

**PATELLAR TENDINOPATHY REHABILITATION FOR A COLLEGIATE FOOTBALL  
ATHLETE: CASE REPORT**

**By**

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## **Abstract**

**Background and Purpose:** Patellar tendinopathy is a common pathology among young athletes who participate in sports with requirements for high intensity loading of the lower extremities. The purpose of this case report is to show the progression of an athlete through a protocol intended specifically for patellar tendinopathy.

**Case Description:** A 21-year-old male collegiate football player presented to the clinic with 8/10 left patellar tendinopathy that was hindering his ability to perform the necessary tasks for his position as a slot receiver. The interventions used followed a progression from isometric, all the way to sport specific high intensity tasks using a 4-phase protocol.

**Outcomes:** The patient showed vast improvements in his lower extremity functional scale (LEFS) score, as well as improved tolerance to loading in higher range of motions. The patient subjectively reported feeling a 95% recovery in function with 0/10 pain.

**Discussion:** The 4-phase protocol that was followed for this patient's course of treatment was incredibly effective at improving tolerance to loading and reducing pain levels. The use of blood flow restriction early on appeared to also be helpful in reducing the time of healing, despite it being a deviation from the main protocol.

**Key Words:** Patella, Tendinopathy, Football, Athlete

## **Introduction**

Tendinopathy is defined as a “complex multifaceted pathology of the tendon, characterized by pain, decline in function, and reduced exercise tolerance”.<sup>1</sup> This condition is a common overuse injury to a specific tendon, most commonly caused by repetitive motions, and can be seen in a wide range of patient populations. The most common locations for tendinopathy include the rotator cuff, the elbow, the knee, the hip, and the ankle.<sup>1</sup> Patellar tendinopathy is a common injury among young athletes.<sup>2</sup> Hallmark signs for patellar tendinopathy include pain at the inferior pole of the patella, and pain with activities that is not also present at rest.<sup>2</sup> This specific subtype of tendinopathy can occur with high intensity activities of the lower extremity such as running, jumping, and cutting maneuvers. Sports where these motions are most common include football, soccer, basketball, track and field, and others with similar requirements.<sup>2</sup>

This case report follows the course of treatment for a young athlete who presented with a classic presentation of patellar tendinopathy. This particular case of patellar tendinopathy treatment is unique due to the swift recovery of the patient, and his overall positive response to the interventions provided.

## **Case Description**

The patient is a 21-year-old male who presented to the clinic with left anterior knee pain. He is a collegiate football player, and plays for his team as a slot receiver. He is incredibly healthy and exercises frequently, and there were no reports of other medical conditions in his medical history. No family medical history was obtained due to the patient's age and overall health, as well as the nature of the injury itself.

The patient reported that his symptoms began towards the end of the previous football season, roughly 8 months prior to presenting to the clinic, and progressively worsened over the course of spring training. He claimed that he reported to his team's athletic training staff due to the pain, however the pain continued to worsen week to week. He did not disclose the specific interventions that were used by the athletic training staff aside from icing after practice. Once the pain became too much to handle, he visited an orthopedic physician and was then referred to physical therapy to address the pain. He reported that he would like to be back to high intensity exercises before the beginning of his college team's summer training camp, which would begin in 6 weeks from the initial evaluation.

## **Examination**

Upon arrival to the clinic, the patient was asked to fill out his intake paperwork, which included a lower extremity functional scale (LEFS). This outcome measure was used to set a baseline for the patient's level of function, and to determine how severely his condition is impacting his daily activities.<sup>3</sup> The patient also obtained imaging from the referring physician prior to his initial session in order to determine if there was any structural damage that could be related to the patient's symptoms. No observable damage was seen in those images.

For the initial examination, traditional measurements of range of motion and muscular strength were taken, as well as an evaluation of the patient's squat mechanics due to his complaint of pain with squatting. All measurements that were taken for the initial evaluation are listed in table 1. Passive and active range of motion were measured with a traditional goniometer,<sup>4</sup> and full range was present bilaterally with only slight asymmetry. Manual muscle testing was used not purely for strength measurements, but to determine if there was a difference in strength between the left and right quadriceps.<sup>5</sup> As shown in the table, there was a slight discrepancy, and the left side was slightly weaker and had slightly less range of motion than the right due to pain. With the patient's squat, he was only able to achieve 30 degrees of knee flexion on flat ground, and he reported 8/10 pain on the numeric pain scale<sup>6</sup> while doing so. There was no evidence of knee valgus or other incorrect movement patterns with the squat at this depth, only pain just below the left patella.

The symptoms that the patient was reporting could be explained with several diagnoses, so special care was taken to determine which diagnosis best fit the patient's presentation. The initial differential diagnoses that were used for selecting tests were patellar tendinopathy, patella-

femoral pain syndrome (PFPS), and a meniscus tear. Due to the patient having imaging that showed no evidence of structural damage, the meniscus tear was ruled out. Because the patient reported no pain at rest, the location of his symptoms during activities was slightly distal to the inferior pole of the patella, and his chief complaint was pain with squatting, the final PT diagnosis was determined to be patellar tendinopathy. This patient showed very good potential for recovery as his motivation to return to football was high, and therefore his prognosis was very good.

## **Intervention**

The interventions chosen for this patient were based largely on an article found in the *Journal of Orthopedic and Sports Physical Therapy* by Miliaras et al titled, “Patellar Tendinopathy: Clinical Diagnosis, Load Management, and Advice for Challenging Case Presentations”.<sup>2</sup> This article includes a 4-phase intervention protocol specific to patellar tendinopathy in the athletic population, and has been highly cited in literature. All interventions that were provided are listed in table 2. The total course of treatment was 7 visits across the span of 4 weeks. Phase 1 was focused on isometric holds, as these have been shown to provide analgesic effects for patients with tendinopathies when dosed in 5 sets of 45 second holds as per the article. This patient had a very positive response to the isometric short-arc quadricep hold that was given during the evaluation, and was prescribed in his initial home exercise program. Progression to phase 2 was initiated once the patient was able to tolerate phase 1 with minimal pain. Phase 2 included exercises with heavy slow resistance to build tolerance and strength. Special care was taken to monitor the patient’s symptoms and form to prevent overloading. Blood flow restriction was also used for this patient in the first 2 phases to facilitate healing and strengthening of the patellar tendon.<sup>7</sup> Although this was not mentioned in the Miliaris et al<sup>2</sup> article, it was instrumental to the speed of recovery for this patient. Phase 3 was initiated once the patient reported no pain with any activities in a session. This phase included quick loading with activities such as sprinting, jumping, and cutting. Once again, the patient’s symptoms were monitored heavily when beginning this phase in order to not overload or progress the patient too quickly. Finally, phase 4 included sport-specific tasks and drills to facilitate his return to football. Because his position as a slot receiver requires many sprinting and cutting maneuvers, as well as

reaction and quick decision making, the drills that were used were intended to mimic that environment.



## **Outcomes**

A comparison of the patients progress from the initial evaluation to the final appointment can be observed in table 3. Overall, the patient showed vast improvements in all aspects of movement and strength, and he reported that he felt as though he had made a 95% recovery. The last 5% he reported was some slight pain with high intensity resisted jumping with an immediate lateral hop, and he scored that pain as a 2/10 when it happened and resolved quickly after impact. His LEFS score also improved by 32 points, which far exceeds both the MDC and MCID of 9 points for this outcome measure.<sup>8</sup> Although it was very easy to see the progress that the patient made by just looking at the exercise progressions and looking qualitatively at his squat progression, this improvement on the LEFS and all other quantitative measures demonstrated a solid, evidence based, and measurable change in the patient's ability to perform the necessary movements for his sport.

The progress that was made in such a short number of visits showed that the patient was compliant with his home exercises, and also diligent about implementing our education and treatment methods to his own workouts outside of the clinic. "Patient buy-in" was achieved after the patient noticed his pain levels reducing from performing the isometric activities. Regardless of which stage he was in, upon entering the clinic he was asked to demonstrate a squat and report his symptom severity from 0-10. Early on when he was unable to reach a squat depth of 90 degrees of knee flexion due to pain, he was sent to do wall sits to begin the session. The main isometric activities were discontinued by session 4 when he was able to squat to 95 degrees of knee flexion with 0/10 pain. The squat demonstration at the beginning of each session was progressed from double leg on flat ground, to double leg on a decline, and then to single leg on a decline, and finally to single leg on a decline while holding a 15-pound dumbbell. No adverse

events or reactions occurred throughout the course of treatment with any of the interventions provided. The patient reported feeling optimistic about his upcoming training camp for the fall season, and was very pleased with how well the overall course of physical therapy went.

## Discussion

This case study followed a young athlete through a course of treatment for patellar tendinopathy. Due to all types of tendinopathy being highly studied, it was easy to find and apply evidence-based practice to this patient using a specific article that matched his case very well. The protocol that was followed from the Milliaris et al<sup>2</sup> article, along with the supplemented use of blood flow restriction,<sup>7</sup> was instrumental in this course of treatment and proved to be effective with the speed and quality of this patient's recovery. There was some concern early on that the patient was not being entirely truthful and was masking some pain in order to be cleared to return to football on time, however his non-verbal communication such as facial expressions and body language also showed a vast decrease in pain behaviors throughout the course of treatment. Building early rapport with this patient was one of the strengths on the side of the physical therapists. This patient was somewhat introverted at first, and it was difficult to gain information about his pain levels unless they were constantly asked for. Towards the end of the course of treatment, he was voluntarily reporting his pain levels if an exercise caused any discomfort, and even offered his own ideas for modifying each exercise.

Limitations of this study include the vague guidelines for the return to sport aspect in phase 4 from the Milliaris et al<sup>2</sup> article, as well as the use of blood flow restriction in the early phases, which was a deviation from the Milliaris et al<sup>2</sup> article. Because the article was intended for a multitude of sports, the exercises that were chosen for this patient may not be applicable for athletes in a different sport. Reproducibility of those exercises that were performed with this patient will also greatly depend on access to a large enough area to run those drills. A physical therapist's creativity and clinical reasoning are required for tailoring the exercises to their patient and their clinic.

The primary takeaway from this case report is that patellar tendinopathy has the potential to heal quickly in a motivated patient, even if the tendon is highly irritable during the initial evaluation. Further studies could be done to look into more cases similar to this, establish a more concrete timeline for recovery expectations using the 4-phase protocol, treat more patients with and without blood flow restriction, and possibly determine how much of an effect each has on recovery time.

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## Tables and Figures

Table 1: Initial Evaluation Outcomes

Outcome Measure	Results
Range of Motion	Left knee: 2-0-140 Right knee: 2-0-145
Manual Muscle Testing	Left Quadricep: 4-/5 Right Quadricep: 5/5
Squat	30° knee flexion achieved with 8/10 pain Performed double leg on flat ground.
Lower Extremity Functional Scale	Score: 46/80

Table 2: Interventions by phase

Phase 1 (visits 1-2)	Phase 2 (visits 3-5)	Phase 3 (visits 5-6)	Phase 4 (visits 6-7)
Wall sit isometric - 5x45 sec - Body weight Bulgarian split squat isometric - 5x45 sec - Body weight Plank - 3x30 sec - Body weight Single leg press with blood flow restriction - 1x30, 3x15 - 50 lbs - 80% LOP Single leg bridge - 3x10 - Body weight	Sled push/pull - 3x20 yards ea - 85 lbs Long arc quad with blood flow restriction - 1x30, 3x15 - 12 lbs - 80% LOP Decline squat isometric - 5x45 sec - Body weight Single leg press - 3x8 ea - 180 lbs Bulgarian split squat - 3x10 ea - 45# barbell	Cone sprint/backpedal - 3x45 sec - Body weight Decline squat single leg isometric - 5x45 sec - 15 lb dumbbell Ladder agility drills - 1x5 - Body weight Cone T drills - 10 min - Sprint, shuffle, backpedal Short hurdle jumps single leg - 2x8 - Body weight - 12 in hurdle	Sport cord jumps with lateral hop - 2x8 - 15 lb cord 180 jumps - 3x10 - Body weight In/out route with stop at sideline - 2x10 ea - Body weight - Football catch Hitch route - 2x5 ea - Body weight - Football catch

Table 3: Outcome measurements comparison, initial evaluation to final visit

<b>Outcome Measure</b>	<b>Initial Evaluation</b>	<b>Final Visit</b>
Range of Motion	Left knee: 2-0-140 Right knee: 2-0-145	Left knee: 2-0-145 Right knee: 2-0-145
Manual Muscle Testing	Left Quadricep: 4-/5 Right Quadricep: 5/5	Left Quadricep: 5/5 Right Quadricep: 5/5
Squat	30° knee flexion achieved with 8/10 pain. Performed double leg on flat ground.	110° knee flexion achieved with 0/10 pain. Performed single leg on decline while holding 15 lb dumbbell.
Lower Extremity Functional Scale	Score: 46/80	Score: 78/80