Humeral Lateral Epicondylitis Complicated by Hydroxyapatite Dihydrate Deposition Disease: A Case Report

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Abstract

Objective: The aim of this case report is to differentiate the recovery timeline expected for patients with simple lateral epicondylitis from an abnormal recovery period, in which case an underlying condition should be suspected.

Clinical features: A 49-year-old woman presented to a chiropractic clinic with posterolateral right elbow pain. The history included chronic recurrent lateral elbow pain, followed by a traumatic event leading to sustained pain and disability.

Intervention and outcomes: Following a trial of conservative therapy including activity restrictions, soft tissue therapy, joint mobilizations, and therapeutic ultrasonography that led to no significant improvement, the patient was referred for diagnostic imaging that revealed hydroxyapatite dihydrate deposition disease.

Conclusion: This report describes a case for which lateral epicondylitis symptoms failed to resolve because of an underlying condition (hydroxyapatite dihydrate deposition disease). This case emphasizes that primary care practitioners treating lateral epicondylitis should consider referral for further investigations when positive results are not achieved.

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Introduction

Epicondylitis is one of the most prevalent disorders of the arm.¹ The incidence of lateral epicondylitis (LE) is reported to be 3 to 11/1000 patients per year in general practice²; the prevalence varies between 1%

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and 3% in the general population and can reach up to 23% among workers.^{1,3,4} The peak prevalence has been estimated to 1.3% in subjects aged between 45 and 54 years.¹ There is no clear association between sex and epicondylitis^{3,5,6}; however, a few studies report a higher risk in women.^{7,8} Despite the fact that it is often referred to as *tennis elbow*, this condition occurs more commonly in nonathletes.⁹

Lateral epicondylitis is clinically defined by pain at the origin of the common extensor tendon on the lateral epicondyle of the humerus with maximal tenderness usually 2 to 5 mm distal and anterior to the midpoint of the proximal muscular insertions.⁹ Patients most commonly present with lateral elbow pain that frequently radiates into the proximal extensor forearm musculature.¹⁰ Symptoms are related to activities involving repetitive or forceful recruitment of the wrist extensor and supinator muscles (eg, forceful gripping or lifting of heavy objects).¹⁰ There is evidence of an association between epicondylitis and forceful work tasks of the upper extremity, a combination of forceful and repetitive activities, and a combination of either forceful or repetitive activities with an extreme nonneutral posture of the hand and arm.¹ Correlations of LE with specific repetitive movements 2 hours per day, handling tools greater than 1 kg, handling loads greater than 20 kg at least 10 times a day, low job control, and low social support at work have also been identified.¹¹ Although the pathogenesis of epicondylitis is unclear, repeated microtrauma localized at the origin of common extensor is thought to initiate the disease.

Two possible biomechanical mechanisms have been proposed to explain the etiology and of LE and its related symptomatology.¹² The first one is the eccentric exertion due to repetitive dorsiflexion of the wrist that exceeds the tolerable rate of strain of the tendon fibers. The second one suggests that tensile loading of the extensor carpi radialis brevis (ECRB) combined with elbow extension leads to compression between the underside of the ECRB aponeurosis, the annular ligament, and the radial head. Pronation and supination movements also contribute to this process, given the asymmetric axis of rotation of the radial head.¹² Although the exact nature of the biomechanical events leading to it is unknown, the natural repair response from repetitive mechanical stress leads to an accumulation of connective tissue that may account for the clinical and pathologic manifestations.¹ A common pathologic finding seen during operative procedures includes chronic tears with formation of granulation tissue in the origin of the ECRB.¹³

Despite being a common condition, LE may represent a clinical challenge when becoming chronic or recurrent. Practitioners should be made aware of the subtle features characterizing the different pathologic stages that can interfere with clinical interventions. As such, the aim of this case report is to describe a patient who was not responsive to care and was referred for further imaging. This article reviews natural history and evidence-based interventions for LE to highlight normal recovery period of complicated cases that may warrant further diagnostic modalities.

Case Report

A 49-year-old woman presented to a chiropractic clinic with posterolateral right elbow pain. The pain had started about a month earlier, following a ski fall that involved a direct blow to the olecranon. Initial pain was described as sharp, with an intensity of 8/10 gradually decreasing to an intensity of 4/10 within the first 24 hours, at which point the pain became constant for a period of 10 days. Subsequently, the patient noticed that the pain had become localized to the posterolateral aspect of her elbow and described it as a sharp pain sensation brought on by elbow or wrist extension and lifting heavy objects. This was a recurring condition for the patient who had experienced intermittent episodes of noninvalidating right elbow pain for the past 15 years. Aggravating factors included physical activities such as road biking and chiropractic practice. The patient used to receive preventive care consisting of soft tissue therapy and manual therapy including carpal bones manipulations every month to prevent disabling episodes of elbow pain. She also reported having used a compressive elbow brace to carry through her daily activities. There were no associated symptoms or red flags at any point in time.

The patient's medical history included high blood pressure, high cholesterol, and Hashimoto thyroiditis that were all controlled by medications (valsartan, rosuvastatin, and levothyroxine). She also reported multiple sites of chronic musculoskeletal pain including the spine, feet, as well as left shoulder and right wrist.

During physical examination, a moderate edema was noticed at the right lateral epicondyle without associated warmth or redness. Right elbow ranges of motion were full in all directions but produced pain in maximal active flexion and extension. Resisted wrist extension and passive wrist flexion reproduced the chief

complaint. The right, Cozen, and Mill orthopedic test results were positive for elbow pain. Palpation revealed tight and tender right extensor carpi, triceps and supinator muscles. Right lateral epicondyle, olecranon, and annular ligament were tender to touch; but no restrictions were found within the surrounding joints. Result of neurologic examination of the upper limbs was normal for sensation, motor strength (5/5), and deep tendon reflexes (2+).

Based on the findings, the clinician suspected a chronic right LE with myofascial pain of the right extensor carpi and supinator muscles. For symptomatic relief, a trial of conservative treatment consisting of patient's education with regard to daily activity restrictions, soft tissue therapy to involved muscles, carpal and elbow joint mobilizations, and ultrasonography for 3 to 4 weeks was recommended.

The patient received 7 treatments over a 4-week period. Upon follow-up evaluation, the patient noted an 80% improvement in the intensity of symptoms and a 60% improvement of her daily function. She noticed that lifting heavy charges could now be performed without much pain and that the edema had slowly started to decrease. Another course of 9 treatments over 6 weeks was administered to the patient, after which she mentioned having only short-term relief following each treatment. Sustained elbow postures and light work were reported as aggravating factors for the edema around the lateral epicondyle. Although the pain remained relatively low and stable, active elbow ranges of motion such as pronation, supination, and extension were limited. Application of Kinesio tape to help reduce edema was added to the management plan, along with the use of nonsteroidal anti-inflammatory drugs. Three visits later, following the lack of results and an unexplained increase in pain at the right radioulnar joint, the decision was made to order radiographs.

The right elbow radiographs revealed a bone spur at the medial surface of the radial head, and numerous calcific deposits could be visualized at the lateral epicondyle. Findings were consistent with a diagnosis of hydroxyapatite dihydrate deposition disease (Fig 1A and B). Both bony structures and joint space were calculated and considered to be within normal limits.

Recent follow-up with the patient revealed that, following the final diagnosis of hydroxyapatite dihydrate deposition disease, the patient sought care from a colleague who performed 4 treatments of aggressive deep transverse friction massage (Graston technique), after which she reported complete resolution of symptoms.

Discussion

Lateral epicondylitis is believed to be a self-limiting condition with typical episodes lasting an average of 6 months to 2 years, with most patients reporting complete resolution of symptoms after 1 year.¹⁴ A randomized control trial conducted by Smidt et al¹⁵ showed that, for patients with symptoms present for more than 6 weeks, natural complete recovery peaked at 26 weeks in 79% of patients, followed by a slow increase of 5% at 52 weeks (83% of patients). Although pathomechanical history (volume, intensity, and frequency) and individual factors (age, sex, and biomechanics) may influence the onset and amount of tendon pathology, these are rarely taken into consideration by clinicians when establishing a treatment plan.¹⁶

Cook and Purdam¹⁶ have proposed a model of tendon pathology consisting of a 3-stage continuum: reactive tendinopathy, tendon dysrepair (failed healing), and degenerative tendinopathy. This model hypothesizes that the different stages of pathology differ in the response to treatment and that interventions should be tailored accordingly.

Stage 1

Reactive tendinopathy is a noninflammatory proliferative response in the cell and matrix following acute tensile or compressive overload. It results in a short-term adaptation that thickens the tendon to reduce stress and increase stiffness, which can be reverted to normal if the overload is sufficiently reduced or if there is sufficient time between loading sessions. Clinicians treating patients with LE should note that this stage is clinically seen in tendons exposed to sudden increase in load or as a result of direct trauma.

Stage 2

Tendon dysrepair describes the tendon's attempt at healing with further matrix breakdown due to increased production of proteoglycans resulting in separation of the collagen fibers. This stage is hard to distinguish clinically because of its area of localized thickness within the tendon. Imaging (magnetic resonance imaging and ultrasonography) can best detect focal structural changes with or without increased vascularity.¹⁶ The frequency, volume, and length of time over which load has been applied seem to be important variables in predicting the degree of reversibility, which is still possible with load management and

Fig 1. A, Anteroposterior right elbow. Visualization of calcific deposits at the lateral epicondyle (arrow). B, Lateral right elbow. Normal study. C, Medial-oblique right elbow. Visualization of bone spur at the medial surface of the radial head (arrow). D, Medial oblique right elbow. Visualization of calcific deposits at the lateral epicondyle (arrow).

exercise to stimulate matrix structure. This stage represents a clinical challenge, as it may appear in younger individuals with chronically overloaded tendons as well as in older individuals with involvement of lower loads due to less adaptive tendon ability.

Stage 3

Degenerative tendinopathy is characterized by the heterogeneity of the tendon matrix with areas of acellularity and very little collagen mixed with other stages of pathology and normal tendon structure. Disintegration of the matrix leads to irreversible changes that weaken the tendon. Clinically, this stage can be seen in chronically overloaded tendons, which are consistent with a history of repeated episodes of tendon pain.

Understanding the different stages and being able to recognize them based on patient's history and physical examination should help determining the appropriate clinical interventions as well as in setting realistic expectations with regards to maximum recovery. In light of this information, the patient described in this case report is most likely to belong to the degenerative tendinopathy category. It should be kept in mind that the irreversible changes that occurred within the tendons will yield a longer symptom recovery period and poorer long-term prognosis, including increased likelihood to reinjury.

Management

For the first line of treatment, it has been proposed that a wait-and-see policy, with adequate advice (ice and avoidance of exacerbating activities and inactivity)

and pain medication, if needed, should be recommended for patients with symptoms duration of less than 6 weeks.¹⁵ Consistent with the reactive tendinopathy/early tendon disrepair stage, the reduction of load and mechanical stresses allows the tendon to adapt, the cells to become less reactive, and the matrix to recover a structure closer to normal. Assessment and modification of the intensity, duration, frequency, and type of load are the keys of the clinical intervention. Furthermore, tendon load without energy storage and release (strength-based weight training) can be maintained, whereas high-load elastic or eccentric loading with little recovery should be avoided at this stage.¹⁶ Pharmacologic management (such as ibuprofen, celecoxib, corticosteroid, naproxen sodium, and indomethacin) can be used to downregulate the cellular response.¹⁶ Use of a counterforce brace placed over the forearm musculature is also a common recommendation. Theoretically, binding the muscle with a brace should limit expansion and thereby decrease the contribution to force production by muscle fibers proximal to the band. In practice, brace might be useful as an initial therapy, as it has been shown that, at 6-week follow-up, brace-only treatment is superior to physical therapy (pulsed ultrasonography, friction massage, and strengthening and stretching exercise protocol) for increasing ability to perform daily activities.¹⁷ Alternatively, physical therapy seems more efficient than brace in terms of severity of pain, disability, and satisfaction, whereas a combination of both has no additional advantage.¹⁷ However, a systematic review concluded that no definitive conclusion could be drawn concerning effectiveness of orthotic devices for LE because of lack of randomized control trials with sufficient power.¹⁸ With regard to physical therapy alone, studies have shown a similar trend to natural history with only slightly better (nonsignificant) results over a 1-year period.¹⁵ Similarly, the use of ice alone has been estimated to be as effective as physical therapy in decreasing disability scores; and no additional benefit was found with combination of interventions.¹⁹

During the late tendon disrepair/degenerative tendinopathy stage, management should focus on interventions that stimulate cell activity, increase protein production, and restructure the matrix. Main attention should be brought on eccentric exercises that have been shown to be beneficial for function, return to activity, and pain reduction in 4 to 6 weeks.¹⁶ Injections around or into the tendon to stimulate a short-term healing response can also be considered at this stage.¹⁶ As such, it has been reported that quick relief of symptoms can be achieved

with corticosteroid injection, but the mid- and long-term outcomes (12 and 52 weeks) have been shown to be poor, with a high number of relapses and recurrences (23% and 18% to 54%, respectively).^{15,20} Furthermore, a corticosteroid injection early in the course of LE (less than 4 weeks) does not significantly change the outcome at 4 weeks, 8 weeks, or 6 months.²¹

A recent systematic review² exploring the effectiveness of electrophysical modalities for treatment of LE has shown that there is moderate evidence for effectiveness of ultrasonography (protocol obtain from the original study: 1 MHz, 1:4, 1 W/cm², 10 minutes per session, 2 to 3 times weekly, for a total of 10 treatments)²² vs placebo in the medium term. There is limited evidence for the effectiveness of noxious-level electrical stimulation over tender points or low- or high-frequency transcutaneous electrical nerve stimulation on acupuncture points vs, respectively, placebo and sham transcutaneous electrical nerve stimulation in the short term (2 weeks). Similarly, there are conflicting evidence concerning the effectiveness of laser and extracorporeal shock wave therapy vs placebo on short-term follow-up and evidence of no difference in effect on mid- and long-term follow-up. As such, low-level laser therapy energy dose of 0.275 J per tender point was shown to be effective for mechanical pain threshold, maximum grip strength, and level of pain at maximum grip strength.²³ Whereas low-intensity continuous wave laser emitted 204 mW/cm² (12.24 J/cm²) resulted in no effects on pain level in the last 24 hours, tenderness to palpation, patient's perception of change, grasp and pinch strength, medication use, and pain with grasp and pinch.²⁴ Finally, there is evidence that pulsed electromagnetic field therapy effect on pain is no different than placebo in the short term. In a systematic review on the efficacy of acupuncture for lateral elbow pain,²⁵ patients treated with verum acupuncture (non-segmental distal points [homolateral leg]) were more likely to report a 50% or greater reduction in pain after 1 treatment²⁶ and more likely to report an overall improvement after 10 treatments²⁷ (L1 10, 11, 12, Lu 5, and SJ 5 treated 10 times [2-3 times weekly for 20 weeks]). No significant differences were found in the longer term (after 3 or 12 months). Similarly, a randomized controlled trial reported reduced pain intensity and improved function of the arm as well as increased maximal strength following verum acupuncture (L1 10, 11, Lu 5, L1 4, and SJ 5) at 2 weeks, whereas no differences were observed between the 2 groups at 2-month follow-up.²⁸ Consistent with current literature, application of these modalities in the different stages of the condition is suggested mainly for short-term relief of pain and short-term improvement in disability. Of

interest, standard therapeutic modalities offered as part of chiropractic plan of management such as manipulation and soft tissue therapy have received little attention. Indeed, one systematic review reported no evidence of clinically important benefit of deep transverse friction massage for treating subacute tendinitis based on a single randomized controlled trial.²⁹ Similarly, a pilot study on increased soft tissue mobilization showed a slight decrease in pain level after treatment but no benefit over the natural course of the disease.³⁰ On the other hand, elbow, wrist, and neck manipulation has yielded short-term analgesic effects.^{31,32}

Prognosis

Prospective follow-up studies¹⁴ showed that age, being female, concomitant shoulder pain, and social class were all associated ($P < .10$) with higher pain scores at 1 month. Patients from higher social class reported lower pain scores at 1-year follow-up, although it is unclear whether the association refers to the aspects of social class (eg, system of disability payment) or occupational activity (eg, opportunity to rest).¹⁴ Both long duration of elbow complaints and severe pain at baseline were associated with higher pain scores at 1-, 6- and 12-month follow-up.^{14,33,34} Finally, concomitant upper extremity musculoskeletal disorders and lower level of social support were also associated with higher pain scores at 1-year follow-up.^{14,35} In addition, the 3-year recovery rate reported in an observational study with workers highly exposed to repetitive work differed according to the site of the disorders: high for elbow disorders only (47.6%), moderate for neck/shoulder or hand/wrist disorders (respectively, 25.7% and 18.5%), and low for multiple sites of upper extremity musculoskeletal disorders (12.1%).³⁶ Table 1 highlights the personal and work-related factors that have been studied and their level of association with long-term poorer prognosis.

In summary, clinicians should be made aware of the different pathologic stages of LE, as identification should enhance appropriate interventional strategies. Fig 2 illustrates the clinical profile of each pathologic stage with their proposed interventions.

Limitations

Because of its nature, a case report does not allow for cause and effect or potential associations but may provide insight into disorder presentations that differ from what is expected. The patient experienced chronic pain at multiple sites including left shoulder and right wrist that has been greatly improved by pharmaceutical chronic pain management. Furthermore, the patient still reports bout of transient joints inflammation that could be caused by a nondiagnosed underlying inflammatory condition. Systematic disorders including infectious or reactive arthritis, rheumatoid arthritis, or seronegative arthritis could partly explain the lack of improvement described in this case report. Caution must be made when applying the conclusions of a case report into clinical practice.

Conclusion

Identification of tendinopathy stages in conjunction with factors of poorer prognosis should assist with estimating the recovery period of patients with LE. If symptoms fail to resolve within the first 6 weeks following injury and no significant improvement is noted at 12 weeks with or without the use of therapeutic interventions, an underlying disease should be suspected. In addition, relapses with acute presentation should warrant further diagnostic investigation.

Table 1 Prognosis Factors and Their Association to Long-Term Poor Outcomes

	Associated	Nonassociated	Conflicting
Personal factors ^{1,14,33-35,37}	Smoking, diabetes, prior occurrence, concomitant neck pain, low social class, severe pain at baseline, duration of complaint	Sex, level of education, compliance with rest, vascular disease, high cholesterol level, forceful leisure time physical activity, years at current job	Older age, involvement of dominant side
Work-related factors ^{1,34,35,37}	Manual work, handling of loads ≥ 20 kg, high level of physical strain, high hand repetition level (≥ 5 times/min), nonneutral wrist position, forearm supination ($\geq 45^\circ$ for $\geq 5\%$ of the time), perceived low decision authority on the job

Fig 2. Clinical profile and related interventions for each of the pathologic stages of LE.

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