

## Novel Fish Derived Collagen Matrix Of Clinical Comparison Of Modified Mucogingival Flap Technique

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### Abstract

Root coverage in mandibular anterior teeth is frequently challenging due to the presence of frenum insertion, shallow vestibule and insufficient attached gingiva. A modified mucogingival flap technique along with the use of a xenogenic collagen matrix has been attempted to address such clinical scenario.

### Aim

To evaluate and compare the clinical outcomes following Modified Mucogingival flap (MMGF) procedure with connective tissue graft / xenogenic collagen matrix in treatment of gingival recession defects.

### Materials and methods

30 patients presenting multiple mandibular class III recession defects were treated using MMGF along with either connective tissue graft (n=15) or xenogenic collagen matrix (n=15). Patients were recalled at 3 and 6 months to assess the changes in plaque, gingival index

scores, recession height (RH), pocket depth, clinical attachment level (CAL), keratinised tissue width (KT), attached gingiva (AG), vestibular depth (RVD) and percentage of root coverage (RC%). Self reported VAS pain scores were recorded at the end of 6 weeks.

### Results

Both control and test sites exhibited statistically significant ( $p < 0.05$ ) improvement in all clinical parameters at 3, 6 months intervals with respect to baseline. However, control sites showed significant improvement in CAL, VD and RC from 3 to 6 months' time period, whereas test sites showed significant gain in clinical attachment, RC, width of AG, KT and VD from baseline to 3 months with a considerable deterioration of all these parameters at the end of 6 months. VAS pain scale demonstrated significantly lower pain perception in test subjects. ( $p < 0.05$ ).

## Conclusions

Xenogenic collagen matrix along with MMGF yielded short term gain in terms of root coverage, CAL and VD, the improvement in width of AG AND KT were comparable with the control subjects till the end of study. LOW VAS scores in the test subjects showed patient preference towards collagen based scaffolds.

## Keywords

Connective tissue graft; Mandibular anteriors; Miller's Class III gingival recession.

## Introduction

Gingival recession is a composite phenomenon often associated with other mucogingival conditions complicating therapeutic outcome [1]. Root hypersensitivity, the progression of gingival recession, difficulty in plaque maintenance around non – keratinized alveolar mucosa and predisposition to root caries has broadened the scope of mucogingival therapy.

## Materials and Methods

Systemically healthy patients within the age range of 20-65 years, presenting multiple adjacent Miller's class III gingival recession in mandibular anteriors were included. Sites with periodontal probing depth > 4mm, advanced tooth mobility, caries, cervical abrasion / restorations were excluded. Patients showing unacceptable oral hygiene compliance during or after phase I therapy, patients with systemic diseases or on medication affecting periodontal healing, smokers, pregnant and lactating women were excluded.

30 Patients who met the study criteria were enrolled and the following clinical parameters were assessed: plaque index (Silness and Loe 1964), gingival index (Loe and Silness 1963), probing pocket depth (PPD), recession height (RH), clinical attachment level (CAL), width of attached gingiva (AG), width of keratinized tissue (KT), relative vestibular depth (RVD), root coverage

percentage (RC%) and VAS pain scores. The clinical parameters were measured using customized acrylic stent with UNC 15 periodontal probe and were expressed in nearest mm (Figure 1A,1B,2A,2B). Recession height (RH) was measured as the distance from cemento-enamel junction to gingival margin at the mid buccal position of each site. Probing pocket depth (PPD) was measured as the distance from gingival margin to base of the gingival sulcus at the mid buccal position. Clinical attachment level (CAL) was measured as the distance from the cemento – enamel junction to base of the gingival sulcus. Keratinized gingiva (KT) was measured as the distance from the gingival margin to the mucogingival junction (evaluated using a chemical method –Lugol's Iodine). Attached gingiva (AG) was measured by subtracting the probing depth from width of keratinized tissue. Relative vestibular depth (RVD) was measured as the distance from base of stent to the deepest position of the vestibule. Root coverage percentage (RC%) was calculated according to the following formula:

Root coverage = (preoperative vertical recession height - postoperative vertical recession height)/preoperative vertical recession height) x 100

The VAS scores were recorded by asking the patient to rate the pain on a calibrated scale based on the overall experience with the procedure.

After completion of cause related therapy study participants were advised to withdraw a slip labelled with treatment protocol and were subsequently enrolled into one of the two study groups. Control group subjects were treated by modified mucogingival flap (MMGF) technique along with connective tissue graft. Test group subjects were treated by modified mucogingival flap technique (MMGF) along with xenogenic collagen matrix, KOLSPON® Type I Collagen.

#### Surgical procedure:

Under local anesthesia, horizontal crevicular incisions were made with the help of scalpel using #15 C blade at the marginal gingiva of involved teeth and laterally extended to one tooth on either side. A full thickness mucoperiosteal flap was elevated beyond the mucogingival junction relieving frenal/muscle attachments. Root planning was carried out using curettes and recipient site dimensions were measured arbitrarily using graduated periodontal probe.

In control Group, Connective tissue graft was harvested from the palate using the single incision / trap door technique. The obtained graft was trimmed to remove the fatty glandular tissue and the incisions were approximated with simple interrupted sutures (Figure 1C, 1D). Whereas in the test subjects, the sterile collagen matrix was retrieved from the pack and trimmed in such a way that the graft extends laterally and apically beyond the defect (Figure 2C, 2D). The CTG/CM was placed on to the prepared root surfaces and was firmly adapted to the recipient bed with finger pressure in order to minimize the dead space. Flap margins were approximated using independent sling absorbable sutures (vicryl). A superficial relieving incision was made approximately 7mm apical to the marginal gingiva which released tension in the flap (Figure 1E, 2E). After achieving adequate homeostasis, periodontal dressing (coe-pak) was placed in order to protect the surgical site.

After surgery, patients were prescribed with routine antibiotics and analgesics for five days. Patients were instructed not to brush in the surgical area for 6 weeks post-surgically in order to avoid trauma to the surgical site. Chlorhexidine mouth wash 0.12% was recommended as an adjunct to oral hygiene maintenance

twice a day for 6 weeks. The periodontal dressing, sutures were removed at the end of two weeks.

#### Results

The mean age, gender distribution of study population are shown in table 1, there was no statistically significant difference between the control and test participants. Table 2 shows the mean descriptive values of all the clinical parameters measured at baseline, three and six months in the study subjects. There was no statistical significant difference between test and control subjects at baseline except for plaque scores. The PPD values remained constant throughout the study period in both the groups. Within control participants there was significant reduction in RH, gain in CAL, RC% and VD throughout the study period. ( $p < 0.001$ ). Whereas gain in AG and KT was significant only from baseline to three and six month (Table 3). Among test subjects the recession height significantly reduced from baseline to 3 and 6 months however there was a progression of RH from 3 to 6 months. There was a statistically significant gain in CAL, AG, KT and VD from baseline to three months; however, these parameters showed a meek loss at the end of six months. (Table 3) On intergroup analysis, control subjects showed statistically significant gain in clinical attachment and reduction of gingival recession over test subjects at all follow up intervals. Moreover, significant improvement in VD was noted in the control subjects at six months follow up ( $p < 0.05$ ). The intergroup comparison of VAS pain scores revealed that subjective pain perception was significantly less in the test group. (Table 2)

#### Discussion

The management of advanced recession defects often involves a two-stage surgical protocol, where initial procedure aims at augmenting the vestibular depth and keratinized tissue followed by attempt for root coverage.

This clinical trial proposed a modified mucogingival flap technique (MMGF) that aimed to deepen the vestibule. The benefits of the current surgical technique are that the conventional two stage protocol is overridden, and a single stage procedure is attempted. The superficial vestibular incision neither exposed the deeper tissues nor compromised the vascularity explaining the uncomplicated rapid healing which occurred in all the study subjects.

The advantage of laser assisted vestibular incision given during the early healing period in our study resulted in tension free remodelling of tissues and had auxiliary clinical benefits of minimal intraoperative bleeding and reduced patient discomfort [20]. In a study by Yilmaz Eftalet al 2014, they compared the outcomes using additional external vestibular releasing incision made with diode laser/ scalpel along with laterally positioned flap and reported reduced patient discomfort in the laser incision group [21].

### Conclusion

The results obtained in our study may not be conclusive owing to the inclusion of advanced recession defects and presence of associated mucogingival conditions. Further studies are warranted with long term follow up using collagen matrices in minimal recession defects which may yield superior results and may enhance the prospects of using xenogenic collagen matrices in the field of mucogingival surgery.

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