Evaluation of Effectiveness of Acellular Dermal Matrix Allograft and Subepithelial Connective Tissue Graft in Combination with Coronally Positioned Flap in Treatment of Multiple Gingival Recession in Aesthetic Areas: A Case Series

BK Somnath, Priti Charde, ML Bhongade
Department of Periodontics, Sharad Pawar Dental College & Hospital, Datta Meghe Institute of Medical Sciences (Deemed University) Sawangi (Meghe) Wardha, Maharashtra - 442004

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Abstract:
Obtaining predictable and aesthetic root coverage has become an important part of periodontal therapy. Several techniques have been developed to achieve these goals with variable outcomes. The aim of this case series was to evaluate the effectiveness of Acellular Dermal Matrix Allograft (ADMA) and Subepithelial Connective Tissue Graft (SCTG) in combination with Coronally Positioned Flap (CPF) in the treatment of Miller’s class I and II multiple gingival recession in aesthetic areas.

A total of 10 patients aged between 18 to 40 years were selected for this study, meeting all the criteria for inclusion. Five patients were treated with ADMA and 5 patients with SCTG in combination with CPF. Various clinical parameters were assessed viz. probing pocket depth (PPD), clinical attachment level (CAL), gingival recession (GR), width of keratinized tissue (WKT) at baseline and 6 months after surgery.

No significant differences in gingival recession, reduction were noted between ADMA and gold standard SCTG. Within limits of this case series, the use of ADMA may represent an acceptable alternative to the SCTG for treating gingival recession. The use of ADMA eliminates the need for the palatal donor site and it involves a less invasive surgery for treating multiple gingival recession. These results suggest that ADMA may be a useful substitute for SCTG to achieve predictable root coverage.

Key Words: Gingival recession; Acellular dermal matrix allograft; Subepithelial connective tissue graft.

Introduction:
The patients today are increasingly conscious of personal appearance and much attention has been focused on denuded roots that are exposed during smiling and are unaesthetic (Zucchelli & De Sanctis, 2000). The main indications for root coverage procedures are aesthetic and/or cosmetic demands (Zucchelli & De Sanctis, 2000) followed by the management of root hypersensitivity (Gottlow et al, 1990), or whenever it hampers proper plaque removal (Mathur et al, 1969). Obtaining predictable root coverage has been an important part of periodontal therapy. Over the years, various techniques have been used to achieve root coverage.

The pedicle flaps have been used successfully for root coverage with different modifications (Allen & Miller (Jr.), 1989; Caffesse et al, 1987; Harris, 2000). The coronally positioned flap (CPF) is one of the valid surgical options in the treatment of Miller’s Class I and Class II gingival recession (Bernimoulin et al, 1975). However, the root coverage obtained with this procedure is associated with thin marginal soft tissue, which makes it vulnerable to future recession at treated sites and thus, questions the long term predictability of CPF in the treatment of multiple gingival recessions (da Silva et al, 2004).

Langer & Langer (1985) introduced subepithelial connective tissue graft (SCTG) in treating gingival recession, in which connective tissue graft combined with an overlaying pedicle graft was used. The SCTG covered by a CPF is a frequently used procedure due to its high predictability (Wennstrom & Zucchelli, 1996). However, this procedure requires a second surgical site that may cause certain degree of discomfort and increase the risk of post operative complications such as pain and hemorrhage.

Recently, the use of an ADMA has become an increasingly popular technique as a substitute for SCTG in treating marginal tissue recession (Rahmani & Lades, 2006; Gartrell & Mattews, 1976). Acellular dermal matrix allograft is an acellular, non-immunogenic...
scaffold that heals by repopulation and revascularization, rather than healing through a granulation process (Livesey et al., 1995). The use of an ADMA has been reported to have a favourable clinical outcome in root coverage procedures with a range of mean root, coverage from 86% to 99% (Harris, 2002; Hederson et al., 2001; Hirsch et al., 2005; Woodyard et al., 2004).

Therefore, the aim of this case series was to evaluate the effectiveness of ADMA and SCTG in combination with CPF in the treatment of multiple gingival recessions in aesthetic areas with the following objectives:

1) To evaluate the effectiveness of ADMA with respect to root coverage, gain in clinical attachment level and increase in the width of keratinized gingiva.
2) To evaluate the effectiveness of SCTG in terms of root coverage, gain in clinical attachment level and increase in the width of keratinized gingiva.

Materials & Methods:
Ten systemically healthy patients aged between 18 to 40 years were selected from the Outpatient, Department of Periodontics, Sharad Pawar Dental College, Sawangi (Meghe).

Inclusion Criteria:
1) Presence of multiple gingival recession defects on the labial or buccal surfaces of the teeth, either in maxillary or mandibular arch, classified as either Miller’s Class I or II.
2) Presence of ≥ 2 mm gingival recession depth.
3) Presence of width of keratinized gingiva apical to recession ≥ 2mm.
4) Absence of bone loos on IOPA X-ray

Exclusion Criteria:
1) Use of tobacco products.
2) Uncooperative patients.
3) Patients plaque score ≥ 1 after phase I therapy.
4) History of periodontal surgery in selected gingival recession defects.

The surgical procedures were explained to all patients. Informed consent forms were explained and signed by them prior to treatment.

Initial Therapy:
Each patient received initial therapy prior to surgical therapy. Every effort was made to modify habits that may have contributed to the development of gingival recession. Occlusal adjustment was done if needed. Plaque control instructions were given until patients achieved a plaque score of 1.

Oral Hygiene Status:
Patient’s oral hygiene status was evaluated at baseline and after 6 months by using Full mouth Plaque index (FMPI, Turesky et al., 1970) and gingival health by Full mouth Papillary Bleeding index (Muhlemann, 1977)

The following clinical parameters were measured for assessment of the results in all the selected cases: probing pocket depth (PPD), clinical attachment level (CAL), gingival recession (GR) and width of keratinized gingiva (WKG) by using the William’s graduated periodontal probe. All the probing measurements were recorded at maximum depth recession (Mid-facially per tooth), only on teeth to be treated at baseline and evaluated at 6 months postoperatively.

Surgical Procedure: After local anesthesia, the exposed root surface was planed with hand & ultrasonic instruments.

Recipient site preparation: Intrasulcular incision was made at the labial aspect of the involved teeth. Two horizontal incisions were made at right angles to the adjacent interdental papillae at the level of cemento-enamel junction without interfering with the gingival margin of the neighbouring teeth. Two oblique vertical incisions were extended, beyond the mucogingival junction and a trapezoidal mucoperiosteal flap was raised, up to the mucogingival junction. After this point, a split thickness flap was extended apically, releasing the tension and favouring the coronal positioning of the flap. The epithelium on the adjacent papillae was de-epithelised. The smooth root surface was achieved with curettes and was washed with saline solution.

Harvesting of connective tissue graft: A SCTG in a proper dimension was harvested from the palate and trimmed as necessary.

Placement of connective tissue graft under the flap: The SCTG was placed at the Cemento Enamel Junction (CEJ) level and 2-3mm beyond to margin of alveolar bone covering the entire defect and adjacent recipient bed. It was secured by sling sutures and flap was coronally positioned to cover the graft. The coronal margins of flap were placed, slightly coronal to CEJ, stabilized with simple interrupted 5.0 Vicryl sutures laterally and continuous sling sutures coronally (Fig. I).
For the ADMA group: Acellular Dermal Matrix Allograft to be adapted after being aseptically rehydrated in sterile saline according to the manufacturer’s instruction. The graft was trimmed in such a way that coronally it was at CEJ and apically it covered the alveolar bone up to at least 2 to 3 mm. The basement side was placed adjacent to the bone and tooth and connective tissue side was placed facing the flap. The coronal and lateral border of ADMA was sutured to lingual gingival tissue with resorbable sutures. The flap was then coronally positioned and sutured to cover the ADMA (Fig. II).

Subsequently periodontal dressing was placed over the surgical site in both the groups.

**Clinical Indices:**

The decrease in mean Plaque index score (PI) and mean Papillary bleeding index score (PBI) at baseline and 6 months postoperatively in both groups indicated improvement in gingival condition throughout the study (Table I).

In both SCTG and ADMA group no significant difference in reduction in mean PPD, CAL, GR and WKG was recorded after six month post-operatively (Table II). Mean percent root coverage in SCTG group was 96% and in ADMA group was 93% indicating no significant difference in mean percent root coverage (Table III & IV; Fig. III).

**Discussion:**

When multiple gingival recession defects affecting adjacent teeth in aesthetic areas of the mouth are present, they should be treated at the same time to achieve the best aesthetic results (Cetiner et al, 2004). Therefore, this case series was carried out to evaluate the effectiveness of Subepithelial connective tissue graft and Acellular dermal matrix allograft.

**Results:**

During the course of the study, wound healing was uneventful. The periodontal dressing remained in place until the first postoperative appointment. There were no postoperative complications in any patient. None of the selected patients dropped out before the termination of the study and the patients were satisfied with the results.
Evaluation of Effectiveness of Acellular Dermal Matrix Allograft-----Somnath B.K., P. Charde & M.L. Bhongade

Table I: Mean Plaque Index (PI) and Papilla Bleeding Index (PBI) score between baseline and at 6 Months. Postoperatively in SCTG And ADMA Group.

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<th>Parameters</th>
<th>SCTG</th>
<th>ADMA</th>
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<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>6 Months</td>
</tr>
<tr>
<td>PI</td>
<td>0.76</td>
<td>0.75</td>
</tr>
<tr>
<td>PBI</td>
<td>0.76</td>
<td>0.74</td>
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Table II: Comparison of clinical parameters between baseline and 6 months postoperatively in SCTG and ADMA group.

<table>
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<tr>
<th>Parameters</th>
<th>SCTG</th>
<th>ADMA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>6 Months</td>
</tr>
<tr>
<td>PPD(mm)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CAL(mm)</td>
<td>3.8</td>
<td>1.1</td>
</tr>
<tr>
<td>GR(mm)</td>
<td>2.8</td>
<td>0.1</td>
</tr>
<tr>
<td>WKG(mm)</td>
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A total number of 20 buccal/labial recession defects in 10 patients were treated. There was no sign of allergy, infection or any other complication in any patient after the use of ADMA graft, which indicates that the product Acellular dermal matrix (Alloderm) was well tolerated.

The clinical outcome of various forms of surgical interventions are influenced by general level of oral hygiene. The results indicate that both treatment modalities, SCTG and ADMA group showed good improvement in the studied clinical parameters with respect to baseline & at 6 months (Table I). Successful root coverage was found in both the treated groups with root coverage in SCTG group being 97% and in ADMA group was 94% (Table III & IV). These

Fig. II : Clinical sequence of Acellular dermal matrix allograft (ADMA) group (A) Preoperative gingival recession on 31&41 (B) Horizontal & Vertical incisions (C) Flap reflection with Split thickness (D) ADMA sutured in place (E) Flap sutured coronally covering the entire ADMA (F) Postoperative clinical view after 6 months.
findings are in agreement with earlier studies by Hirsch et al (2005), who observed 99% root coverage for SCTG group and 95% for ADMA group. However, Rahmani & Lades (2006) observed mean root coverage of 70% for both SCTG and ADMA groups.

In the present study, mean gain in clinical attachment level in both the groups was 2.7 mm. Since, no histological evaluations were available, the type of healing obtained between the ADMA and previously denuded root surface can only be speculated on. Based on the reports of ADMA, matrix would revascularize via preserved vascular channel and that it would integrate into the host tissue (Bernimoulin et al, 1975; Yukna et al, 1977; Vernino et al, 1986). At the same time ADMA may also act as a barrier equivalent to selective cell repopulation membrane, thus encouraging periodontal guided tissue regeneration. The observed clinical changes probably represent a combination of new connective tissue attachment in the apical half of the defect and the presence of long junctional epithelial attachment in the coronal half (Harris, 1994). In case of connective tissue graft, based on histological evidence, healing has been shown to be mediated through a long junctional epithelium along the major portion of the root with an extremely limited area of new attachment and bone formation at the base of the recessions (Majzoub et al, 2001). Although a new connective tissue attachment mostly fails to form in the entire depth of the defect, in previous histological studies on ADMA and SCTG the treatment procedures used in the present series did not result in formation of a deep periodontal pocket.

In the present series, we observed increase in the WKG in SCTG and ADMA groups by 1.2 mm & 1.0 mm respectively. A similar observation was made in a clinical trial comparing SCTG and ADMA with coronally positioned flap (Hirsch et al, 2005; Tal et al, 2002). In a comparative study on the effectiveness of ADMA to increase width of attached gingiva, Wei et al (2000), reported that ADMA produced a lesser extent of attached gingiva in comparison to SCTG. They believed that the difference could be attributed to considerable shrinkage of ADMA during the healing phase.

One of the advantage of ADMA is that the need for palatal donor material is eliminated which reduces postoperative morbidity. In addition, it provides an unlimited supply of graft material, thus permitting multiple site root coverage that can be extended for a sextant, quadrant, or even a full mouth arch at one time. Moreover, other advantage of ADMA was an excellent tissue colour match obtained. Although there was no attempt to objectively evaluate colour match in this investigation, however, the effect was clearly seen clinically.

The root coverage obtained by both procedures although, was satisfactory, patient’s satisfaction was especially observed with the use of ADMA as most of the patients were treated with aesthetic request.

**Conclusions:**

From the analysis of result of this case series, the following conclusions were drawn:

1. Both therapies resulted in better reduction of the gingival recession, probing pocket depth, significant gain in clinical attachment level and width of keratinized gingiva.
2. SCTG and ADMA group showed mean root coverage of 97% and 94% respectively at 6 months postsurgically.
3. Mean CAL gain obtained in both groups was 2.7 mm.
4. Mean increase in width of keratinized gingiva was 1.2 mm in SCTG and 1 mm in ADMA group.

**Bibliography:**


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Conflict of Interest: None declared.