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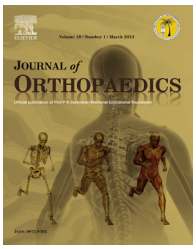

Original Article

Platelet-rich plasma versus open surgical release in chronic tennis elbow: A retrospective comparative study

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ABSTRACT

Purpose: To compare short and mid-term results in the treatment of chronic elbow tendinosis with platelet-rich plasma (PRP) or Nirschl surgical technique.
Method: A retrospective study was conducted on patients with chronic lateral epicondylitis, treated by Nirschl surgical technique (50 elbows) or PRP (60 elbows). Outcome was evaluated with Visual Analog Score (VAS), Mayo Elbow Scores and grip strength measurements.
Results: VAS and Mayo Elbow Scores of the PRP group had improved as a mean of 83% ($p = 0.0001$), 74% ($p = 0.0001$) over baseline and 34.2 pounds gain of grip strength.
Conclusion: The PRP seems to be better for pain relief and functionality in the short and mid-term periods.

1. Introduction

Elbow epicondylar tendinosis is a common problem for patients, whose activities require strong gripping or repetitive wrist movements. Histologic specimens from chronic cases confirm that tendinosis is not an acute inflammatory condition but rather a failure of the normal tendon repair mechanism associated with angiofibroblastic degeneration.[1] The cause of elbow tendinosis is most likely a combination of mechanical overloading and abnormal microvascular responses.[2,3] Nirschl and Pettrone identified the primary pathologic alteration in the extensor carpi radialis brevis (ECRB), termed histologically as angiofibroblastic hyperplasia. The term was subsequently modified to angiofibroblastic tendinosis and has been theorized to be a degenerative process, as no inflammatory cells are identified histologically.[4] Nirschl and Pettrone reported on 1213 clinical elbow cases with 88 surgical interventions. At surgery, identification and excision of the tendinosis tissue within the ECRB were undertaken, with anatomical repair of the normal tissues: extensor carpi radialis longus (ECRL) and extensor digitorum communis (EDC).[5]

Numerous methods have been advocated for treating elbow tendinosis, including rest, nonsteroidal anti-inflammatory medication, bracing, physical therapy, iontophoresis,

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extracorporeal shock wave therapy, and botulism toxin.[6,7] Injections of corticosteroids or whole blood and various types of surgical procedures have also been recommended.[8] The utility of several of these treatments has recently come into question. Recently, platelet-rich plasma (PRP) is promoted as an ideal autologous biological blood-derived product that 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.[9] In addition, PRP possesses antimicrobial properties that may contribute to the prevention of infections.[10,11] When platelets become activated, growth factors are released and initiate the body's natural healing response. The use of PRP for healing purposes was first popularized in maxillofacial and plastic surgery in the 1990s.[4] Its use in orthopedics started later and it is increasing.[6] Laboratory and clinical studies of PRP use on tendons, ligaments, muscle, bone, and cartilage are already published.[5] A further research into the precise cause of tendinosis is, however, still needed.

Our hypothesis was that the PRP technique is better than open surgical release of the ECRB for lateral epicondylitis. Therefore, the purpose of this study was to review and compare the short and mid-term results of the Nirschl surgical technique for lateral epicondylitis by resection of tendinosis tissue within the ECRB with repair of the ECRL-EDC interface with PRP as a potential new treatment for chronic severe elbow tendinosis.

2. Materials and methods

This study is a third level of evidence, retrospective cohort study, was conducted on patients with chronic lateral epicondylitis whom were treated by open surgical Nirschl technique (44 patients, 55 elbows) or PRP (36 patients, 60 elbows) from February 2011 to December 2012. Patients with bilateral lateral epicondylitis were operated or treated with PRP injection one by one with a 3 months interval. Inclusion criteria were as follows: patients with suggestive symptoms of lateral epicondylitis (point tenderness, decreased grip strength and pain with resisted wrist extension), of at least twelve months of duration and unresponsive to a course of at least six months of conservative treatment including non-steroidal anti-inflammatory drugs, physical therapy modalities, corticosteroid injections and splints. The ethics committee of the hospital approved this study. Written informed consent was obtained from each patient before enrollment.

3. Surgical technique

All procedures were performed on an out-patient basis and carried out by the same investigator (MA) by means of lateral release technique as previously described by Nirschl.[4] The visualization of the ECRB origin was facilitated by horizontal dissection of the ECRL off the ECRB. The tendinosis tissue within the ECRB was identified by its gray, edematous, and friable nature. All tendinosis tissue was resected sharply. A scratch maneuver was then performed using the scalpel to scrape away any remaining tendinosis tissue while leaving the normal tendon intact. If present, tendinosis tissue within the anterior edge of the EDC is resected as well. To enhance the vascular supply, a single drill hole was placed into the anterior lateral condyle but not into the lateral epicondyle. The extensor aponeurosis was then repaired to the ECRL using interrupted buried no. 1 polydioxanone suture. Postoperatively, an elbow immobilizer in 90° of flexion with the forearm in neutral rotation was applied for 48 h. Light activities of daily living and office work were resumed in 3–5 days. Strengthening with lightweights was allowed at 3 weeks. A counterforce brace was used while exercising. Gradual return to sports such as tennis was initiated 5–6 weeks from surgery.

4. PRP technique

By using a centrifuge type system (Biomet Biologics GPS III, Warsaw, IN), PRP injections were done by the same investigator (MK). This method requires drawing 54 mL of whole blood with 6 mL of anticoagulant from a peripheral vein. The blood was then placed in a plastic cylinder inside a centrifuge for 15 min at 3200 rpm. This action separates the blood into platelet-poor plasma, red blood cells, and PRP. It is a simple and reproducible method of producing at least 5 times baseline platelets in an office, surgery center, or hospital. With the use of these methods, 6 mL of PRP was obtained and then buffered to physiologic pH with the use of sodium bicarbonate. The lateral epicondylar region was sterilely prepared and injected with a local anesthetic, and 5–6 mL of PRP was then injected into and around echographically identified extensor tendon with inflammatory findings by use of a peppering technique. Approximately 0.5 mL was placed deep to the extensor tendon, 1–2 mL was placed into and around the tendon, and an additional 0.5 mL can be placed in the dermal layer. After the injection, the patient was kept in the supine position for 15 min to allow for binding of the PRP to the tendon. The patient was then given a home-based stretching and strengthening program to begin 48 h after the injection. No anti-inflammatory medication was allowed for 4 weeks. The patient was then followed at monthly intervals and allowed to return to activities as tolerated.

The subjects were evaluated five times. They were first evaluated just before the procedure and than follow-up examinations were carried out at outpatient clinic at first month, second month, 6th month and one year follow-ups. The evaluation included the following components: Visual Analog Scale (VAS) from 0 mm (no symptoms) to 100 mm (the most intense symptoms), a modified Mayo Elbow Score (best score, 100 points) and grip strength gain measurement (0–200 lb) (using a hydraulic hand dynamometer according to the American Society of Hand Therapists guidelines).[12] Baseline® HiRes Hydraulic Hand Dynamometer (Fabrication Enterprises Inc., NY, USA) was used for grip strength measurement.

During follow-up examinations, all patients reported complete compliance with the recommended post-procedure exercise program. All patients' rehabilitations were done by the same physical therapist according to the same rehabilitation protocol.