Successful treatment of refractory lateral epicondylitis with injections of hyaluronic acid

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ABSTRACT • Hyaluronic acid (HA) injections are increasingly used for the treatment of various soft-tissue disorders. We report the case of total healing of tennis elbow with cicatrizing of the tendon tear following three injections of HA performed under ultrasound guidance. A 46-year-old table tennis player was diagnosed with chronic right lateral epicondylitis without any improvement after optimal medical treatment. Ultrasound of the right elbow showed a focal hypoechogenic region with a big linear intra-substance tear (12 x 4 x 2 mm) next to the bone insertion of the lateral epicondyle tendons. The patient underwent a course of three injections of HA at one-month interval. One month after the 3rd injection, ultrasound showed almost a complete healing of the tendon tear with a decrease of more than 90% of the pain intensity. Our case suggested that HA injections under ultrasound guidance may be a successful treatment for refractory lateral epicondylitis allowing complete cicatrizing of the tendon tear.

Keywords: hyaluronic acid; tennis elbow; ultrasound; treatment

INTRODUCTION

Chronic tennis elbow or lateral epicondylitis is a typical enthesisopathy affecting yearly 1 to 3% of the adult population. It occurs most frequently between the ages of 35 and 50 years and affects equally men and women [1]. A typical episode of lateral epicondylitis lasts between 6 to 24 months. Lateral epicondylitis can be responsible for pain and loss of function of the affected limb, which can have a major impact on patient’s social and professional life. Although originally thought to be an inflammatory condition, lateral epicondylitis is perhaps better characterized as a tendinopathy, because there are no inflammatory cells in pathologic specimens [1].

There is currently no consensus on the optimal treatment of lateral epicondylitis, but numerous therapeutic options are available. The best available scientific evidence suggests that topical and possibly oral non-steroidal anti-inflammatory drugs may be the most useful treatment for short-term pain relief. In addition, stretching, physical therapy and bracing are usually used. Corticosteroid injections, generally performed in patients whose symptoms are severe, have been reported to be markedly effective at temporarily alleviating pain but carry the risk of possible adverse effects such as rash, local skin atrophy, digit paralysis, and weakness of finger extension [2].

Recently, alternative injections including platelet-rich-plasma (PRP) and autologous blood have been used for patients suffering from lateral epicondylitis and not responsive to conservative therapy with high degree of efficacy [3]. The use and efficacy of PRP have been empirically examined and compared among traditional treatments. Hence, the available evidence indicates limitations in utility of PRP injections for treatment of lateral epicondylitis particularly in the short-term when compared to corticosteroids injections [4].

Hyaluronic acid (HA) is a natural substance that has been used for patient with knee osteoarthritis and peri-artthritis scapulohumeralis [5,6]. Recently, several studies have reported the efficacy of HA in soft-tissue disorders, including lateral epicondylitis [7], acute ankle sprain [8], supraspinatus tendinitis [9], rotator cuff tears [10], achilles tendinopathy, and plantar fasciitis [11].
On the other hand, the surgical treatment of tendinosis of the elbow consists on resection of the pathological material, stimulation of the neovascularization by producing focused local bleeding, and therefore creation of a healthy scar with the least possible structural damage to the surrounding tissues [12].

We report for the first time a case of total healing of tennis elbow with cicatrizing of the tendon tear following three injections of HA performed under ultrasound guidance in a patient with refractory lateral epicondylitis and we discuss the mechanisms of action of HA.

CASE PRESENTATION

A 46-year-old table tennis player was referred to our institution for refractory chronic pain on the right elbow with important disability of the right upper limb. He was diagnosed with right lateral epicondylitis that started one year ago and was treated with NSAIDs, pain killers, and bracing without any improvement. Ultrasound (US) of the right elbow showed a focal hypoechoic region with a big linear intrasubstance tear next to the bone insertion of the lateral epicondyle tendons. The tear measured 1.2 cm in length with a width of 4 mm and a thickness of 2 mm (Figure 1).

An US-guided corticosteroid injection relieved the pain for one month only. Then, three injections of HA were performed at one-month interval under US guidance to increase the accuracy of the injections. A pre-filled syringe of 2 ml containing 20 mg of linear high molecular weight HA of nonanimal origin (Neovisc® tribute Pharmaceuticals Canada Inc.) was used for each injection every month. After sterile preparation of the skin above the right lateral epicondyle with Betadine®, HA was injected into the soft tissue of the lateral epicondyle around and inside the tendon tear. The patient was informed that he might experience a postinjection flare-up in the pain level. With the exception of acetaminophen and cold application, no other medical treatment was prescribed during three months. In addition, the patient was asked to avoid activities causing pain in the elbow during the course of treatment. Efficacy was assessed by comparing the visual analog scale (VAS) for pain at baseline, then before each injection and at one month after the third injection. In addition, we evaluated with US the size of the tendon tear before each injection and at one month after the 3rd one.

The patient stated that the pain severity decreased by about 90% one month after the 3rd injection (VAS 100 mm at baseline decreased to 10 mm after the three HA injections). The time to return to disability-free activities of daily living and sport was about 10 days after the 3rd injection. One month after the 2nd injection, we noted a decrease of the size of tear from 12 x 4 x 2 mm to 6 x 2 mm.

One month after the 3rd injection of HA, US showed a healing of more than 90% of the tear with persistence of some micro-ruptures (inframillimeter) at the upper third of the lateral epicondyle tendons with tiny calcifications next to their insertions on the cortical bone (Figure 2).

DISCUSSION

This case is the first report of total repair of the tendon tear in chronic refractory lateral epicondylitis treated with three monthly injections of HA under US guidance. We assumed that the healing of the tendon tear was related to the positive effect of HA. Indeed, the patient had
suffered for more than one year from lateral epicondylitis without any improvement after optimal medical treatment. In addition, US performed at each injection showed a progressive healing of the tear since the first month after the first injection of HA.

Previous studies concerning treatment of chronic tennis elbow have shown lack of consensus on the treatment of lateral epicondylitis while efficacy of existing treatment is poor. HA has been used in soft tissue application for acute ankle sprain and has shown high degree of efficacy with limited side effects [8]. In addition, Shibata et al. [10] reported that HA was an effective conservative treatment equivalent to steroids for patients with rotator cuff tears that did not require surgical repair. Hence, given the biocompatibility of HA in treatment of various entheseopathies, Pretella et al. [7] investigated the efficacy and safety of periarticular injections of HA versus placebo in the treatment of lateral epicondylitis and found significant relief over the long term. The time to return to pain-free and disability-free sports was 18 (± 11) days in the HA group, but was not achieved in any of the control group (saline) patients. Kumai et al. [11], reported that a single injection of HA resulted in improvement of pain in four types of entheseopathies (lateral epicondylitis, patellar tendinopathy, insertional Achilles tendinopathy, and plantar fasciitis). Changes in VAS was -2.2 ± 2.26 cm for the four sites overall and -2.55 ± 2.43 cm for lateral epicondylitis. In all these studies, the treatment of patients with lateral epicondylitis aimed to improve pain but not to restore the tendon. However, in our case we had a complete restoration of the tendon tear.

The primary lesion in epicondylitis consists of microruptures of the forearm musculature at the tendinous portion just distal to the humeral epicondyle. The tendon fibers attached to the periosteum are relatively avascular and prone to ischemic stress, and thus slow to heal. Therefore, Nirschl [13] maintained that the basic cause of chronic lateral epicondylitis is microtears at the origin of the extensor carpi radialis brevis (ECRB) as a result of avascular compromise due to an angiofibroblastic hyperplasia. In addition, it is important to notice that lateral epicondylitis is not only the result of structural failure and inflammatory process, but also an insufficient tendon repair, which presents with angiofibroblastic degeneration.

Hyaluronic acid is a high-molecular weight glycosaminoglycan found in diverse tissues throughout the body especially as a major component of synovial fluid cartilage and surrounding structures of arthrodial joints. Depending on their characteristics, glycosaminoglycans contribute to wound healing processes by the creation of an appropriate environment for growth via the accumulation of other matrix proteins and the formation of differentiation factors, leading to cell migration [6]. During the proliferative stage of wound healing, HA is responsible for the stimulation of mitosis and migration in epithelial cells and fibroblasts. Additionally, it contributes to the transformation of young tenoblasts into mature tenoblasts and tenocytes. Oryan et al. reported that the combination treatment of HA and glycosamine N-chondroitine sulfate in tendon repair has been demonstrated to: 1) decrease lymphocyte and macrophage infiltration, 2) increase vasculogenesis, 3) increase the number and maturity of the tenocytes, 4) reduce adhesion formation, and 5) improve the differentiation, maturation, density, and alignment of collagen and the elastic fibrils. So it can help in the restoration of the tendon [14]. Tosun et al. support the idea that for a single injection treatment of

![Figure 2. Ultrasound images showing healing of the tendon tear one month after the third HA injection.](image-url)
patients with lateral epicondylitis, a combination injection of HA + corticosteroid is more effective than triamcinolone in terms of clinically significant improvement and the functional outcomes at three and six months, with more efficacy in terms of pain relief at six months [15].

CONCLUSION

Chronic lateral epicondylitis is a frequent enthesopathy associated with pain and disability. In the absence of a consensus for optimal treatment, US-guided injections of HA near the damaged tendon may provide an alternative efficient medical treatment for clinicians and their patients. Randomized controlled trials with large sample of patients are needed to confirm our results.

REFERENCES