

Rapid and Successful Rehabilitation and Return to Play for a D1 Gymnast After Treatment for Lateral Epicondylitis with Ultrasound Guided Percutaneous Tenotomy (Tenex)

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To cite this article:

Bryant Walrod, Wilbert Turner, Kelly Pauls. Rapid and Successful Rehabilitation and Return to Play for a D1 Gymnast After Treatment for Lateral Epicondylitis with Ultrasound Guided Percutaneous Tenotomy (Tenex). *American Journal of Sports Science*.

Vol. 5, No. 1, 2020, pp. 1-4. doi: 10.11648/j.rs.20200501.11

Received: March 26, 2020; **Accepted:** April 15, 2020; **Published:** May 14, 2020

Abstract: Lateral elbow pain is a commonly seen in sports medicine. There are multiple interventions for this chronic condition which may lead to difficulty with successful treatment. There are also multiple rehabilitation strategies employed for treatment. Variations in treatments and rehabilitation protocols can lead to different and sometimes unsuccessful long term outcomes. We present a novel case of a Division 1 college gymnast with recalcitrant lateral elbow pain who underwent percutaneous tenotomy (Tenex) of the common wrist extensor tendon. The athlete was able to return to full Division 1 athletics two months after the procedure. This case is unique secondary to the patient being a high level athlete and his rapid return to the intensity and requirements of competing in Division 1 sports. We also developed a specific rehabilitation protocol that we postulated would be appropriate after this procedure. We illustrate the athlete's rehabilitation in detail. We feel that this specific protocol may have also influenced his rapid and complete return. We anticipate that this specific rehabilitation protocol may potentially guide future rehabilitation protocols after the Tenex procedure for recalcitrant lateral epicondylitis. In addition, this rehabilitation protocol may be considered after the Tenex procedure for additional conditions like medial epicondylitis, achilles tendinitis, patella tendinitis and gluteal tendinitis.

Keywords: Percutaneous Tenotomy, Tenex, Lateral Epicondylitis

1. Introduction

Lateral epicondylalgia is a common chronic condition affecting 1 -3% of the population [1] and up to 40-50% of regular tennis players. [2] Anatomically, the extensor carpi radialis brevis and common wrist extensor tendons are the involved tendons. Typically, lateral epicondylalgia will resolve spontaneously without treatment in 1 – 2 years. [2] However, there also exists a multitude of treatment options for this chronic condition to hasten a more rapid resolution of symptoms and return to activity. [3] While this condition is often referred to lateral epicondylitis and tendinitis, histological examination would support the terms lateral epicondylitis and tendinosis. Findings of angiofibroblastic hyperplasia and collagen disarray indicate a poorly healing

process rather than an acutely inflamed process of the tendon. [4] Secondary to this, alternative treatments to cortisone have been explored. Sonographic guided percutaneous ultrasonic tenotomy and debridement (Tenex) has emerged as a viable treatment option for this chronic condition. This procedure emulsifies the tendinotic/pathologic tissue with a continuous slow saline inflow and then the tissue is selectively removed in a closed collecting system. Tenex is an outpatient procedure and is minimally invasive, requiring little downtime. Prospective and retrospective studies and case reports have been published on this procedure demonstrating positive outcomes. [5 - 12] Tenex has emerged as a viable treatment option for those wanting to undergo a less invasive procedure than surgery. Surgical treatment for lateral epicondylitis has a large variability in

surgical technique. [13]

In addition to the large variability in treatment options for refractory tennis elbow, there also exists a wide variation in rehabilitation treatment approaches with no certain consistency. [14] Additionally there is no consensus with respect to treatment after regenerative or orthobiologic procedures. [15] Finally, there are no established rehabilitation guidelines at all with respect to rehabilitation after a patient undergoes the Tenex procedure.

2. Case Presentation

2.1. Patient Information

The patient is an 18 year-old male freshman varsity gymnast with lateral elbow pain for 7 months. He was seen for his pre-participation physical examination in July 2018 and reported these chronic symptoms. His symptoms were refractory to rest, activity modification, formal physical therapy, acupuncture and an elbow sleeve.

2.2. Clinical Findings

Physical examination revealed full ROM of the elbow and wrist. He had pain at the right lateral epicondyle and common wrist extensor origin. The pain was worse with resisted wrist extension, third finger extension and supination. He was neurovascularly intact. The athlete was recommended formal rehabilitation under the guidance of the Athletic Training team at the University. He was also given Naproxen 500 mg twice daily for 2 weeks. He had negative x-rays at this time as well.

2.2.1. Timeline

The student-athlete was compliant with supervised rehabilitation for 8 weeks but his symptoms persisted.

2.2.2. Diagnostic Evaluation

An MRI was obtained which revealed thickened and intermediate signal within the common tendon of the forearm extensor muscles compatible with tendinosis. A superimposed partial-thickness tear of the origin of the common forearm extensor was also evident at the posterior margin. Additional

treatment options were reviewed with the student athlete including continued rehabilitation, activity modification, autologous blood injection, Platelet Rich Plasma (PRP) injection, and percutaneous tenotomy (Tenex).

2.2.3. Therapeutic Intervention

After a detailed discussion of the treatment options and anticipated rehabilitation and time off of gymnastics, the patient wanted to proceed with Tenex. He underwent the procedure on 09/28/2018. He began rehabilitation after the procedure.

3. Rehabilitation Protocol

The protocol is summarized in Table 1. This protocol was developed with the understanding that we are now treating an inflamed tendon. Prior to the procedure, the tendon was in a state of tendinosis, but after the procedure, the tendon was irritated and inflamed secondary to the local trauma of the procedure. This occurred despite the procedure emulsifying and removing tendinotic tissue. Day one of the rehabilitation protocol involved changing bandages and passive range of motion (PROM) of elbow flexion and extension. Day four of the program started active range of motion (AROM) of elbow flexion and extension to compliment the PROM. On day seven status-post the procedure, the patient began to incorporate wrist flexion and extension as well as forearm pronation and supination into the stretching regimen. The patient began isometric strengthening exercises for wrist and elbow flexion and extension on day 10. Exercises were started with low sets (1-2) and repetitions (8-10) with 3 second contraction holds. Rest was encouraged as needed before beginning the next repetition or set. On day 16, the patient was instructed to begin adding eccentric and isotonic wrist extension and flexion exercises with the goals of building muscle endurance and encouraging proper remodeling of the tendon. The patient was able to complete moderate sets (2-4) and high repetitions (10-15) at this time. These various types of contractions and exercises were continued for two weeks as weights and frequency progressed slowly. Pain free movements were the criteria to progress treatment.

Table 1. Rehabilitation Protocol.

	Week 1 (0-7 days)	Week 2 (7-14 days)	Week 3 (14-21 days)	Week 4 (21-28 days)	Week 5 (28-35 days)	Week 6 (35-42 days)
Passive ROM	Elbow flexion & Extension – 3' each Wrist Flexion & Extension – 3' each On day 4 – Introduce Elbow/Wrist flexion & extension – 3' each	Same as week 1, add forearm pronation and supination.	Same as week 2	Same as week 2	Same as week 2	Same as week 2
Active ROM		Same as week 1, add forearm pronation and supination.	Same as week 2	Same as week 2	Same as week 2	Same as week 2
Exercises	None.	Isometric wrist and elbow flexion and extension	Isometric, Isotonic, Eccentric wrist and elbow extension	Isometric, Isotonic, Eccentric wrist and elbow extension	Begin to incorporate joint integrated movements.	Progress joint integrated movements. Begin to incorporate sport specific training.
Avoid	Sustained gripping	Sustained gripping	Exercises that force non-neutral grip	Exercises that force non-neutral grip	Exercises that force non-neutral grip	None.

	Week 1 (0-7 days)	Week 2 (7-14 days)	Week 3 (14-21 days)	Week 4 (21-28 days)	Week 5 (28-35 days)	Week 6 (35-42 days)
Manual Therapies	None.	None.	None.	Soft tissue manipulation or Graston Technique	Soft tissue manipulation or Graston Technique	Soft tissue manipulation or Graston Technique
Post Activity	Ice 20'	Ice 20'	Ice 20'	Ice as needed	Ice as needed	Ice as needed

Once all exercises could be performed in a pain free manner, the patient was then introduced to joint integrated movements such as bicep curls, chest press, rows, pull-ups and push-ups. This began at five weeks status-post procedure. All of these movements were completed with a neutral grip of the wrist to avoid stressing the wrist extensors. Next, the patient was introduced to endurance type exercises utilizing a five gallon bucket filled with dry rice grains. This exercise focused on all aspects of wrist range of motion (ROM) and strengthening with 1 minute intervals of turning the rice. The final step of return to sport and activity was to complete handstand progressions and holds. The patient began on the floor with a flattened wrist position for the first few days before he could progress to utilizing the parallettes which would allow for more extension of the wrist in the handstand position. At week 4, soft tissue mobilization techniques were incorporated including the Graston Technique and massage therapies.

The student athlete progressed well. In follow-up on 12/05/2018 he reported no pain at rest or with full activity and his strength and ROM were normal. He was able to return to full Division 1 athletic gymnastic practice on 12/05/2018 and then competed in the season opening competition on 01/12/2019. He was able to compete in the entire 2020 season with no lateral elbow pain, indicating sustained symptom improvement at greater than one year.

4. Discussion

This case illustrating percutaneous tenotomy for chronic lateral epicondylitis is unique for 2 reasons. First, we describe successful return to high level competition in the form of Division 1 Athletics for chronic and refractory lateral elbow pain. Second, we describe a specific rehabilitation protocol that allowed for rapid return to full practice in 2 months. Typically, patients are given activity and lifting restrictions for about 6 weeks following this procedure but these can vary depending upon physician preference. Often, no formal rehabilitation guidelines are provided. When given, recommendations are often vague with no strong recommendation of when the patient can safely return to activities such as ADLs. There are no specific guidelines with respect to return to high level activities like Division 1 athletics. There are no published standard of care guidelines on specific rehabilitation protocols after the Tenex procedure from the manufacturer nor has such recommendations appeared in the literature. We postulated that treating the chronic, poorly healing tendon as a tendinitis after the procedure would result in rapid and successful treatment and return to play.

In addition, often the outcomes measures in the published studies on Tenex for lateral epicondylitis are VAS and Q-

DASH scores and patient satisfaction. Published studies on the Tenex procedure have not reported on outcomes measuring return to high level activity such as Division 1 athletics.

Secondary to our successful and rapid treatment success to high level activities, clinicians should consider employing the treatment and rehabilitation protocols illustrated above after percutaneous tenotomy for recalcitrant lateral epicondylitis. Further studies will be needed to determine if similar treatment protocols will be applicable to additional indications for the Tenex procedure such as medial epicondylitis, patella tendinosis, gluteal tendinosis and achilles tendinosis.

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