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Clinical Decision Making Associated with Persistent Lateral Elbow Pain: A Case Study

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Abstract

Background: Lateral elbow pain is a common musculoskeletal condition of the upper extremity. It can lead to marked dysfunction and decreased productivity at work. Persistent lateral elbow pain is often challenging to treat due to numerous treatment options with limited evidence to prove which is more efficacious. **Purpose:** The purpose of this case study is to outline the clinical decision making associated with treating persistent lateral elbow pain in a patient that displayed variable responses to care. **Case Description:** This case study examines a 33-year-old male with lateral elbow pain who was initially diagnosed with lateral epicondylalgia. His pain lasted over ten physical therapy visits despite conventional treatment interventions including manual therapy, trigger point dry needling, and various forms of therapeutic exercises including concentrics, eccentrics, and isometrics. **Outcome Measures:** The Quick Disabilities of Arm, Shoulder, and Hand (QuickDASH) was used to assess this patient's outcome. **Discussion:** Various treatments were performed with the patient discussed in this study due to changing symptoms and lasting pain. This case study presents the clinical reasoning behind treatment decisions based on patient response. While often therapeutic interventions have gradually positive outcomes, it is important to recognize and evaluate cases which show less clear immediate improvement.

Keywords: Physical Therapy; rehabilitation; elbow pain; lateral epicondylalgia

Background

Lateral elbow pain is a common musculoskeletal condition that affects both athletes and the working population that, if allowed to progress, can lead to severe pain and disability. Bisset and Vincenzo[1] state that approximately 40% of people will experience lateral elbow pain in their lifetime. The prevalence is reported to be 1-3% of the population with 4-7 out of 1000 seeking medical attention.[1–3] The most common cause of lateral elbow pain is overload of the forearm extensor muscles that attach to the lateral epicondyle, which includes the extensor carpi radialis longus (ECRL), extensor carpi radialis brevis (ECRB), extensor digitorum communis, extensor digiti minimi, and extensor carpi ulnaris (ECU). This condition can also be caused by various other muscles that attach on the lateral epicondyle of the humerus, including the supinator and anconeus, and specific injuries that can be treated a variety of ways. Treatment interventions utilized frequently for lateral elbow pain include manual therapy (soft tissue and joint mobilizations), exercise (concentric, eccentric, and isometric), and modalities (ultrasound, heat, ice).

With all of the structures that can be involved in lateral elbow pain, identifying an exact diagnosis can be challenging. Differential diagnoses can include: lateral epicondylalgia, posterolateral rotatory instability, boxer's elbow, and anconeus syndrome. With these various possibilities, it can be difficult to distinguish the exact structures involved in lateral elbow pain and determine which treatment interventions will be the most effective for each individual patient. It is important to reconsider alternate diagnoses and review other possibilities when patients don't respond as expected to specific treatments. Therefore, the purpose of this case study is to outline the clinical decision making associated with treating persistent lateral elbow pain in a patient that displayed variable responses to care.

Patient History and Systems Review

Thirty-three-year-old male originally presented to physical therapy with right patellar tendinopathy. Two months later, he began to report bilateral lateral elbow pain, with his left being worse than his right. At this time his care was transitioned to focus on what was presumed to be lateral epicondylalgia.

Signs and Symptoms

The patient's pain was increased with gym activities such as pull-ups and push-ups, as well as with reaching across his body, specifically to shut off his alarm in the morning or grab a glass of water. He rated his pain 8/10 at worst and 0/10 at best. His active range of motion of his elbows was determined to be within functional limits bilaterally. His upper extremity strength was found to be 5/5 with the exception of forearm supination (4/5 with pain), wrist extension (4+/5), wrist flexion (4+/5), and finger abduction (4/5) on the left.

He denied any numbness or tingling in either forearm. His symptoms were aggravated by the valgus stress test at 25 degrees of flexion on the left, but no laxity of the ulnar collateral ligament was found. The patient was tender to palpation of the supinator and common extensor origin including ECU, ECRL, ECRB, and extensor digitorum communis bilaterally. The patient also had pain with resisted supination bilaterally, but greater pain on the left. On initial evaluation, he scored 56.82 on the QuickDASH. The QuickDASH is a self-report of pain and function in the upper extremity scored out of 100. Higher scores indicate higher dysfunction; therefore, we expected his score to decrease over the course of his treatment.

Differential Diagnoses

Multiple differential diagnoses should be considered when evaluating lateral elbow pain. Some of the more likely are the following:

Lateral Epicondylalgia

Lateral epicondylalgia, also known as tennis elbow, is the most common pathology of the elbow.[1] This condition is most often seen in both men and women ages 35-54, in manual laborers, and those

whose occupation requires repetitive forearm motions.[1–3,8] It is characterized by pain over the lateral epicondyle of the humerus elicited by palpation or contraction of the wrist extensor muscles. The combined motions of wrist extension and forearm supination are thought to be an underlying cause of this condition. Generally, wrist and elbow range of motion is found to be within functional limits.[3] It is also common to have decreased grip strength due to pain with lateral epicondylalgia.[1,3,8] The pain-free grip test has been found to be preferable to a maximal grip test because maximal grip strength is not always impaired in this patient population.[2] Other tests that should be performed to determine the involved structures of lateral elbow pain are Cozen's test (resisted wrist flexion and radial deviation), Madusley's test (resisted third digit extension), and Mill's test (passively taking the patient into wrist flexion and elbow extension).

Posterolateral Rotatory Instability

Posterolateral rotatory instability (PLRI) results from an injury to the lateral ulnar collateral ligament complex leading to instability or dislocation.[4,9] Causes include trauma, such as a fall, complications from a previous procedure including corticosteroid injections, from poor alignment due to previous injury, or it can be associated with tennis elbow.[4,9] Trauma is the most common cause of this injury. Patients typically experience lateral elbow pain, specifically with movements that extend the elbow and supinate the forearm.[4] They may also experience mechanical symptoms with this injury including clicking, popping, or grinding that is most noticeable at forty degrees of flexion.[4] PLRI associated with tennis elbow typically doesn't present with any of these mechanical symptoms.[9] When this condition becomes chronic, patients may not experience palpation tenderness and they may have full, pain-free range of motion.[4] Many patients do not have pain with the valgus stress test.[4] The lateral pivot shift test should be administered to determine the presence of this condition. It is important for the patient to be completely relaxed for this test to get a true positive, which is difficult due to patient apprehension. Another test for PLRI is the chair pushup test. If the patient has apprehension or their elbow dislocates when pushing up out of a chair then the test is positive for PLRI.[4]

Boxer's Elbow

Boxer's elbow typically occurs from trauma experienced with hyperextension that can lead to posterolateral impingement or a hyperflexion injury that results in anterior impingement.[10] Posterolateral impingement occurs due to repetitive forced elbow hyperextension with a pronated forearm, such as when throwing a punch.[10] This can cause microtrauma to bone stabilizers such as ligaments more so than injuring soft tissue, resulting in instability.[10] The main symptom of posterior impingement is acute elbow pain following a missed punch that is felt dorsally. Swelling may accompany the pain. Patients may report a feeling of their arm "going dead" immediately after.[10] Repeated injuries can result in a chronic condition that presents as elbow pain, stiffness, and loss of extension range of motion.[10] Anterior impingement can occur from forced hyperflexion during the punching motion or when fending off an opponent.[10] The coronoid process of the ulna can become impinged in the coronoid fossa of the humerus resulting in pain. Anterior impingement is characterized by similar symptoms to posterior impingement, but pain is felt anteriorly and there may be a loss of flexion.[10] Locking in the elbow may be present in both variations of boxer's elbow due to loose bodies in the joint.[10] Upon examination, there may be no tenderness to palpation, but there will be decreased range of motion into flexion or extension with pain.[10]

Anconeus Syndrome

Anconeus syndrome is described as irritation of the anconeus muscle or increased compartment pressure of the anconeus. This condition can present differently from patient to patient but typically leads to lateral elbow pain and does not respond to conventional treatment for lateral epicondylalgia.[5–7] A case study done by Gangartharam[5] examined a patient with gradual onset of lateral elbow pain that increased over six months despite attending therapy.[5] This patient was having pain with driving at the time of evaluation and his range of motion was within normal limits.[5] He also had palpation tenderness

over the anconeus and lateral elbow with decreased strength of elbow and wrist extension and decreased grip strength in the affected upper extremity.[5] Another case study done by Steinmann et al[6] followed a patient with elbow pain with gradual onset.[6] This patient had increased pain with typing, which she did daily at work, despite ergonomic adjustments. She also had range of motion within functional limits and pain with resisted elbow extension and pronation.[6] The patient had palpation tenderness and noticeable swelling of the area over the anconeus.[6] Her condition was determined through magnetic resonance imaging and measuring compartmental pressure.[6] A third case study done by Abrahamsson et al[7] followed a patient with prolonged lateral elbow pain that was not improved with conservative treatment.[7] He was found to have pain with heavy work and a bulging mass and palpation tenderness of his anconeus.[7] This patient's pain was reproduced with repeated elbow extension and forearm pronation.[7] His compartment pressure was also found to be high, leading to the diagnosis of anconeus syndrome.[7]

Based on the location of the patient's pain and the initial examination findings, his initial diagnosis was determined to be lateral epicondylalgia. He continued with therapy one time per week (due to insurance authorization constraints) for his lateral elbow pain.

Treatment Approach

First Five Sessions

The first four treatment sessions over four weeks focused on a combination of manual therapy including soft tissue massage and friction massage of the extensor mass muscles. The patient's symptoms began to worsen and he reported pain with driving, typing at work, reaching behind his back to grab items from the backseat of his car, cross body reaching, and getting out of bed due to putting pressure through his elbows to sit up. At this point, his elbow pain was starting to wake him up at night. Upon further examination, his first rib on the left was elevated and mobilizations were performed to depress his first rib. Upper limb nerve tension tests were performed for the radial, median, and ulnar nerves and all were found to be negative. The patient tried wearing a compression strap on the left during his third visit with no significant decrease in pain seen over the next two weeks. He completed the QuickDASH again at his fifth visit and his score increased by 9.09 points to 65.91, indicating increased dysfunction since his initial evaluation. Soft tissue massage was continued and radial head and cervical posterior-to-anterior mobilizations were added. Dry needling of the supinator, extensor mass, biceps, brachioradialis, triceps, and C7 multifidi on the left was also added during the fifth visit. Prone scapular retraction exercises for improved stability were also added to his exercise routine and he was advised to avoid pull-ups for the time being. The patient's strength was reassessed during his fifth visit also, and his forearm supination and finger abduction had both increased by a half-grade to 4+/5.

Visit Six

By his sixth visit, the patient's right elbow was feeling better but he was still having pain in his left elbow. This pain occurred primarily with turning doorknobs and with motions that he didn't have his elbow close to his body. At this visit he revealed that he had been boxing frequently for cardiovascular exercise over the past few months due to his knees being unable to tolerate running. Because of his increase in pain and decrease in function, lateral epicondylitis tests including Cozen's, Maudsley's, and Mill's and the medial epicondylitis test were performed with no reproduction of symptoms with any of the tests. However, his pain continued to be reproduced with resisted supination and palpation of the supinator. He reported that he had the most relief of his symptoms following the first session that was focused on his elbows, therefore the sixth visit focused primarily on soft tissue massage, radiohumeral dorsal glide mobilizations, and humeroulnar distraction. He displayed decreased pain with cross body reaching for two and four-pound weights at the end of visit six compared to his visit the week prior.

Based on the new information that he had been boxing frequently and his response to treatment, two new differential diagnoses, PLRI and boxer's elbow, were considered. This was based on his pain

with elbow extension and supination movements, his full range of motion, and a negative valgus stress test. We were unable to perform a lateral pivot shift test due to the patient being unable to relax fully. He also reported pain with triceps dips, similar to the chair pushup test. These were eventually ruled out based on lack of mechanical symptoms and lack of loss of range of motion commonly seen in boxer's elbow.

Visits Seven and Eight

With improvement in symptoms that had only been lasting about twenty-four hours after treatment, isometric exercises were implemented. The patient performed the exercises with a one-pound dumbbell with his elbow at a ninety-degree angle. He performed isometric holds for thirty seconds in neutral forearm supination/pronation, in full pronation, and in full supination. The patient began in the specified position and the weight was handed to him to begin each thirty second bout. The patient experienced pain with isometric supination in this position, so he initially performed the exercise in neutral and pronation only. Eccentric supination exercises starting in neutral and moving into pronation were added to strengthen the muscles that control supination. The patient reported pain with this motion that was decreased when radial head mobilizations were performed during the exercise. He was instructed in how to perform a self-mobilization of the radial head with movement during the exercise so that he could perform these exercises at home with decreased pain. Proximal radioulnar volar glides were performed to increase pronation with decreased pain. Isometric exercises and active pronation were both added to his home exercise program and he reported compliance in performing them on his own. The patient reported slight improvement in symptoms and decreased pain with cross body reaching. He also reported that his pain was now primarily distal to the lateral epicondyle following implementation of isometric exercises.

Visits Nine and Ten

The patient's grip was grossly assessed at visit nine and he demonstrated pain with gripping in full elbow extension and with his elbow flexed to ninety degrees. Another physical therapist in the clinic was consulted about the patient's symptoms and persistent pain and, based on the patient's presentation, suggested the anconeus as a potential problem area. Dry needling was performed to the anconeus on his left upper extremity. He displayed reduced pain with gripping in both positions of elbow extension and flexion immediately following the treatment.

At his next session, he reported an increase in pain directly following dry needling then decreased symptoms throughout the rest of the week. Dry needling of the anconeus was again performed in addition to continuing the isometric exercises. By the end of visit ten he had no pain with gripping with his elbow extended and flexed or with resisted elbow flexion in neutral and supinated positions. He was also able to perform full pronation with a two-pound weight for the first time with no pain. The patient was beginning to return to lifting weights at the gym, although he reported that he was compensating by keeping his left elbow close to his side and avoiding aggravating activities. Table 1 outlines the patient's symptoms and associated treatment interventions throughout the course of his care.

The patient had dry needling performed on various muscles surrounding the elbow throughout the duration of his treatment. The muscle that seemed to show the most pain reduction from dry needling was the anconeus. He noticed improvements in pain shortly after dry needling was performed and continued to have decreased pain one week later at his next visit. The rationale behind the decision to target the anconeus was based on where the muscle attaches on the ulna and its pain referral pattern to the lateral elbow.

Anconeus syndrome was strongly considered as his primary diagnosis following his favorable response to dry needling of this muscle and symptoms similar to those seen in case studies looking deeper into this condition. He had not responded as expected to conventional treatments for lateral epicondylalgia and had elbow range of motion within functional limits. The patient also had pain with typing and palpation tenderness of his anconeus. This diagnosis could not be fully ruled in, however,

due to lack of imaging and compartmental pressure measures as well as the patient being unable to financially return to physical therapy following improvements in his symptoms.

Table 1. Patient Signs and Symptoms with Corresponding Treatment Introduction
(All visits were 1 week apart.)

Initial visit	First 5 visits	Visit 6	Visits 7 & 8	Visits 9 & 10
*Soft tissue massage, dry needling	*Soft tissue massage, friction massage, dry needling	*Radioulnar and humeroulnar mobilizations added	*Isometric exercises added	*Dry needling of anconeus added
8/10 pain at worst	Pain with driving, typing, reaching behind and across body, getting out of bed	Pain with turning doorknobs and with motions with his arm away from his body	Pain with isometric exercise in supinated position	Decreased pain with cross body reaching
56.82 on QuickDASH	QuickDASH score increased to 65.91	Pain with resisted supination	Pain with pronation movement that decreased with radial head mobilization with movement	Pain was now primarily distal to lateral epicondyle
Pain with resisted supination with elbow flexed	Pain was waking hip up at night	Reported that he had been boxing frequently		Began to return to lifting at gym with compensations to decrease pain
Tenderness to palpation of supinator and common extensor origin	Started having decreased pain with resisted supination with elbow flexed			
Initial diagnosis of lateral epicondylalgia		Differential diagnoses of PLRI and boxer's elbow considered		Differential diagnosis of anconeus syndrome considered

Outcome

This patient's pain varied frequently, and as a result the treatment plan and interventions had to be revised often. Manual therapy was consistently performed to decrease pain and improve joint mobility and various exercises were performed to improve strength and motor control of the wrist extensors and forearm supinators.

The patient was beginning to notice improvement in his symptoms at his tenth visit for his elbow pain. His pain was decreasing with continued isometric exercises at home and with two sessions of dry needling the anconeus. The patient was able to type with minimal pain, which was an important development for being able to perform his work duties. He was also able to return to lifting with modifications such as keeping his elbows adducted against his body and avoiding movements requiring

end range supination. He reported that he could reach across his body to shut off his alarm and get out of bed with decreased pain compared to his initial visit for his elbow pain.

The patient had used most of his allowed visits from his insurance company for his knee pain. We had requested additional visits for his elbow pain after his fourth visit and were allowed only six additional visits. He was unable to return to physical therapy following his tenth visit due to financial constraints. Consequently, he was unable to fill out a final QuickDASH questionnaire to evaluate his overall improvement. However, based on his subjective report of symptom improvement after visit nine, it is reasonable to estimate that his QuickDASH score would have decreased, indicating improved function.

Discussion

Based on this patient's signs and symptoms and examination findings, he was initially diagnosed with lateral epicondylalgia. He was treated with manual therapy and trigger point dry needling to reduce pain and improve tissue extensibility in the effected wrist extensor muscles as well as the supinator muscle. Soft tissue massage has been found to increase skin temperature, and therefore blood flow, to treatment areas regardless of instruments used.[11] Massage has also been found to have short term benefits decreasing pain compared to using no other interventions.[12] When compared to other interventions there is no clear benefit, but it can be utilized as part of a treatment plan that also includes exercises.[12] During his sixth visit, the patient reported that he had the most relief of his symptoms after the first session when he was primarily treated with massage. In this case, the patient had short term improvement in symptoms with massage, supporting the research for this intervention.

In the course of this patient's treatment, alternate differential diagnoses were considered as his initial response was not as favorable as we had expected. Accordingly, additional treatments were added to target the possible underlying mechanisms contributing to his lateral elbow pain, including various exercises. Resistance exercise has been found to be beneficial for lateral elbow pain across diagnoses. Eccentric exercise programs have had the greatest effect on lateral elbow pain at any follow-up period and should be considered as the first exercise treatment option.[16] A study done by Raman et al[16] showed that patients with lateral epicondylitis who perform exercises in an eccentric, concentric, isometric, or isokinetic fashion will have decreased pain and improved strength and disability over time.[16] The patient began to show slight improvement of his symptoms with implementation of isometric exercises in his seventh visit. His strength was not reassessed after his fifth visit, so it is not known if his strength increased with isometric exercises.

As his diagnosis seemed to be more consistent with PLRI, treatment was again shifted to target joint mobilizations. Self-performed radial head mobilizations were added to his eccentric supination exercise to decrease pain. He was instructed how to find the radial head and then to perform a sustained posterior to anterior glide. A study performed by Lucado et al[17] demonstrated that mobilizations with movement had a moderate effect on decreasing pain rated on a visual analog scale, increasing grip strength, and improving function as rated on the patient-rated tennis elbow evaluation scale.[17]

Finally, his localized pain in the region of his anconeus led us to try dry needling of this small muscle. The exact mechanism underlying dry needling is not completely understood. Proposed mechanisms of pain reduction include reduced peripheral and central sensitization and increased blood and oxygen flow.[13,14] Deep dry needling has been found to have greater effects on pain reduction in the treatment of myofascial trigger points compared to superficial dry needling.[15] A study done by Uygur et al[13] found that dry needling produced significant reductions in pain in patients with lateral epicondylitis at both 3 weeks and 6 months.[13] While this case followed an erratic trajectory, ultimately he appeared to respond well to the dry needling.

In summary, this case study highlights the challenges that can occur with identifying a clear differential diagnosis, and thus providing targeted care. This patient's symptoms initially seemed to be consistent with lateral epicondylalgia but changed throughout the course of his treatment. The exact cause of his elbow pain was unknown, so various treatment interventions were tried in an attempt to

decrease the patient's pain and improve his overall function with activities of daily living. If an intervention seemed to increase his pain or his symptoms remained unchanged, we researched differential diagnoses or collaborated with other physical therapists to determine what other treatments could potentially be effective. A portion of this patient's care was to research and review other possibilities and reconsider alternate diagnoses. This case study demonstrates the often-challenging nature of treating a condition that otherwise seems straight forward. Future research may improve our ability to optimally identify when to select alternate treatments for lateral elbow pain, such focusing more on the anconeus muscle, the supinator muscle, and isometric exercises.

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