



Review

Apprising the diverse facets of Platelet rich fibrin in surgery through a systematic review



S. Nanditha ^{a,*}, ^{1,2}, Balamanikandasrinivasan Chandrasekaran ^{b,2},
Senthilkumar Muthusamy ^a, Kavitha Muthu ^b

^a Academic Unit of Primary and Preventive dentistry, Faculty of Dentistry, AIMST University, Jalan Bedong Semeling, Kedah 08100, Malaysia

^b Academic Unit of Craniofacial Clinical Care, Faculty of Dentistry, AIMST University, Jalan Bedong Semeling, Kedah 08100, Malaysia

H I G H L I G H T S

- Discusses the applications of PRF in Surgery using published data from past 10 years.
- Compares PRF with other platelet concentrates.
- Assesses the effectiveness of PRF in various surgical procedures and broadens the scope for further research.

A R T I C L E I N F O

Article history:

Received 12 May 2017

Received in revised form

7 August 2017

Accepted 16 August 2017

Available online 18 August 2017

Keywords:

Platelet rich fibrin

Applications

Surgery

Healing

Regeneration

A B S T R A C T

Context: Comprehensive reviews on clinical applications of Platelet rich fibrin (PRF) in surgery are limited despite its extensive utilization resulting in a dearth of knowledge on its effectiveness. Hence this article focuses on shedding light to the various applications of PRF pertaining to surgery through a systematic review.

Objective: The systematic review is aimed at evaluating the value of PRF in different areas of surgery.

Data sources: A systematic review of articles sourced from MEDLINE-pubmed (2008–2017(July)) was done. Additional articles were searched through GOOGLE SCHOLAR and SCIENCE DIRECT. Search terms such as Platelet rich fibrin; Platelet rich fibrin, surgery; Platelet concentrate; second generation concentrate; Applications of PRF in surgery were used.

Study selection: Systematic reviews, Randomized control trials, Pilot studies and Case reports were included. Non English articles, in-vitro and animal studies were excluded.

Data extraction: Independent sourcing of articles by 3 authors using a set of predefined criteria.

Data synthesis: Out of the 25 articles covering various surgical procedures that met the inclusion criteria, positive outcomes were noted in most. Although categorization into one specific type of study was not done, the overall success rate with PRF usage was 78%. No differences between test and control groups were observed in 2 studies and 3 studies showed no significant improvements with the usage of PRF.

Limitations: The systematic review did not categorize the study designs while evaluating success rates which might be considered as a shortcoming as case reports were also included.

Conclusions: The future propositions are vast and point towards innovative applications of this bio-material possibly in transplant and burn cases if a method of obtaining large amounts can be devised. However since we rely on evidence-based results, further long term studies are needed in distinct areas of applications to decisively prove its effectiveness.

© 2017 Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd.

* Corresponding author.

E-mail addresses: nandu98402@gmail.com (S. Nanditha), drbalamanikanda@gmail.com (B. Chandrasekaran), drsenthilkumarm@yahoo.com (S. Muthusamy), kavidentist@yahoo.co.in (K. Muthu).

¹ Old no. 8, new no.17, park street, kilpauk garden colony, Chennai –600010, India.

² Authors 1 and 2 have contributed equally to the review.

1. Introduction

1.1. Rationale

Modern innovations made pertaining to clinical research should not only focus towards regeneration of lost tissues but also on

accelerated and comprehensive healing. The new era in clinical research is therefore streamlined towards achieving these objectives through the use of biomaterials that are saturated with benefactors providing wide range of applications. Regeneration involves a complex cascade of events at molecular and genetic levels in which our understanding remains partial/limited [1]. The search for new biomaterials that enhance wound healing brought about the evolution of platelet derived concentrates. The development of a second generation platelet concentrate by Choukroun et al. boasts of all the properties of its earlier generations without the difficulty of using biochemical reagents [2]. Though the scope of platelet rich fibrin (PRF) is significant in the field of surgery, systematic reviews are scarce. Therefore this systematic review focuses on the various applications of PRF in the field of surgery.

1.2. Objectives

- To identify all fields in surgery where PRF has been used as a treatment modality
- To assess the value of PRF either used alone or as an adjunct in various surgical procedures
- To identify areas where usage of PRF has not provided any added advantage or has been equivalent to or below traditional treatment methods

2. Materials and methods

An extensive literature search on clinical applications of PRF in the field of Surgery was done using electronic databases and search engines such as MEDLINE-Pubmed, GOOGLE SCHOLAR AND SCIENCE DIRECT. No restrictions were applied on publication types i.e. research articles, reviews and case reports were all sourced. Limits on age, sex, geographical distribution was not set. In-vitro, animal studies and articles written in languages other than English were excluded from the collection. Additional information was gathered from reference list of articles where relevant. MeSH such as Platelet rich fibrin; Platelet rich fibrin, surgery; Platelet concentrate; second generation concentrate; Applications of PRF in surgery; with Boolean commands such as “AND” “OR” were preferentially used to restrict articles pertaining only to relevant fields [refer Appendix]. Papers were sourced from years 2008–2017(July) using filters.

A set of eligibility criteria was drafted and assessment of articles that fit the criteria, were determined by two reviewers. The reviewers were un-blinded and any disagreement between them was sorted by a consensus amongst all four authors. Any duplication of articles were checked for and removed. The abstracts of all sourced articles and full text of available ones were systematically reviewed. Since all publication types were included some degree of reporting bias may be expected.

3. Results

Details such as number of studies screened, assessed for eligibility, included in the review, and excluded with reasons are depicted in a flow diagram (Fig. 1).

Information that was retrieved from each included study (1) publication type (2) characteristics of the participants such as age, gender, disease type and severity and inclusion criteria (3) surgical procedures performed, comparison between traditional methods vs platelet rich fibrin, platelet rich plasma vs platelet rich fibrin, platelet rich fibrin usage alone.(4) Outcome measures such as pain reduction, accelerated wound healing, reduced post-operative complications such as re-tears in the surgical site and better functional outcomes, motor nerve recovery and bone-tendon healing. Based on this information the reviewers drew their

inferences against each study. A total of 65 articles were sourced, out of which only 25 satisfied the inclusion criteria. All the data were then tabulated sequentially in descending order from the latest to the earliest articles starting from year 2017 until 2008 with notes on study design, description, results and inferences and summarized in Table 1 [3–27].

A wide range of clinical implications of PRF ranging from urethroplasty to skin regenerative therapies have been highlighted with positive outcomes in most except six giving it a 78% success rate. Among them, in two studies, though no significant results were obtained between test and control groups, PRF acted as an effective coverage in distal hypospadias surgery and reduced blood loss [8,18]. The remaining three studies showed no significant improvements [19,21,27]. Articles written in other languages were completely eliminated without being translated probably resulting in publication bias.

4. Discussion

“Good things come in small packages”. Living upto this idiomatic expression are platelets—one of the three major constituents of blood. With a diameter ranging from only 200–500 nm they are packed with growth factors that possess invigorative healing and regenerative potential [2]. They play a crucial role in hemostasis and wound healing which are attributed to the proteins [platelet-derived growth factor (PDGF), transforming growth factor (TGFβ), and insulin-like growth factor (IGF-I) contained within. Possession of these properties made researchers pursue further and develop biomaterials which were collectively named as “platelet derivatives”.

4.1. “The rise of platelet derivatives”

Various biomaterials were quested and tested against time for its competency to achieve accelerated healing. Out of these, platelet derived concentrates have remained unique since their introduction in the 1970's. The history of platelet derivatives dates back with the introduction of fibrin for hemostasis by Bergel [28], a century ago. After a series of transformations, it was reintroduced in the form of fibrin glue in humans in 1974. Fibrin glue formed by polymerizing fibrinogen with thrombin and calcium was commercially made available in 1982 which was subsequently approved by Food and Drug Administration in 1998 [29]. However due to the low concentration of fibrinogen, its stability and quality was compromised [30].

This led to the development of an autologous alternative called platelet rich plasma (PRP). The humble beginnings of PRP started in 1975 with its usage as an adhesive for corneal and nerve repairs [31,32]. The clinical applications of PRP in different and distant clinical areas began in mid - 1980's when commercially available formulations such as the platelet derived wound healing formula (PDWHF) and the activated platelet supernatant CT-102® (Curative Technologies, Setauket, NY), opened an exciting arena for research [33–41]. The wound healing properties of PRP occupied the spotlight for several years until the late 1990's when it was first used for bone regeneration in dentistry by Marx et al., in 1998 [42].

He used PRP with cancellous bone marrow grafts in mandibular reconstruction with a positive outcome [43]. Due to its high concentration of platelets and native fibrinogen it acts as an ideal growth factor delivery system that promotes and modulates tissue healing, regeneration, and cell proliferation [44]. Several studies have been documented revering the regenerative potential of PRP from then on. Despite its several advantages, biochemical handling of blood with cumbersome preparation protocol, the usage of bovine thrombin which has been associated with life threatening

Download English Version:

<https://daneshyari.com/en/article/5732054>

Download Persian Version:

<https://daneshyari.com/article/5732054>

[Daneshyari.com](https://daneshyari.com)