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Non-Surgical Treatment of Gingival Recession by Platelet-Rich Plasma

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ABSTRACT

Background: *Gingival recession is one of the most important esthetic problems of dental patients. Different methods have been used to treat gingival recession and cover the exposed root. Most of these techniques are surgical. Using platelets-rich plasma (PRP) to cover the exposed root is a new non-surgical technique.* ***Objective:*** *This study aimed to assess the soft-tissue healing using platelets-rich plasma (PRP).* ***Methods:*** *Fifty patients were divided into two Groups: Group 1 (Miller Class I) included 195 sites of recession and Group 2 (Miller Class II) with 223 sites of recession. Platelets-rich plasma was injected at the site of recession three times for three months with an interval of one month between each injection. Then the degree of Miller Classification was recorded for each site in each visit.* ***Results:*** *In Group 1 and after the three injections, only 6 sites remained as Miller Class I with a percentage reduction of 96.92% from Miller Class I to zero. In Group 2, only 28 sites became Miller Class zero and 90 sites remained unchanged as Miller Class II with 105 sites became Miller Class I.* ***Conclusions:*** *Gingival recession with Miller Class I and II could be treated non-surgically by the use of platelets-rich plasma. It is safe, less costly, easily prepared and applied without any complications.*

Keywords: PRP, Gingival recession, Platelets, Plasma, Non-surgical

Abbreviations: PRP: Platelets-Rich Plasma; PDGF: Platelet-Derived Growth Factor; PDAF: Platelet-Derived Angiogenesis Factor; PDECG: Platelet-Derived Endothelial Cell Growth Factor; TGF-β: Transforming Growth Factor-beta; IGF: Insulin-like Growth Factor; VEGF: Vascular Endothelial Growth Factor; rpm: Round per Minute; RBCs: Red Blood Cells; HS: Highly Significant

INTRODUCTION

Gingival recession is the exposure of the root surface caused by apical migration of the gingival margin to the cementoenamel junction. The recession could be either localized or generalized [1]. Different causes may be associated with gingival recession such as periodontal disease, aggressive and incorrect tooth brushing, traumatic occlusion or dominant roots [2]. Gingival recession results in functional and esthetic problems as it may increase the incidence of dentinal hypersensitivity, root caries and the loss of periodontal attachment [3]. The esthetic problem that is associated with gingival recession stills the main concern of the dental patients seeking treatments [4].

Surgical modalities have been used to cover the root and treat gingival recession such as subepithelial connective tissue graft [5], free gingival autograft [6], lateral repositioned flap [7], double papilla flap [8], guided tissue regeneration techniques [9], coronally repositioned flap [10] and pinhole surgical technique [11]. In this article, we tried with a more conservative technique by the injection of PRP.

Platelets-rich plasma is a developing adaptable component of regenerative dentistry by providing a concentrated growth-factor cocktail that facilitates healing [12]. In 1998, Marx first reported the applications and the clinical

benefits of using PRP. He stated that "PRP is a volume of autologous plasma that has a platelet concentration above baseline". Platelets-rich plasma has many growth factors such as Platelet-Derived Growth Factor (PDGF), Platelet-Derived Angiogenesis Factor (PDAF), Platelet-Derived Endothelial Cell Growth Factor (PDECG), Transforming Growth Factor-beta (TGF-β), Insulin-like Growth Factor (IGF) and Vascular Endothelial Growth Factor (VEGF) [13]. Supra-physiological doses of growth factor concentration can be reached by centrifugation from whole blood [14]. Platelet-Derived Growth Factor is capable of modulating tissue healing. Previous studies have shown that high levels of PDGF are present in PRP compared to whole blood [15-17]. Some investigators hypothesized that bone healing may be improved by the effects of PRP on cell differentiation and proliferation [18,19]. A study published on the effects of PRP on human gingival fibroblast and periodontal ligament cell behavior suggested that PRP may induce a strong potential for soft-tissue regeneration by a marked increase in gingival fibroblast cell proliferation, migration, the release of growth factors and collagen synthesis [20]. The objective of this study was to assess the enhancement of soft-tissue healing with the use of PRP.

PATIENTS AND METHODS

The study sample was composed of 50 subjects (27 males and 23 females) who were systemically healthy, non-smoker and were seeking treatment for their gum recession mainly for esthetic reasons. All participants were informed about the advantages and disadvantages of PRP and they were free to withdraw at any time. A signed consent was obtained from all patients regarding their agreement to be enrolled in this clinical study. The Ethics Committee of the College of Dentistry, University of Baghdad, has approved this research.

Subjects were divided into two Groups according to Miller's Classification [21].

Group 1- Miller Class I (recession that does not extend to the mucogingival junction): 25 patients with 195 sites of recession.

Group 2- Miller Class II (recession that extends beyond the mucogingival junction with no periodontal attachment loss): 25 patients with 223 sites of recession.

Blood Collection and Preparation of PRP

Four mL of blood was collected in a glass tube with sodium citrate as anti-coagulant. The tubes were gently rocked for eight times back and forth to incorporate the entire blood with anti-coagulant [22]. The tubes were placed in the centrifuge at a balanced position. Two spins were done for the separation of PRP [23]. The first spin was done for five minutes at 3000 rpm to separate the red blood cells (RBCs) from the rest of the total blood. By the use of a micropipette, the entire upper portion was pipetted and moved to another plain tube without anticoagulant. The tube then was left for 10 minutes to rest and then a second centrifugation was done at 3500 rpm for 15 minutes. The second centrifugation was done to split the white blood cells, small number of residual RBCs and platelets from the clear straw yellow fluid. The upper two-third of this fluid was discarded and thrown away to leave the residual fluid. This residual fluid is the PRP.

Platelets-rich plasma injections were done in five points, 0.2 mL in each papilla mesial and distal, 0.1 mL in attached gingiva, submucosal, supraperiosteal in mesiobuccal, buccal and distobuccal. Platelets-rich plasma was injected by using 30-gauge X1/2 disposable insulin needle at the site of recession three times for three months with an interval of one month between each injection and the degree of Miller Classification was recorded for each site in each visit.

RESULTS

In Group 1 and after the first PRP injection, the total number of sites of Miller Class I was reduced from 195 to 145 and 50 sites became Miller Class zero with a percentage decrease of 25.64% from Miller Class I to zero. In the second PRP injection, Miller Class I was reduced to100 sites and the Class zero became 95 with a percentage decrease of 48.72% from Miller Class I to zero. After the third PRP injection, only 6 sites remained as Miller Class I while 189 sites had been improved to Class zero with a percentage reduction of 96.92% from Miller Class I to zero (Tables 1 and 2).

Table 1 Descriptive statistics for Group 1 (Miller Class I)

Miller Class 1		1st PRP		2nd PRP		3rd PRP	
		CL I	CL Zero	CL I	CL Zero	CL I	CL Zero
No. of sites	195	145	50	100	95	6	189
Percentage	100%	74.36%	25.64%	51.28%	48.72%	3.08%	96.92%

Table 2 Percentage decrease from Miller Class I to zero in Group 1

1st Month	0.2564
2nd Month	0.4872
3rd Month	0.9692

In Group 2 and after the first PRP injection, the total number of sites of Miller Class II was reduced from 223 to 160 and 63 sites became Miller Class I with a percentage decrease of 28.25% from Miller Class II to Class I. After the second PRP injection, Miller Class II was reduced to 100 sites and the Class I became 123 with a percentage decrease of 55.16% from Miller Class II to Class I. After the third PRP injection, only 28 sites became Miller Class zero while 90 sites remained unchanged as Miller Class II and 105 sites became Miller Class I with a percentage reduction of 59.64% from Miller Class II to Class I and 14.6% from Miller Class II to Class zero (Tables 3 and 4). Using Chi-square, a high significant difference was found in the change from Class II to Class I and Class I to zero in the two Groups (Table 5).

Table 3 Descriptive statistics for Group 2 (Miller Class II)

Miller Class II		**1st PRP**		**2nd PRP**		**3rd PRP**		
		CL II	**CL I**	**CL II**	**CL I**	**CL II**	**CL I**	**CL Zero**
No. of sites	223	160	63	100	123	90	105	28
Percentage	1	71.75%	28.25%	44.84%	55.16%	40.36%	47.09%	12.56%

Table 4 Percentage decrease of Miller Classes in Group 2

1st PRP	From Miller Class II to Class I	28.25%
2nd PRP	From Miller Class II to Class I	55.16%
3rd PRP	From Miller Class II to Class I	59.64%
	From Miller Class II to Zero	14.60%

Table 5 Chi-square for change in Miller's Classification in both Groups

	Start	**1st month**	**2nd month**	**3rd month**	**Total**
Miller Class II	223	160	100	90	573
Miller Class I	195	145	100	6	446
Total	418	305	200	96	
Chi-square	61.2362				
P-value	<0.001 HS**				
** Highly significant					

DISCUSSION

This study showed the effect of non-surgical treatment of gingival recession for Miller Class I and II by PRP. The function of PRP is to "stimulate cell replication of stem cells for healing, stimulate cell replication of endothelial cells, promote the migration of perivascular healing and modulate the effect of other growth factors [24]. Thus, soft tissue healing was substantially improved through the application of PRP by increasing collagen content, promoting angiogenesis and increasing early wound strength [25]. The change of Class II to Class I and Class I to zero can be due to the growth of soft tissue of attached gingiva which is explained by the proliferation of fibroblast many folds. This is in agreement with many studies that found that PRP significantly increased cell migration of all cell types up to four folds. Furthermore, PRP increased cell proliferation of gingival fibroblast at 3 and 5 days [20].

CONCLUSION

Platelets-rich plasma can be applied in the treatment of some gum recession cases instead of surgery. It is autologous in nature, considered free from cross infection, less costly to the patient, not associated with post-operative pain or complication and it is easy to prepare and apply.

DECLARATIONS

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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