

A CASE REPORT ON THE EFFECT OF EARLY MOBILIZATION IN THE REHABILITATION OF AN ACROBAT POST-OPEN TRIANGULAR FIBROCARILAGE COMPLEX REPAIR

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Abstract

The Triangular Fibrocartilage Complex (TFCC) is one of the more vital structures in the wrist. The TFCC functions as a stabilizer of the distal radioulnar joint and a conduit in the transmission of load in the upper extremity. Its integrity is important to allow the dynamic movement of the hand and wrist as well as in weight bearing. The TFCC can be subjected to excessive stresses, especially in elite performing athletes such as an acrobat, that can lead to its rupture.

Partial or complete rupture of the TFCC of an elite athlete would benefit most from an open surgical repair. Surgery is then followed by hand therapy. However, due to the complexity of the TFCC, there is currently no gold standard in the rehabilitation of the TFCC. Albeit the globally practiced treatment post-surgery involves prolonged immobilization in a cast or a Muenster Splint that can range between 3 weeks and 8 weeks beforehand therapy can commence.

The length of immobilization and time spent in hand therapy to recover range of motion, function, and strength can consume more than four months. This is a time that a performing acrobat may not have.

This paper presents the effect of immediate hand therapy and early mobilization of the wrist of a professional acrobat who had an open surgical repair of a partial rupture of the TFCC and the Lunotriquetral ligament of the wrist.

Keywords

Triangular Fibrocartilage Complex, TFCC, Hand Therapy, wrist injury, early mobilization

1. INTRODUCTION

The Triangular Fibrocartilage Complex or TFCC is a confluence of six different ligaments and a cartilage to form a structure that connects the distal radioulnar joint and some of the carpal bone on the ulnar side. The TFCC also serves to transmit forces from the upper extremity and aids in the regulation of load during object manipulation.

The TFCC is comprised of the (1) ulnocarpal or articular disc, (2) meniscus homologue, (3) deep and superficial radioulnar ligaments, (4) tendon sheath of the Extensor Carpi Ulnaris, (5) dorsal and volar ulnar carpal ligaments, and (6) ulnocarpal capsule. (Lerma et al.,

2022) Injury of one or a combination of these structures can cause pain and compromise wrist stability. (Jung et al., 2009)

Diagnosis of a TFCC injury can usually be done through physical examination in the clinic, using a battery of special tests to determine the integrity of the components of the TFCC.

However, to further reinforce the result of the physical examination, an MRI is usually obtained. To further identify the ligament damage in detail, arthroscopy may be done. Arthroscopy is regarded as the gold standard in wrist ligament injury diagnosis. (De Santis et al., 2022)

TFCC injuries are categorized by Palmer as either traumatic or degenerative. Traumatic injuries to the TFCC are identified based on the location. (Palmer, 1989) The case presented in this paper is a TFCC Type 1B injury associated with a Lunotriquetral ligament rupture.

2. CASE PRESENTATION

A 24-year-old, male, professional acrobat, who performed as part of an acrobat troupe in Dubai, United Arab Emirates in 2017, came for consultation due to ulnar-sided wrist pain aggravated by supination of the wrist and weight bearing. Upon clinical examination by a seasoned Orthopaedic Hand Surgeon, he

was diagnosed to have a TFCC injury. To confirm the diagnosis, an MRI of the wrist was ordered.

The MRI revealed a partial tear or rupture in the TFCC complex and a complete rupture of the Lunotriquetral ligament of the right wrist. The injury was sustained during rehearsals of a new acrobatic act that was different from his trained and usual role.

Within the week of the diagnosis, the patient agreed to an elective open surgical repair of the TFCC and Lunotriquetral ligament. A few days after the surgery, he was referred to the author's clinic for hand therapy.



Figure 1. The patient performs active range of motion exercises with the forearm and wrist in the neutral position.

The hand therapy involved wound care, edema management, use of physical modalities, gentle active range of motion exercises of the wrist, tendon gliding exercises, isometric exercises, scar management, conditioning, and strengthening exercises, proprioceptive exercises, simulation, and scaled actual task performance.

The patient was provided with a wrist brace from the first session of hand therapy, a few days after the surgery, instead of being placed in a Münster Cast or Münster Brace. The brace was always worn including during sleeping and was only removed for therapy and hygiene activities. The patient was instructed to ensure that the wrist and forearm are not rotated palm up or supinated when not

wearing the brace. The brace was weaned off by week 6 post-surgery and was only worn during light gym exercises and in crowded public venues. By the 8th week, the wrist brace was discarded completely.

The patient engaged in intensive hand therapy in the first month, having sessions 2-3 times per week and reduced to twice per week in the

second and third months. Whenever the patient did not have sessions with the author, he was treated by the Troupe's in-house Physiotherapist who used the Human Tecar as a physical modality and replicated the exercises prescribed. The in-house Physiotherapist collaborated with the author to ensure that the exercises to preserve the strength of the proximal muscles of the shoulder girdle and upper arm are still carried out during the initial stages post-surgery.



Figure 2. The patient lifting 150kgs pain-free 5 years post-surgery.

By the 8th week post-surgery, the patient was back in the gym performing scaled exercises for conditioning and strengthening. By the 12th week from the surgery date, the patient was discharged from my care and resumed his work, easing in with reduced participation in shows. As of the time of writing, the patient is performing as part of the Cirque De Soleil Troupe.

3 DISCUSSION

The aim of immobilization of the wrist and forearm in the neutral position in the treatment of a TFCC injury is to allow the structures to heal without the risks of re-injury or re-rupture. However, prolonged immobilization also increases the chances of stiffness of the wrist

joint and muscle weakness. (Lerma et al., 2022) Immobilization also creates cortical changes in the brain, influencing mental imagery, muscular sensitivity, and limb control. (Gaffney et al., 2021; King et al., 2022)

Knowledge of the wrist and biomechanics also allows the initiation of hand therapy for early mobilization. By positioning the wrist and forearm in the neutral position, the stress in the TFCC is reduced. (Jung et al., 2009; Lerma et al., 2022)

The stability of the wrist is not exclusive to the integrity of the TFCC, the tendons that cross the wrist also provide extrinsic support for strength and stability. Therefore, the muscle strength and general fitness of the patient before the injury are factors that would

facilitate faster recovery. (Lerma et al., 2022) Additionally, the patient's athletic genes may also play a role in the recovery rate allowing for faster progression.

Moreover, the time window between proper diagnosis of an injury and actual surgical and therapeutic intervention impacts the outcome of recovery as well.

4 CONCLUSION

Early mobilization of the wrist post-Open TFCC repair of an athlete may be beneficial to achieve a good outcome and safely allow the return to work within a shorter period. Early mobilization prevents complications such as adhesions, weakness, loss of range of motion, and unfavorable cortical and sensorimotor characteristic changes. However, a sound knowledge of the TFCC anatomy, biomechanics, and surgical method used in the repair are essential in confidently implementing the method.

Limitations

This is a single case report, and the same method needs to be implemented in a bigger sample population. Likewise, the same method of early mobilization therapeutic intervention needs to be implemented in other facilities for comparison.

Acknowledgement

The Early Mobilization of the wrist for Open TFCC repair is a brainchild of Dr. Lucia Heras, who laid down the fundamental principles that served as cornerstones for my therapeutic exercise routine that I have developed and continually fine-tuned up to this date. I worked with Dr. Heras from 2013 until 2021, treating orthopedic post-surgical cases for hand therapy, the majority of them with TFCC injuries. I thank Dr. Lucia Heras for initiating and providing me with the main guidelines for the post-surgical treatment of her Open TFCC repairs.

Ethics

Consent was obtained from the patient in 2017 and is logged in the records of Burjeel Hospital for Advanced Surgery in Dubai, United Arab Emirates. Consent for publication and use of

data and images were obtained personally by the author from the patient via e-mail.

Declaration: The author has nothing to declare.

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