Ramesh Sundersing Chavan, Ishan Ramakant Tiwari, Manohar Laxman Bhongade, Priyanka Jaiswal, Vikas Devkaran Singh Deo

Open flap debridement in combination with subepithelial connective tissue graft for the prevention of post-operative gingival recession: a report on a series of cases

KEY WORDS *subepithelial connective tissue graft, post-operative gingival recession*

Background: Open flap debridement (OFD) with flap repositioning may result in significant gingival recession. In the present case series, patients with periodontal pockets were treated with subepithelial connective tissue grafts (SCTG) in combination with OFD for the prevention of post-operative gingival recession.

Study design: Ten patients (60 teeth) with periodontal pockets in the anterior dentition underwent OFD combined with SCTG. Probing pocket depth (PPD), relative attachment level (RAL), and relative gingival margin level (RGML) were recorded at baseline and at 6 months post-operatively.

Results: Mean PPD at baseline was 4.2 mm, and 1.8 mm at 6 months ($P<0.05$), RAL at baseline was 12.2 mm and 10.7 mm at 6 months ($P<0.05$), while RGML at baseline was 8 mm and 8.9 mm at 6 months post-operatively.

Conclusion: Results indicated that use of SCTG underneath the flap when combined with OFD was an effective method to minimize post-operative gingival recession.

Ramesh Sundersing Chavan
Senior Lecturer

Ishan Ramakant Tiwari
Senior Lecturer, Department of Periodontics

Manohar Laxman Bhongade
Professor & Head

Priyanka Jaiswal
Post-graduate student

Vikas Devkaran Singh Deo
Senior lecturer

All from:
Department of Periodontics and Implantology,
Sharad Pawar Dental College,
Deemed University,
Sawangi (meghe),
Wardha, 442001
Maharashtra State,
India

Correspondence to:
Ramesh Sundersing Chavan,
Senior Lecturer
Department of Periodontics and Implantology,
Sharad Pawar Dental College,
Deemed University,
Sawangi (meghe) ,
Wardha, 442001
Maharashtra State,
India
00 91 7152 287701,
Tel: 00 91 9970162126
Email: dr_rsc8@yahoo.com

■ Introduction

The ultimate goal in the treatment of chronic periodontitis is the maintenance of the teeth in relative health, function, and comfort, while at the same time, maintaining the aesthetic expectations of the patient. The periodontal pocket is one of several sequelae of the periodontal disease process. The therapeutic objective of periodontal flap surgery is to provide access to underlying root surfaces so as to reduce the pocket depth[1], to arrest further breakdown and to prevent additional attachment loss. Open flap debridement (OFD)[2] is a common procedure for the treatment of deep periodontal pockets associated with horizontal bone loss. This procedure is indicated when pocket elimination is undesirable, particularly in the anterior dentition, due to aesthetic considerations. However, surgical debridement with flap repositioning may result in significant gingival recession[2-4].

Becker et al[1] reported more significant gingival recession in sites with deep periodontal pockets. This occurred because of a lack of bone support for the flap, thin gingival tissue with limited blood supply and post-operative shrinkage of the flap[1,2]. The post-operative recession may lead to tooth hypersensitivity, root surface caries and unaesthetic results. Therefore, its prevention should be considered as an additional goal of flap debridement surgery.

Fig 1 Preoperative view.

Fig 2 Preoperative measurement.

Root coverage procedures using subepithelial connective tissue grafts (SCTG)[5,6] have been found to be effective in treating gingival recession, thereby improving clinical attachment levels[7,8]. When a connective tissue graft was used in combination with a coronally positioned flap (CPF), it was found to be more effective with a high percentage of root coverage. Hirsch et al[9] reported in a case series study that OFD, when combined with SCTG in the mandibular central incisors for the treatment of suprabony pockets, was an effective procedure to prevent post-operative gingival recession.

The present paper reports on a series of cases in which OFD surgery combined with SCTG in aesthetic regions such as the maxillary anterior as well as the mandibular anterior region to prevent post-operative gingival recession. The cases were treated for periodontal pockets with horizontal bone loss.

■ Study design

Ten patients (4 males and 6 females) in the age range of 24 to 42 years (mean age 31.6±6.7 years) with chronic periodontitis were selected. Systemically healthy patients were included for the surgical procedures if they had: i) the presence of a probing pocket depth ≥5.0 mm following initial therapy and ii) attachment loss of ≥5.0 mm around more than one surface of each tooth in the anterior sextant, either in the maxilla or mandible; iii) radiographic evidence of horizontal bone loss; and iv) the presence of at least 2 mm of keratinised gingiva in the selected area.

Patients with the following criteria were excluded: i) non-compliant with periodontal maintenance programmes; ii) smokers or patients that used any other tobacco products; iii) exhibited grade II tooth mobility in the treatment area; iv) with cross bite, edge to edge incisor occlusion or deep anterior overbites; v) a history of periodontal surgical treatment in the selected quadrant; and vi) pregnant females or lactating mothers.

■ Clinical measurements

Full-mouth plaque score was assessed by the Turesky–Gilmore–Glickman modification of the Quigley Hein (1970) plaque index (PI)[10] and gingival inflammation was assessed by Muehlemann's (1977) papillary bleeding index (PBI)[11] on the day of surgery and at 6 months post-operatively. The normal preoperative clinical view is presented in Fig 1.

The probing pocket depth (PPD), relative attachment level (RAL) and relative gingival margin level (RGML) were recorded for assessment of results. These measurements were recorded with the Florida Disk Probe (Florida Probe Corporation, Gainsville, FL, USA) (Fig 2). The Florida probe tip was placed at the base of the pocket, with the base of the disk resting on the occlusal level. The foot-pedal was pressed and the measurement recorded as relative attachment level (RAL) using the occlusal level as a fixed reference point. The probe tip was then placed at the gingival margin and the foot-pedal was pressed to record the distance from the occlusal level to the gingival margin as the relative gingival margin level (RGML). The probing depth was calculated by subtracting the RGML from the RAL. All measurements were recorded at four sites per tooth: mesiobuccal and distobuccal line angles, midbuccal and midlingual surfaces. For later calculations, the mean of the four sites was taken into

Fig 3 Flap reflection and debridement after crevicular incision.

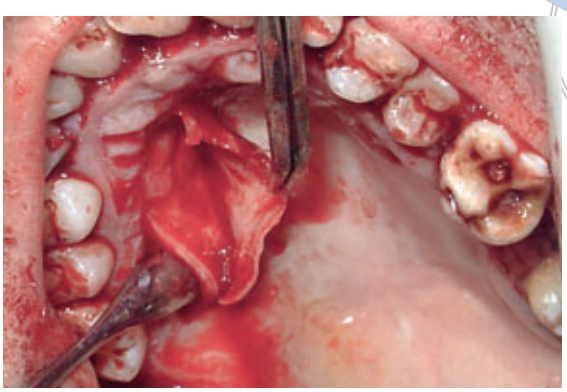

Fig 4 Trap door technique for harvesting SCTG.

Fig 5 SCTG placed underneath the flap.

Fig 6 Coronally advanced flap and suturing.

consideration. The midlingual measurements were taken to evaluate overall efficacy of the treatment. All the probing measurements were recorded at baseline (Fig 2) and at 6 months post-operatively.

■ Surgical procedure

The surgical protocol emphasised maximal asepsis and infection control. Briefly, after induction of local anaesthesia, the conventional approach consisting of a periodontal access flap was initiated by intrasulcular incisions on the buccal and lingual aspects. The incisions were carried as far interproximally as possible to preserve the entire interdental papillae and to achieve primary wound closure. For each experimental site the flap was extended to the next tooth on the mesial and distal side. A full-thickness flap was reflected using a periosteal elevator to expose the alveolar bone margin. Any granulation tissue was removed and the roots were carefully planed using curettes (Hu-Friedy, USA) (Fig 3).

The connective tissue graft was harvested by a 'trap door approach'[5] from the palatal area between the maxillary first molar and maxillary canine (Fig 4). The graft was then placed on a sterile gauze pad. Excess fatty glandular tissue was removed and the graft was irrigated with saline. Following the reflection of the flap, the connective tissue graft was positioned at the recipient site to cover the exposed facial surfaces of roots of the treated teeth with the coronal extension of the graft corresponding to the level of the cementoenamel junction (Fig 5). The periosteal side of the connective tissue graft was positioned facing the root surfaces and was not sutured. The flap was then coronally advanced to completely cover the connective tissue graft. Tensionless flap elevation was facilitated by a split thickness flap apical to the bone margin through the periosteum in the vestibule to allow movement of the flap in a coronal direction so that the graft was completely covered. Finally, the flap was stabilized with simple interrupted 4-0 silk sutures (Fig 6). The surgical site was dressed with Coe-Pak™ periodontal dressing (GC America, Alsip, IL, USA) to prevent apical displacement of the flap during the healing period.

Fig 7 Coronally advanced flap and suturing.

Fig 8 Post-operative measurement.

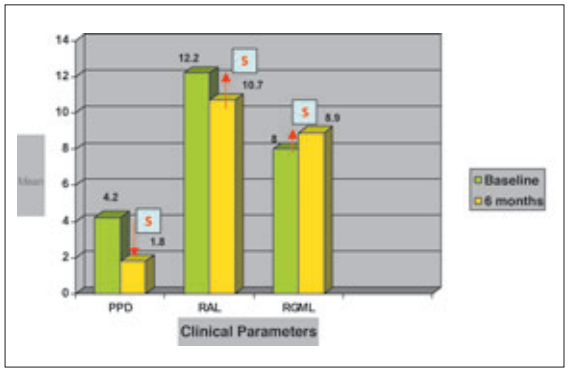

Fig 9 Comparison of PPD, RAL and RGML at baseline and 6 months follow-up showing significant (S) differences.

■ Post-operative care

Amoxicillin 500 mg t.d.s was prescribed for 5 days. Patients were instructed not to brush the teeth in the treated area. All patients were placed on 0.2% chlorhexidine mouthwash 10 ml twice daily, for 1 minute, for 6 weeks.

The periodontal pack and sutures were removed at 8 to 10 days after surgery. Patients were instructed to clean the treated site with a cotton pellet saturated with 0.2% chlorhexidine for an additional 3 to 5 weeks in an apico-coronal direction, and after 6 weeks with a soft toothbrush using Charter's brushing method.

Fig 7 shows the post-operative clinical view and Fig 8 shows probing measurements recorded at 6 months post-operatively.

■ Statistical analysis

Statistical analysis was performed using Student paired *t* test (SPSS Version 14.0, SPSS® Inc, Chicago IL, USA).

■ Results

The individual results of 60 consecutively treated teeth in 10 cases with the mean standard deviation (±SD) of all clinical parameters are summarised in Table 1.

■ Clinical outcomes

Probing pocket depth

At 6 months, the mean PPD decreased from 4.2±0.3 mm at baseline to 1.8±0.2 mm. Student paired *t* test indicated that the mean PPD reductions of 2.3±0.5 mm were statistically significant ($P<0.05$) (Table 1).

Relative attachment level

At 6 months, the mean RAL decreased from 12.2±1 mm at baseline to 10.7±0.9 mm at 6 months, with a mean attachment level gain of 1.5±0.9 mm. Student paired *t* test indicated that the difference in mean attachment level at 6 months was statistically significantly improved over the baseline ($P<0.05$) (Table 1).

Relative gingival margin level

At 6 months, the mean RGML increased from 8±1.1 mm at baseline to 8.9±1 mm at 6 months with the mean change in the position of the gingival margin of 0.9±0.7 mm. Student paired *t* test indicated that the mean RGML at 6 months was statistically significant ($P<0.05$) (Table 1).

Table 1 The individual clinical data of treated teeth in 10 patients (mean ±SD in mm)

Pt No	Gender	Age (yrs)	Anterior Sextant	Baseline			6 months		
				PPD	RAL	RGML	PPD	RAL	RGML
1	M	29	Mandibular	3.7	12.8	9.1	1.3	10.9	9.6
2	M	27	Maxillary	3.9	12.8	8.9	1.9	12.0	10.1
3	M	24	Mandibular	4.2	11.7	7.4	2.2	10.5	8.2
4	F	41	Maxillary	4.5	11.5	6.9	1.7	10.7	9.0
5	F	42	Mandibular	4.4	12.0	7.7	2.0	10.9	8.9
6	F	25	Mandibular	3.7	12.9	9.1	1.5	11.6	10.1
7	F	32	Maxillary	4.3	13.9	9.6	1.9	11.7	9.7
8	M	35	Mandibular	3.9	10.2	6.3	2	9.6	7.6
9	F	25	Mandibular	4.4	12.5	8.0	1.7	10.0	8.4
10	F	36	Mandibular	4.8	11.8	6.9	2.1	9.3	7.2
Mean		31.6±6.7		4.2±0.3	12.2±1	8.0±1.1	1.8±0.2	10.7±0.9	8.9±1

PPD, probing pocket depth; RAL, relative attachment level; RGML, relative gingival margin level.

■ Discussion

A primary goal of periodontal therapy is to reduce probing pocket depth to limit the risk of local re-infection. Shallow pockets have a strong, negative predictive value for future disease progression, whereas deep pockets in treated areas are a risk indicator for periodontal disease progression[12]. In the present study, statistically significant reductions in mean probing pocket depths of 2.3±0.5mm were observed during the study period. The present findings with use of SCTG in combination with OFD are comparable to those reported in previous studies. Nelson[13] observed mean PPD reductions of 3mm from 6mm pretreatment pocket depths, when SCTG was grafted with OFD into two periodontal osseous defects. Castellani et al[14] reported mean pocket depth reductions of 2.4±0.6mm from initial mean probing depth of 5mm in their pocket elimination surgery with simultaneous connective tissue grafting in a case report with 3 years follow-up. Hirsch[9] treated 14 patients (27 teeth) with mean initial pocket depths of 6.2mm (range 5 to 8mm) using SCTG combined with OFD, and reported PPD reductions of 1.9±0.6mm.

The changes in attachment level following periodontal therapy and especially periodontal surgery are the most commonly used clinical outcome variables. In the present study, a significant gain of a 1.5mm mean clinical attachment level (CAL) was observed at 6 months. The present finding of a mean attachment level gain of 1.5mm (range of initial PPD was 4 to 7mm) with SCTG is different with those found in other studies. In a case report, Nelson[13] observed a CAL gain of 3 to 4mm by using OFD in the treatment of periodontal osseous defects. Hirsch et al[9] reported a CAL gain of 3.2±0.9mm (range of initial PPD 1 to 5mm) with SCTG combined with OFD, while Castellani et al[14] reported a 0.37mm gain in attachment in pocket elimination surgery with simultaneous SCTG in a case report with 3 years follow up.

Several studies[1,15] have reported that the treatment of suprabony pockets with different periodontal surgical procedures has resulted in significant post-operative gingival recession. Isidor et al[16] compared the clinical results of root planing with the modified Widman flap, and the reverse beveled flap with osseous surgery and reported significant gingival recession of 2.2mm for modified Widman flaps, 2.4mm for osseous surgery and 1.8mm for root planing. The combination of OFD with SCTG was found to be an effective procedure to prevent post-operative gingival recession. In the present study a minimum change in the position of gingival margin post-operatively of 0.9mm with SCTG was observed. Although the recession in the present study is less than the recession obtained with other techniques, there still is approximately 1mm of gingival recession. Also, the complexity of the surgical

procedure and creation of a second surgical site, which enhances the post-operative complications for the patients, might prove to be a matter of concern for some clinicians.

The findings in the present study are in agreement with those of other single arm studies without a control group. Nelson[13] observed 1 mm gingival recession when connective tissue was grafted into periodontal osseous defects. Hirsch et al[9] observed mean gingival recession of 1.3 mm from initial gingival recession of 3 mm using SCTG combined with OFD.

The SCTG replaces the inflamed granulation tissue and pocket epithelium of approximately the same dimensions as the tissue removed, and fills the void between the flap and the root surface. This means that the flap position is not changed, thus minimising post-operative recession.

A 6-month period may be considered too short to evaluate the effect of periodontal therapy, especially in dealing with grafting techniques and biomaterials. However, Yukna et al[17] stated in their long-term study that the majority of clinical changes were achieved at the time of re-entry of 6 to 7 months, with no real further changes in re-entry at 3 years. Therefore, the 6-month time period used in the present study could be considered adequate.

■ Conclusions

Within the limitations of the reported case series, it is reasonable to conclude that SCTG in combination with OFD resulted in statistically significant improvements in terms of attachment level gain and PDD reduction, with minimal changes in the position of post-surgical gingival margin levels.

■ References

1. Becker W, Becker B, Caffesse R, Kerry G, Ochsenbein E, Prichard J. A longitudinal study comparing scaling, osseous surgery and modified Widman procedures: Results after 5 years. J Periodontol 2001;72:1675-1684.
2. Palacanis KG. Surgical pocket therapy. Ann Periodontol 1996;1:589-617.
3. Becker W, Becker BE, Ochsenbein C, Kerry G, Caffesse R, Morrison EC, Prichard J. A longitudinal study comparing scaling osseous surgery and modified Widman procedures. Results after 1 year. J Periodontol 1988;59:351–365.
4. Hall WB. Gingival augmentation/mucogingival surgery. In: Proceedings of the World Workshop in Clinical Periodontics. Chicago: American Academy of Periodontology; 1989:VII/1-VII-VII/23.
5. Langer B, Langer L. Subepithelial connective tissue graft technique for root coverage. J Periodontol 1985;56:715-720.
6. Harris RJ. The connective tissue and partial thickness double pedicle graft: a predictable method of obtaining root coverage. J Periodontol 1992;63:477-486.
7. Harris RJ. Human histologic evaluation of root coverage obtained with a connective tissue with partial thickness double pedicle graft. A case report. J Periodontol 1999;70:813-821.
8. Pasquinelli KL. The histology of new attachment utilising a thick autogenous soft tissue graft in an area of deep recession. A case report. Int J Periodontics Restorative Dent 1995;15:248-257.
9. Hirsch A, Brayer L, Shapira L, Goldstein M. Prevention of gingival recession following flap debridement surgery by subepithelial connective issue graft. Consecutive case series. J Periodontol 2004:75:757-761.
10. Turesky S, Gilmore ND, Glickman I. Reduced plaque formation by the chloromethyl analogue of vitamin C. J Periodontol 1970;41:41-49.
11. Muehlemann HR. Psychological and chemical mediators of gingival health. J Prev Dent 1977;4:6.
12. Armitage G. Periodontal diseases: diagnosis. Ann Periodontol 1996;1:37-222.
13. Nelson S. Subperiosteal connective tissue grafts for pocket reduction and preservation of gingival esthetic. A case report. J Periodontol 2001;72:1092-1099.
14. Castellani R, Wolffe GN, Renggli HH. Pocket elimination surgery with simultaneous connective tissue graft. A case report with 3-year follow up. J Clin Periodontol 2001; 28:365-371.
15. Kaldahl WB, Kalkwarf KL, Patil KD, Molvar MP, Dyer JK. Long-term evaluation of periodontal therapy: response to four therapeutic modalities. J Periodontol 1996;67:93-102.
16. Isidor F, Karring T, Nyman S, Lindhe J. New attachment-reattachment following reconstructive periodontal surgery. J Clin Periodontol 1984;12:728-735.
17. Yukna RA, Krauser JT, Callan DP, Evans GH, Cruz R, Martin M. Thirty-six month follow-up of 25 patients treated with combination anorganic bovine-derived hydroxyapatitie matrix (ABM)/cell binding peptide (P-15) bone replacement grafts in human intrabony defects. I. Clinical findings. J Periodontol 2002;73:123-128.