

Autologous Platelet Concentrates to improve post extraction outcomes

Abstracted from

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Question: Does the adjunctive use of autologous platelet concentrates improve post extraction outcomes?

Data sources Electronic search of Medline, Embase, Scopus and the Cochrane Central Register of Controlled Trials (CENTRAL). Manual search of multiple dental journals and review reference lists.

Study selection Two authors searched studies without any language or follow-up duration restrictions. Randomised and controlled clinical trials with a minimum of five patients per group and a parallel or split-mouth design were included. Outcome variables assessed comparing APC use included: patient satisfaction, self-reported postoperative quality of life, radiographic bone healing, clinical and radiographic marginal bone remodelling, soft tissue healing and complications such as alveolar osteitis.

Data extraction and synthesis Methodologic quality of research was assessed using the following parameters: random sequence generation method and allocation concealment, calibration and binding of outcome assessment, comparability of control and treatment groups at entry, clear definition of inclusion and exclusion criteria, clear definition of outcomes assessment and success criteria, completeness of the outcome data reported and explanation for dropouts/withdrawal, recall rate, sample size and number of surgeons involved. Meta-analysis was carried out with data from studies reporting the same outcome measurements at comparable observations times following tooth extraction. Dichotomous outcomes (ie development of alveolar osteitis) for different treatments were expressed as risk ratios with a 95% confidence interval and continuous outcomes (ie quantifiable bone changes) were expressed as mean differences with a 95% confidence interval. Study design risk of bias was assessed using sensitivity analysis.

Results Thirty three studies met the inclusion criteria. Soft tissue healing at seven days after extraction was better when APCs were used (mean difference of 1.01; 95% CI; 0.77 to 1.24). Three months postoperatively, the second mandibular molar distal probing depth was statistically better in the APC group, mean difference of -1.63; (95% CI; -2.05 to -1.22). There were no statistical differences between the APC and control groups for alveolar osteitis, acute inflammation or alveolar infection. Although the percentage of new bone and indirect measurement of bone metabolism were similar for both groups, bone density was statistically better for the APC group, mean difference of 5.06; (95% CI; 1.45 to 8.66). Qualitative analysis found decreased

swelling in four of five studies and decreased trismus in two of three studies. The variations between different types of APCs were not evaluated as part of this review.

Conclusions APCs including platelet-rich plasma (PRP), platelet-rich fibrin (PRF) and plasma rich in growth factors (PRGF) can be used following tooth extraction to improve soft tissue healing, probing depth and bone density, as well as to reduce swelling and trismus. However, their use in reducing other postoperative complications such as pain, alveolar osteitis, inflammation, infection, or in improving new bone percentage and metabolism cannot be recommended. Study heterogeneity made it impossible to perform meta-analysis for pain reduction; therefore further studies investigating the effect on pain are required.

Commentary

Tooth extraction is associated with multiple adverse outcomes. These include pain, bleeding, swelling, trismus, delayed healing and infection.¹ Furthermore; extraction will result in bone resorption which in turn causes recession around adjacent teeth and hinders the functional and aesthetic implant and prosthetic rehabilitation.² APCs provide an opportunity to reduce some of these negative effects. The most popular APC modalities include PRP, PRF and PRGF. High concentrations of platelets have been shown to play an important role in tissue healing, and growth factors regulate cellular events such as cell migration, proliferation and differentiation, in addition to synthesis of the extracellular matrix.^{3,4} High quality research is required to investigate these treatments as to their efficacy in socket preservation and healing.

The primary aim of this systematic review and meta-analysis was to determine whether the use of APCs reduces complications and improves patients' quality of life following tooth extraction. The secondary aims were to assess socket healing for hard and soft tissue parameters. This included both clinical and radiographic assessment.

Several databases were searched for controlled clinical trials and randomised clinical trials with a parallel or split-mouth design, and a sample size of at least five patients per group. Language and follow-up duration were not a restriction. Of the 33 included studies, nine had a parallel design and 24 had a split-mouth design. Overall, 1,191 teeth were extracted from 911 patients and 620 of these sockets were treated with APCs. Data extraction was carried out rigorously and included numerous categories such as: 1) study design, 2) study setting, 3) ethical approval, 4) country, 5) number

of patients and sockets in the control and experimental groups, 6) mean age, 7) intervention, 8) follow-up duration, 9) tooth type, 10) reason for extraction, 11) number of drop-outs, 12) APC production method, 13) adverse events, 14) patient satisfaction, 15) quality of life, 16) radiographic bone healing, 17) clinical or radiographic marginal bone remodelling and 18) soft tissue healing.

In addition, quality assessment was also carried out by two authors. Multiple parameters adapted from the Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0⁵ were used to assess the risk of bias of included studies. Data from quantitative and qualitative studies were integrated whenever thematic synthesis was possible. If a meta-analysis was not feasible for a given outcome, then a qualitative report of the results was provided. Risk ratios from dichotomous outcomes and mean differences from continuous outcomes were combined using fixed- and random-effects models. Heterogeneity among many studies precluded meta-analysis for certain outcomes. For instance, pain was measured and recorded in different ways using varying statistics, and the standard deviation was only recorded in one study. Furthermore, bone density was calculated using different methods.

Multiple conclusions may be drawn from this review. Soft tissue healing at seven days after extraction is better when APCs are used when compared to no APCs (mean difference of 1.01; 95% confidence interval). Furthermore, three months post-operatively, the second mandibular molar distal probing depth is reduced when APCs are used (mean difference of -1.63; 95% confidence interval). There are no differences in alveolar osteitis, acute inflammation or alveolar infection. Bone density is also improved when APCs are used (mean difference of 5.06; 95% confidence interval). However, new bone and bone metabolism showed no difference. The review also concluded that decreased swelling and trismus may be a result of APC administration.

Interestingly, four studies reviewed by Del Fabbro *et al.* were also reviewed in another systematic review completed in 2015,⁶ yet their conclusions differ slightly. For example, Moraschini and Barboza conclude that pain and inflammation are reduced, whereas Del Fabbro *et al.* state that the use of APCs in reducing pain and inflammation cannot be recommended.

The current systematic review adds to the evidence supporting the use of APCs to aid healing and tissue preservation following tooth extraction. However, there are some details that those considering integrating the results into their clinical practice should consider carefully. The systematic review was not registered, nor was

a protocol published; this could have potentially introduced bias into the systematic review process.

One important aspect not discussed by the authors was the cost-effectiveness of such an intervention, and perhaps future clinical trials should include this analysis. General dental practitioners should be aware of the potential benefit of APCs in reducing certain adverse postextraction effects.

In summary, although well written and conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines,⁷ the results of this review should be interpreted carefully. In order for further meta-analysis to be possible, there is a need for well conducted studies comparing the effect of APCs in decreasing pain following tooth extraction. This, patients may argue, is the most important outcome to be investigated. Furthermore, comparison between different APCs is required in order to determine the most effective modality.

Practice point

- The use of APCs such as PRP, PRF and PRGF following tooth extraction could be considered in order to improve soft tissue healing, probing depth and bone density, as well as to reduce swelling and trismus
- From the available evidence, APCs cannot be recommended for reducing pain, alveolar osteitis, inflammation or infection. Nor can they be recommended to improve bone percentage or metabolism.

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