Int. J. Oral Maxillofac. Surg. 2015; 44: 632–641
http://dx.doi.org/10.1016/j.ijom.2014.12.010, available online at http://www.sciencedirect.com

International Journal of Oral & Maxillofacial Surgery

Systematic Review Paper
Dental Implants

Effect of autologous platelet concentrates for alveolar socket preservation: a systematic review

V. Moraschini, E. S. P. Barboza
Department of Periodontology, School of Dentistry, Fluminense Federal University, Rio de Janeiro, Brazil

V. Moraschini, E. S. P. Barboza: Effect of autologous platelet concentrates for alveolar socket preservation: a systematic review. Int. J. Oral Maxillofac. Surg. 2015; 44: 632–641.

Abstract. The current literature was reviewed to evaluate the effect of autologous plasma concentrates on the preservation of extraction sockets. A comprehensive literature search was performed from October 2013 to February 2014 in the MEDLINE/PubMed and Cochrane Central Register of Controlled Trials (CENTRAL) databases. Four studies, published between the years 2010 and 2013, met the eligibility criteria and were included in the review. There were 102 extractions (55 tests, 47 controls) in 82 patients. There was considerable heterogeneity between studies with regard to the design, follow-up time, surgical techniques, and method of preparation of plasma concentrates, and therefore the data could not be analyzed quantitatively. The use of plasma concentrates seems to accelerate healing and soft tissue epithelialization in extraction sockets and reduce postoperative pain and discomfort. However, there is no evidence to date to confirm that plasma concentrates improve hard tissue regeneration.

Key words: alveolar socket preservation; growth factors; platelet concentrates; systematic review; tooth extraction.

Accepted for publication 15 December 2014
Available online 24 January 2015

Socket preservation procedures should be performed at the time of extraction to minimize resorption of external tissues and maximize bone formation inside the socket.[1] The preservation of the ridge after tooth extraction is fundamental to the success and predictability of treatments that include dental implants. Tissue loss after extraction is physiological, progressive, and more marked during the first 3–6 months, and is followed by less intense resorption thereafter. Two recent systematic reviews on dimensional changes in soft and hard tissues showed that changes in thickness are usually greater than those in height. In addition, the buccal wall is usually more affected than the lingual wall, and the mandible tends to undergo greater resorption than the maxilla.[2,3]

Several grafting techniques and materials combined or not with biological barriers have been suggested to reduce ridge changes after extractions.[4–9] Although several of these techniques and materials may limit or reduce resorption, the quality of the newly formed tissue inside the extraction socket may vary widely.[4]

Recently, the use of plasma-rich growth factor (PRGF) has been recommended for tissue regeneration in oral surgeries.[10–12] Some studies have described the potential of plasma concentrates rich in growth factors to stimulate soft and hard tissue repair and regeneration and to reduce inflammation and the consequent pain and discomfort.[11–13] Important factors and cytokines, such as platelet-derived growth factor (PDGF), transforming growth factor beta

(TGF-β), vascular endothelial growth factor (VEGF), and platelet-derived endothelial growth factor (PDEGF), are released during the preparation of plasma concentrates. These factors, also found in tissues during natural healing, are responsible for the regulation of cell events, such as induction, proliferation, differentiation, chemotaxis, and the synthesis of the extracellular matrix,[13] which accelerates mitosis, osteoblast proliferation, vascularization, and collagen synthesis.[14,15] As plasma concentrates are autologous and easily obtained at a relatively affordable cost, they have been used increasingly for the preservation of extraction sockets.

A systematic review of the literature on the effects of autologous platelet concentrates for alveolar socket preservation was conducted.

Materials and methods

Development of a protocol

The method used in this systematic review was adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[16] and the guide prepared by Needleman.[17] Clinical questions were formulated and organized according to the PICO framework for evidence-based practice.[18,19]

Focused question

The focused question was 'What is the effect of autologous platelet concentrates for alveolar socket preservation using autologous plasma concentrates when compared with natural (spontaneous) socket healing?'

Search strategy

The search strategy was based on the PRISMA guidelines (http://www.prisma-statement.org). A broad electronic search was performed from October 2013 to February 2014 in the database of the National Library of Medicine, Washington, DC (MEDLINE/PubMed) and the Cochrane Central Register of Controlled Trials (CENTRAL) for relevant publications in indexed journals. The electronic search followed the strategy shown in Table 1.

Screening and selection

Human studies (partially edentulous patients), published in English, including randomized clinical trials (RCTs), controlled clinical trials (CCTs), and prospective cohort studies with a control group, were included in this review. In addition, studies that conducted quantitative or qualitative analysis of bone and soft tissue changes by means of clinical or radiographic follow-up for at least 2 months were also included in the present study.

Studies in animals, case reports, case series, retrospective studies, technique descriptions, and narrative reviews, as well as studies that included the extraction of third molars or the immediate placement of implants, were excluded.

The screening of titles and abstracts for potential inclusion in the review was undertaken by the two reviewers independently. Selected full studies were read carefully and analyzed for the eligibility criteria (inclusion/exclusion) and planned data extraction. Differences between reviewers were resolved by discussion and consensus.

Assessment of heterogeneity

The heterogeneity of the primary results of the studies included in this review was evaluated according to the following factors: study design, follow-up time, number, age, and gender of participants, extraction site, extraction method and intervention, evaluation method, and statistical analysis.

Table 1. Systematic search strategy.

Focus question	What is the effect of autologous platelet concentrates for alveolar socket preservation using autologous plasma concentrates when compared with spontaneous socket healing?
Search strategy	
Population	(1) MeSH terms: extraction socket OR tooth extraction socket OR post-extraction socket OR alveolar socket OR Text words: fresh extraction socket
Intervention	(2) MeSH terms: socket preservation OR extraction socket preservation OR platelet growth factors OR platelet rich plasma OR platelet rich fibrin OR Text words: PRP OR PRF OR L-PRP OR L-PRF OR PRGF
Outcomes	(3) MeSH terms: extraction socket healing OR wound healing OR bone healing OR tissue healing OR dimensional change OR Text words: dimensional changes OR socket dimensional changes
Search combination	1 AND 2 AND 3
Database search	
Language	English
Electronic databases	MEDLINE/PubMed and Cochrane Central Register of Controlled Trials (CENTRAL)
Selection criteria	
Inclusion criteria	• RCTs, CCTs, and prospective cohort studies with a control group • Studies that conducted quantitative or qualitative analysis of bone changes and soft tissues by means of clinical or radiographic follow-up for at least 2 months • Population: partially edentulous humans • No restriction on age or number of patients • Healthy individuals (no systemic diseases) • Intervention: treatment to preserve the extraction socket using autologous plasma concentrates (PRP or PRF) • Comparison: no biomaterial in the control group; only clot in the socket • Outcome: dimensional changes of soft and hard tissues
Exclusion criteria	Studies in animals, case reports, case series, retrospective studies, technique descriptions, and narrative reviews, as well as studies that included the extraction of third molars or the immediate placement of implants

MeSH, medical subject headings; PRP, platelet-rich plasma; PRF, platelet-rich fibrin; L-PRP, leucocyte- and platelet-rich plasma; L-PRF, leucocyte- and platelet-rich fibrin; PRGF, plasma-rich growth factor; RCT, randomized clinical trial; CCT, controlled clinical trial.