

EFFECTIVENESS OF THUMB TAPING AND PROGRESSIVE STRENGTHENING EXERCISES IN CONSERVATIVE MANAGEMENT OF TFCC INJURY: A CASE STUDY

Sadeem Khan, BPT (Final Year)

Department of Physiotherapy
[PCPS & RC / People's University, Bhopal, India]

ABSTRACT

Background: The triangular fibrocartilage complex (TFCC) provides stability to the wrist and distal radioulnar joint. Injury can cause pain, weakness, restricted movement, and difficulty in daily activities.

Case Description: A 34-year-old right-hand-dominant female competitive badminton player and bank manager presented with left ulnar-sided wrist pain and functional limitation. Clinical examination revealed mild ulnar-sided swelling, marked TFCC tenderness, guarding, and pain-limited wrist range of motion. Grip strength was reduced on the affected side. Baseline DASH score was 48.5/100, with pain rated 7/10 at rest and up to 9/10 during gripping and overhead activities.

Intervention: A structured conservative physiotherapy rehabilitation program was provided, incorporating wrist orthotic stabilization, thumb-spica taping, cryotherapy, progressive resistance exercises, grip strengthening, proprioceptive training, and graded return to functional activity.

Results: Following the rehabilitation program, wrist range of motion, pain, and grip strength improved. Wrist flexion improved from 60° to 80°, extension from 55° to 70°, radial deviation from 18° to 20°, pain at rest from 7/10 to 0/10, activity pain from 9/10 to 0–1/10, and grip strength from 18.5 kg to 30 kg.

Conclusion: This case demonstrates the potential usefulness of structured conservative physiotherapy incorporating stabilization, taping, progressive strengthening, proprioceptive training, and graded functional progression in a patient with partial TFCC injury without distal radioulnar joint instability.

Keywords: TFCC injury, wrist pain, physiotherapy, thumb taping, strengthening, proprioception, grip strength.

I. INTRODUCTION

The triangular fibrocartilage complex (TFCC) is one of the major stabilizing structures of the ulnar side of the wrist. It contributes to stability of the distal radioulnar joint (DRUJ), facilitates forearm rotation, transmits loads across the ulnar aspect of the wrist, and acts as a shock absorber during wrist loading.

Because of its anatomical position and the high functional demands placed on the wrist, TFCC injury may occur in individuals involved in occupational, recreational, and sports activities requiring gripping, throwing, repetitive loading, or forearm rotation.

TFCC injuries may be traumatic or degenerative. Traumatic lesions can occur after falls on an outstretched hand or forceful supination-pronation movements, whereas degenerative changes may develop through repetitive microtrauma. Loss of normal TFCC function can alter ulnar-wrist biomechanics, increase stress on remaining stabilizing structures, impair proprioceptive input, and contribute to pain, instability, and functional limitation.

EPIDEMIOLOGY

The exact incidence of symptomatic TFCC injury in the general population is difficult to establish because TFCC abnormalities may be asymptomatic and may be detected incidentally on MRI. The source case report cites a systematic review of 15 studies involving 977 wrists in which TFCC abnormalities were reported in approximately 38% of wrists overall, with prevalence increasing with age. TFCC abnormalities are also reported in asymptomatic individuals. Therefore, imaging findings should be interpreted together with clinical examination and symptoms. In patients with a history of wrist trauma, partial and complete TFCC tears and degenerative changes have also been reported.

PREVALENCE

The source document reports TFCC abnormalities in approximately 38% of wrists overall in a systematic review, while emphasizing that the prevalence of clinically symptomatic TFCC injury is less clearly established. In asymptomatic volunteers, MRI-detected abnormalities were also reported, demonstrating that structural findings do not necessarily correspond to clinical symptoms.

Among individuals with a history of wrist trauma, the source document reports partial TFCC tears, complete tears, and degenerative TFCC changes. Sports involving repetitive forearm rotation and wrist loading may increase the risk of symptomatic TFCC injury.

UNIQUENESS OF THE STUDY

This case study describes a structured conservative physiotherapy approach for partial TFCC injury. The rehabilitation program integrates immobilization and stabilization, thumb taping, progressive resistance training, proprioceptive enhancement, and graded functional or sport-specific progression within a phased framework. The multimodal approach is intended to address pain, mechanical protection, strength, proprioception, wrist mobility, and functional recovery.

II. CASE PRESENTATION

A 34-year-old right-hand-dominant female competitive badminton player and bank manager presented with left ulnar-sided wrist pain and functional limitation. She had no significant medical or surgical history and no previous wrist injury.

Clinical examination revealed mild ulnar-sided swelling, marked TFCC tenderness, guarding, and pain-limited wrist range of motion, particularly extension and ulnar deviation. Resisted testing demonstrated weakness in wrist extension, ulnar deviation, and pronation (3+/5). TFCC-specific tests, including the ulnocarpal foveal sign, ulnolunate ballottement, and ulnar-foveal shear test, were positive.

Grip strength was reduced on the affected side (18.5 kg versus 32 kg on the contralateral side), with mild proprioceptive impairment. The baseline Disabilities of the Arm, Shoulder and Hand (DASH) score was 48.5/100. Pain was rated 7/10 at rest and up to 9/10 during gripping and overhead activities. She reported difficulty with daily activities, computer work, gripping, wrist loading, badminton strokes, and prolonged sleep.

Radiographs showed normal wrist alignment without fracture or subluxation. MRI revealed an approximately 8-mm partial central tear of the TFCC disc with mild adjacent edema, while the peripheral and foveal attachments, radioulnar ligaments, and DRUJ remained intact.

III. INTERVENTION

3.1 Short-Term Goals

- Reduction of pain intensity from 7/10 to 4/10 or less on the Visual Analogue Scale.
- Reduction of DASH disability score from 48.5 to 35 or less.
- Restoration of active wrist range of motion in all planes to within 80% of the contralateral side baseline measurements.
- Achievement of 0 out of 3 positive TFCC-specific special tests.
- Tolerance of immobilization and taping strategies without skin irritation or significant activity limitation.

3.2 Long-Term Goals

- Complete resolution of pain with a Visual Analogue Scale score of 0–1/10.
- Restoration of DASH score to 15 or less.
- Restoration of grip strength to 90% or greater of the contralateral side (approximately 28–29 kg).
- Complete restoration of wrist range of motion to values comparable to the contralateral side.
- Negative TFCC-specific special tests.
- Return to full competitive badminton participation without pain or functional limitation.
- Restoration of normal proprioceptive acuity.

3.3 Rehabilitation Protocol

The treatment protocol was structured into progressive phases, with advancement based on achievement of phase-specific goals and absence of symptom exacerbation.

Phase 1: Immobilization, Pain Reduction, and Protection

The initial phase emphasized symptom containment, inflammation control, and protection of the healing TFCC.

1. Orthotic Stabilization

A custom below-elbow wrist orthosis made of semi-rigid thermoplastic material was used to maintain the wrist in 10–15° extension with neutral radial-ulnar deviation. It was worn continuously, including during sleep, except during hygiene and prescribed exercises.

2. Thumb Taping

Rigid 3.8-cm athletic tape was applied with the thumb in opposition to provide dynamic wrist stabilization and proprioceptive feedback. Taping was renewed every three days or when required.

3. Cryotherapy

Cryotherapy was applied for 15 minutes, three times daily, to reduce pain and inflammation.

Phase 2: Progressive Loading and Strengthening

Phase 2 emphasized gradual reloading of the healing TFCC structures through progressive resistance exercise, proprioceptive training, and continued stabilization using taping and orthotic support, with gradual reduction in bracing duration.

1. Progressive Orthotic Support

The wrist orthosis was continued during high-demand activities and gradually reduced during low-demand activities. Thumb taping was continued.

2. Progressive Resistance Exercises

Strengthening targeted the wrist flexors, extensors, radial and ulnar deviators, and pronator-supinator muscles. Exercises began with isometric contractions at approximately 50% maximum voluntary contraction, using 10-second contraction and rest intervals, progressing to 30-second contractions by week 8.

3. Grip Strengthening

Grip training progressed from soft therapy putty to calibrated hand-dynamometer exercises. Resistance was increased gradually, approximately 5% of contralateral grip strength per week.

4. Proprioceptive Training

Joint-position sense exercises were initially performed with visual guidance and progressed to eyes-closed exercises and gentle perturbation training to improve wrist proprioception and stability.

IV. OUTCOME MEASURES

4.1 Functional Assessment by Goniometry

Wrist function was assessed using a standard universal goniometer to measure active range of motion (AROM) of wrist flexion, extension, radial deviation, and ulnar deviation.

4.2 Visual Analogue Scale (VAS)

The Visual Analogue Scale was used to assess pain intensity. Scores were recorded during the rehabilitation period to track changes in pain.

4.3 Jamar Hand Dynamometer

Grip strength was measured using a calibrated Jamar hand dynamometer. Measurements were performed three times and averaged to improve measurement reliability.

V. RESULTS

Following the rehabilitation program, clinically meaningful improvements were observed in wrist range of motion, pain, and grip strength.

Outcome Measure/Scale	Pre-Rehabilitation	Post-Rehabilitation
Wrist Flexion	60°	80°
Wrist Extension	55°	70°
Radial Deviation	18°	20°
VAS – Rest	7/10	0/10
VAS – Activity	9/10	0–1/10
Grip Strength	18.5 kg	30 kg

Table 1. Pre- and post-rehabilitation outcome measures.

Wrist flexion improved from 60° to 80°, wrist extension from 55° to 70°, and radial deviation from 18° to 20°. Pain at rest reduced from 7/10 to 0/10, while activity-related pain reduced from 9/10 to 0–1/10. Grip strength increased from 18.5 kg to 30 kg.

VI. DISCUSSION

The present case findings support the potential role of conservative physiotherapy in the management of partial TFCC injury in a patient without DRUJ instability. The rehabilitation program combined protection and stabilization during the early phase with progressive loading, strengthening, proprioceptive training, and graded functional progression.

The use of a custom wrist orthosis and thumb taping was intended to reduce mechanical stress on the injured TFCC while maintaining controlled movement and proprioceptive input. Progressive strengthening was subsequently used to improve the capacity of the wrist musculature to contribute to dynamic stability and functional loading.

The improvement in wrist range of motion, pain, and grip strength observed in this case is consistent with the conservative management approach discussed in the source document. However, because this is a single-case report without a control group, the observed changes cannot be attributed to any single intervention with certainty.

6.1 Limitations of the Study

- Single-case design: only one patient was included, limiting generalizability.
- Lack of a control group: the specific contribution of the rehabilitation program cannot be established with certainty.
- Multiple interventions: immobilization, taping, ROM exercise, strengthening, and proprioceptive training were combined, making it difficult to isolate the effect of individual components.
- Subjective outcome measures: pain and some functional outcomes may be influenced by individual perception.

VII. CONCLUSION

This case demonstrates successful conservative management of a partial central TFCC tear in a 34-year-old competitive badminton player using a structured physiotherapy rehabilitation program incorporating wrist stabilization, thumb taping, progressive strengthening, proprioceptive training, and graded return to activity. Improvements were observed in wrist range of motion, pain, and grip strength. Despite the limitations of a single-case design, the findings suggest that an appropriately phased conservative rehabilitation approach may facilitate functional recovery in patients with partial TFCC injury without DRUJ instability.

VIII. ACKNOWLEDGMENT

[Add acknowledgment, supervisor, institution, or other contributors here if applicable.]

REFERENCES

- [1] Chung S, Huan KWS, Nah JH, Jerome T. Arthroscopic algorithm for acute traumatic triangular fibrocartilage complex (TFCC) tears. *Journal of Hand and Microsurgery* [Internet]. 2024.
- [2] Huang J. Triangular Fibrocartilage Complex (TFCC) in Sports Injuries: Anatomy, Pathomechanics and Evidence-Based Interventions. *Theoretical and Natural Science* [Internet]. 2025.
- [3] Onggo J, Walsh K, Darcy GM, Nambiar M, Mahendru G, Hui C, et al. Triangular fibrocartilage complex injury: outcomes of operative and non-operative management. *ANZ Journal of Surgery* [Internet]. 2024.
- [4] Mak M, Ho P C. Complications after arthroscopic triangular fibrocartilage complex (TFCC) surgery. *Journal of Hand Surgery (European Volume)* [Internet]. 2024.
- [5] Choi SI, Malik SS, MacLean S. The Natural History of Non-operatively Treated Traumatic Triangular Fibrocartilage Complex Tears: A Systematic Review. *Journal of Wrist Surgery* [Internet]. 2024.
- [6] Thapa R, Js N, Thampi G, Prakash A. Outcomes of Below-Elbow Versus Above-Elbow Immobilization in the Management of a Partial Triangular Fibrocartilage Complex Tear Without Distal Radio-Ulnar Joint Disruption: A Retrospective Study. *Cureus* [Internet]. 2025.
- [7] Shackleford T, Cornwall R, Little K, Dorich J. The Role of Initial Conservative Treatment for Suspected Triangular Fibrocartilage Complex Injuries in Children and Adolescents. *Journal of Hand Surgery Global Online* [Internet]. 2026.

Copyright & License:

© Authors retain the copyright of this article. This work is published under the Creative Commons Attribution 4.0 International License (CC BY 4.0), permitting unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

EDITORIAL CHECK BEFORE SUBMISSION: The supplied manuscript contains conflicting clinical details in the original abstract/body (e.g., age, rehabilitation duration, and outcome measure). These were not silently merged; the formatted version uses the detailed case-presentation dataset (34 years, DASH, and 16-week post-rehabilitation values). Please verify these items against the original clinical record before submission.

Copyright & License:

© Authors retain the copyright of this article. This work is published under the Creative Commons Attribution 4.0 International License (CC BY 4.0), permitting unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.