

Comparative Evaluation of Plaque Index in Kirkland Flap with Platelet Rich Fibrin and Kirkland Flap Without Platelet Rich Fibrin in Chronic Periodontitis Patients

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Abstract

Background: Evaluation of plaque index in kirkland flap with platelet rich fibrin and kirkland flap without platelet rich fibrin in chronic periodontitis.

Method: Group-A It was comprised of 10 individuals to which kirkland flap procedure was performed with PRF in chronic periodontitis patients.

Group-B It was comprised of 10 individuals to which Kirkland flap was performed without PRF in chronic periodontitis patients.

Result: There is statistically significant difference present between the mean plaque index at various durations in both the groups ($p < 0.001$).

Keywords; PRF: Platelet rich fibrin, PI; Plaque index, Kirkland flap.

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Introduction

Periodontitis is an infection of periodontium. Whereas, the word 'Perio' means gingiva and other tissues surrounding teeth, 'doesn't' mean tooth and itis means inflammation, so the whole term 'Periodontitis' indicates chronic inflammation of gingiva [1], periodontal ligaments, alveolar bone and dental cementum. According to World Health Organization it is widely spreadable chronic disease around the world. [2] Gingivitis is a reactive condition that is reversible upon the improvement of oral hygiene. Periodontitis is when periodontal condition has progressed beyond gingivitis into a chronic, destructive, irreversible inflammatory disease state. The bacteria

then can penetrate deeper into the tissues and surrounding periodontium. This triggers a host response in an attempt to defend against the bacteria. However, during the process of protecting against the bacteria, the host defences also leads to the destruction of periodontium. Periodontitis leads to loss of attachment of the periodontium, which subsequently progresses to alveolar bone loss, potentially resulting in loss of affected tooth. [3,4,5] The rationale for periodontal therapy is to re-establish and maintain periodontal health and function (Yusof 1987, Caffesse et al. 1995). The traditional approach to treating periodontitis includes an initial non-surgical therapy phase followed by a

surgical phase as necessary. In conventional periodontal therapy the non-surgical phase or the initial phase precedes the surgical phase. Non-surgical therapy involves, and not limited to scaling and root planning combined with oral hygiene instructions and patient motivation.(Lang 1983), which aims at eliminating or reducing putative pathogens and shifting the microbial flora to a more favourable environment to achieve stable periodontal conditions (Rawlinson and Wash 1993).

Aim and Objectives; To evaluate the role of PRF membrane in enhancing the benefits ascribed to it, in the plaque index and compares the same procedure without it in the patients with chronic periodontitis.

Objectives of the Study:

1. To assess the amount of plaque in Kirkland flap with PRF.
2. To assess the amount of plaque in Kirkland flap without PRF.

To compare the plaque index between the Kirkland flap with PRF and Kirkland flap without PRF in chronic periodontitis patients.

Material and Method

Criteria for Patient Selection:

For standardization of sample, patients were selected on the basis of following criteria

Inclusion Criteria:

1. Individuals in the age group of 20 - 60years with chronic periodontitis

2. Probing depth \geq 5mm
3. Clinical attachment loss of \geq 3 mm
4. Ability to attend the hospital at recall intervals

Exclusion Criteria:

1. Subjects taking medication known to affect periodontal conditions.
2. Patients under immunosuppressive therapy
3. Pregnant women and lactating mother
4. History of antibiotic therapy within 6 months prior to the study

Blood was collected in the test tube. The same was centrifuged at 3000 rpm for 10 minutes. The procedure followed for the above was as enumerated by Choukran et al 2006.

After centrifugation, the resultant product was seen in the test tube as below:

1. Top most layer, consisted of straw colored acellular plasma
2. The middle layer consisted of PRF clot.
3. Third layer formed was red colored lower fraction containing red blood cells.

The middle layer of PRF clot was then removed by sterile tweezer and separated from the underlying RBC layer using scissors and then transferred on a sterile dish. After obtaining the PRF was placed within the Kirkland flap.

Result

Table 1: Intragroup comparison of plaque index at various durations

Group	Parameter	Duration	Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	P value
Group I	Plaque index	Baseline	2.2169	10	0.14704	0.04649	1.597690	<0.001**
		7 days	0.6200	10	0.13983	0.04420		
	Plaque index	Baseline	2.2169	10	0.14704	0.04649	1.71700	<0.001**
		14 days	0.5000	10	0.11545	0.03649		
		Baseline	2.2169	10	0.14704	0.04649	2.07699	<0.001**

	Plaque index	1 month	0.139	10	0.0514	0.0161		
	Plaque index	Baseline	2.2169	10	0.14704	0.04649	2.09696	<0.001**
		2 months	0.119	10	0.0420	0.0132		
Group II	Plaque index	Baseline	2.2169	10	0.14704	0.04649	1.4998	<0.001**
		7 days	0.7258	10	0.14482	0.04579		
	Plaque index	Baseline	2.2169	10	0.14704	0.04649	1.51100	<0.001**
		14 days	0.7057	10	0.13132	0.04152		
	Plaque index	Baseline	2.2169	10	0.14704	0.04649	1.60699	<0.001**
		1 month	0.609	10	0.1285	0.0405		
Plaque index	Baseline	2.2169	10	0.14704	0.04649	1.79699	<0.001**	
	2 months	0.419	10	0.1397	0.0440			

** - Highly significant ($p < 0.001$)

There is statistically significant difference present between the mean plaque index at various durations in both the groups ($p < 0.001$)

Table 2: Intergroup comparison of mean plaque index at various durations

Duration	N	Group I		Group II		Mean Difference	P value
		Mean	SD	Mean	SD		
Baseline	10	2.23	0.16	2.23	0.16	0.000	1 NS
7 Days	10	0.64	0.15	0.74	0.15	-0.106	0.113 NS
14 days	10	0.51	0.13	0.72	0.14	-0.206	0.002*
1 month	10	0.15	0.06	0.62	0.14	-0.470	<0.001**
2 months	10	0.13	0.05	0.43	0.15	-0.300	<0.001**

*Statistically significant ($p < 0.05$), NS- Not significant ($p > 0.05$)

Inference:

There is no statistically significant difference present in the Plaque index values at Baseline and 7 days when compared between both groups ($p > 0.05$), there is statistically significant difference present in the plaque index values at 14 days, 1 month & 2 months in both groups ($p < 0.05$) with lower values in group I

Discussion

Nonsurgical periodontal therapy includes plaque control, supra- and sub-gingival scaling, root planning, and the adjunctive use of chemotherapeutic agents. [6] Surgical therapy based upon the management of papilla includes "conventional flap and papilla preservation flap". Conventional flaps includes modified Widman flap, [7] the apically displaced flap and flap for regenerative procedures.

Furthermore, different treatment techniques have been used including subgingival curettage, gingivectomy, Kirkland flap and full- or split-thickness flap procedures with or without osseous recontouring. The best surgical approach remains controversial. [8] The main goal of periodontal surgery is to gain access to the root surface for adequate debridement and to establish gingival contours that are optimal for the patients self-performed plaque control. [9] Kirkland flap addresses the above two requisites satisfactorily. [10]

In present study, plaque index was detected among two groups with and without prf membrane in Kirkland flap surgery. Periodontal regeneration requires a multi dependent orchestrated sequence of biological events, including cell adhesion, migration, proliferation and differentiation. Platelet rich fibrin membrane was first

prepared by Dr. Choukroun in France in 2001 to promote wound healing in implant. Platelet rich fibrin is a fibrin matrix in which platelet cytokines, growth factors and cells are trapped and may be released after a certain time and that can serve as a resorbable membrane. [11] Growth factors are released after activation from the platelets trapped within fibrin matrix, and have been shown to stimulate the mitogenic response in the periosteum for bone repair during normal wound healing. [12] PRF also releases growth factors such as platelet-derived growth factor and transforming growth factor which promote periodontal regeneration. [13] Many studies in past reported that PRF can promote the healing of osseous defects. [14] As per Chang et al. it promotes the expression of phosphorylated extracellular signal-regulated protein kinase (p-ERK) and stimulates the production of osteoprotegerin (OPG) which causes proliferation of osteoblasts. [15] Huang et al. reported that it stimulates the osteogenic differentiation of the human dental pulp cells by up-regulating osteoprotegerin and alkaline phosphatase expression. It also releases growth factors such as PDGF and TGF which promote periodontal regeneration. [16] Chang et al reported that it stimulates cell proliferation in a specific manner. [17] Further Tsai et al. related the regenerative abilities of PRF to the growth factors released by the platelets entrapped within, such as PDGF and TGF in an *in vitro* study. These factors can promote periodontal regeneration by stimulating specific cell differentiation and proliferation in a specific manner. [18] PRF as bioactive surgical additive has been used to regulate inflammation and increase the speed of healing process. [19] Its matrix carries all the favourable constituents of blood that is why this biomaterial can be considered a physiologic concentrate. In plastic surgery fibrin glues are still used for their capacities to prevent formation of keloid scars. [20]

Present study showed a statistically highly significant reduction in intragroup comparison of mean plaque index in test group and controls at baseline, 7th day, 14th day, 1 month and 2 months. There is no statistically significant difference present in the Plaque index values at Baseline and 7 days when compared between both groups ($p > 0.05$), there is statistically significant difference present in the plaque index values at 14 days, 1 month & 2 months in both groups ($p < 0.05$) with lower values in group I

Conclusion

Currently platelet rich fibrin seems to be an accepted minimally invasive technique with low risks and satisfactory clinical results. PRF belongs to new generation of platelet concentrates with new possibilities for enhanced healing and functional recovery.

References

1. Preshaw PM, Bissett SM. Periodontitis; Oral complication of diabetes. *Endocrine Metab clin N Am.* 2013;42(4);849-67
2. Chapple ILC, Mealey BL, Dyke TEV, Bartold PM. *J Clin Periodontol.* 2018; 45(S20);24-9.
3. Philstrom BL, Michalowicz BS, Johnson NW. Periodontal diseases. *Lancet.* 2005 Nov 19;366(9499);1809-20
4. Kinane DF, Stathopoulos PG, Papananou PN. Periodontal diseases. *Nat Rev Dis Primers.* 2017 Jun 22;3; 17038
5. Highfield J. Diagnosis and classification of periodontal disease. *Aust Dent J.* 2009 Sep;54 Suppl 1; S11-26.
6. Shruthi Nambiar, Vijay Kumar Chava, Ramesh Reddy B.V, Surgical and Non-Surgical Treatment of Chronic Periodontal Disease. *Annals and Essences of Dentistry.* Vol. VIII. Issue 2 Apr–Jun 20161b.
7. Sander L, Karring T. Healing of periodontal lesions in monkeys

- following the guided tissue regeneration procedure. A histological study. *J Clin Periodontol*. 1995;22:332-337.
8. Heitz-Mayfield LJ, Lang NP. Surgical and nonsurgical periodontal therapy. Learned and unlearned concepts. *Periodontol*. 2000. 2013 Jun; 62(1):2.
 9. Shruthi Nambiar, Vijay Kumar Chava, Ramesh Reddy B.V, surgical and non-surgical treatment of chronic periodontal disease. *Annals and Essences of Dentistry*. Vol. VIII. Issue 2 Apr–Jun 20161b.
 10. Kirkland O. The suppurative periodontal pus pocket; its treatment by the modified flap operation. *Journal of the American Dental Association*. 1931; 18: 1462–1470.
 11. Dohan Ehrenfest DM, dePeppo GM, Doglioli P, Sammartino G. Slow release of growth factors and thrombospondin-1 in Choukroun's platelet-rich fibrin (PRF): a gold standard to achieve for all surgical platelet concentrates technologies. *Growth Factors*. 2009; 27(1): 63–9.
 12. Passaretti F, Tia M, D'esposito V, Pascale MD, Corso MD, Sepulveres R, et al. Growth-promoting action and growth factor release by different platelet derivatives. *Platelets*. 2014;25 (4):252–6.
 13. Hom DB, Linzie BM, Huang TC. The healing effects of autologous platelet gel on acute human skin wounds. *Arch Facial Plast Surg*. 2007; 9:174-83.
 14. Gupta V, Bains VK, Singh GP, Mathur A, Bains R. Regenerative Potential of Platelet Rich Fibrin In Dentistry: Literature Review. *Asian J Oral Health Allied Sci*. 2011; 1(1):22-288
 15. Kanakamedala A, Ari G, Sudhakar U, Rajaram Vijayalakshmi, Ramakrishnan T, Emmad P. Treatment of a furcation defect with a combination of platelet-rich fibrin (PRF) and bone graft – a case report. *ENDO (Lond Engl)*. 2009; 3(2):127–135.
 16. Chandran P, Sivadas A. Platelet-rich fibrin: Its role in periodontal regeneration. *King Saud University Journal of Dental Sciences*. 2013.
 17. Heitz-Mayfield LJA, Trombelli L, Heitz F, Needleman I, Moles D. A systematic review of the effect of surgical debridement vs. non-surgical debridement for the treatment of chronic periodontitis. *J Clin Periodontol*. 2002;29:92–10.
 18. Chang IC, Tsai CH, Chang YC. Platelet-rich fibrin modulates the expression of extracellular signal-regulated protein kinase and osteoprotegerin in human osteoblasts. *J Biomed Mater Res A*. 2010; 95:327–32.
 19. Forum S, Cho SC, Rosenberg E, Rohrer M, Tarnow D. Histological comparison of healing extraction sockets implanted with bioactive glass or demineralized freeze-dried bone allograft; A pilot study. *J periodontal*. 2002;73:94-102.
 20. Shantipriya Reddy, Prasad M.G.S, Savita Singh, Krishnanand. P, Nirjhar Bhowmik, Ashwini. N. Enhancing palatal wound healing by using platelet rich fibrin membrane as fibrin bandage. 2015; 1(4): 02-04.