

Peerbooms JC, Sluimer J, et al. Positive Effect of an Autologous Platelet Concentrate in Lateral Epicondylitis in a Double-Blind Randomized Controlled Trial. Am J Sports Med 2010;38(2):255-261.

Design: Randomized clinical trial

Population/sample size/setting:

- 100 patients (48 men, 52 women, mean age 47) treated for lateral epicondylitis (LE) at 2 university orthopedics departments in the Netherlands
- Inclusion criteria included LE for at least 6 months with pain of at least 50 on a 100 point scale
- Exclusion criteria included any history of surgery for LE, corticosteroid injection in the previous 6 months, history of carpal tunnel syndrome or cervical radiculopathy, diabetes, rheumatoid arthritis, and hepatitis
- LE defined as pain over the lateral epicondyle on direct palpation and on resisted wrist extension
- Patients had previously been treated with cast immobilization, corticosteroids, or physical therapy at some point during the course of their symptoms

Main outcome measures:

- Randomized to one of two injections at the lateral epicondyle: either platelet-rich plasma (PRP, n=51) or steroid (n=49)
- Both treatment groups had 27 ml of blood drawn from the uninvolved arm
- The PRP group's 27 ml of drawn blood was centrifuged into a 3 ml platelet-rich concentrate, placed into an opaque tube, and buffered with sodium bicarbonate; 1 ml was injected, together with bupivacaine HCl, into the affected lateral epicondyle at the point of maximum tenderness
- PRP injection was done without using an activation agent
- The steroid group received 1 ml of 40 mg of triamcinolone acetonide with bupivacaine in a manner identical to that of the PRP group
- Both groups had the same post-procedure protocol: 24 hours of rest, acetaminophen prn, 2 weeks of standardized stretching under the supervision of a physical therapist, and activity as tolerated after 4 weeks
- Pain VAS and Disability of Arm, Shoulder, and Hand (DASH) scores were measured at baseline and then at 4, 8, 12, 26, and 52 weeks after the injection
- Any patient who required a re-intervention (either an operation or a second injection) was recorded as a treatment failure; at 6 months, there were 5 failures (3 operations, 2 re-injections) in the PRP group and 13 failures in the steroid group (6 operations, 7 re-injections)
- Failures were declared an average of 5 months after the injection (range was 2-6 months)
- Most of the re-injections were done with the injectate of the other group; both PRP re-injections received steroid, and 6 of the 7 steroid re-injections were done with PRP
- At 4 weeks, steroid response appeared to be slightly better than for PRP; steroid group had a 32.8% improvement in VAS and a 25.8% improvement in

- DASH, compared to a 21% improvement in VAS and a 15.7% improvement in DASH for the PRP group; neither difference was statistically significant
- At 8 and 12 weeks, the PRP group scores began to improve relative to the steroid group scores, but the two groups did not differ in a statistically significant way
 - At 6 months, a statistically significant advantage was observed for the PRP group over the steroid group in pain VAS (53.5% improvement vs. 14.0% improvement), and in DASH (50.7% improvement in PRP group vs. 10.7% improvement for steroid group)
 - At 12 months, PRP continued to show an advantage over steroid; greater improvements in pain VAS (63.9% vs. 24.0%) and in DASH (66% vs. 17.4%)
 - Successful treatment had been defined a priori as a reduction of 25% in VAS or DASH; under the VAS criterion, the success rate was 73% for PRP vs. 49% for steroid; under the DASH criterion, the success rate was 73% for PRP and 51% for steroid
 - PRP was not cost-effective compared with steroid on a short-term basis; the cost of PRP treatment would be approximately \$840 vs. \$300 for steroid

Authors' conclusions:

- A single injection of PRP improves pain and function better than steroid injection for patients who have tennis elbow for longer than 6 months
- Steroid injection appears to produce an initial therapeutic response; however, this is followed by a decline, while PRP improves progressively over time
- Significant results for PRP were achieved only after 26 weeks, which put the improvement in the study patients beyond the one-year mark from the time of onset of symptoms

Comments:

- The 18 patients who needed a re-intervention were scored as failures of treatment; however, it is not clear whether the clinician making the decision to re-intervene was aware of the PRP/steroid group assignment of the patient
- Randomization, allocation concealment, and the use of opaque tubes for blinding are well described and adequately performed
- Percent change from baseline was reported and compared for the main outcomes of VAS and DASH; because the PRP group had slightly worse scores at baseline for VAS and DASH, some of the greater percent improvement could have been due to regression to the mean
- Regression to the mean can be controlled by using analysis of covariance as the method of analysis, and would have been a better way of making the group comparisons
- However, the large effect sizes reported in this study would have been significant with analysis of covariance as well, since the final VAS and DASH scores were lower in the PRP group by large amounts
- There is an error at the top of Table 1, which says that there were 51 patients in the steroid group and 49 in the PRP group; the other tables and the text show that the reverse is the case

- In Table 1, the p value for re-interventions is also incorrect; the stated p value is .970, which would be non-significant; the correct p value (calculated by SPSS with Fisher's exact test) is .027; the authors have thus understated the significance of the difference in failure rate between the treatment groups
- The intention-to-treat principle was preserved in counting the crossovers (to surgery or to re-injection) in the randomized groups; the steroid groups who crossed over to PRP before 6 months are counted at 12 months as steroid group outcomes; this would tend to make their outcomes closer to the PRP outcomes, and would provide further confidence in the authors' estimate of the treatment difference
- All patients had had symptoms for more than 6 months and had failed conservative treatment of other kinds; this group may not be representative of patients with symptoms for less than 6 months

Assessment: High quality (all important principles of randomized trial conduct and reporting were adhered to) for an evidence statement that PRP is superior to steroid injection in patient with symptoms of lateral epicondylitis for more than 6 months