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What is More Effective: Corticosteroid Injections or Platelet Rich Plasma Injections in the Treatment of Lateral Epicondylitis?

Joseph Mohr

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TITLE

What is more effective: corticosteroid injections or platelet rich plasma injections in the treatment of lateral epicondylitis?

AUTHORS

Joseph Mohr PA-S, George Fox University, Newberg, OR jmohr13@georgefox.edu

Justin Gambini DMSc, PA-C, George Fox University, Newberg, OR jgambini@georgefox.edu

Curt Stilp EdD, PA-C, George Fox University, Newberg, OR cstilp@georgefox.edu

ABSTRACT

Lateral epicondylitis is a common degenerative tendinopathy that affects a wide variety of individuals. One patient population that often suffers more than others are workers with manual labor jobs that use vibrating tools and repetitive motions.¹ Procedural costs and disease burden associated with lateral epicondylitis have increased in recent years.³ Current treatment of lateral epicondylitis using corticosteroid injections is beginning to fall out of favor. Corticosteroid injections help decrease inflammation; however, research looking into the histology of lateral epicondylitis favors more of a degenerative tendinopathy rather than an inflammatory condition.¹ In addition, several studies have found corticosteroid injections to be helpful in the acute phase of lateral epicondylitis but detrimental long-term with rates of relapse in pain and functional impairment.⁵ Platelet rich plasma (PRP) injections are proving to be an alternative type of injection to treat lateral epicondylitis. PRP contains growth factors and cytokines that help stimulate the healing process.⁷ Several promising studies have shown that PRP might be more helpful in long-term treatment of lateral epicondylitis. One systematic review found that corticosteroid injections proved to be beneficial for pain relief and function in the short-term (2-8 weeks); whereas PRP injections was shown to be beneficial for long term (8 weeks) pain relief and function.²

INTRODUCTION OF LATERAL EPICONDYLITIS

Lateral epicondylitis (LE), also known as “tennis elbow”, is a degenerative condition of the extensor carpi radialis brevis tendon’s origin at the lateral epicondyle of the humerus.¹ It is characterized as an overuse syndrome with histology favoring degenerative tendinosis rather than an inflammatory process.¹ Researchers believe that lateral epicondylitis is caused by repetitive motions that strain the origins of the extensor tendons at the lateral epicondyle of the

humerus.² Most commonly, the extensor carpi radialis brevis is involved but the supinator, extensor carpi radialis longus, extensor digitorum, extensor digiti minimi and extensor carpi ulnaris can also play a role in lateral epicondylitis.²

LATERAL EPICONDYLITIS CLINICAL PRESENTATION

Most patients present with lateral elbow pain exacerbated with extension of the wrist and long finger against resistance.¹ Weakened grip strength is also often seen.² Symptoms typically have an acute onset and are not related to a traumatic event.¹ Pain is felt with lifting and/or pronation.¹ Patients often experience symptoms between six and twenty-four months with 90% seeing a complete resolution of symptoms within one year.¹

EPIDEMIOLOGY OF LATERAL EPICONDYLITIS

Lateral epicondylitis affects 1-3% of adults annually.³ Some research has found that there is a higher incidence in females, but most agree that it is similar between sexes.³ As patients age there is a higher incidence in 40-64 year olds.³ Lateral epicondylitis has been associated with manual labor, vibrating tools and arm dominance.¹ Overuse activity is more strongly associated with lateral epicondylitis than metabolic factors such as hyperglycemia, obesity, and thyroid abnormalities.⁴ Some studies have also identified other risk factors for lateral epicondylitis including elevated body mass index, oral corticosteroid use, history of smoking, and history of additional tendinopathies.² Cases of lateral epicondylitis treated surgically have remained low at 2%; however, procedural costs and associated disease burdens have both increased.³

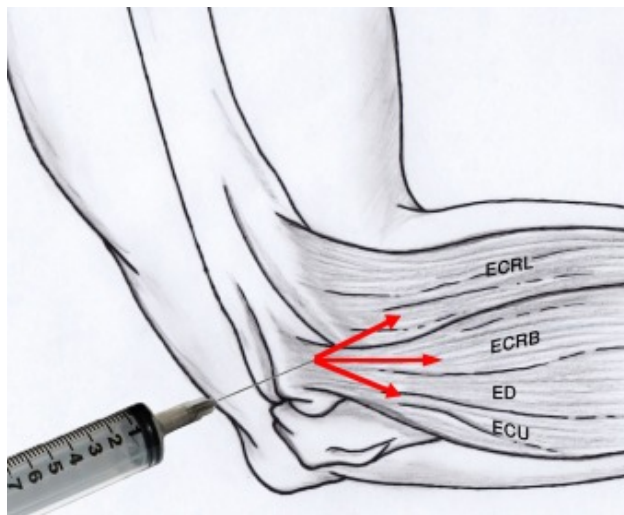
DIAGNOSIS OF LATERAL EPICONDYLITIS

Diagnosis of lateral epicondylitis is done clinically based on history and physical examination.¹ While taking a history, patients often complain of pain over the lateral elbow.¹ On physical

examination, tenderness can be provoked anterior and distal to the lateral epicondyle.¹ Two common provocation tests are Maudsley's and Cozen's¹. These tests have a sensitivity of 88% and 84% but have poor specificity.¹ Imaging is typically not needed to diagnose lateral epicondylitis, but MRI and ultrasound can show thickening, hypoechogenicity or defects in the tendo-osseous enthesis.¹

CURRENT TREATMENT OF LATERAL EPICONDYLITIS

Current treatments for LE involves operative and nonoperative measures.² Common nonoperative treatments include rest, physical therapy, bracing, extracorporeal shockwave therapy, therapeutic ultrasound, dry needling, corticosteroid injections, platelet-rich plasma (PRP) injections, autologous blood injections, botulinum toxin injections, or acupuncture.²



Surgical management involves debridement of the extensor carpi radialis brevis tendon, denervation of the lateral epicondyle, V-Y slide of the common extensor tendon, extensor fasciotomy, intra-articular repairs, epicondylar resection with anconeus transfer, and lengthening of the extensor tendons.²

CORTICOSTEROID INJECTIONS IN LATERAL EPICONDYLITIS

In the past, corticosteroid injections have been the injection of choice to help treat lateral epicondylitis.² The mechanism of action of the corticosteroid injection involves reducing inflammation; however, with recent data pointing towards lateral epicondylitis being more of a degenerative condition rather than an inflammatory one, some question whether this is the most optimal injection. Early studies showed that corticosteroid injections reduced lateral epicondylitis pain 6 weeks after injection, but recent studies have demonstrated increased rates of relapse of lateral epicondylitis pain and functional impairment.⁵ Additional studies supporting these findings suggest that corticosteroid injections can be helpful in reducing acute lateral epicondylitis pain, but are contraindicated in long-term cases due to decreased rates of symptom improvement compared to those receiving other nonsurgical treatments.⁵

CURRENT DEMAND FOR ALTERNATIVE THERAPY

Cho et al⁶ demonstrated that the number of patients visiting western medicine facilities for lateral epicondylitis rose each year from 2010 to 2018. On one hand, cases of lateral epicondylitis treated surgically have remained low at 2%; however, procedural costs and associated disease burdens have both increased.³ Degen et al³ demonstrated the increasing burden of cost on the health-care system with lateral epicondylitis due to the steady rise in total reimbursement and average per-patient reimbursement. Cho et al⁶ supported this finding and found that both costs increased annually. The study done by Cho et al⁶ also reported that the number of patients visiting a healthcare facility for lateral epicondylitis increased by 41%, while the cost of care for treating lateral epicondylitis at these healthcare facilities increased by 104% over a nine-year period.

PLATELET RICH PLASMA OVERVIEW

Platelet-rich plasma (PRP) is autologous human plasma with an increased platelet concentration.⁷ PRP injections are prepared by drawing a patient's blood and centrifuging it to separate platelets to be injected back into the body.⁷ Platelets contain growth factors and cytokines that help stimulate the healing process.⁷ More specifically, PRP has a high concentration of platelet growth factors within α -granules that each have a specific function to help with wound repair.⁸ α -granules can be best thought of as storage units in platelets that contain a plethora of growth factors that helps with inflammation, angiogenesis, stem cell migration, and cell proliferation.⁹ PRP injections can be further divided into leukocyte-rich PRP (LR-PRP) and leukocyte-poor PRP (LP-PRP).⁷ LR-PRP has an increase in neutrophil concentration; whereas, LP-PRP has a decrease in neutrophil concentration.⁷ Neutrophils are essential in healing pathways by creating a barrier against invading pathogens, and aiding with angiogenesis and tissue restoration.⁷ Current data supports that LR-PRP is associated with pro-inflammatory effects.⁷ In addition, LR-PRP typically is associated with an increase in catabolic cytokines which may antagonize the anabolic cytokines found in platelets.⁷ Various factors of how PRP is prepared makes it difficult to interpret literature and determine the effectiveness of PRP in treating conditions. Some common discrepancies in the preparation of PRP includes optimal volume, timing, injection technique, quality of PRP preparations, leukocyte-rich vs leukocyte-poor PRP, and difference in WBC and growth factor concentrations in the samples.² In addition, patient specific factors like medications taken and commercial system preparation methods increase the variability in PRP injections.⁷ PRP is often thought to help treat tendinopathies by increasing blood supply to injured tissue through neovascularization, and with cytokines that help with inflammation, cellular proliferation, and tissue remodeling.⁷

ROLE OF PLATELET RICH PLASMA IN LATERAL EPICONDYLITIS

Because the pathophysiology of lateral epicondylitis is thought to be more of a tendinopathy rather than inflammation, PRP injections are beginning show more benefit over traditional corticosteroid injection. Some think that corticosteroid injections may be detrimental to the long-term healing process in lateral epicondylitis by decreasing the tensile strength of the tendons and tissue². Within the α -granules, PRP contains platelet-derived growth factor AB (PDGF-AB), PDGF-BB, transforming growth factor beta (TGF- β), vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), interleukin 1 beta (IL-1b), and a growth factor for hepatocytes.⁸ These cytokines and growth factors help heal injured tendons through chemotaxis, mitogenesis, angiogenesis, differentiation, and metabolism.⁸ Simply, PRP increases the amount of growth factors to the lateral epicondyle helping augment the healing process.⁸

An article by Lim et al⁸ investigated the biological effects of PRP injections on lateral epicondylitis by examining the relationship between cytokine levels and clinical effect of PRP treated lateral epicondylitis. This is one of few studies that used a randomized controlled trial design to investigate biomarkers to assess the effectiveness of PRP. Inclusion criteria included unilateral elbow pain for >3 months, lateral epicondylitis diagnosed on magnetic resonance imaging (MRI), no improvement in the condition despite receiving treatment in the previous 3 months.⁸ Patients were excluded if they had central or peripheral nervous system diseases, hematological diseases, radial nerve entrapment, inflammatory diseases, gout, tumor, or radiocapitellar osteoarthritis; underwent operation for lateral epicondylalgia; or were pregnant.⁸ Patients were randomly assigned a computer-generated number and then divided into a PRP-treated group and a manipulation group as control.⁸ This study found a significant improvement in the pain score, function score, and MRI grade in the PRP treated group.⁸ Lim et al⁸ also found an increase in the white blood cell count, platelet count, PDGF-AB, PDGF-BB, and TGF- β in the

group treated with PRP. The main finding of this study was the correlation of clinical assessment with the biological components of PRP.⁸ The researchers concluded that PRP improves lateral epicondylitis through TGF- β mediated mechanisms.⁸ Despite the positive findings of the PRP group, small sample size was a reported limitation. A repeated study using a larger population might help reinforce the findings of this study.

PLATELET RICH PLASMA EFFECTIVENESS IN LATERAL EPICONDYLITIS

Kemp et al² published an important systematic review of studies which provided guidance in the effectiveness of PRP versus corticosteroid injections in treating lateral epicondylitis. The study reviewed previous systematic reviews on this topic by searching the key words “platelet-rich plasma”, “corticosteroid”, and “lateral epicondylitis” in the search engines Cochrane Library, ProQuest, and PubMed.² Studies were included if they were designed as a systematic review, were written in English, and involved a direct comparison of corticosteroid and platelet rich plasma for the intervention.² Studies were excluded if the involved interventions were other than the direct comparison of corticosteroid and PRP injections, grouped PRP into treatments involving autologous blood or whole blood platelets, or if they used the broad term “regenerative therapies” or “regenerative injections” without specification to what the specific intervention was.² There were five full text articles that met the inclusion and exclusion criteria for this review.² Four out of the five reviews found that corticosteroid injections proved to be beneficial for pain relief and function in the short-term (2-8 weeks); whereas, PRP injections proved to be beneficial for long term (8 weeks) pain relief and function.² There was consistency in all five reviews that favor using PRP injections for optimal long-term outcomes.² Kemp et al² addressed several weaknesses with prior systematic reviews on this topic. Weaknesses include the inconsistency in the literature with PRP injections including the optimal volume, timing,

injection technique, quality of PRP preparations, leukocyte-rich vs leukocyte-poor PRP, and difference in WBC and growth factor concentrations in the samples.²

In a study published by Brkljac et al¹⁰ researchers investigated the long-term benefits of PRP injections for refractory lateral epicondylitis. The authors evaluated 34 patients (18 women and 16 men) suffering from LE who received PRP injections between 2011 and 2013.¹⁰ The mean age of the subjects was 46 years with a range of 33-61.¹⁰ Patients were considered to have refractory LE if they failed conservative management which comprised of: analgesia, physiotherapy and at least one corticosteroid injection.¹⁰ The patients who had refractory LE were offered surgery or PRP injection.¹⁰ The PRP injection in this study was leukocyte-poor PRP (LP-PRP).¹⁰ The researchers used the Oxford Elbow Score (OES) to evaluate the outcomes following PRP.¹⁰ The mean follow up after injection was 5.2 years with a range of 4.2-6.1¹⁰. Thirty patients (96.8%) had an improvement in their OES score after long-term follow-up compared to their pre-op score.¹⁰ One patient (3.2%) experienced no change in symptoms.¹⁰ Eight patients had further procedures after initial PRP injection including two who had a repeat injection and six who received surgery.¹⁰ This study did not list long term outcomes from the surgery group. It is important to note, sample size and only using LP-PRP were several weaknesses in this study.

CONCLUSION

Current data supports that PRP injections are more beneficial than corticosteroid injections at providing long term pain relief and improving function.² With the increase in procedural costs and disease burden of lateral epicondylitis, PRP injections can be an effective option at decreasing the amount of follow-up visits, repeat injections, and more invasive treatments. PRP injections can help workers who develop lateral epicondylitis due to repetitive motions of their job get back to work by providing more long-term pain relief and improving function compared

to corticosteroid injections. By doing this, PRP injections can help reduce overall healthcare costs in populations with limited resources by reducing the need for future injections, appointments, and surgeries. The current standard of corticosteroid injections in lateral epicondylitis often involves repeat injections and surgery. In populations with limited resources, this is often not feasible for patients that need to return to work. Furthermore, it increases the cost of healthcare through follow up appointments, additional injections, referrals to specialists, and surgical costs.

FUTURE RESEARCH

Further research is needed to specify what formulation and preparation of PRP injections is most effective in treating lateral epicondylitis. Various factors that need to be addressed include includes optimal volume, timing, injection technique, quality of PRP preparations, leukocyte-rich vs leukocyte-poor PRP, and difference in WBC and growth factor concentrations in the samples. Additional studies are recommended that directly look at long-term pain relief and function of workers who develop lateral epicondylitis on the job when given PRP injections compared to corticosteroid injections. In the end, consideration of PRP injections for the long-term treatment of lateral epicondylitis should not be overlooked.

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FIGURE LEGEND

1. Sports Medicine Review. (2022, October 13). *Platelet rich plasma (PRP) and lateral epicondylitis*. Sports Medicine Review. Retrieved December 11, 2022, from <https://www.sportsmedreview.com/blog/platelet-rich-plasma-prp-and-lateral-epicondylitis/>