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New Treatment Methods for Lateral Epicondylitis

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Abstract. Lateral epicondylitis, commonly known as tennis elbow, is a common overuse injury that causes pain and reduces function of the tendons around the elbow. This essay analyzes multiple studies comparing conventional treatments with three emerging treatments for tennis elbow, focusing on platelet-rich plasma (PRP), extracorporeal shock wave therapy (ESWT), and mesenchymal stem cell (MSC) therapy. For PRP therapy, research suggests that it can improve pain and elbow function within at least 52 weeks, but the scores decrease when the time reaches 104 weeks. The second therapy, ESWT, also improves pain and grip strength over a period of 6 months, but the results remain inconsistent among studies. While early research of mensenchymal stem cell (MSC) therapy reports enhancement in pain and function. However, current studies are generally limited by small sample sizes and insufficient long-term evidence. Overall, these three treatments may provide valuable alternatives for patients who seem to experience no effects under conventional care, but none of them can be considered universally effective.

Keywords: Lateral Epicondylitis, platelet-rich plasma (PRP), extracorporeal shock wave therapy (ESWT), mesenchymal stem cell (MSC) therapy

1. Introduction

Lateral epicondylitis, is one of the most common overuse injuries affecting the upper limb, occurring in approximately 1–3% of the general population [1]. It is characterized by pain over the lateral epicondyle of the humerus due to degeneration or microtearing of the common extensor tendon, particularly the extensor carpi radialis brevis (ECRB) in charge of the wrist extension and the forearm stabilization. Despite its name, tennis elbow does not affect only tennis players. Repetitive movements involving the wrist and forearm can cause the condition in athletes, workers, and people who frequently perform activities that require gripping, wrist extension or forearm rotation. Over time, these repeated stresses can lead to pain and weakness. Tennis elbow can make everyday activities such as carrying objects, opening containers, using tools, and playing sports with certain difficulty [2].

Initially, doctors often recommend conservative treatment in most circumstances. Traditional treatments for tennis elbow include rest, icing, physical therapy, non-steroidal anti-inflammatory drugs, and corticosteroid injections. Physical therapy usually includes stretching and strengthening exercises designed to improve the strength and function of the affected tendon, while corticosteroid injections provide short-term pain relief.

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These treatments can be helpful over a short period of time, but patients may continue experiencing symptoms once the time reaches a certain limit. As a result, researchers have studied several newer treatment methods, such as PRP injections, ESWT, and MSC therapy.

2. Platelet-rich plasma injections

Platelet-rich plasma injection is one of the newer treatments that has received significant attention, studied specifically for lateral epicondylitis. PRP is produced by processing the patient's own blood to injection fluid with concentrated platelets. The dense platelets are then injected into the affected area of the common extensor tendon. As platelets contain transforming growth factor beta (TGF-ß) and vascular endothelial growth factor (VEGF), they promote the recruitment, proliferation, and differentiation of cells involved in tissue repair and regeneration [3]. This makes PRP an appealing treatment because it is intended to foster natural body healing rather than simply reducing pain.

Generally, patients, especially tennis players, would like to return to a significant amount of intensive wrist movement, which requires the elbow to function effectively over a long time. Therefore, patients who would like to improve elbow function emphasize more on the long-term outcomes rather than short-term pain relief. Five systematic reviews comparing PRP with corticosteroid injections for lateral epicondylitis suggest that PRP may be particularly useful for the long-term management of tennis elbow. Among the five studies, four of them suggest that PRP was more beneficial than corticosteroid injection for long-term (>8 weeks) pain relief [3]. Corticosteroid injections may reduce pain more quickly, but this does not necessarily mean that the underlying tendon problem has improved. PRP, in contrast, is intended to influence the healing environment of the affected tendon. This may explain why its benefits can become more noticeable over a longer period.

A 2022 systematic review analyzed 26 studies and measured changes in pain and arm function from 4 to 104 weeks after PRP treatment. At baseline, the average Visual Analog Scale (VAS) pain score was 7.40, but it decreased to 1.57 after 52 weeks. The average Disabilities of the Arm, Shoulder and Hand (DASH) score, which measures disability of the arm, shoulder, and hand, decreased from 60.8 to 19.3. The PRTEE score, which specifically measures tennis elbow pain and function, decreased from 55.6 to 9.0. The Mayo Clinic Performance Index (MAYO) increased from 55.5 to 93.0. These changes were statistically significant, with $P < .0001$, and the improvements exceeded the minimum clinically important difference (MCID) for all four measures during the relevant follow-up periods. However, the results after 104 weeks indicate that the average VAS and PRTEE scores were not maintained or improved, moving back toward the baseline. The VAS and PRTEE scores increased from 1.57 to 3.71 and from 9.0 in week 52 to 48.8 in week 104 [4].

These results highlight both potential benefits and limitations of PRP as a treatment for lateral epicondylitis. While PRP can provide meaningful improvements in pain and elbow function for people with tennis elbow approximately within one year, its long-term effectiveness beyond one year remains uncertain. Therefore, understanding the advantages and disadvantages is crucial when evaluating whether PRP is a feasible alternative to conventional treatments.

One major advantage of PRP is that it uses the patient's own blood, indicating that PRP is a minimally invasive treatment because the material comes from the patient and donor tissue is not required. PRP is also minimally invasive compared with surgical procedures, as it only requires an injection. Another possible advantage is that PRP is intended to support the natural healing process of the body rather than simply provide temporary pain relief.

However, PRP has several disadvantages. Firstly, the treatment requires an injection, which can cause temporary discomfort at the injection site and ultimately influence patients' daily lives. As

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insurance coverage may vary, PRP could also be expensive, which means it might not be an affordable option for several families. Another insurmountable limitation is that there is no single standardized PRP treatment. Different doctors and researchers may use different methods to prepare the plasma, different concentrations of platelets, or different targeted injection sites. These differences make it difficult to determine exactly which PRP procedure is most effective for tennis elbow.

Overall, the research on PRP suggests that it can be considered a promising treatment for long-term pain and a more functional improvement compared with certain traditional treatments like corticosteroid injections.

3. Extracorporeal shockwave therapy

Extracorporeal shockwave therapy is another treatment that has been studied recently for chronic tennis elbow. Unlike PRP, ESWT does not require any injection of biological material. Instead, a medical device produces mechanical sound waves that are directed toward the affected tendon. These waves help to inhibit pain receptors and stimulate biological activity, which encourage the body's healing response. Because chronic tennis elbow involves degeneration of the extensor tendon, researchers have investigated whether ESWT can improve pain over time.

A 2024 systematic review and meta-analysis provides evidence comparing ESWT with local corticosteroid injections for chronic lateral epicondylitis. The study included six randomized controlled trials (RCTs) involving 276 patients, with 149 patients receiving ESWT and 127 receiving corticosteroid injections. At the first month, corticosteroid injections produced better results than ESWT, with a 1.14-point weighted mean difference (WMD) in VAS pain scores, a 4.01-point difference in grip strength, and an 8.64-point difference in PRTEE scores, all favoring corticosteroid injections. However, the results changed at three months. ESWT produced a 1.15-point greater reduction in VAS pain scores, a 2.04-point in grip strength, and a 9.50-point greater improvement in PRTEE scores compared with corticosteroid injections. After six months, ESWT continued to show better results, with a 1.81-point greater reduction in VAS pain and a 3.06-point greater improvement in grip strength [5]. Moreover, the two groups had a similarly low rate of adverse effects. These results suggest that corticosteroid injections may provide greater short-term relief of pain, while ESWT might produce better enhancement in pain, grip strength, and function over the longer term.

An additional 2025 umbrella review examined the effectiveness of ESWT of another two treatments --- corticosteroid injection and ultrasound therapy. It reached a similar conclusion regarding corticosteroid injections, finding that ESWT provided better long-term pain outcomes than corticosteroid injections. Since this comparison has already been discussed in the previous review, the following evidence focuses on ESWT compared with ultrasound therapy, another commonly used noninvasive treatment for tennis elbow. This review found that ESWT produced a 1.42-point reduction in VAS pain scores than ultrasound therapy at one month and a 1.65-point at three months. ESWT also produced significantly greater improvements in grip strength, with a mean difference (MD) of 0.75-point advantage over ultrasound therapy at one month and a 2.15-point at six months. However, there was no statistically significant difference in overall elbow function between ESWT and ultrasound therapy at three months with an SMD of 1.49 point [6]. These findings show that ESWT may be more effective than ultrasound therapy for reducing pain and improving grip strength, although its advantage may not extend to every measure of elbow function.

One of the biggest advantages of ESWT is that it is noninvasive. Patients do not need to have blood drawn or receive an injection. This makes ESWT an attractive option for people who prefer to

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avoid injections. It may also be useful for patients whose symptoms have continued despite traditional treatments. Research has suggested that ESWT can improve pain and function in patients with chronic tennis elbow, especially during longer-term (within 6 months) follow-up. The study also found that ESWT had low rates of adverse events, and the reported adverse events were mild.

However, one major drawback of ESWT would be high treatment cost, making it unenforceable for some families. ESWT always requires multiple sessions for the whole treatment procedure, which makes it inconvenient for patients who seek for a relatively faster recovery. Furthermore, a 2022 systematic review and meta-analysis evaluated 2 RCTs for eletrophysiotherapy, ESWT and transcutaneous in lateral epicondylitis and found that ESWT did not show a statistically significant benefit for pain, with a score of 7.063, or function, with an SMD of 0.03, compared with control treatments. The authors therefore concluded that the available evidence did not support the use of ESWT for lateral epicondylitis [7]. This contrasts with the more favorable results reported by the 2024 and 2025 reviews, suggesting that differences in study design and outcome measurements may influence the results.

4. Mesenchymal stem cell therapy

Mesenchymal stem cell therapy is a more experimental treatment for tennis elbow. Unlike traditional treatments that focus mainly on reducing pain or improving function, stem cell therapy is designed to encourage tendon regeneration that conservative treatments cannot reverse [8]. The ability of MSCs is now better understood that the mode of action is probably caused by paracrine mechanisms through the generation of cytokines and secretomes or exosomes, which directly affect the local microenvironment by encouraging repair and modifying the local immune response [9]. Because tennis elbow involves degeneration of the common extensor tendon, researchers are interested in whether MSCs could help improve the condition of the tendon itself.

Research has examined mesenchymal stem cells in patients with lateral epicondylitis. One study examined 18 patients with chronic lateral elbow tendinopathy who had not improved with previous conventional treatments. The researchers injected adipose-derived mesenchymal stromal cells (ASCs), a type of mesenchymal stem cell, directly into the affected common extensor tendon. After six months, the players' average maximum pain score decreased from 6.28 to 1.05, while the player's QuickDASH-Sport score, which measures difficulty with sports activities, decreased from 56.94 to 8.68. Magnetic resonance imaging (MRI) scores of tendon damage also improved from 4.22 to 2.22. Most importantly for tennis players, all 18 participants returned to playing tennis, with an average return time of 3.31 months [9]. These results suggest that MSCs may improve not only pain but also tendon structure and sports function. However, the study only included a limited amount of patients and there was no control group involved, so the effectiveness of MSC therapy would still be considered as uncertain.

A 2022 narrative review examined the potential of mesenchymal stem cell therapy for lateral epicondylitis and other tendon disorders, where two of the total five studies specifically analyzed about lateral epicondylitis. In one study of 12 patients, six received 1 million adipose-derived mesenchymal stem cells while the other six received 10 million cells. Both groups experienced significant reductions in elbow pain, and elbow performance improved considerably by the sixth week. Ultrasound examinations also showed a substantial reduction in tendon lesions throughout 26 weeks despite a small increase in lesion size was observed at 52 weeks. No adverse events or significant differences between the two groups were observed. In the other study, the patients were observed and measured for the PRTEE score in the second, sixth, and twelfth weeks following the injection. Although the average score of all patients were about 70 out of a total 100 points, a

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notable improvement in pain was seen --- a fall of 30 points in the second week, a decrease of 20 points in the sixth week, and an additional 10 points in the twelfth week were shown in the study [10]. However, the review pointed out that the available studies had small sample sizes and that there was not enough clinical evidence to determine the ideal cell source, dosage, or transplantation method.

The major advantage of MSC therapy is that it does not only control symptoms, this regenerative treatment could potentially address the damaged tissue itself and eventually heal the damaged tendon. However, mesenchymal stem cell therapy currently has relatively more limitations. Since the treatment requires specialized cell preparation and injection procedures, which can increase its cost and limit its availability compared with conventional treatments. In addition, the safety and long-term effectiveness of MSC therapy for tennis elbow remain uncertain. Stem cell therapy is not yet an established standard treatment for tennis elbow.

5. Conclusion

Tennis elbow can cause significant pain and interfere with both everyday activities and athletic performance. As traditional treatments for lateral epicondylitis do not fully resolve the patients' problem in most cases, researchers have investigated on newer treatments, such as PRP, ESWT, and MSC therapies, which may provide additional possibilities for patients seeking longer-lasting improvements according to multiple studies.

First of all, PRP therapy serves as a good alternative to traditional treatment because it uses concentrated platelets extracting from patients themselves to support the healing process. Research has shown improvements in pain and function that can continue for more than one year after the injection. The second treatment, ESWT, is another noninvasive option that may be useful for long-term pain relief and recovery, although studies have demonstrated inconsistent results due to distinct treatment procedures and comparison group. The final method, MSC therapy, represents a more regenerative approach, but only relatively early studies have shown better effects on pain and overall elbow function. Its high cost and limited study populations also prevent it from being considered a promising treatment at this time.

When determining the most appropriate treatment for one specific patient, physicians should consider various factors, such as the patient's symptoms, previous treatments, and, most importantly, the patient's personal preferences. In conclusion, it is more useful to recognize that each method has different strengths and limitations rather than identifying one treatment as universally superior. In the future, researchers should conduct RCTs with larger and diverse groups of patients and longer follow-up periods to compare treatments directly with each other. The research should also determine the most effective treatment dosage, timing, and process and identify which patients are most likely to benefit from each approach. For instance, restoring strength and function is especially important for tennis player to safely return to regular training and games. As a result, continued research could be conducted through more personalized treatments that provide a more effective and longer-lasting recovery from lateral epicondylitis.

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