EFFECT OF TYPE II AUTOLOGOUS PLATELET CONCENTRATES ON CLINICAL OUTCOMES OF ROOT COVERAGE PROCEDURES : A SYSTEMATIC REVIEW

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ABSTRACT Aim and Objectives : The aim of this systematic review is to evaluate the effects of type II autologous platelet concentrates on the outcomes of clinical treatments in patients with gingival recession. **Materials and Method :** Interventional studies and Randomized controlled trials were included. Case reports, in vitro studies,animal studies and publications in language other than English were excluded. **Results:** Fouteen articles were analysed thoroughly which revealed statistically significant increase in percentage root coverage when PRF was used.It also resulted in improvements of CAL,KTW,GTT . **Conclusions:** Being autologous PRF was more comfortable ,cost effective for the patient .Rate of healing was also enhanced. From this systematic review it can be concluded that PRF is an excellent material for treatment of recession defects.

INTRODUCTION : Gingival recession (GR) in addition to cosmetic problems, may lead to tooth sensitivity, difficulties in maintaining oral hygiene, root caries, and loss of palatal support.1Etiological factors included are bone dehiscences , gingival quality and quantity , frenal pull , traumatic tooth brushing ,and malpositioned tooth.2-4A recent innovation in dentistry is the use of second -generation platelet concentrate which is a readily available, inexpensive autologous platelet - rich fibrin (PRF) gel with growth factors and cicatricial properties for root coverage procedures.5 In contrast to platelet-rich plasma (PRP), preparation of PRF is simpler ,faster and does not require anticoagulants.6 PRF is a fibrin-rich gel produced from the venous blood by single centrifugation pioneered in France by Choukroun et al.7 The aim of this systematic review is to evaluate the effects of PRF on the outcomes of the clinical treatments of patients with gingival recession.
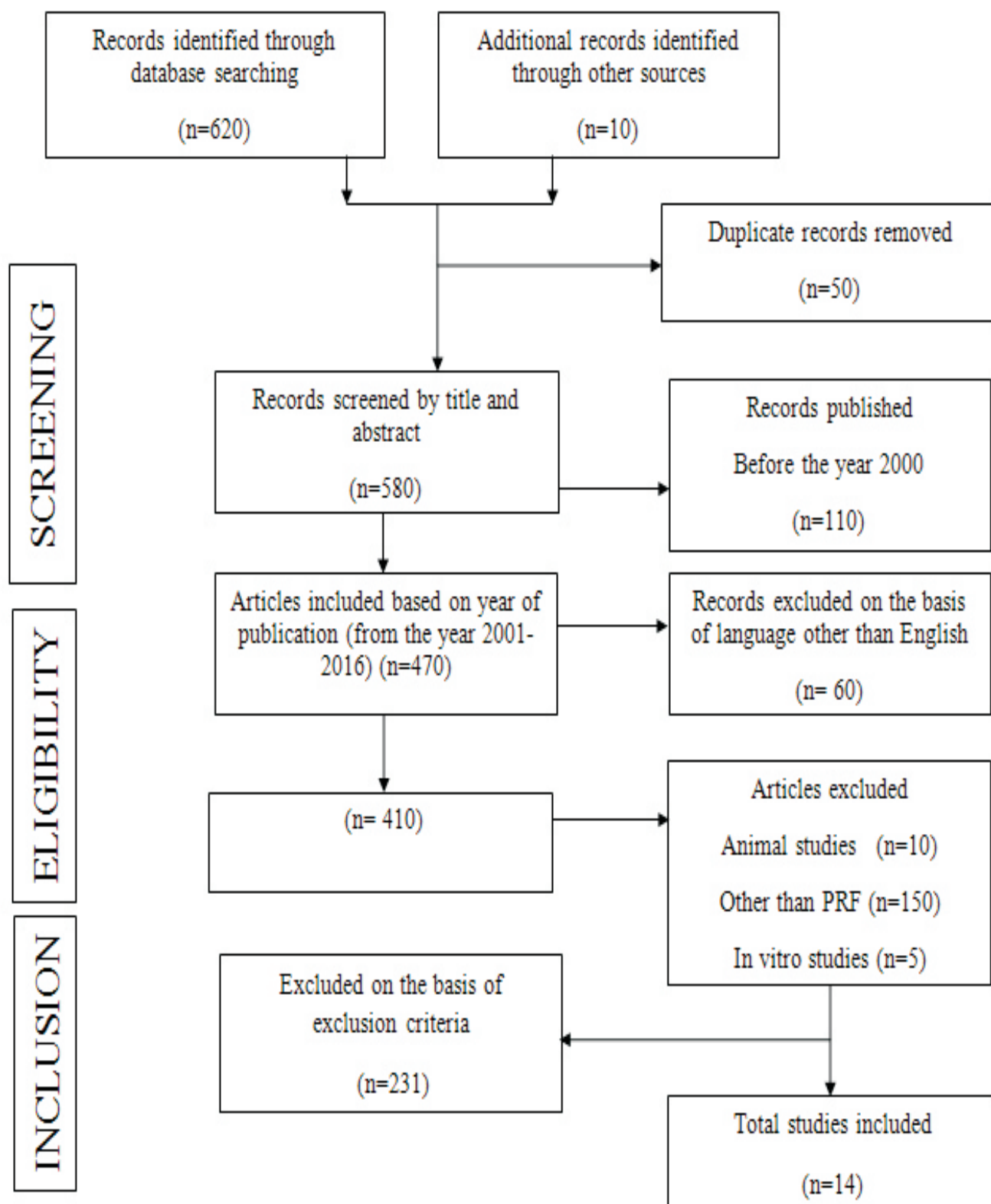
Method : To enhance the quality and research transparency, the methodology adhered to the PRISMA guidelines(Preferred Reporting Items for Systematic Reviews and Meta-Analyses).Electronic database search of Pubmed, Medline, Google Scholar and   Scopus was performed using MeSH terms(Medical Subject Headings).Articles published between year 2000-2016 were reviwed .Interventional studies and randomied controlled trials were included .The primary outcome variable measuredwas the change in percentage of root coverage (RC).

RESULTS: A systematic review methodology was followed and database searching was done which yielded 620 records . Additional hand searching yielded 10 more records. Records from year 2000-2016 were taken into consideration. Finally total studies to be systematically reviewed came out to be 14.The analysis of these articles revealed statistically significant increase in percentage root coverage when PRF was used.It   also resulted in improvements of CAL,KTW,GTT .Being autologous it was more comfortable ,cost effective   for   the patient.Rate of healing was also enhanced . PRF technique as compared to SCTG has the

bonus advantage of being more comfortable during the post operative period.

FIGURE 1 Flow diagram (PRISMA format) of the screening and selection process (Original)

Study Design researchers and year	Sample size	Mean Age (years)	Interventions	Parameters evaluated	Primary outcome (mean values) Root coverage	Secondary outcome (mean values)	Inference
1) Rajaram , et al.[10] 2015	**Subjects** (20) **Sites** (40)	20-45	DLSBF PRF+DLSBF	RW RD KTW CAL PD	**DLSBF group:** 80%+29.1% **PRF+DLSBF group:** 78.8%+37.6%	**CAL(mm)** Baseline **DLSBF group :** 6.00+0.973 **PRF+DLSBF group:** 5.95+1.146 At 24 weeks **DLSBF group:** 1.45+2.038 **PRF+DLSBF group:** 1.15+1.899 **KTW** (mm) Baseline **DLSBF group:** 1.70+0.657 **PRF+DLSBF group:** 1.60+0.821 At 24 weeks **DLSBFgroup** 4.80+1.105 **PRF+DLSBF group** 4.90+0.553	Addition of PRF to DLSBF gives no additional benefits to clinical parameters measured in root coverage
2) Gupta, et al.[11] 2015	**Subjects** (26) 16 M 10 F **Sites** (30)	20-50 (37.17+8 .81)	**Test group** : CAF +PRF (15 sites) **Control group:** CAF alone (15 sites)	PD RD CAL KTW GTT	**Test group:** 91.00 + 19.98% **Control group:** 86.60 + 23.83%	**CAL(mm)** Baseline -3 months **Test group :** 3.33+0.72 **Control group:** 2.60+0.83 Baseline -6 months **Test group** 3.27+0.80 **Control group** 2.47+0.74 **GTT(mm)** Baseline -3 months **Test group:** -0.05+0.04 **Control group:** -0.03+0.05 Baseline -6 months **Test group:** -0.07+0.03 **Control group:** -0.04+0.05 **KTW (mm)** Baseline -3 months **Test group:** -0.93+0.46 **Control group** : -1.07+0.26 Baseline -6 months **Test group** -1.60+0.63 **Control group** -1.40+0.51	PRF +CAF did not provide any added advantage in terms of recession coverage.
3)Thamaraiselvan, et al.[12] 2015	**Subjects** (20) 18 M 2 F **Sites** (20)	21-47	**Test group:** CAF+PRF **Control group:** CAF	RD RW PD CAL KTW GTT PI GI	**Test group**+ 74.16 + 28.98% **Control group:** 65.00 + 44.47%	**CAL(mm)** At baseline **Test group:** 3.70+0.82 **Control group:** 3.50+0.97 At 6 months **Test group** 2.50+1.17 **Control group** 1.80+0.91 **GTT (mm)** At baseline **Test group** 0.95+0.14 **Control group** 0.93+0.18 At 6 months **Test group** -0.30+0.10 **Control group** 0.03+0.04 **KTW (mm)** At baseline **Test group:** 2.30+0.82 **Control group:** 2.40+0.69 At 6 months **Test group** -0.40+0.69 **Control group** -0.40+0.69	PRF +CAF did not provide any added advantage in terms of root coverage except for an increase in GTT.
4) Padma , et al.[13] 2013	**Subjects** 15 **Sites** 30	18-35	**Test group:** CAF +PRF **Control group:** CAF	RD CAL KTW	1 month **Test group:** 34.58 %+15.84% **Control group:** 31.15%+20.53% 3month **Test group:** 70.73%+21.24% **Control group:** 61.46%+19.56% 6month **Test group:** 100.00%+0.00% **Control group:** 68.44%+17.42%	**CAL(mm)** At baseline **Test group:** 4.75+1.29 **Control group:** 4.69+1.25 6 months **Test group:** 1.00+0.00 **Control group:** 2.00+0.89 **KTW(mm)** At baseline **Test group:** 2.94+0.77 **Control group:** 2.44+0.81 6month **Test group:** 5.38+1.67 **Control group:** 4.63+0.81	CAF is a predictable treatment option for isolated Miller's Class I and II recession defects. Addition of PRF membrane with CAF provides superior root coverage with additional benefits of gain in CAL and KTW at 6 months postoperatively.

| **5)** Aroca S, Keglevich T, Barbieri B, Gera Istvan, Etienne D.[14] 2009 | **Subjects** (20) 5M 15 F **Sites** 67 | 22-47 (31.7) | **Test group:** MCAF+PRF **Control group:** MCAF alone | PD RW CAL KTW GTT | 1 month **Test group:** 81.0% ± 16.6% **Control group:** 86.7% ± 16.6% 3month **Test group:** 76.1% ± 17.7% **Control group:** 88.2% ± 16.9% **6 month**: **Test group:** 80.7% ± 14.7% **Control group:** 91.5 % ± 11.4% | **CAL(mm)** Baseline **Test group :** 4.23±1.56 **Control group:** 3.93±1.43 6 months **Test group:** 1.76±0.97 **Control group:** 1.37±0.62 **GTT(mm)** At Baseline **Test group:** 1.1±0.4 **Control group:** 1.1±0.3 6 months **Test group:** 1.4±0.5 **Control group:** 1.1±0.3 **KTW(mm)** At Baseline **Test group:** 2.78±1.08 **Control group:** 2.85±1.23 6 months **Test group** 2.54±0.85 **Control group** 2.37±0.89 | Addition of PRF membrane positioned under MCAF provided inferior root coverage but an additional gain in GTT at 6months compared to conventional therapy. |

CAF- Coronally Advanced Flap, PRF-Platelet Rich Fibrin, PD- Probing depth, RD Recession depth, CAL-Clinical attachment loss ,RW-Recession width, ,KTW-Keratinized tissue width, GTT-Gingival/mucosal thickness, PI-Plaque index ,GI-Gingival index, MCAF-Modified Coronally Advanced Flap ,DLSBF- Double Lateral Sliding Bridge Flap

Table 2 Interventions with Platelet concentrate compared to accepted treatment protocol

Study Design researchers and year	Sample size	Mean Age (years)	Interventions	Parameters evaluated	Primary outcome (Mean values) Root coverage	Secondary outcome (Mean values)	Inference
1) Oncu E.[15] 2017	**Subjects** (20) 9M 11F **Sites** 60	20-60 (40)	**Test group:** PRF+MCAF (30 sites) **Control group:** MCAF+SCTG (30 sites)	RD KTW PD CAL GT	**Test group:** 77.12% **Control group:** 84%	**CAL(mm)** Baseline **Test group:** 5.37±1.07 **Control group:** 5.53±1.07 Post operative **Test group:** 2.07±1.17 **Control group:** 1.77±0.97 **KTW(mm)** Baseline **Test group:** 2.70±0.70 **Control group:** 2.60±0.77 Postoperative **Test group:** 3.80±0.93 **Control group:** 4.33±0.88 **GTT(mm)** Baseline **Test group:** 0.69±0.21 **Control group:** 0.69±0.23 Postoperative **Test group:** 0.99±0.2 **Control group:** 0.85±0.21	It was concluded that MCAF +PRF as well as MCAF +SCTG could be successfully used for treatment of localized gingival recessions with PRF technique being more comfortable during postoperative period
2)Agarwal ,et al.[16] 2016	**Subjects** (30) 22 M 8 F **Sites** 45	Above 18 years	**Experimental group I :** CAF +PRF (15 sites) **Experimental group II :** CAF+AM (15 sites) **Control group:** CAF alone (15 sites)	VGR HGR GT	**Experimental group I:** 33% sites **Experimental group II:** 26.6%sites **Control group**:13.3%	**CAL(mm)** Baseline **Experimental group I:** 4.33±1.63 **Experimental group II:** 3.67±1.11 **Control group:** 4.13±1.19 At 6 month **Experimental group I :** 2.87±1.88 **Experimental group II:** 2.47±1.36 **Control group:** 3.27±1.22 **AG (mm)** Baseline **Experimental group I:** 1.73±0.96 **Experimental group II:** 2.20±1.37 **Control group:** 2.00±0.85 At 6 months **Experimental group I:** 3.20±1.32 **Experimental group II:** 3.33±1.45 **Control group:**2.93±0.80 **KTW (mm)** Baseline **Experimental group I :** 3.60±1.12 **Experimental group II:** 3.67±0.98 **Control group:** 4.40±0.91 At 6 months **Experimental group I:** 4.80±1.66 **Experimental group II:** 4.60±1.56 **Control group:** 5.27±0.96 **GTT USG (mm)** Baseline **Experimental group I:** 0.60±0.10 **Experimental group II :** 0.55±0.09 **Control group:** 0.59±0.24 At 6 months **Experimental group I:** 0.76±1.6 **Experimental group II :** 0.61±0.08 **Control group:** 0.59±0.18 **GTT TGP(mm)** Baseline **Experimental group I:** 0.72±0.09 **Experimental group II :** 0.81±0.09 **Control group :** 0.72±0.12 At 6 months **Experimental group I:** 0.79±0.12 **Experimental group II:** 0.82±0.11 **Control group:** 0.71±0.12	Enhancement in root coverage seen with PRF or AM usage in conjunction with CAF when compared to CAF alone

3)Chenchev Iv, Atanasov D , VichevaD, Noncheva V. [17] 2016	**Subjects** (30) 7 M 23 F **Sites** 118	23 – 70 (37.93)	**Test group:** CAF+PRF **Control group:** CAF+CTG	Postoperative pain Teeth sensitivity Aesthetic	**Test group:** 80.48%±10.19% **Control group:** 90.29%±9.05%	Aesthetic (cm) **Test group :** 8.37±1.19cm **Control group:** 9.03±1.0cm	**Aesthetic :** Control group showed better results with a statistically significant difference in comparison to the test group results
4) Tunali M, Özdemir H, Arabaci T, Pikdöken M L.[18] 2015	**Subjects** (10) 4M 6F **Sites** 44	25-52 (34.2)	**Test group :** L-PRF (22 sites) **Control group :** CTG (22 sites)	GR PD CAL KTW	At 6 months **Test group:** 74.61% **Control group:** 74.13% At 12 months **Test group:** 76.63% **Control groups :** 77.36%	**CAL(mm)** Baseline Test group:5.03±1.94 Control group:5.20±1.49 At 12 months Test group:2.33±0.90 Control group:2.16±0.79 **KTW(mm)** Baseline Test group:2.33±0.56 Control group:2.43±0.52 At 12 monthsTest group: 2.86±0.69 Control group:3.03±0.74	Suggested that L-PRF membrane may be used as an alternative graft material for treatment of multiple adjacent gingival recessions greater than 3 mm in size without any requirement for additional surgery
5) Keceli HG, Kamak G, Erdemir EO, Evginer MS, Dolgun A.[19] 2015	**Subjects** (40) 13 M 27 F **Sites** 40	22-50 (40.72±7.18)	**Test group:** CAF + CTG + PRF **Control group:** CAF + CTG	PI GI VGR GTT PD CAL KTW HGR MGJL TT RC CRC AG KTC	**Test group:** 89.6% **Control group:** 79.9%	**CAL(mm)** Baseline Test group:4.45±0.60 Control group:4.20±0.47 At 6 months Test group : 1.35±0.52 Control group:1.70±0.66 **KTW(mm)** Baseline Test group:3.25±1.17 Control group :2.85±1.03 At 6 months Test group: 4.43±1.48 Control group:3.63±1.37 **GTT(mm)** Baseline Test group:0.85±0.33 Control group:0.83±0.31 At 6 months Test group: 1.96±0.34 Control group:1.55±0.37	The addition of PRF did not lead to improvement of the outcomes of CAF + CTG treatment except increasing the TT
6) Uraz, et al.[20] 2015	**Subjects** (15) 9 M 6 F **Sites** 106	23-48 (33.7±7.12)	**Test Group:** CAF +PRF-M **Control Group:** (CAF) + (e-MCTG)	RD RW PD CAL KTW GI PI	**Test group:** 95% **Control group:** 96.1%	**CAL(mm)** Baseline Test group : 6.27±1.27 Control group: 4.40±0.86 At 6 months Test group: 2.48±1.41 Control group: 1.18±0.35 **KTW(mm)** Baseline Test group: 3.45±1.05 Control group: 3.93±0.72 At 6 months Test group: 4.63±0.86 Control group: 5.11±0.76	Use of PRF allowed the treatment of MARD with adequate wound healing and highly predictable root coverage
7) Eren G, Atilla G.[21] 2014	**Subjects** (22) **Sites** 44		**Test Group:** CAF+? PRF **Control Group:** CAF +SCTG	RD RW KTW RA PD CAL GT PI GI	**Test group :** 92.7 % **Control group:** 94.2%	**CAL(mm)** Baseline Test group: 3.75±0.70 Control group: 3.68±0.73 At 6 months Test group: 1.32±0.55 Control group: 1.59±0.65 **KTW(mm)** Baseline Test group: 2.58±1.37 Control group: 2.41±1.20 At 6 months Test group: 3.51±1.28 Control group: 3.63±1.43 **GTT(mm)** Baseline Test group: ±0.81 Control group: ±0.23 At 6 months Test group: 1.59±0.53 Control group: 1.68±0.57	It can be concluded that localized gingival recessions could be successfully treated with CAF? +? PRF as well as CAF? +? SCTG. PRF might be suggested as an alternative to SCTG for the treating localized recessions.
8) Jankovic S, Klokkevold P, Dmitrijevic B, Kenney E B, CamargoP.[22] 2012	**Subjects** (15) 5M 10F **Sites** 30	19-47years	**Test group:** CAF+PRF **Control group:** CAF+CTG	VRD CAL PD KTW	**Test group:** 75.85% **Control group:** 79.56%	**CAL(mm)** Baseline Test group: 4.35±0.67 Control group: 4.31±0.61 At 6 months Test group: 1.48±0.40 Control group: 1.35±0.38 **KTW(mm)** Baseline Test group: 1.32±0.66 Control group: 1.41±0.58 At 6 months Test group: 2.20±0.54 Control group : 2.85±0.45	CTG is a highly effective treatment option for root coverage A high level of observed clinical parameter equivalence between CTG and PRF groups powerfully supports the clinical use of PRF
9)Jankovic S, Aleksic Z, Milinkovic I, DimitrijevicB.[23] 2010	**Subjects** (20) 8M 12F **Sites** (40)	21-48 years	CAF+PRF CAF+EMD	GR KTW PD	**CAF+PRF:** 72.1±9.55% **CAF+EMD:** 70.5±11.76%	**KTW(mm)** Baseline **PRF group:** 1.45±0.86 **EMD group:** 1.30±0.56 At 12 months **PRF group:** 1.62±0.28 **EMD group:** 1.90±0.81	The study did not succeed in demonstrating any clinical benefit of PRF compared to EMD in the coverage of gingival recession with the CAF procedure. The EMD group showed a higher success rate in increasing KTW than the PRF group

AM-Amniotic Membrane, VGR-Vertical gingival recession, HGR-Horizontal gingival recession, AG- Width of attached gingiva ,GTT TGP-Gingival Tissue Thickness Transgingival probing, GTT USG - Gingival Tissue Thickness Ultrasonography , CTG - Connective tissue graft, L PRF-Leukocyte and Platelet Rich Fibrin ,MGJL - Mucogingival Junction location, RC-Root coverage ,CRC-Complete root coverage, AG-Attachment gain, KTC-Keratinized tissue change, TT- Tissue thickness, e MCTG-mesh connective tissue graft ,MARD- multiple adjacent recession-type defects, VRD-Vertical recession depth ,EMD-Enamel Matrix Derivative,GR-Gingival recession, MCAF-Modified Coronally Advanced Flap

DISCUSSION: This systematic review analysed effect of Type II autologous platelet concentrate (PRF) on clinical outcome of root coverage procedures. Among other parameters evaluated were GTT, CAL ,KTW, PI ,GI, Pain intensity and patient comfort.

The connective tissue attachment achieved by CAF is not stable over long periods . Various adjunctive agents have been used to promote healing and to further enhance the clinical outcomes.[8]These include the use of root biomodification agents ,CTG ,barrier membranes, EMD, ADM ,PRP ,living tissue engineered human fibroblast derived dermal substitute and PRF .[9]

One study [10] was conducted comparing Double sliding bridge flap with PRF and Double sliding bridge flap alone.

According to Table I (1)[10] Root coverage achieved in patients with Double lateral sliding bridge flap alone was 80% +29.1% and 78.8%+37.6% in Double lateral sliding bridge flap with PRF group with no statistically significant difference (p value 0.05).[10]

CAL (in mm) was 6.00+0.973 at baseline and 1.45+2.038 at 6 months in patients treated with DLSBF group and for PRF +DLSBF treated patients CAL at baseline was 5.95+1.146 and after 6 months it was 1.15+1.899. [10]

Width of keratinized tissue (in mm) was measured at baseline and after 6 months. At baseline KTW for DLSBF group was 1.70+0.657 and 4.80+1.105 at 6 months. For PRF+DLSBF group value of KTW at baseline was 1.60+0.821 and after 6 months it was 4.90+0.553.[10]

4 studies [11-14]comparing CAF with PRF and CAF alone were analysed.

According to Table I (2)[11] CAF with PRF (test group) showed a mean percentage root coverage of 91.00+19.98% while CAF alone (control group) showed a root coverage of 86.60+23.83% .[11]The difference was found to be non significant (p value = 0.59).[11] In another study [12] a root coverage of 74.16+28.98% in CAF +PRF (test group) and 65.00+44.47% in CAF alone (control group) was recorded with no statistically significant difference between them (p value 0.05) .[12]A similar study [13] reported a root coverage of 100.00+0.00% in CAF + PRF (test group) and 68.44+17.42% in patients treated with CAF alone (control group).Differences between control and test group were statistically significant (p value = 0.001).[13] MCAF +PRF (test group)showed a root coverage 80.7+14.7% at 6 months while MCAF alone (control group) resulted in root coverage of 91.5+11.4% at 6 months.[14]Differences between the two groups were statistically significant (p value =0.0039).[14]

A CAL of 3.27 +0.80 in test group while 2.47+0.74 in control group was recorded at 6 months .[11] CAL in test group was 3.70+0.82 at baseline and 2.50+1.17 at 6 months while in control group it was 3.50+0.97 at baseline and 1.80+0.91 at 6 months.[12]At baseline CAL was 4.75+1.29 , after 6 months 1.00+0.00 in test group and 4.69+1.25 at baseline, and 2.00+0.89 at 6 months .[13] CAL at baseline was 4.23+1.56,at 6 months 1.76+0.97 in test group , 3.93+1.43 at baseline ,1.37+0.62 at 6 months in control group.[14]

GTT(in mm) was -0.07 +0.03 in test group and -0.04+0.05 in control group at 6 months.[11] GTT at baseline was 0.95 +0.14, -0.30+0.10 at 6 months in test group and at baseline 0.93+0.18, and 0.03+0.04 at 6months in control group.[12] In another study,[14] GTT was 1.1+0.4 and 1.4+0.5 at baseline and at 6 months in test group and 1.1+0.3 and 1.1+0.3 at baseline and 6 months in control group.[14]

Width of keratinized tissue (in mm) at 6 months was -1.60+0.63 in test group and -1.04+0.51 in control group.[11]KTW in test group was 2.30 +0.82 at baseline,-0.40+0.69 at 6 months and in control group it was 2.40+0.69 at baseline and -0.40+0.69 at 6 months.[12]At baseline KTW for test group was 2.94+0.77 and 5.38+1.67 at 6 months and in case of control group it was 2.44+0.81 at baseline and 4.63+0.81 at 6 months. [13] Value of KTW recorded at baseline was 2.78+1.08 , 2.54+0.85 at 6 months for test group and for control group it was 2.85+1.23 at baseline and at 6 months it was 2.37+0.89.[14]

Two studies [15,21]comparing MCAF and SCTG were recorded. According to TableII (1).[15]Root coverage achieved was 77.12 % for test group (PRF +MCAF) and 84 % for control group (MCAF +SCTG)[15](P value=0.007)which is statistically significant.[15] In another study[21],root coverage

of 92.7% was achieved in group treated with CAF +PRF (test group) and 94.2% in group treated with CAF +SCTG(control group) ,(p value   0.05).21

CAL values (in mm) of 5.37 +1.07 ,2.07 +1.17 for test group at baseline and post surgery were recorded.For control group values   were 5.53 +1.07 and 1.77 +0.97   at baseline and postoperatively.15 In other study21 CAL values were 3.75 +0.70 ,1.32 +0.55 at baseline ,6 months for test group and 3.68 +0.73 ,1.59 +0.65 at baseline ,6 months for control group.21

KTW values   were 2.70 + 0.70   at baseline ,3.80 +0.93 postoperatively for test group and 2.60+0.77 at baseline ,4.33 +0.88 postoperatively for control group .15Values of 2.58 +1.37 and 3.51 +1.28 were recorded at baseline and after 6 months for test group. Control group showed KTW values of 2.41 +1.20   at baseline and 3.63 +1.43 after 6 months.21

Test group gave value of 0.69 +0.21 and 0.99+0.2 of GTT (in mm) at baseline and postoperatively .For control group values were 0.69 +0.23 at baseline and 0.85 +0.21 postoperatively.15GTT values for test group at baseline and after 6 months were +0.81 and 1.59 +0.53.For control group values of   + 0.23 and 1.68 +0.57   at baseline and after 6 months were recorded.21

One study 16 was evaluated which compared PRF with amniotic membrane .According to Table II (2) 16 ,patients were grouped into group I (CAF +PRF) , group II (CAF +AM) and control group (CAF alone).Root coverage achieved in group I, group II and group III   was 33%,26.6% and 13.3% respectively.16 There were statistically greater increase in root coverage in group I compared to group II and group III.16

Value of CAL(in mm) was 4.33+1.63   and 2.87+1.88 at baseline and 6 months .For group II value was 3.67+1.11 and 2.47+1.36 at baseline and 6 months .For control group value was 4.13+1.19 and 3.27+1.22.16

Values of attached gingiva (in mm) were 1.73+0.96 and 3.20+1.32 at baseline and 6 months in group I. For group II values were 2.20+1.37 and 3.33+1.45 at baseline and 6 months.16

Values of KTW (in mm) were 3.60+1.12 and 4.80+1.66 at baseline and at 6 months for group I. For group II   values were 3.67+0.98 and 4.60+1.56 at baseline and at 6 months. Values were 4.40+0.91 and 5.27+0.96 at baseline and at 6 months for control group.16

GTT(in mm)   was recorded using ultrasonography .17 Values were 0.60+ 0.10 and 0.76+1.6 at baseline and 6 months for group I. For group II values were 0.55 +0.09 and 0.61+0.08 at baseline and 6 months respectively .For control group values were 0.59+0.24 and 0.59+0.18 at baseline and 6 months.16

GTT was also recorded using transgingival probing. 16 For group I values were 0.72+0.09 and 0.79+0.12 at baseline and 6 months .For group II values were 0.81+0.09 and 0.82+0.11 at baseline and 6 months.For control group values   were 0.72+0.12 and 0.71+0.12   at baseline and 6 months respectively.16

5 articles 17-20,22 were analysed which compared CAF+PRF and CAF+CTG

 According to Table II(3)17Root coverage achieved was 80.48%+10.19% in test group(CAF +PRF) and 90.29%+ 9.05% in control group(CAF+ CTG).17Here the CAF along with PRF showed statistically significant   inferior root coverage to commonly deployed CAF + CTG technique .17 In another study 18 ,Root coverage achieved in test group(L-PRF)was 74.61%at 6 months and in control group root coverage achieved was 74.13% at 6 months .18A significant decrease in recession depth was noted in both groups (p value

  0.001).18Root coverage in test group (CAF + CTG + PRF) and   control group (CAF + CTG) was 89.6% and 79.9%.19 Root coverage was higher in (CAF +CTG +PRF)applied patients (p value   0.05).19A similar study 20 , revealed a Root coverage of 95 % and 96.1%. in CAF +PRF –M (test group) and CAF + e MCTG (control group).20At 6 months both treatments resulted in significant improvements in % root coverage compared with baseline values.20 Root coverage in CAF +PRF (test group) was 75.85% and CAF +CTG (control group)was 79.56%.22The differences between the groups were not statistically significant at baseline or 6 months.22

Values of CAL (in mm)were 5.03 +1.94 and 2.27+0.92 at baseline and 6 months for test group. For control group values were 5.20+1.49 and 2.24+0.82 at baseline and 6 months respectively.18 CAL   at baseline and 6 months   was 4.45+0.60 and 1.35+0.52 for test group .Values for control group were 4.20+0.47 and 1.70+0.66 at baseline and 6 months.19 In another similar study 20,values of CAL recorded were 6.27+1.27 and 2.48+1.41 at baseline and after 6 months   for test group .Control group gave values of 4.40+0.86 and 1.18 +0.35 at baseline and after 6 months.20 Clinical attachment values at baseline for test group was 4.35+0.67 and 1.48+0.40 after 6 months and for control group values were 4.31+0.61 at baseline and 1.35+0.38 after 6 months.22

KTW was also compared for test and control groups in these studies .Values of KTW were 2.33+0.56 and 2.93+0.70 at baseline and 6 months for test group .Control group gave values of 2.43+0.52 and 2.93 +0.71 at baseline and 6 months.18 In another study, KTW values were 3.25 +1.17 and 4.43 +1.48 at baseline and 6 months for test group. Control group gave values of 2.85 +1.03 and 3.63 +1.37 at baseline and 6 months.19 A study 20 revealed KTW values of 3.45 +1.05 and 4.63+ 0.86 at baseline and after 6 months for test group. Control group gave values of 3.93 +0.72 and 5.11 +0.76 at baseline and after 6 months.20 KTW values were 1.32 +0.66 and 2.20 +0.54 at baseline and 6 months for test group. Control group showed values of 1.41 +0.58 and 2.85 +0.45 at baseline and 6 months respectively.22

Values of GTT (in mm) were 0.85 +0.33 and 1.96 + 0.34 at baseline and 6 months. For control group, values were 0.83 +0.31 at baseline and 1.55 +0.37 at 6 months. 19

Values for Aesthetics were 8.37 +1.19cm for test group and 9.03 +1.0cm for conrol group.17

One study 23 compared PRF with EMD.According to Table II(9)23,Root coverage achieved in group treated with CAF +PRF was 72.1+9.55% and 70.5 +11.76 % in CAF +EMD treated patients.23 Within the groups both test and control statistically significant improvement in root coverage was observed however the observation period was 12 months and intergroup comparision was not statistically significant .23

KTW values for PRF group at baseline and 12 months were 1.45 +0.86 and 1.62 +0.28.EMD group gave 1.30 +0.56 at baseline and 1.90 +0.81 at 12 months.23

CONCLUSION : Gingival recession is unesthetic and may lead to hypersensitivity and difficulty in maintaining oral hygiene. No tissue reaction, cost effectiveness and avoidance of another surgical site make PRF an extremely valuable treatment material .It has good concentration of growth factors ,thereby enhancing the rate of healing. Fourteen articles published between 2000-2016 were analysed thoroughly which revealed statistically significant increase in percentage root coverage when PRF was used.It also resulted in improvements in CAL,KTW,GTT . From this systematic review it can be concluded that PRF is an excellent material for treatment of recession defects.

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