

Efficacy of platelet-rich plasma in the treatment of degenerative knee pathology

Study Type:ACE Review

OE Level Evidence:N/A

Journal Level of Evidence:N/A

Synopsis

Six ACE Reports (5 randomized controlled trials and 1 systematic review/meta-analysis) were identified from the OrthoEvidence database which evaluated the efficacy of platelet-rich plasma in the treatment of knee osteoarthritis. All included studies were randomized controlled trials, and reported clinical and functional assessment at various time points between 1 and 6 months following treatment. Pooled analysis of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) Total scores suggested a possible beneficial effect with PRP injection in comparison to saline and a lower effect versus hyaluronic acid. Beneficial effects were also noted for individual subscales of the WOMAC assessment (pain, stiffness, and physical function). However, pooling of OMERACT-OARSI responders and a review of the literature indicated that there was no significant difference between PRP and comparison groups in other functional outcome measures, such as the International Knee Documentation Committee (IKDC) assessment and Knee Injury and Osteoarthritis Outcome Score (KOOS). Furthermore, contrasting results were obtained between two studies reporting function on the Lequesne Index. The discrepancy in the efficacy of PRP in treatment for osteoarthritis of the knee indicates the need for future high-quality randomized trials, with uniform reporting, in order to provide further evidence in this emerging treatment method.

Publication Funding Details +

Report Details and Scores

Autologous conditioned plasma more effective than hyaluronic acid in treating gonarthrosis +
PRP not superior to HA injections for treatment of knee degenerative pathology +
Single and 2 PRP injections provide similar short term pain reduction in knee OA patients +
PRP reduces pain in knee osteoarthritis, but has no effect on physical function +
Knee osteoarthritis: Plasma rich in growth factor (Endoret) vs. hyaluronic acid (Durolane) +
Functional outcome improved with PRP treatment for knee osteoarthritis +

Background

Significant pain and disability is a common symptom of patients suffering from degenerative knee conditions, such as knee osteoarthritis and gonarthrosis. Although there are numerous management options available for this disease, the most efficacious modality has yet to be determined. Currently, intra-articular injections of hyaluronic acid (HA) are the most popular method of treatment. However, substantial interest has arisen in the efficacy of platelet rich plasma and its related derivatives in the management of degenerative knee pathology. Many studies have examined this subject; however conclusive findings regarding the application of PRP injections remain elusive. Hence, this review aimed to determine the efficacy of PRP and its related products, plasma rich in growth factors (PRGF) and autologous conditioned plasma (ACP), on the treatment of knee osteoarthritis and gonarthrosis.

What was the principal research question?

Were intra-articular PRP injections (plasma rich in growth factors and autologous conditioned plasma) more effective in treating degenerative knee pathology than hyaluronic acid or saline injections?

Study Characteristics -

Report Characteristics:

Six reports from the OrthoEvidence database were identified that evaluated the use of platelet-rich plasma injection(s) in the management of symptomatic knee osteoarthritis. Five of the included reports were of randomized controlled trials, and 1 was a systematic review/meta-analysis. The included studies ranged in publication date from August 2012 to February 2013. A total of 480 patients were included in the four trials.

Report Selection:

The following terms were used to search the OrthoEvidence database for relevant articles: "platelet-rich plasma", "plasma rich in growth factors", "platelet-rich fibrin matrix", and "conditioned plasma". The search identified 35 articles for possible inclusion. Screening the identified articles on the basis of the inclusion criteria resulted in the exclusion of 29 reports, and left 6 reports for inclusion. Inclusion criteria were: studies that (1) assessed the use of platelet-rich plasma (or related product) for treatment of osteoarthritis of the knee which (2) had a minimum follow-up period of 6 months and (3) reported one of the outcomes of pain or disability/physical function.

Outcomes:

The outcomes assessed throughout the studies included were: The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC; total and pain, stiffness, and physical function subscales), OMERACT-OARSI responders, the International Knee Documentation Committee (IKDC) questionnaire, the Knee Injury and Osteoarthritis Outcome Score (KOOS) instrument, and a visual analog scale (VAS) for pain.

Heterogeneity:

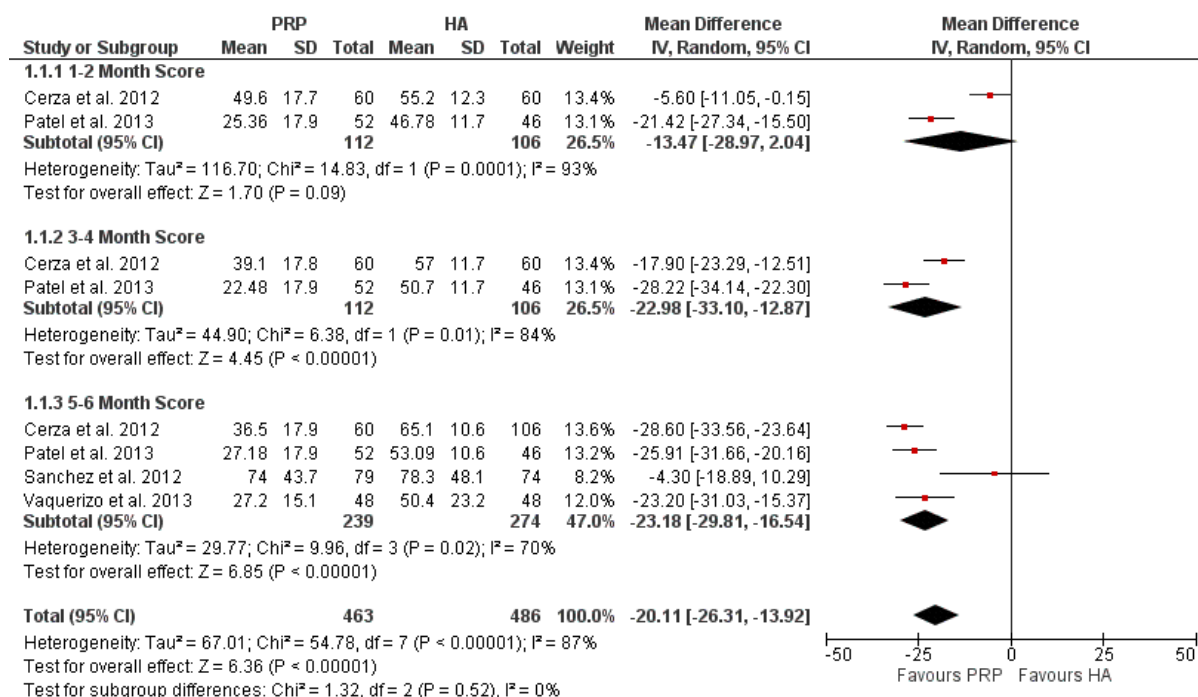
Heterogeneity was assessed using the I-squared statistic for poolable outcomes. Heterogeneity was assumed to be high, and pooling was performed with a random effects model.

Pooling and statistical Analysis

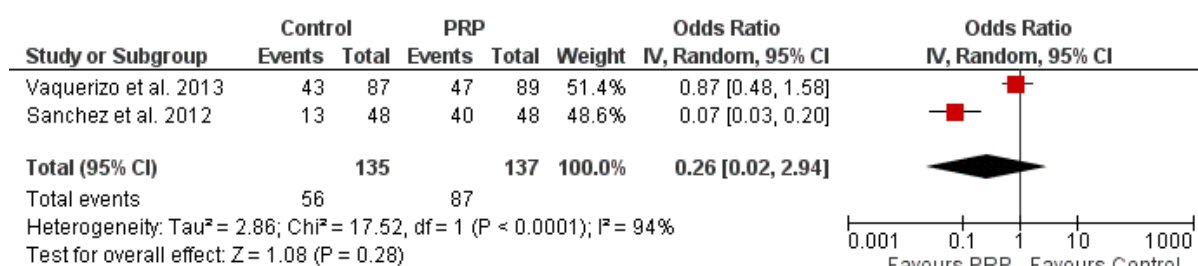
- The search of OE database resulted in the identification of 6 studies (5 RCTs totaling 576 patients, and 1 meta-analysis) involving the use of PRP to treat knee osteoarthritis and gonarthrosis.
- Pooled results from 3 trials indicated that the total WOMAC score tended to be significantly better in the PRP treatment groups compared to comparison treatment at 1-2 month ($p=0.0001$), 3-4 month ($p=0.01$), and 5-6 month follow-up ($p=0.009$). It should be noted that heterogeneity was found to be significant (I-squared = 93.2%). It is also important to note 2 studies compared PRP to hyaluronic acid and one study to saline treatment (Patel et al), this difference between PRP and the saline treatment may be greater than the hyaluronic acid.
- Two studies were pooled for the number of patients achieving criteria on the OMERACT-OARSI Responder Index. Despite a greater number of patients treated with PRP meeting the criteria, the difference between groups did not reach statistical significance (OR 0.26 (95%CI 0.02, 2.94); $P=0.28$). Heterogeneity was observed to be significant (I-squared = 94%)
- Two studies reporting WOMAC score assessed the number of patients achieving a 50% reduction in the WOMAC pain subscale. Both found that a significantly larger proportion of patients treated with PRP injection achieved a 50% reduction in pain compared to hyaluronic acid injection ($P=0.044$). In another study, PRP injections (either 1 or 2) also significantly reduced WOMAC pain subscale scores compared to saline ($P<0.001$).

- WOMAC stiffness subscale scores were reported in 3 studies. Two reported a significantly better effect with PRP injections; one observing a significantly greater proportion of patients achieving a 50% decrease with PRP compared to hyaluronic acid ($P=0.035$), and the other a significantly greater reduction with PRP compared to saline ($P<0.001$). The third article reported no significant difference between PRP and hyaluronic acid on the WOMAC stiffness subscale ($P=0.901$).
- Similar results were reported for outcome on the WOMAC function subscale to that of the stiffness subscale. Two studies reported significantly better outcomes with PRP treatment ($P<0.001$ in both trials), and one reported no significant difference between PRP and hyaluronic acid ($P=0.682$).
- Patel et al. reported VAS pain scores after 6 months, and observed a marked reduction in pain with both 1 and 2 injections of PRP ($P<0.001$) compared to baseline scores, whereas no reduction was observed with saline injections ($P=0.598$). A similar finding to this was also observed for pain on the WOMAC pain subscale.
- Contrasting results were observed for outcome on the Lequesne Index compared between two trials. One indicated significant differences in favour of PRP concerning mean Lequesne Index score, the number of patients with a 30% decrease, and the number of patients with a 50% reduction at both 24 and 48 weeks postinjection. However, the other trial reported no significant difference between PRP and HA groups in mean Lequesne score and percent improvement from baseline over 6 months.
- Filardo et al. reported IKDC values at 2, 6, and 12 months. Assessments at all time points revealed no significant difference between PRP and hyaluronic acid ($P>0.05$).
- Filardo et al. also reported KOOS outcomes at 2, 6, and 12 months, and observed that there were no significant differences between PRP and hyaluronic acid groups in any subscale at any time point.
- Similar pooled results for outcome on the WOMAC assessment were obtained in comparison to a previous meta-analysis examining the effect of PRP in knee osteoarthritis treatment. The meta-analysis also suggested a significant effect of PRP compared to HA with respect to outcome on the IKDC ($P=0.004$), although pooling was performed with data from both randomized and non-randomized trials.

Main Findings



Forest Plot: WOMAC Total Score



Forest Plot: OMERACT-OARSI Responders

What should I remember most?

The results of this review suggest that intra-articular platelet-rich plasma injections are beneficial in reducing pain caused by degenerative knee diseases, in comparison to hyaluronic acid and placebo injections. Additionally, total WOMAC scores supported the application of platelet-rich plasma injections when analyzed against both hyaluronic acid and placebo injection groups, and benefits were seen in individual WOMAC subscales. No significant differences between the groups existed for IKDC and KOOS outcomes, and outcome on the Lequesne Index was conflicting. Overall, as pooling of the majority of outcomes was not possible for the four included studies, the efficacy in the utilization of platelet-rich plasma and other related products in the treatment of knee osteoarthritis and gonarthrosis remain inconclusive.

Implications for patient treatment and future research:

Pain reduction in osteoarthritis and gonarthrosis patients may be achieved with the use of platelet-rich plasma injections. However, due to the inability to pool the spectrum of functional outcomes, advocacy

of widespread application of platelet-rich plasma as a treatment method should be withheld until future studies have provided more insight on the efficacy of this treatment with uniform methodology.