

Root Coverage Using Alloderm® Acellular Dermal Graft Material

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Abstract

This report describes a surgical technique for root coverage using an acellular dermal graft material and a coronally positioned flap. Video clips of a root coverage surgery are included using the graft material to cover multiple teeth in the same quadrant. Three additional completed cases are presented in which a mean root coverage of 97% was achieved, resulting in 100% coverage on 9 of 11 teeth. The results from this case series conform with the available evidence on the use of acellular dermal graft material in root coverage procedures.

Keywords: AlloDerm, acellular dermal graft, gingival recession, mucogingival, periodontal disease

Introduction

Patients are more conscious of dental esthetics and are requesting more root coverage procedures. This generates a need for clinicians to develop materials and techniques that will predictably satisfy these patient-centered esthetic demands.

According to the National Survey of Oral Health, 88% of seniors aged 65 years and more and 50% of adults aged 18-64 years have lost gingival form and function and have one or more sites with recession. The prevalence and extent of recession increases progressively with age.^{1,2}

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%.^{3,4,10} Thus treatment of buccal recession remains a major challenge to clinicians.

Root coverage techniques currently used by most clinicians include pedicle grafts (lateral sliding or

double papillae) with or without connective tissue grafts, epithelialized autogenous grafts (free gingival), connective tissue grafts, coronally positioned flaps (CPF) alone, CPF preceded by a free gingival graft, and CPF with a simultaneous connective tissue graft. Each of these techniques result in varying degrees of success and offer a variety of treatments for such defects.³

A new acellular dermal allograft tissue (Alloderm®^ε) has been recently introduced for use in dentistry, although it has been used in medicine for full-thickness burns,^{1,12} the revision of depressed scars and nasal reconstruction,¹³ facial defect repair,¹⁴ lip augmentation,^{15,16} and septal perforation repair.¹⁷ In dentistry, its uses include substitution for palatal donor tissue in soft tissue surgeries around natural teeth and implants to increase the zone of keratinized tissue,¹⁸ for tissue augmentation,¹⁹ and for root coverage.^{20,21} The intent of these procedures is principally to create a tissue barrier that is more resistant to further recession due to trauma. Other indications include soft tissue flap extension over bone graft, amalgam tattoo correction, and soft tissue defect repair (Table 1).

Table 1

Advantages and disadvantages of acellular dermal graft material
Uses <ul style="list-style-type: none">• root coverage• soft tissue flap extension over bone graft• amalgam tattoo correction• soft tissue defect repair
Advantages <ul style="list-style-type: none">• reduces need for palatal autografts or other second surgical site• ability to treat larger areas in one surgery• provide excellent esthetic results
Disadvantages <ul style="list-style-type: none">• decreases surgical chairtime• additional cost• technique sensitive• longer healing time

Advantages and Disadvantages of Acellular Dermal Graft Material

Table 1 lists the advantages and disadvantages of the acellular dermal graft material. Acellular dermal graft material can be used to treat larger areas of recession with just one surgical site, with less time, and with good aesthetic results. Disadvantages include longer healing time, additional cost of material, and the learning curve associated with the handling of the material.

Processing of the Acellular Dermal Graft Material

During the processing of Alloderm® acellular dermal graft material, the epithelium is first removed from the donor tissue while the basement membrane is retained to promote faster reepithelialization. Next, cells are removed from the remaining tissue by a series of detergents that eliminate the chance for an antigenic response by the recipient. The tissue is then freeze-dried and packaged for immediate use. The graft material consists of a connective tissue surface which readily absorbs blood and a basement membrane surface that does not allow for blood absorption.

Technique for Root Coverage Using Acellular Dermal Graft Material

The surgical procedure consists of a coronally positioned flap and placement of the acellular dermal graft material.¹⁴ Prior to incision, the teeth are scaled to remove any debris, then conditioned by burnishing the exposed root(s) with one of the following: tetracycline (100 mg/ml for 4 minutes), citric acid (aqueous pH 1 for 2-3 minutes) or EDTA (pH 7.3 for 2-3 minutes). Bleeding points equivalent to the amount of buccal recession are marked in the interproximal papillae with a probe at the location of the intended new papillae tip. Scalloped sulcular incisions are made with the

new papillae tips formed from the existing papillae. The incision is extended to the nearest line angle of the adjacent non-defect tooth. At these line angles, oblique corono-apical releasing incisions are made. Full thickness flaps are reflected to approximately 3 mm apical to the alveolar bone crest. Starting at the coronal aspect, a split thickness flap is dissected to facilitate adequate mobility and coronal positioning of the flap. The papillae are then deepithelialized to ensure a good vascular and connective tissue bed. Rehydration of the acellular dermal graft material is essential for a minimum of 10 minutes. Sterile saline or a tetracycline solution (250 mg tetracycline per 50 ml of sterile saline) is recommended. The acellular dermal graft material is sized in the mouth. The graft is then removed from the mouth and notched to fit the area. The graft is adjusted to completely cover the defect and is positioned at the CEJ, while the inferior and lateral borders of the graft are extended at least 3.0 mm beyond the osseous defect margins. The coronal border of the graft material is notched at the interproximal papillae to facilitate adequate blood flow between the papillae and the flap. The graft is placed with the basement membrane side (smooth side) against the root surface and is sutured using a sling suture technique with a Maxon® suture. This suture material is ideal because it is a monofilament with an extended resorption time of approximately 10 weeks. Following anchoring of the graft material, the flap is coronally repositioned and sutured using a double sling suture technique. Novafil® suture material is used here because it is a nonresorbable monofilament with greater elasticity and excellent memory. The releasing incisions are closed with interrupted sutures using the Novafil® suture material.

Table 2

Recommended Post-operative Protocol
Antibiotic <ul style="list-style-type: none">• doxycycline hyclate 50 mg q.d. for 14 days
Anti-inflammatory <ul style="list-style-type: none">• naproxen 375 mg q12h for 7 days
Pain Control PRN <ul style="list-style-type: none">• narcotic analgesic of choice if needed
Anti-inflammatory <ul style="list-style-type: none">• tapered dose of a glucocorticoid steroid such as:<ul style="list-style-type: none">• @dexamethasone 3.0 mg q.d. for 3 days• 2.0 mg q.d. for 3 days• 1.0 mg q.d. for 3 days
Antiplaque <ul style="list-style-type: none">• chlorhexidine digluconate 0.12% rinse at least twice daily for 1 month

Recommended Post-Operative Protocol

The recommended post-operative protocol (Table 2) includes prescriptions for systemic doxycycline hyclate 50 mg once a day for 14 days to prevent plaque from colonizing the graft material to enhance optimal healing.¹⁵ Naproxen 375 mg every 12 hours for 7 days is used to control inflammation and swelling as well as post-operative pain. If needed for severe pain, a narcotic analgesic of choice can also be given. Starting the day of surgery when large areas (3 teeth or more) are treated, a tapered dose of dexamethasone, 3.0 mg q.d. for 3 days (three 1.0 mg tablets), 2.0 mg q.d. for 3 days (two 1.0 mg tablets), and 1.0 mg q.d. for 3 days (one 1.0 mg tablets) is given to reduce post-operative swelling. It is important to prevent as much swelling as possible because clinical experience has shown that edema can disrupt graft stability and cause the sutures to pull through the papillae resulting in apical flap displacement. Chlorhexidine digluconate 0.12% (CHX) mouthrinse should be applied twice daily with a cotton tip applicator for one month post-operatively for plaque control. The CHX regimen should be continued until routine oral hygiene procedures can be resumed at approximately 1 month. The patient is seen for weekly post-operative visits to evaluate healing and plaque control. Sutures are not removed until the 1 month post-operative visit.

Case Descriptions

Case 1

The patient is a 28-year-old male with recession generalized at premolar/canine regions of the dentition. The pre-operative recession in this initial slide measures 1 mm for #10, 4 mm for #11, and early recession (approximately 0.5 to 1.0 mm) and very thin marginal gingiva of #12 and #13.





The patient elected to use AlloDerm® in lieu of the conventional palatal donor approach. AlloDerm® was placed with the connective tissue side facing the teeth, as previously discussed in the technique section.

Eight weeks post-operatively, the tissue appears firm and healthy with no probing depth. Complete root coverage was achieved in addition to increasing the thickness of the marginal tissue. In approximately 6 months, the tissue will mature to a smooth contour.

Table 3. Frequency of Root Coverage for Presented Case Series

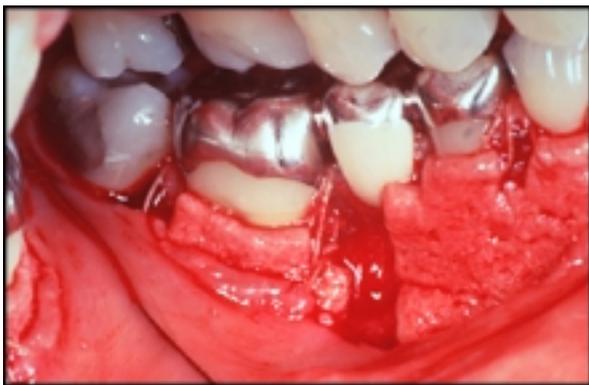
Tooth/Case	Recession	Mean Initial Recession	Mean Final Difference	% Root Coverage
Case 1				
10	1.00 mm	0.00 mm	1.00 mm	100
11	4.00 mm	0.00 mm	4.00 mm	100
12	1.00 mm	0.00 mm	1.00 mm	100
13	1.00 mm	0.00 mm	1.00 mm	100
Case 2				
28	3.00 mm	0.00 mm	3.00 mm	100
29	3.00 mm	0.50 mm	2.50 mm	83
31	3.00 mm	0.50 mm	2.50 mm	83
Case 3				
19	1.00 mm	0.00 mm	1.00 mm	100
20	3.00 mm	0.00 mm	3.00 mm	100
21	3.00 mm	0.00 mm	3.00 mm	100
22	3.00 mm	0.00 mm	3.00 mm	100
Total Mean	2.36 mm	0.09 mm	2.27 mm	97%

Case 2

The patient is a 62-year-old female with recession generalized at premolar/canine region. The pre-operative recession in these initial slides shows a fixed bridge from #29 to 31, with recession of 3 mm at #28, 29, and 31. Early Class II furcation invasion is evident on the buccal of #31.



The one-year post-operative results show a smooth gingival contour with a very firm and healthy appearance. There is residual recession of 0.25 to 0.5 mm at #29 and 31 (previously classified as Miller Class III).²⁴ The gingival margin appears thicker and more resistant to trauma.



AlloDerm® was placed with the basement membrane side to the teeth.

Table 3. Frequency of Root Coverage for Presented Case Series

Tooth/Case	Recession	Mean Initial Recession	Mean Final Difference	% Root Coverage
Case 1				
10	1.00 mm	0.00 mm	1.00 mm	100
11	4.00 mm	0.00 mm	4.00 mm	100
12	1.00 mm	0.00 mm	1.00 mm	100
13	1.00 mm	0.00 mm	1.00 mm	100
Case 2				
28	3.00 mm	0.00 mm	3.00 mm	100
29	3.00 mm	0.50 mm	2.50 mm	83
31	3.00 mm	0.50 mm	2.50 mm	83
Case 3				
19	1.00 mm	0.00 mm	1.00 mm	100
20	3.00 mm	0.00 mm	3.00 mm	100
21	3.00 mm	0.00 mm	3.00 mm	100
22	3.00 mm	0.00 mm	3.00 mm	100
Total Mean	2.36 mm	0.09 mm	2.27 mm	97%

Case 3

The patient is a 28-year-old male with generalized recession, but most pronounced at premolars/canines. The pre-operative recession measures 3 mm on teeth #20-22 and 1 mm recession on #19. The gingival margins are very thin, transparent, and do not appear resistant to trauma. The exposed root surfaces are sensitive to air and cold. AlloDerm® was placed as previously described.

The eight-week post-operative results show complete root coverage, with a healthy appearance to the gingiva. The gingival margins appear thicker and more resistant to trauma. Sensitivity to either air or cold has been eliminated and sulcular probing depths are 2 mm or less.



Table 3. Frequency of Root Coverage for Presented Case Series

Tooth/Case	Recession	Mean Initial Recession	Mean Final Difference	% Root Coverage
Case 1				
10	1.00 mm	0.00 mm	1.00 mm	100
11	4.00 mm	0.00 mm	4.00 mm	100
12	1.00 mm	0.00 mm	1.00 mm	100
13	1.00 mm	0.00 mm	1.00 mm	100
Case 2				
28	3.00 mm	0.00 mm	3.00 mm	100
29	3.00 mm	0.50 mm	2.50 mm	83
31	3.00 mm	0.50 mm	2.50 mm	83
Case 3				
19	1.00 mm	0.00 mm	1.00 mm	100
20	3.00 mm	0.00 mm	3.00 mm	100
21	3.00 mm	0.00 mm	3.00 mm	100
22	3.00 mm	0.00 mm	3.00 mm	100
Total Mean	2.36 mm	0.09 mm	2.27 mm	97%

Comments

Connective tissue grafts are currently considered the gold standard for root coverage since they are highly predictable procedures for treating recession defects and average between 65% and 98% root coverage.⁴⁻¹⁰ However, a common concern of patients is that connective tissue grafts require an additional surgical site and produce added morbidity. Harvesting a palatal or other intraoral donor site causes additional discomfort to the patient and increases chair time for the surgeon. The availability of the acellular dermal graft material for use in mucogingival surgery can minimize or eliminate both of these problems. The acellular dermal graft material is available without creating a second surgical site and can be purchased in large pieces adequate to cover large areas of buccal recession (i.e., up to a full arch) in one surgery.

Results of this case series demonstrated a mean of 97% root coverage with 100% root coverage on 9 of 11 teeth. This technique represents yet another advancement in the treatment of recession defects. Graft success with the material is highly dependent on proper orientation of the material. Accordingly, the connective tissue side is placed towards the tooth.

Technique Questions

If there are any questions about this technique, contact Dr. Robin D. Henderson via email at rdhenderson@earthlink.net.

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£ Lifecore Biomedical, Inc., Chaska, Minnesota
££ Sherwood, Davis & Geck, D & G Monofil Inc., Manati, PA 00701
¶ Sherwood, Davis & Geck, D & G Monofil Inc., Manati, PA 00701

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