Autologous Blood and Platelet-Rich Plasma Injections for Treatment of Lateral Epicondylitis

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KEYWORDS

• Lateral epicondylitis • Tennis elbow • Autologous blood injection • Platelet-rich plasma • Outcomes

KEY POINTS

- Lateral epicondylitis (tennis elbow) is a frequent cause of elbow pain; most patients (80%–90%) are successfully treated with standard nonoperative methods (rest, nonsteroidal anti-inflammatory drugs, bracing, and physical therapy).
- Autologous blood injections (ABI) and platelet-rich plasma (PRP) injections are the two most frequently used orthobiologic techniques in the treatment of lateral epicondylitis (tennis elbow).
- Studies of the effectiveness of ABI and PRP report varying outcomes, some citing significant clinical relief and others reporting no beneficial effect.
- More research is needed to determine how to best use orthobiologics in the treatment of lateral epicondylitis.

Lateral epicondylitis (tennis elbow) is a common cause of elbow pain, affecting approximately 2% to 3% of the general population and up to 40% of athletes participating in overhead sports, such as tennis.[1,2] A recent large-scale, population-based study estimated that nearly 1 million individuals in the United States develop lateral epicondylitis each year.[3] In 80% to 90% of patients, the condition is self-limiting and resolves within a year. Walker-Bone and colleagues,[4] however, found that 27% of patients with lateral epicondylitis had severe difficulties with activities of daily living, and the current consensus is that a year is too long for the patient to wait for relief from pain, disability, and loss of economic productivity.

PATHOLOGY

Generally, lateral epicondylitis results from microtrauma to the extensor carpi radialis brevis, but may involve other tendons within the forearm extensor muscles, such as the extensor digitorum communis.[5] Nirschl described four stages based on severity of tendon involvement: (1) initial inflammatory reaction, (2) angiofibroblastic degeneration, (3) structural failure or rupture, and (4) structural failure plus fibrosis and calcification.[6,7] Most patients who present with sports-related lateral epicondyitis have stage 2 involvement (angiofibroblastic degeneration).

PATIENT EVALUATION/EXAMINATION

The most common complaint of patients with lateral epicondylitis is pain around the bony prominence of the lateral epicondyle that radiates along the forearm within the area of the common extensor mass. Typically, pain is exacerbated by repetitive activities that involve contraction of the forearm extensors.[8] Nirschl

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described seven stages based on pain severity (Table 1).[6]

NONOPERATIVE TREATMENT

Traditional nonoperative methods include rest, nonsteroidal anti-inflammatory drugs (NSAIDs), bracing, and physical therapy. Because of reports in the literature that corticosteroid injections, although they provide short-term pain relief, may actually have deleterious effects,[9,10] efforts have increased to evaluate biologics that may enhance healing of the degenerated extensor tendons.

Autologous Blood Injection

Autologous whole blood injections (ABI) have been widely used for treatment of lateral epicondylitis. The rationale is that ABI can initiate an inflammatory reaction around the tendon, which leads to cellular and humoral mediators to induce a healing cascade.[11] Another hypothesis is that ABI allows delivery of growth factors that increase vascularity and new collagen formation.[12] In studies comparing ABI with corticosteroids or platelet-rich plasma (PRP), results have been mixed (Table 2).

Two recent meta-analyses came to contradictory conclusions. Tsikopolous and colleagues[14] determined that ABI provides significant clinical relief at 8 to 24 weeks, whereas Sirico and colleagues[13] concluded that currently available data offer no support for the effect of ABI in medium- or long-term follow-up. Several studies found better pain relief at 4 weeks with corticosteroid injections but better long-term results with ABI,[15,20,21] whereas others found ABI more effective at short-term follow-up[19] and others found no differences at either short-term or long-term follow-up.[22,23] Based on their systematic review and network meta-analysis, Arirachakaran and colleagues[17] concluded that, when comparing ABI, PRP, and corticosteroid injections, PRP was best at reducing pain, whereas ABI was best for functional improvements; however, ABI had the highest risk of adverse effects (injection site pain and skin reaction).

Table 1
Seven stages of pain severity described by Nirschl

Phase 1	Mild pain with exercise, resolves within 24 h
Phase 2	Pain after exercise, exceeds 48 h
Phase 3	Pain with exercise, does not alter activity
Phase 4	Pain with exercise, alters activity
Phase 5	Pain with heavy activities of daily living
Phase 6	Pain with light activities of daily living, intermittent pain at rest
Phase 7	Constant pain at rest, disrupts sleep

Adapted from Nirschl RP. Elbow tendinosis/tennis elbow. Clin Sports Med 1992;11:855.

Technique (Calandruccio)

A total of 2 mL of autologous blood are drawn from the ipsilateral upper extremity and mixed with 1 mL of 2% lidocaine HCl or 1 mL of 0.5% bupivacaine HCl. The needle is introduced proximal to the lateral epicondyle along the supracondylar ridge and gently advanced into the undersurface of the extensor carpi radialis brevis while infusing the blood-anesthetic mixture extra-articularly (Fig. 1).

A removable 40-degree orthoplast cock-up splint is applied. NSAIDs are withheld, and patients are restricted from using straps, braces, or physiotherapy. At 3 weeks, an interval wrist motion program consisting of stretching the musculature about the wrist and elbow, especially the forearm extensor compartment, is begun. At 6 weeks, patients are released to activities as tolerated.

Platelet-Rich Plasma

PRP has been used extensively in the treatment of tendon, ligament, muscle, bone, and cartilage pathology. It is attractive because it is can be exogenously applied to various tissues, where it releases high concentrations of platelet-derived growth factors that enhance wound healing, bone healing, and tendon healing,[24] in addition to possessing antimicrobial properties that may help prevent infections.[25,26] The major components of PRP are transforming growth factor-β, platelet-derived insulin-like growth factor, insulin-like growth factor, vascular endothelial growth factor, and fibroblast growth factor-2. Transforming growth factor-β1, insulin-like growth factor-1, and platelet-derived insulin-like growth factor stimulate proliferation of mesenchymal cells; in particular, transforming growth factor-β1 stimulates extracellular matrix production, including collagen.[27]

Studies of the clinical efficacy of PRP report varied outcomes (Table 3). In a systematic review, de Vos and colleagues[44] concluded that there is