

Comparison of Acellular Dermal Matrix Graft (Alloderm) With Subepithelial Connective Tissue Graft For The Treatment of Millers Class I Gingival Recession - A Clinical Study

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Abstract

Aims and Objective: Acellular dermal matrix allograft (ADMG) has successfully been applied as a substitute for free connective tissue grafts (SCTG) in various periodontal procedures, including root coverage. The purpose of this study was to clinically compare the efficiency of ADMG and SCTG in the treatment of millers class I gingival recessions.

Methods: 10 patients with bilateral Millers class I recession were randomly allocated ADMG group and SCTG group, covered by coronally advanced flaps. The subjects were reevaluated at 1,3,6,12 and 24 weeks after

surgery and clinical parameters were recorded. Post-operative discomfort was measured using visual analog scale up to 3 weeks.

Results: Both the groups showed significant improvements in terms of root coverage. Mean recession depth reduced from 2.5±0.97 mm to 0.20±0.63 mm and 3.1±1.10 mm to 0.60±0.84 mm with defect coverage of 96% and 85% at the end of the 6 months in ADMG and SCTG.

The VAS was significantly reduced from 1.5±0.97 to 0.00±0.00 at the end of 3 weeks in test group where in control group VAS reduced from 4.00±1.33 to 1.7±0.48 at

the end of the 3 weeks. Test group showed a better result in root coverage as the use of ADMG achieved 96% compared to SCTG with 85%.

Conclusion: Both SCTG and ADMG were successful in treating the gingival recession however an added advantage of using ADMG for recession coverage is the enhanced patient comfort

Keywords: Gingival recession, Perio-plastic surgery, connective tissue grafts, acellular dermal matrix allograft.

Introduction

The exposure of root surfaces due to gingival recession is a common occurrence. The exposed root surfaces pose a multitude of problems like hypersensitivity, root surface caries along with a massive esthetic deficiency. According to the National Survey of Oral Health, 88% of seniors aged 65 years and 50% of adults aged 18-64 years have one or more sites with recession, increasing progressively with age.¹

Many different surgical approaches including pedicle grafts, free gingival grafts, free connective tissue grafts, and guided tissue regeneration have been shown to result in effective root coverage Langer and Calagna (1982)² described the "Subepithelial Connective Tissue Graft" technique to augment the edentulous ridge. Later Langer and Langer (1985) described the same technique in detail for covering gingival recessions on both single and multiple adjacent teeth. Although subepithelial connective tissue procedures provide excellent esthetics and predictability, the amount of donor material necessary, limits the number of teeth that can be treated in a single surgery. This technique causes patient discomfort, increases the risk of pain and hemorrhage post-operatively. Each of these techniques has its advantages and dis-advantages, indications and contraindications, and varying degrees of successful outcomes.³ Recently, Acellular Dermal Matrix Graft has been used as a

substitute for the palatal donor sites to increase the width of keratinized tissue around teeth and implants. Alloderm[®] is widely used in both medicine and dentistry for reconstructive surgery. Originally developed to treat burn patients, it is now used in general, orthopedic and urogenital surgery in addition to its applications in dental surgical procedures.

The aim was to evaluate and compare the efficacy of ADMG and SCTG in the treatment of gingival recessions.

Methodology

This clinical study was carried out in the Department of Periodontics, Coorg Institute of Dental Sciences, Virajpet. The study sample included 10 subjects having bilateral Miller's class I gingival recession. Patients were randomly divided into 2 groups to receive either Acellular Dermal Matrix graft (Group-A) or Sub epithelial connective tissue graft (Group-B) and followed up for a period of 6 months. Approval from the ethical committee was obtained. Informed consent was obtained from all the patients.

Inclusion Criteria

Included healthy individuals without any systemic diseases. Presence of two or more sites with Millers Class I recession in the anterior sextant. Patients who can maintain good oral hygiene.

Exclusion Criteria

Included Pregnant woman, patients undergoing orthodontic treatment, areas with severe malaligned teeth, patients who have undergone periodontal surgery in the last 6 months, patients with any habit of tobacco usage, teeth in traumatic occlusion. Parameters such as recession depth (RD), probing pocket depth (PPD), clinical attachment level (CAL), visual analog scale (VAS) were recorded at baseline, 1, 3, 6, 12, 24 weeks with patients consent. Patients pain perception was assessed at first and third week post surgically using visual analog scale and compared between two procedures.

Treatment Protocol

Pre-surgical : All patients underwent the initial phase of treatment of thorough scaling and root **planning**. Any existing trauma from occlusion was eliminated. The sites were randomly assigned by flipping a coin (F.F.S) to the control group or the test group immediately before surgery.

Group A - received Acellular Dermal Matrix Graft (Alloderm, ADMG).

Group B - received Sub epithelial connective tissue graft taken from the palate (SCTG).

Surgical Technique

All the surgical procedures were carried out by one operator.

After administering local anesthesia (2%Lignocaine with adrenaline 1:80,000) and before the elevation of the flap after local anesthesia, both the exposed and the intrasulcular root surfaces were gently planed. An intrasulcular incision was made on the buccal aspect of the involved tooth. This incision was horizontally extended to the adjacent papillae avoiding the gingival margin of the adjacent teeth. Two oblique releasing incisions were carried out from the mesial and distal extremities of the horizontal incision beyond the mucogingival junction. A trapezoidal full-thickness flap was raised. Then a partial-thickness dissection was carried out apically towards the marginal bone crest leaving the underlying periosteum in place. In addition a mesio-distal and apical dissection parallel to the vestibular lining mucosa was performed to release residual muscle tension and to facilitate the passive coronal displacement of the flap. The papillae adjacent to the involved tooth were de-epithelialized. The flap was then coronally displaced and adapted to cover the CEJ.

Following preparation, the required dimension of Alloderm[®] allograft was procured and rehydrated in a petri dish with 50 ml of sterile saline solution for 5 min. After the protective backing paper had been floated, the Alloderm allograft was transferred to another dish with 50 ml of sterile saline solution for 5 min. The allograft was placed with the connective tissue surface toward the recipient beds and the basement membrane surface facing externally. The allograft was stabilized on the recipient bed by resorbable suture. A periodontal dressing was applied to the surgical site post operative antibiotic and analgesics were prescribed. Patients were recalled after 1 week for reevaluation. (figure 1-8)

Placement of connective tissue graft, retrieved from palate to recipient was done according to the Langer and Langer technique. (figure 9-17)

A periodontal dressing was applied to the surgical site post operative antibiotic and analgesics were prescribed. Post operative instructions were given. The patients were recalled for collection of data at 1, 3, 6, 12 and 24 weeks.

Result

A total of 10 patients with 20 labial gingival recession with mean age of 34.2 ± 6.56 were included in the study. Group A and B received Acellular dermal matrix graft and sub-epithelial connective tissue graft respectively for the coverage of gingival recession. In all the patients autogenous and allogeneous grafts healed without any complications and at the end of 6 months the grafts were stable and recession coverage between 85% -95% was achieved.

In group A, the mean RD at baseline and 24th week were 2.5 ± 0.97 and 0.2 ± 0.63 respectively, in group B, the mean RD at baseline and 24th week were 3.1 ± 1.1 and 0.6 ± 0.84 respectively. Comparison between the two groups was not statistically significant with greater reduction in group-A. (table-1)

Comparison of the probing pocket depth between group-A and group-B did not reveal any statistically significant result (p value 0.53). Where in group-A showed no clinical or statistical changes from baseline to 24 weeks and group-B showed mild changes from baseline (mean 1.4 ± 0.69 mm) to 24 weeks (1.2 ± 0.42 mm).(table-1)

In group A, the mean CAL at baseline and 24th week were 3.7 ± 0.51 and 1.4 ± 0.96 respectively, in group B, the mean RD at baseline and 24th week were 4.5 ± 1.4 and 1.8 ± 0.78 respectively. When compared to the both groups i.e. Group-A and group-B no statistical significant data (p value 0.15) was detected at the end of the 24 weeks.(table-1)

Comparison between group-A and group-B showed no statistical significant difference (p value 0.15) when compared at the end of the 3 weeks. At the end of the 3 weeks group-A showed a clinically significant result with decrease in a pain scale from mean of 1.5 ± 0.97 to 0.00 ± 0.00 where as in group-B the mean VAS reduced from mean of 4.0 ± 1.33 to 1.7 ± 0.48 .(table-3)

The mean root coverage with SCTG was 85% and with ADMG 96%.(table-2)

Discussion

Obtaining predictable root coverage has become an important part of periodontal therapy. In the prevention and coverage of gingival recession, a choice of four possibilities exists: placing a graft to cover recession; stabilize an existing recession and preventing its further progress, or attempt the coverage of a denuded root or no treatment at all. Recession coverage procedures are usually done to reduce the chances of root caries, to satisfy requirements of restorations and to prevent further recession particularly if prosthetic or orthodontic treatment is planned.⁴

Although several techniques have been proposed to achieve consistent and predictable root coverage, by some estimates, the average percentage of covered root surfaces

resulting from different procedures performed under varying clinical conditions varies from 56% to 97.8%. Thus treatment of buccal recession remains a major challenge to clinicians.⁵

To this day, the gold standard for root coverage procedures is the sub epithelial connective tissue graft^{6,7}. However connective tissue grafting is not without its limitations. The need for multiple surgeries to obtain adequate graft material and the shallow palate with decreased connective tissue limits its application.⁸

Acellular dermal matrix allograft has been introduced as a substitute for connective tissue in root coverage procedures. One advantage of this material is that the need for palatal donor material is eliminated which can reduce postoperative morbidity. Another advantage is that an unlimited supply is available thus permitting multiple site root coverage procedure that can extend for a sextant or a quadrant.^{9, 10}The main goal of this study was to compare the effectiveness root coverage using Acellular dermal matrix graft and sub epithelial connective tissue graft in the treatment of millers class I recession. Ten sites with gingival recession were randomly treated with acellular dermal matrix graft and other ten sites were treated with SCTG in the treatment of millers class I recession defect.

Result of this study showed a statistically significant reduction in both the groups.

The mean RD decreased from 2.5 mm to 0.2 mm in ADMG group (96%) and 3.1 mm to 0.6 mm in SCTG group (85%). The values were statistically significant in both the groups. The decreased RD in SCTG was less than ADMG group but a comparison between the groups i.e. Group-A and group-B was not statistically significant. These values were comparable to the study by Rahamani et al (2006)¹⁸ where they found a reduction in RD of 3.5 mm to 1.85 mm in ADMG group and reduction of 3.1 mm to 1.4 mm in SCTG group.

In a study done by Joly (2007)¹¹ the results were contraindicated to the present study, where they achieved root coverage of 79.5% in SCTG and 50% in ADMG. This may be due to the orientation of ADMG, in the present study the basement membrane side of the ADMG was placed towards root surfaces as advocated by Henderson (1999)¹². Where they achieved 97% of root coverage, which is similar to our study result where we achieved 96% of root coverage with ADMG.

Few subjects in the study did show a reduction of 0.1 -0.2 mm in RD between 3 to 6 months postoperatively. This amount of root coverage could be attributed to creeping attachment. Borghetti and Gardeela (1990)¹³ suggested by increase in attachment after 1 month healing should be considered creeping attachment. Piniprato et al (2000)¹⁴, Harris (1997)¹⁵, Fagan(1975)¹⁶ reported 0.43 mm, 0.85 mm, 0.8 mm creeping attachment at the one year respectively.

Mean PPD did not show any statistical significant changes in 3 and 6 months. This result was expected because baseline PPD in all patients was compatible with condition of gingival health. This result is similar to the study by Palolantiono et al (2002)¹⁷, where they did not find any significant changes in the mean PPD in both SCTG and ADMG group.

Similarly the CAL reduced from 3.7 mm to 1.4 mm in ADMG group and from 4.5 mm to 1.8 mm in SCTG group. The gain in attachment level was 2.3 mm in ADMG group and 2.7 mm in SCTG group. The CAL gain was statistically significant in both groups but again comparison between the groups, it was not statistically significant. In a similar study by Rahamani (2006)¹⁸ compares SCTG and ADMG, they found a gain in attachment level of 2.75 mm and 2.05 mm on ADMG and SCTG group respectively.

In this prospective, clinical randomized study, the mean root coverage with SCTG was 85% and with ADMG 96%. These results compare favorably with percentage of root coverage as reported by Harris (87%)¹⁹ but less favorably with result of Bouchard (69%)²⁰ and Rahamani (65.2%)¹⁸.

The root coverage obtained in the ADMG was 96% in this study. Other studies have reported the similar results. Paolantonio et al (2002) did the same study on ADMG and CTG and reported of this study appear favorable in comparison to the other data from the literature.

The pain perception was evaluated post surgically at 1 and 3 weeks, where it was found surgical procedure using ADMG was less painful than surgical procedure using SCTG. This is accordance with Henderson (1999)¹², who explained that harvesting a palatal or other intraoral donor site causes additional discomfort. The availability of the acellular dermal graft material for use in mucogingival surgery can minimize or eliminate these problems.

Thus mean root coverage in both groups does imply that both surgical procedures have definite therapeutic utility in the clinical practice.

One of the limitations of this study was that the recession width or depth was not assessed which may be critical factor in determining the amount of recession coverage. A subjective evaluation of the two groups was not done but clinical impression gave better result in ADMG groups.

Within the scopes of this study, thus it is possible to predict situations where the results of ADMG will remain stable or improve. Long term evaluation will thus go a long way in substantiating the efficacy and also the stability of ADMG as a coveted alternative for recession cases when viewed on par with the current "Gold Standard" namely SCTG.

Further research is needed to improve methods of measurements of exposed root surfaces in order to assess long term success of such procedure.

Conclusion

There was a definite improvement in the clinical parameters (RD, PPD, CAL) as evaluated in this study from baseline to 24 weeks for both the ADMG and SCTG. ADMG showed a better root coverage (96%) than SCTG (85%) though the values are not statistically significant when compared between the groups. Both ADMG and SCTG are useful and predictable surgical techniques for the treatment of millers class I gingival recession. When compared ADMG and SCTG, ADMG showed a significant reduction in pain scale than SCTG. Hence it can be concluded that ADMG can be used as a substitute for SCTG without involving a second surgical site.

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Legends Table

Table 1: Comparison of clinical parameters values at various time intervals in group-A and group-B

	Group I	Group II
RDBASE	2.50±0.97	3.10±1.1
RD1WK	0.00	0.20±0.63
RD3WK	0.00	0.30±0.67
RD6WK	0.20±0.63	0.50±0.70
RD12WK	0.20±0.63	0.60±0.84
RD24WK	0.20±0.63	0.60±0.84
PPDBASE	1.20±0.42	1.40±0.69
PPD12WK	1.20±0.42	1.20±0.42
PPD24WK	1.20±0.42	1.20±0.42
CALBASE	3.70±0.51	4.50±1.43
CAL12WK	1.40±0.96	1.80±0.78
CAL24WK	1.40±0.96	1.80±0.78
VAS1WK	1.50±0.97	4.00±1.33
VAS3WK	0.00	0.00

Table 2: Comparison of mean percentage of root coverage in between group- A and Group-B

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
PERCENT	Ctrl	10	85.3333	19.06454	6.02874
	Exptl	10	96.0000	12.64911	4.00000

Table 3: Comparison of mean VAS in between group – A and Group – B

	GROUP	Mean	Std. Deviation	N
VAS1WK	Ctrl	4.0000	1.33333	10
	Exptl	1.5000	.97183	10
	Total	2.7500	1.71295	20
VAS3WK	Ctrl	1.7000	.48305	10
	Exptl	.0000	.00000	10
	Total	.8500	.93330	20

Legends Figures



Figure 1: Preoperative group – A

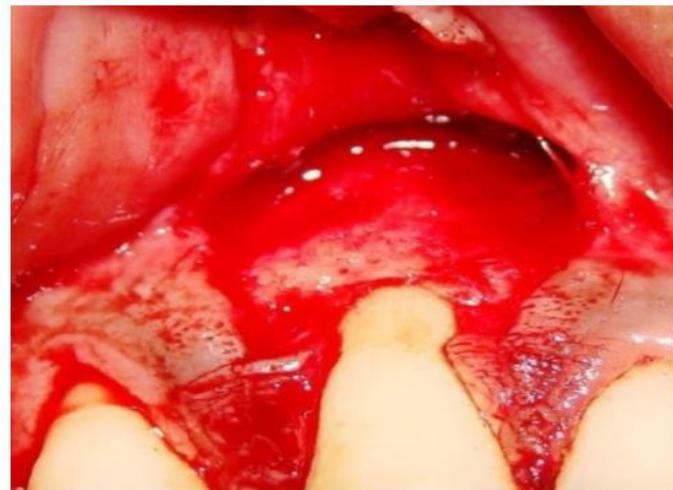


Figure 2: Intra operative group- A

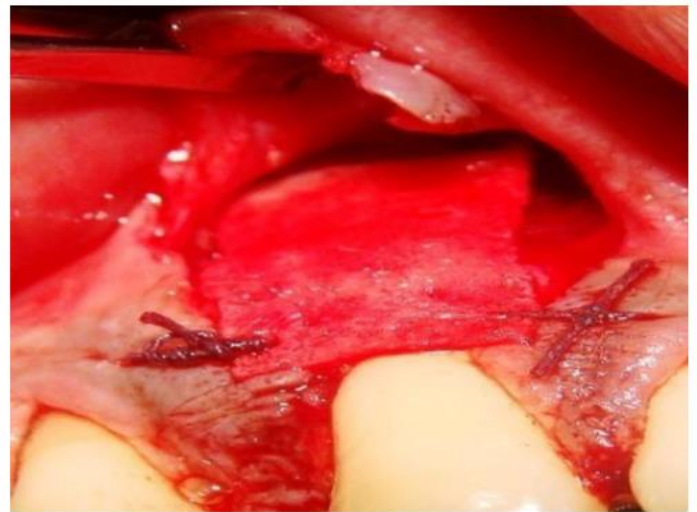


Figure 3: Suturing the Alloderm® in recipient site (Group – A)



Figure 4: Flap coronally advanced and sutured in group – A

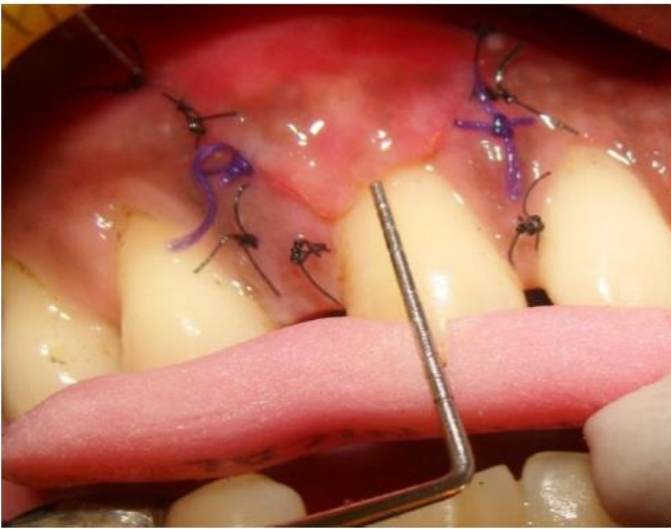


Figure 5: Post operative follow-up 1 week in group – A



Figure 8: Post operative follow-up 24 week in group – A



Figure 6: Post operative follow-up 3 week in group – A

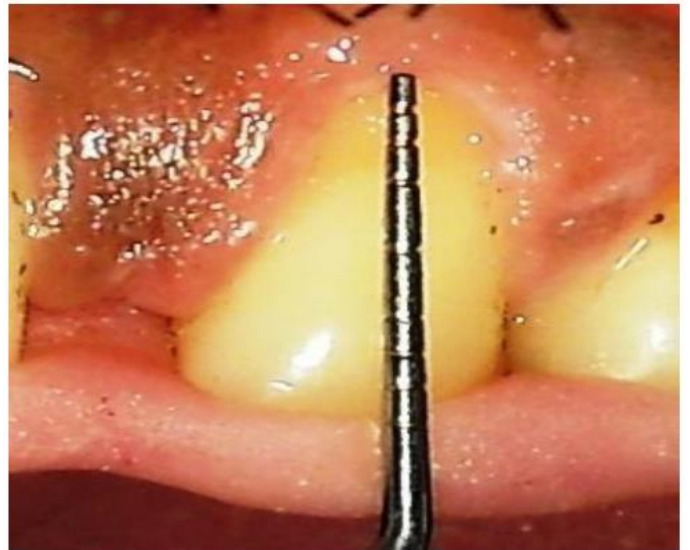


Figure 9: Preoperative group – B



Figure 7: Post operative follow-up 12 week in group – A



Figure 10: Intra operative group – B



Figure 11: Donor site in group - B



Figure 14: Post operative follow-up 1 week in group - B



Figure 12: Suturing Connective Tissue in Recipient Site (Group - B)



Figure 15: Post operative follow-up 3 week in group - B

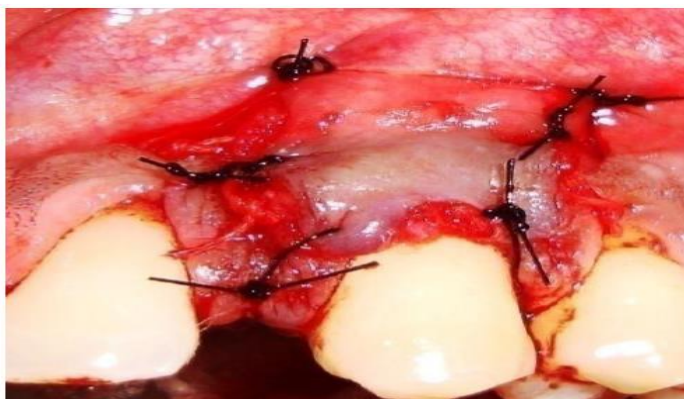


Figure 13: Flap coronally advanced and sutured in group - B



Figure 16: Post operative follow-up 12 week in group - B



Figure 17: Post operative follow-up 24 week in group – B