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Effect of Wristcraft Rehab in Traumatic Triangular Fibrocartilage Complex Repair – A Case Report

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Abstract:

- ***Introduction-***

Triangular fibrocartilage complex injuries are common in amateur and professional sports. (2) The function of the Triangular Fibrocartilage Complex is to act as a stabilizer for the ulnar aspect of the wrist. (3) It can resist both loading and tensive forces. Triangular Fibrocartilage Complex injuries are mainly caused by acute or chronic repetitive axial loads on the wrist, particularly on the ulnar side and in association with rotations or radial/ulnar deviations. (1)

- ***Aim***

Aim of the study was To Find Effect of Structured Rehabilitation Program in patient with Traumatic Triangular Fibrocartilage Repair.

- ***Method-***

After Ethical Approval from IEC the reported case of a 31-year-old male with post operative Triangular Fibrocartilage Complex Repair, with no other significant medical history was selected. Examination was carried out for pain with NUMERICAL PAIN RATING SCALE, Range of Motion with Goniometer, grip strength with hand – held dynamometer and functional outcome with Patient Rated Wrist Evaluation (PRWE) at week 0. Intervention- A structured rehabilitation program was made for 8 weeks. Sessions were followed for 5 days / week.

- ***Result-***

Significant changes in pain, range of motion, grip strength and PRWE indicated progressive improvement in physical function.

- ***Conclusion:***

Based on our study we conclude after 8 weeks of wristcraft rehab protocol patient showed significant decrease in pain, increase mobility, and functional outcomes in patient with Triangular Fibrocartilage Complex repair.

***Keywords*:** *Triangular Fibrocartilage Complex Repair, Pain, Range of Motion, Rehabilitation, Wrist Pain, PRWE, Grip Strength, Numerical Pain Rating Scale, Goniometer.*

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I. INTRODUCTION

The Triangular Fibrocartilage Complex (TFCC) plays a pivotal role in stabilizing the distal radioulnar joint (DRUJ) and supporting load transmission across the ulnocarpal joint. Injuries to the TFCC, particularly traumatic tears, can result in debilitating wrist pain, decreased grip strength, and loss of forearm rotation, significantly impairing functional capacity and quality of life.(1)Triangular fibrocartilage complex injuries are common in amateur and professional sports in games like golf, boxing, tennis, water skiing, gymnastics, pole vaulting and hockey. (2)These injuries are mainly caused by acute or

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chronic repetitive axial loads on the wrist, particularly on the ulnar side and in association with rotations or radial/ulnar deviations.(3),(4)TFCC, especially through its foveal attachment, contributes to the stability of the distal radioulnar joint (DRUJ).(1) Triangular fibrocartilage complex (TFCC) tears are a common source of pain on the ulnar side of the wrist and is often associated with decreased grip strength and impaired function.(5)According to the Previous studies TFCC injuries contribute between 3 to 9% of the hand-wrist injuries in athletes and the prevalence increases with age.(6)

Also, there is paucity of literature on efficacy of structured program in post operative TFCC Repair. Hence, we hypothesized that designing and implementing Structured exercise program a tailored approach (WRISTCRAFT-Cryotherapy, Resisted Strengthening, Active ROM, Functional Exercises, Target Hitting) to optimize recovery and may have improvement in physical function.

II. CASE STUDY

After Ethical Approval from IEC the reported case of a 31-year-old male, dentist by occupation with post operative TFCC Repair and no other significant medical history was selected for the study. The patient reported being asymptomatic until one week prior, when he experienced a sudden onset of severe pain in the wrist joint while engaging in punching bag activity. Despite the pain, he continued the punching for approximately 10 minutes, followed by his regular gym session lasting for 45 minutes. Approximately one hour later, the patient developed marked pain and swelling in the wrist joint. He subsequently consulted an orthopaedic specialist and underwent magnetic resonance imaging (MRI), which revealed a tear of the triangular fibrocartilage complex (TFCC) along with a sprain of the ulnar collateral ligament. Surgical repair i.e. Arthroscopy + ligament reconstruction + synovectomy of the TFCC was advised and was performed on the next day. Post-operative patient was advised with antibiotics, antacids and analgesics. On post-operative day 7, the patient presented with wrist joint pain, Grade 2 tenderness, and persistent swelling. He was then referred for physiotherapy management as part of the post-surgical rehabilitation protocol. After obtaining the consent the examination was carried out for pain with NPRS (r= 0.96), Range of Motion with Goniometer(r=0.95)), grip strength with hand – held dynamometer(r=0.85) and functional outcome with Patient Rated Wrist Evaluation (PRWE)(r=0.87).A planned physiotherapy protocol was made for the patient considering all the complaints and symptoms.

III. INTERVENTION

Table 1 CRAFT - Cryotherapy, Resisted Strengthening, Active ROM, Functional Exercises, Target Hitting)

WEEK	GOALS	EXERCISE
Week 1	Protect Surgical Repair and Minimize Stress On TFCC, control Pain And Swelling	Pain And Edema Control- Cryotherapy - Ultrasound Immobilization-wrist Joint in Neutral Position
Week 2	Maintain Shoulder, Elbow, And Finger Mobility	Week 1 Plus Active Shoulder ROM Exercises, Elbow AROM Exercises, Wrist PROM Exercises, Mild Passive Stretching
Week 3	Light Grip Strengthening And Prevent Stiffness	Week 2 Plus AAROM Exercises, Mild to Moderate Passive Stretching, Precision and Prehension Strengthening
Week 4	Begin Controlled Active- ROM	Week 3 Plus AROM Wrist (All Planes), shoulder Strengthening Ex -Scapular Squeeze Ex with TheraBand, Active Stretching- Prayer Position Stretch
Week 5	Restore Full Wrist ROM, Introduce Progressive Resistance Training	Week 4 Plus Grip Strengthening Ex, Resistance Band Ex, Forearm & Wrist Strengthening Ex with Dumbbells And TheraBand, Wall Push Ups
Week 6	Enhance Neuromuscular Control and Proprioception	Week 5 Plus-proprioception Drills - Medicine Ball Wrist Perturbation with Light Resistance, Wobble Board Grip Strengthening (Light Hand Grippers, Rice Bucket Training)
Week 7	Improve Dynamic Wrist and Forearm Strength and Enhance Functional Wrist Endurance	Week 6 Plus- target Hit with Tennis Ball, Forearm Endurance Drills (Wrist Curls, Hammer Rotations), Reflex & Reaction Training (Speedball, Hand-eye Coordination Drills), Racquet Sports
Week 8	Begin Progressive Return to Sport specific Drills	Week 7 Plus-ground Push Ups, Bosu Ball Push Ups, Punching Mechanics Drill (Shadow Boxing with Light Resistance)

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Fig 1 Patient Performing Theraband Exercises

Fig 2 Patient Performing Target Hitting

Table 2 Outcomes and Outcome Measures Used in the Study

Sr. No.	Outcome	Outcome measure
1	Pain	Numerical Pain Rating Scale
2	Range of Motion	Goniometry
3	Functional Status	Patient Rated Wrist Evaluation
4	Grip Strength	Hand-Held Dynamometer

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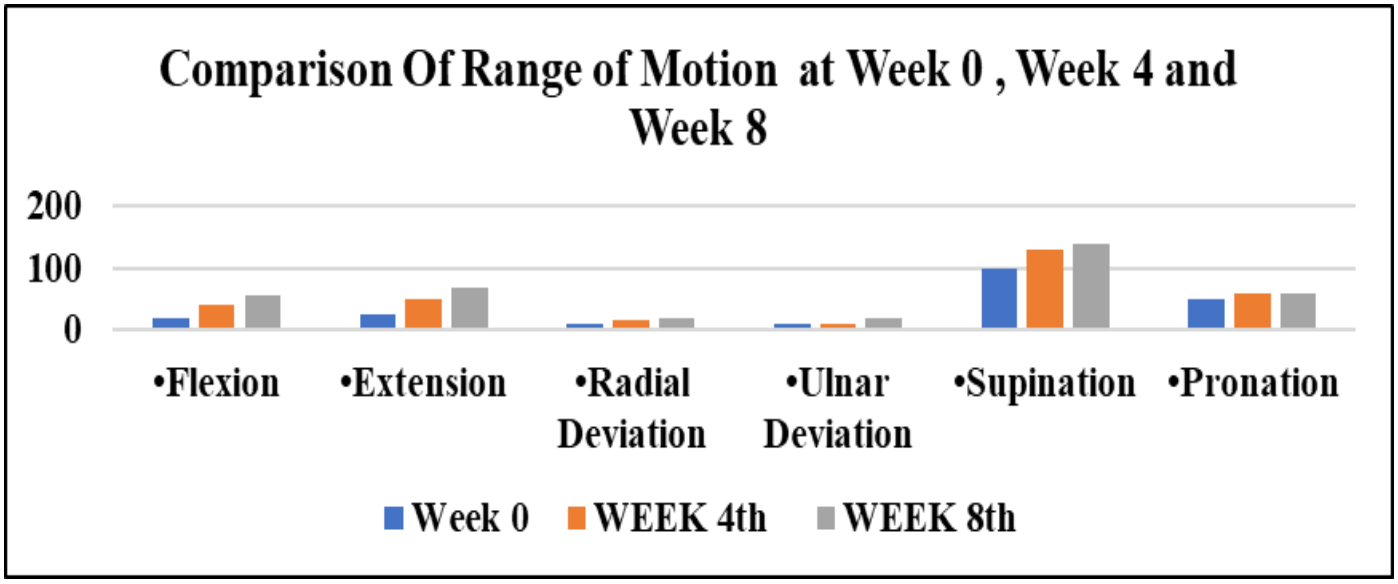
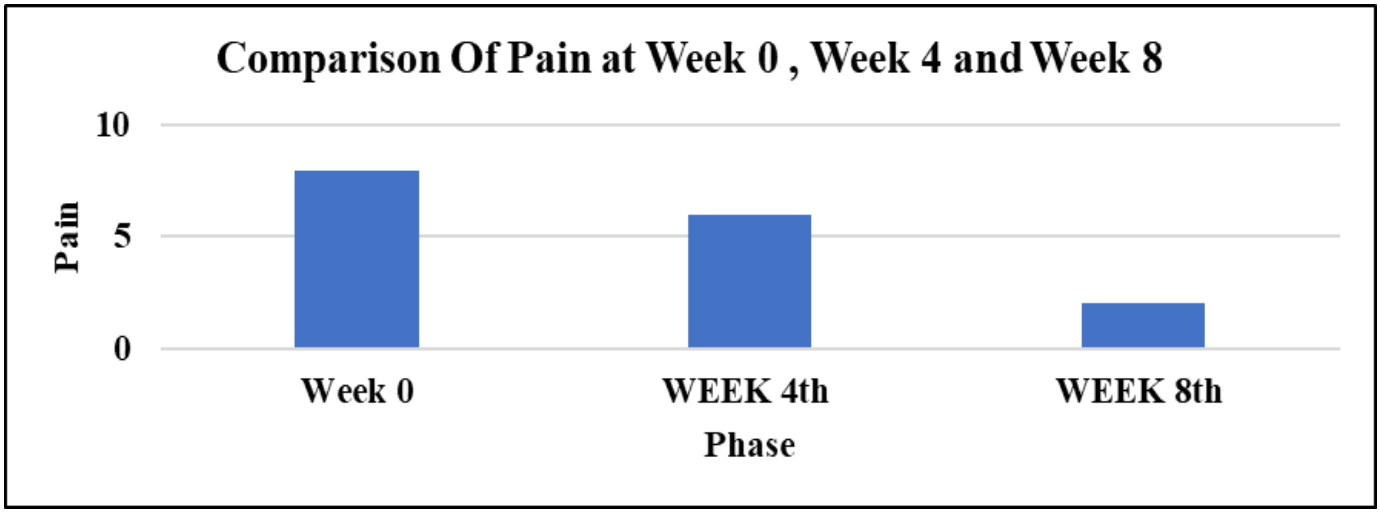
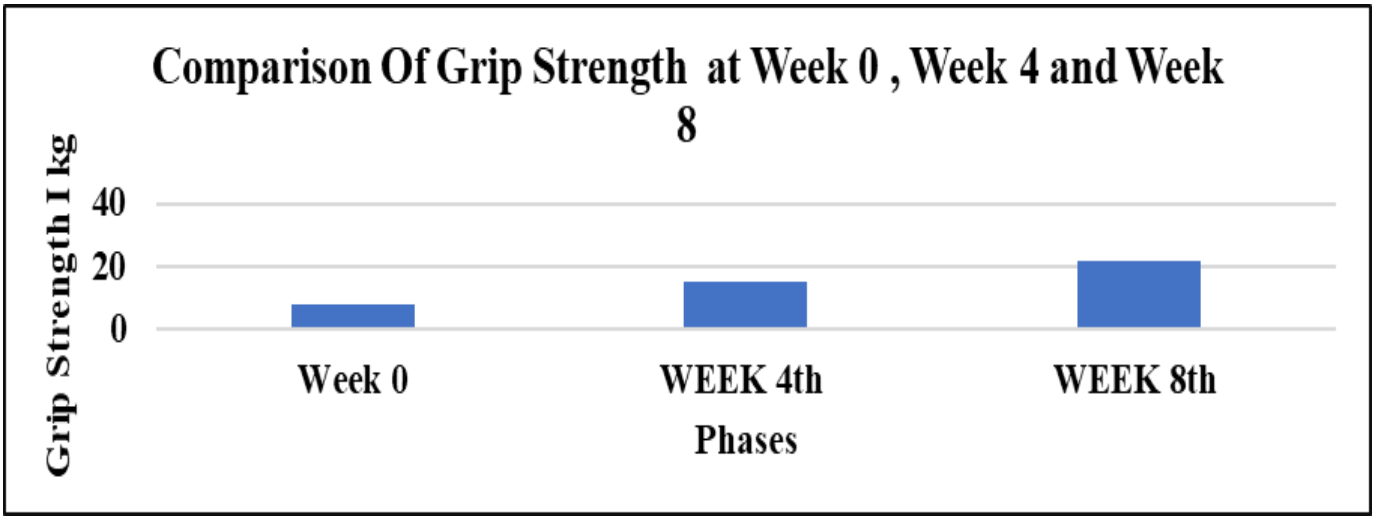
IV. RESULT



Graph No. 1 Comparison of ROM at Different Time Interval



Graph No. 2 Comparison of Pain at Different Time Interval



Graph No. 3 Comparison of Grip Strength at Different Time Interval

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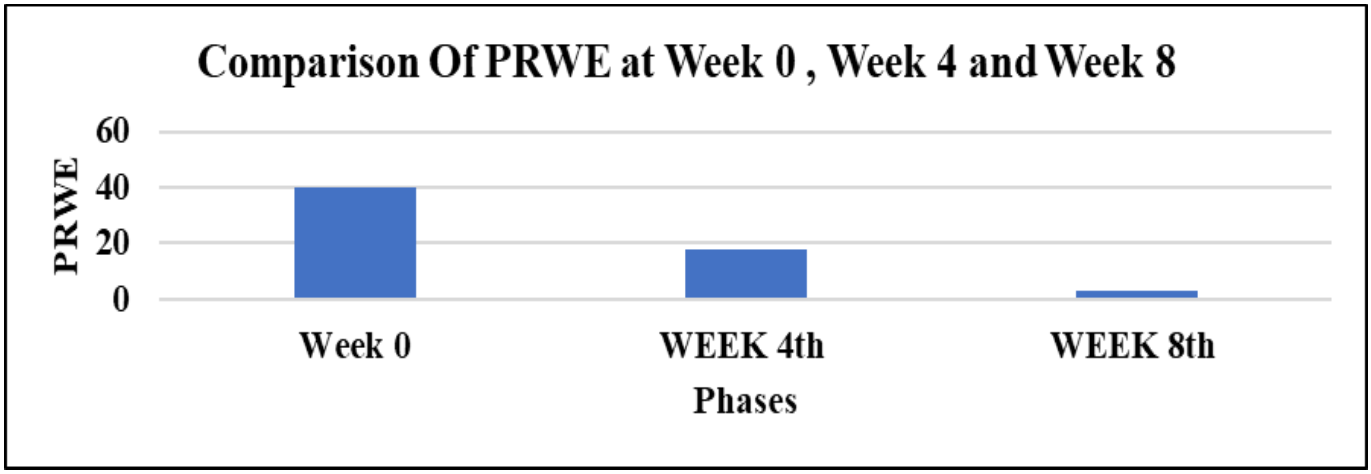

Graph No. 4 Comparison of PRWE at different time

V. DISCUSSION

The rehabilitation of TFCC injuries post-surgery requires a fine balance between protection of the repair and initiating controlled movement to prevent stiffness and chronic hand dysfunction. In present case, the WRISTCRAFT Rehab a structured, evidence-informed progression of wrist mobilization and strengthening protocol was the implemented for 8 weeks. The initial phase emphasized immobilization and edema control, consistent with standard recommendations for early post-operative care(7)Controlled passive range-of-motion (ROM) exercises were introduced based on healing timelines, minimizing stress on the TFCC while preserving joint mobility—an approach supported by biomechanical studies showing the vulnerability of the repaired TFCC to early excessive load.(8)Subject demonstrated reduction in pain, progressive improvements in grip strength, range of motion (ROM), and functional performance following the WRISTCRAFT protocol for 8 weeks. Unlike conventional rehabilitation, which primarily focuses on immobilization followed by general strengthening, WRISTCRAFT integrates early controlled mobilization, proprioceptive neuromuscular re-education, and progressive resistance exercises. These components likely contributed to faster neuromuscular adaptation and wrist stability.

Amin A et. al.(9) in his study determined the effect of cryotherapy on pain tolerance in ankle injuries. The study concluded that cryotherapy at the ankle exerts its clinical effect, a reduction in pain. This results are due to Cryotherapy decreases tissue temperature, leading to vasoconstriction, which in turn reduces blood flow, swelling, and inflammation.(10)This local cooling effect slows down nerve conduction velocity, which directly reduces the transmission of pain signals.(9)According to Kisner et. Al. (11) AROM exercises are essential in the early stages of rehabilitation to prevent joint stiffness, maintain tissue elasticity, and promote synovial fluid circulation, which aids in cartilage nutrition and joint health. Implementing AROM exercises can help in restoring functional motion and preventing adhesions that may limit mobility.Functional mobility exercises are designed to mimic daily activities, thereby facilitating the transition from rehabilitation to everyday tasks. These exercises focus on improving the coordination and strength required for movements such as gripping, lifting, and rotating the wrist. (12),(13) The exercises included in wrist craft rehab protocol like Wrist Curls, Hammer Rotations), Reflex & Reaction Training (Speedball, Hand-eye Coordination Drills), Racquet Sports enhanced neuromuscular control and proprioception which are vital for wrist stability and function. Task oriented exercises aim to improve motor planning, coordination, and functional performance. Strengthening these muscles is crucial for providing dynamic stability to the distal radioulnar joint (DRUJ) and supporting the repaired TFCC.(14) Notably, the patient in this case study achieved near-full functional recovery by 8 weeks, with significant improvements in Patient Rated Wrist Evaluation, Pain, Range of Motion and Grip Strength. WRISTCRAFT facilitated an earlier return to activity levels.

VI. CLINICAL IMPLICATIONS

WRISTCRAFT Rehab presents a clinically significant advancement in post-TFCC repair rehabilitation, emphasizing early mobility, proprioceptive training, and progressive strengthening.

This approach improved recovery timelines, pain management, and functional outcomes, making it a valuable addition to evidence-based wrist rehabilitation protocol for TFCC Repair.

VII. CONCLUSION

Based on our study we conclude that after 8 weeks of wristcraft rehab protocol patient showed significant decrease in pain, increase mobility, and functional outcomes in patient with TFCC repair.

Ethical Approval: Approved

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