint (DRUJ) on clinical examination do not rule out this pathology [17].
- Advanced imaging techniques like MRI and radiocarpal arthroscopy are well-suited for diagnosing central and distal TFCC tears but may report partial foveal injuries as normal despite functional incompetence [55].
- Partial and complete foveal tears without instability may be missed without a high degree of suspicion [55].
- Wrist arthroscopy remains the gold standard for diagnosing TFCC pathologies [22].
- MR arthrography (MRA) is the preferred modality for imaging internal derangements of the wrist due to superior contrast resolution, joint distention, and contrast flow facilitating the diagnosis of TFCC and intrinsic ligament lesions [23].
- MR arthrography has the potential to become a real alternative to arthroscopy for diagnosing TFCC pathologies [22].
- The diagnostic accuracy of MRI for detailed TFCC classifications, such as pc-TFCC tears by Atzei's classification, is lower compared to wrist arthroscopy [19].
- The sensitivity, specificity, and accuracy of 3.0T wrist MRI for TFCC injury detection are consistently higher than those of 1.5T wrist MRI [56].
- A negative MRI result is unable to rule out the possibility of a clinically relevant TFCC injury [24].
- Negative results of MRI or clinical provocative tests are unable to safely rule out clinically relevant TFCC tears, necessitating further diagnostic evaluation with wrist arthroscopy [57].
- Surgeons should maintain a high degree of suspicion for TFCC-related pathology in young patients with positive provocative clinical examination despite negative MRI findings [59].
- The radioulnar stress test alone cannot be recommended to decide whether to perform an acute repair of the TFCC, as radioulnar laxity and clinical outcome do not correlate after distal radius fracture [27].
- MRI-based modified radioulnar ratio technique showed significant instability parameters and diagnostic accuracy (AuC 0.787) in children and adolescents with arthroscopically-verified TFCC tears [60].
- Pisoscaphoid and radioulnar distances on lateral radiographs did not show significant differences compared to controls in children and adolescents with arthroscopically-verified TFCC tears [60].
- Load-bearing radioulnar (RaUI) measurement is a simple method to diagnose an unstable distal radioulnar joint in patients with TFCC injury [63].

Treatment

NON-OPERATIVE MANAGEMENT

- Most acute Atzei class 1 tears (isolated distal component) spontaneously heal without surgical repair [6].
- Careful history and physical examination are required to determine whether a TFCC tear is symptomatic [7].

- Quantifying the severity of symptoms related to TFCC pathology is important to determine whether surgical treatment is necessary [7].
- Using the radioulnar stress test alone to decide whether or not to perform an acute repair of the TFCC cannot be recommended [27].

ARTHROSCOPIC DEBRIDEMENT AND RESECTION

- Arthroscopic debridement of central traumatic TFCC lesions is safe and shows sustained pain relief, significantly improved quality of life (DASH score), and wrist motion, resulting in high patient satisfaction [21].
- Arthroscopic assisted resection for lesions of the TFCC demonstrates persisting satisfactory subjective and functional outcomes at 19 years of follow-up [11].
- Arthroscopic debridement of central degenerative TFCC lesions is safe, reliable, and efficacious even for ulnar positive variance [49].
- There are no outcome studies specifically examining results of TFCC debridement or repair in baseball players [13].

SURGICAL REPAIR AND RECONSTRUCTION

- Surgical treatment of TFCC tears and concomitant pathology in the pediatric and adolescent population results in decreased pain, improved motion and stability, and excellent functional outcomes in the majority of patients [1].
- Arthroscopic ligament-specific repair of the TFCC offers significant improvements in wrist motion, grip strength, pain, and patient-reported outcomes at a minimum 2-year follow-up [8].
- An arthroscopic one-tunnel transosseous approach is effective for chronic foveal tears of the TFCC with intact radioulnar ligament remnants, providing pain relief, improved joint stability, and remarkable functional ratings [53].
- Most TFCC disc tears identified at initial surgery had healed by long-term arthroscopic follow-up [4].
- Arthroscopic-assisted repair techniques provide detailed visualization and facilitate the repair of TFCC injuries and associated pathologies with minimally invasive techniques [5].
- In cases of sustained pain and distal radioulnar joint instability even after successful Atzei class 1 repair, an unrecognized proximal component TFCC tear may exist, requiring appropriate treatment for the proximal component to be combined [6].
- A systematic review demonstrates a current lack of high-quality evidence required to draw firm conclusions on the merits of arthroscopic versus open repair of 1B TFCC tears [25].
- Although statistical analysis revealed significant effects of predictor variables on treatment outcomes for arthroscopic TFCC repair, additional larger comprehensive studies are required to confirm these results so as to control for unaccounted patient variables [62].

SURGICAL DENERVATION

- Operative partial TFCC denervation is planned for recalcitrant TFCC IA injuries that fail nonsurgical treatment and possibly also arthroscopic debridement [10].

REHABILITATION

- TFCC rehabilitation protocols were poorly reported and varied widely between included studies [28].

Complications

- Complete TFCC tears may have inferior long-term outcomes compared to other tear types [2].
- Coexisting type 2 TFCC tears significantly increase the risk of index surgery failure in patients undergoing arthroscopic repair of peripheral ulnar-side TFCC tears [15].
- An unrecognized proximal component TFCC tear may exist in cases of sustained pain and distal radioulnar joint instability even after successful repair of an isolated Atzei class 1 tear [6].

Recovery

- Surgical treatment of TFCC tears and concomitant pathology in the pediatric and adolescent population results in decreased pain, improved motion and stability, and excellent functional outcomes in the majority of patients [1].
- There is no evidence that a TFCC injury influences long-term outcome, though trends suggested complete tears might have inferior outcomes [2].
- Most TFCC disc tears identified at the initial surgery had healed by long-term arthroscopic follow-up [4].
- Most acute Atzei class 1 tears spontaneously heal without surgical repair [6].
- In cases of sustained pain and distal radioulnar joint instability even after successful Atzei class 1 repair, an unrecognized proximal component TFCC tear may exist and appropriate treatment for the proximal component should be combined [6].
- Arthroscopic ligament-specific repair of the TFCC offers significant improvements in wrist motion, grip strength, pain, and patient-reported outcomes at a minimum 2-year follow-up [8].
- Arthroscopic assisted resection for lesions of the TFCC demonstrates persisting satisfactory subjective and functional outcomes at 19 years of follow-up [11].
- TFCC capsular reattachment could be performed with an arthroscopically assisted technique, providing good long-term results [26].
- Disability outcomes were worse in patients with distal radial fracture where TFCC was injured [58].
- Early recognition of longitudinal radioulnar dissociation can aid in timely treatment and improved outcomes, with success rates around 80% for acute cases [64].

Key Evidence

- [L4] Surgical treatment of TFCC tears and concomitant pathology in the pediatric and adolescent population results in decreased pain, improved motion and stability, and excellent functional outcomes in the majority of patients. ([10.1016/j.jhsa.2019.06.019](#))
- [L2] The study found no evidence that a TFCC injury influences long-term outcome, though trends suggested complete tears might have inferior outcomes. ([10.1016/j.jhsa.2012.05.032](#))
- [L3] 1B TFCC injury is most common in patients with DRF and concomitant TFCC injury. ([10.1186/s13018-023-04438-5](#))
- [L4] Most TFCC disc tears identified at the initial surgery had healed by long-term arthroscopic follow-up. ([10.1016/j.jhsa.2012.09.011](#))
- [L5] Arthroscopic-assisted repair techniques have revolutionized surgical management, providing detailed visualization and facilitating the repair of TFCC injuries and associated pathologies with minimally invasive techniques. ([10.1016/j.jhsg.2025.100857](#))
- [Commentary] Most acute Atzei class 1 tears spontaneously heal without surgical repair; however, in cases of sustained pain and distal radioulnar joint instability even after successful Atzei class 1 repair, an unrecognized proximal component TFCC tear may exist and appropriate treatment for the proximal component should be combined. ([10.1016/j.arthro.2022.01.019](#))
- [L4] Careful history and physical examination are required to determine whether a TFCC tear is symptomatic, and it is important to quantify the severity of symptoms related to TFCC pathology to determine whether surgical treatment is necessary. ([10.5435/jaaos-d-20-00998](#))
- [L4] Arthroscopic ligament-specific repair of the TFCC offers significant improvements in wrist motion, grip strength, pain, and patient-reported outcomes at a minimum 2-year follow-up. ([10.1177/1753193420957901](#))
- [L4] The presence of ulnar styloid fracture associated with distal radius fracture predicted the presence of frequently occurring traumatic triangular fibrocartilage complex injury and TFCC 1B injury. ([10.1016/j.arthro.2020.05.025](#))
- [L5] These results provide an initial step in planning an operative partial TFCC denervation for recalcitrant TFCC IA injuries that fail nonsurgical treatment and possibly also arthroscopic debridement. ([10.1016/j.jhsa.2014.03.007](#))
- [L4] This study demonstrates persisting satisfactory subjective and functional outcomes for patients following arthroscopic assisted resection for lesions of the TFCC at 19 years of follow-up. ([10.1177/1558944717708029](#))
- [L5] The article reviews the anatomy, classification, and management of TFCC injuries, noting that acute tears generally provide better results when addressed in the acute phase, while degenerative lesions are typically treated with debridement. ([10.1016/j.hcl.2011.05.013](#))
- [L5] We know of no outcome studies specifically examining results of TFCC debridement or repair in baseball players. ([10.1016/j.hcl.2012.05.019](#))

- [L4] Further prospective research is recommended to explore whether patient-related or rehabilitation factors influence outcomes following TFCC repair. ([10.1016/j.jht.2023.08.009](#))
- [L4] However, coexisting type 2 TFCC tears significantly increased the risk of index surgery failure in these patients. ([10.1016/j.arthro.2020.05.012](#))
- [L4] Having a stable distal radioulnar joint upon clinical examination and normal MRI findings does not rule out foveal TFCC injury, and a high index of clinical suspicion is needed when managing patients with ulnar sided wrist pain. ([10.1177/17531934231206426](#))
- [L5] The article provides a concise approach to the diagnosis and imaging of ulnar-sided wrist pain, discussing anatomy, pathophysiology, and radiographic appearance of common entities including TFCC tears, DRUJ disorders, and ECU tendon disorders. ([10.1016/j.csm.2006.02.008](#))
- [L4] In more detailed classification of TFCC injuries, such as pc-TFCC tears classified by Atzei's classification, the diagnostic accuracy of MRI remains lower compared to wrist arthroscopy. ([10.1186/s12891-023-07140-z](#))
- [L4] A small percentage of arthroscopically validated TFCC injuries involve two tears in one wrist, with the most common pattern being a slit tear coexisting with an ulnar styloid tear. ([10.1177/1753193413479479](#))
- [L4] Central traumatic TFCC lesions can safely be treated by arthroscopic debridement, showing sustained pain relief, significantly improved quality of life (DASH score) and wrist motion, resulting in high patient satisfaction. ([10.1007/s00402-018-2910-4](#))
- [L5] Wrist arthroscopy remains the 'gold standard' for diagnosing TFCC pathologies despite technical progress in imaging modalities, although MR arthrography may have the potential to become a real alternative in the future. ([10.1007/s00402-015-2153-6](#))
- [L4] Superior contrast resolution, joint distention, and the flow of contrast facilitate the diagnosis of lesions of the TFCC and intrinsic ligaments on contrast-sensitive sequences, making MRA the preferred modality for imaging internal derangements of the wrist. ([10.1007/s11552-008-9149-4](#))
- [L2] A negative result from MRI is unable to rule out the possibility of a clinically relevant injury to the TFCC, SL ligament, or LT ligament of the wrist. ([10.1016/j.arthro.2015.04.090](#))
- [L4] This SR demonstrates a current lack of high-quality evidence required to draw firm conclusions on the merits of arthroscopic versus open repair of 1B TFCC tears. ([10.1177/1558944718815244](#))
- [L5] TFCC capsular reattachment could be performed with an arthroscopically assisted technique, providing good long-term results. ([10.1016/j.hcl.2017.06.005](#))
- [L2] Therefore, using the radioulnar stress test alone to decide whether or not to perform an acute repair of the TFCC cannot be recommended. ([10.1177/1753193411403690](#))
- [L4] TFCC rehabilitation protocols were poorly reported and varied widely between the included studies. ([10.1016/j.jht.2021.10.004](#))
- [L5] However, the wrist's position and the direction of radial translation seem to alter the stabilization's effectiveness. ([10.1016/j.otsr.2020.03.041](#))

- [L3] These results supported the initial hypothesis that a fracture of the distal radius interferes with the biomechanical integrity of the wrist, limiting range of motion and affecting hand muscle strength. ([10.1177/1758998315574352](#))
- [L4] Rotational malalignment of the wrist has significant effects on carpal, distal radial and distal radioulnar joint measurements. ([10.1177/1753193408090393](#))
- [L4] The Aptis distal radioulnar joint arthroplasty considerably alters forearm kinematics, which can have clinical implications. ([10.1177/17531934241274142](#))
- [L4] The Palmer classification does not completely classify all peripheral TFCC tears, particularly dorsal tears. ([10.1016/j.arthro.2007.01.026](#))
- [L5] The results show that all wrists have similar loading across the distal ulna regardless of ulnar variance, while pronation relatively increases loading across the distal ulna. ([10.1016/j.jhsa.2014.10.001](#))
- [L4] The flexor carpi ulnaris and extensor carpi ulnaris muscles serve as dynamic stabilizers of the distal radioulnar joint. ([10.1177/17531934231168299](#))
- [L4] The contact area of the DRUJ increases during wrist flexion and decreases during wrist extension and ulnar deviation. ([10.1016/j.jhsa.2015.07.027](#))
- [L5] During forearm rotation, the contact site of the scaphoid and the lunate on the distal radial articular surface changed minimally. ([10.1016/j.jhsa.2013.01.021](#))
- [L5] The study confirms that constant radiocarpal and midcarpal congruence during radioulnar deviation in normal wrists is no longer possible with intercarpal kinematic modifications after these arthrodeses. ([10.1177/17531934231176004](#))
- [L5] This volar ligament-sparing radiocarpal arthrotomy did not cause biomechanical radiocarpal instability. ([10.1016/j.jhsa.2022.08.028](#))
- [L5] Injury to the dorsal wrist extrinsic carpal ligaments exacerbates volar radiocarpal instability. ([10.1177/1558944719851210](#))
- [L5] Disruptions in any of these structures may lead to forearm instability with consequences at the remaining structures. ([10.1016/j.jhsa.2016.10.017](#))
- [L5] Radial lengthening beyond the native length was not detrimental to radial loading and further reduced distal ulnar loading; achieving at least native ulnar variance seems to be appropriate to restore normal biomechanical loading based on this in vitro study. ([10.1016/j.jhsa.2019.03.017](#))
- [L4] Reconstructed animation from four-phase grip MRI demonstrated impairment of the articular disc and longitudinal instability of the distal radioulnar joint simultaneously and should be of value in investigating dynamic pathophysiology causing ulnar wrist pain. ([10.1177/1753193413476979](#))
- [L4] Arthroscopic debridement of central degenerative TFCC lesions is safe, reliable, and efficacious even for ulnar positive variance. ([10.1007/s00402-021-03918-9](#))
- [L3] The Melone classification system does not predict the presence of TFCC lesions, while Frykman Type VI and VIII fractures show a significantly higher incidence of TFCC tears. ([10.1177/1753193408090106](#))
- [L4] Arthroscopic debridement or repair of wrist TFC injury provides predictable pain relief and return to play in competitive athletes. ([10.1177/0363546508325921](#))

- [L4] Tears of the TFCC superficial fibers with the deep fibers intact present with ulnar-sided wrist pain but without distal radioulnar joint instability. ([10.1016/j.jhsa.2011.12.023](#))
- [L4] This simple arthroscopic one-tunnel transosseous approach is effective for chronic foveal tears of the TFCC with intact radioulnar ligament remnants, providing pain relief, improved joint stability, and remarkable functional ratings. ([10.1177/17531934211056854](#))
- [L5] The authors propose a new ‘CUP’ classification system for TFCC injuries based on anatomical location (central, ulnar, peripheral) and severity, aiming to address limitations of existing systems like Palmer and Atzei by focusing exclusively on TFCC lesions and providing specific treatment recommendations for each subtype. ([10.1177/17531934221121931](#))
- [L5] Partial and complete foveal tears without instability may be missed without a high degree of suspicion, as advanced imaging techniques like MRI and radiocarpal arthroscopy are well-suited for diagnosing central and distal TFCC tears but may report partial injuries as normal despite functional incompetence. ([10.1302/0301-620x.105b1.bjj-2022-0908.r1](#))
- [L3] The sensitivity, specificity, and accuracy of 3.0T wrist MRI for the TFCC is consistently higher compared with those of 1.5T wrist MRI, suggesting improved capability for detection of TFCC injuries. ([10.1016/j.jhsa.2008.02.028](#))
- [Letter] Negative results of MRI or clinical provocative tests are still unable to safely rule out the possibility of clinically relevant tears to the TFCC and other wrist ligaments, which makes further diagnostic evaluation with wrist arthroscopy necessary. ([10.1016/j.arthro.2015.08.001](#))
- [L2] Disability outcomes were worse in patients with distal radial fracture where TFCC was injured. ([10.1016/j.jht.2017.09.002](#))
- [L2] Surgeons should have a high degree of suspicion for TFCC-related pathology in the setting of positive provocative clinical examination despite negative MRI findings in young patients. ([10.1016/j.jhsa.2024.04.015](#))
- [L3] MRI-based modified radioulnar ratio technique showed significant instability parameters and diagnostic accuracy (AuC 0.787) in children and adolescents with arthroscopically-verified TFCC tears, whereas pisoscaphoid and radioulnar distances on lateral radiographs did not show significant differences compared to controls. ([10.1007/s00402-020-03470-y](#))
- [L5] Although statistical analysis revealed significant effects of predictor variables on treatment outcomes for arthroscopic TFCC repair, additional larger comprehensive studies are required to confirm these results so as to control for unaccounted patient variables. ([10.1016/j.arthro.2019.04.022](#))
- [L2] Load-bearing RaUI measurement is a simple method to diagnose an unstable distal radioulnar joint in patients with TFCC injury. ([10.1016/j.jhsa.2022.01.008](#))
- [L5] Early recognition of longitudinal radioulnar dissociation can aid in timely treatment and improved outcomes, with success rates around 80% for acute cases. ([10.1016/j.hcl.2007.01.005](#))

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