Abstract

Treatment of gingival recession has been a common practice in periodontics for years. As esthetic demands of periodontal patients increase, more root coverage procedures will be performed to satisfy esthetic demands. Often patients present with multiple areas requiring treatment. Palatal anatomy may limit the amount of autogenous tissue that can be harvested, limiting the number of procedures that can be performed. A patient may not desire to have additional tissue transplanted from the palate, due to increased pain and morbidity associated with multiple transplant procedures.

The following is a case presentation of multiple adjacent recession defects. The patient presented with a shallow palate from which one side would not yield an adequate quantity of connective tissue. Furthermore, the patient declined to have both sides of his palate harvested simultaneously. As an alternative, an acellular dermal matrix allograft was utilized to correct these gingival defects negating the requirement for a second palatal surgical procedure.

Keywords: Periodontal plastic surgery, root coverage, grafts, esthetics, acellular dermal allograft

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Introduction

Gingival deficits are usually corrected with autografts from either the palatal mucosa or buccal gingiva. However, many patients exhibit a minimal band of buccal keratinized tissue with several areas of recession which limits the availability of suitable tissue to transplant. This limitation can be further complicated by the presence of a small, flat palate which also impedes the therapist’s ability to obtain an adequate amount of tissue to transplant. In these situations, a gingival allograft material that is easily obtained, safely used, and provides predictable results benefits both the patient and the surgeon.

An inadequate band of keratinized tissue has been associated with chronic inflammation and progressive recession when associated with poor oral hygiene. Orthodontic appliances, which can impede effective hygiene, can also lead to increased gingival recession in areas with minimal keratinized tissue. Other factors that are associated with gingival recession include underlying bony dehiscences, toothbrush abrasion, trauma, factitious injuries, and iatrogenic dentistry. Various methods of surgical correction for a lack of keratinized tissue range from periosteal separation, sliding or pedicle flaps, the double papilla technique, the coronally positioned flap procedure, free gingival grafts and subepithelial connective tissue grafts.

When a patient presents with a minimal zone of keratinized tissue and the therapist determines that surgical intervention should be undertaken to augment the site, the surgical alternatives are limited to the use of free gingival grafts, connective tissue grafts, denudation procedures, dura mater, AlloDerm, skin grafts, or fascia lata. The advantage of free gingival and connective tissue grafts is that they are autografts. Disadvantages of autografts include the need for a second surgical site, which adds time to the procedure and discomfort for the patient. Furthermore, use of autografts can be limited by anatomy and the amount of tissue available for harvest. Resorting to denudation procedures results in discomfort and additional bone loss during healing.

Dura mater has been used in dentistry as a barrier membrane for guided tissue regeneration to treat mucogingival defects and to increase the band of keratinized tissue. A potential problem with dura mater is the transfer of the virus that causes Creutzfeldt-Jakob disease. However, Marx and Carlson reported no documented case of Creutzfeldt-Jakob infection with the use of allogenic dura mater.

Skin grafts have been used in dentistry for reconstruction after surgery of cancerous and precancerous lesions as well as TMJ disc repair. Additionally, partial thickness skin grafts have

The purpose of this case report is to demonstrate the use of an acellular dermal matrix allograft (AlloDerm) as a gingival substitute. The material was utilized with the goals of achieving coverage of exposed root surfaces and augmentation of a minimal band of keratinized tissue in a patient with a history of aggressive homecare with a hard bristled toothbrush.
been used to augment inadequate bands of keratinized tissue around dental implants.23 As a result, skin grafts would be a viable alternative to oral grafts but with the same disadvantages of a second surgical area. An additional disadvantage would include possible scarring at the donor site.

AlloDerm® is a product that the manufacturer claims to be an alternative to free gingival and connective tissue grafts. The AlloDerm® process decellularizes allograft skin to create an acellular, biocompatible, CT matrix which consistently integrates following transplantation. According to the manufacturer, the allograft is obtained from screened donors then decellularized to extract living cells. The product undergoes two key anti-viral steps. The first is the decellularization process, since viruses reside in human cells. The second step involves the addition of an antiviral agent which will inactivate HIV.24 The process is proprietary and, thus, the manufacturer has not revealed all of its materials or manufacturing steps.

Use of AlloDerm® offers the advantages of an unlimited supply of grafting tissue and elimination of a second surgical site; its handling characteristics are similar to connective tissue and it is non-immunogenic. The disadvantage is that the material is an allograft, requiring donated tissue from a human source.

Case Presentation
A thirty-three year-old Caucasian male was referred for evaluation due to gingival recession. The medical history was reviewed and found to be non-contributory. A periodontal examination resulted in a diagnosis of generalized gingival recession. The mandibular right sextant was the most involved area. Facialy, recession ranged from 2mm at tooth #30 (mandibular right first molar) to 4.5mm at tooth #27 (mandibular right canine). Probing depths ranged from 1-3mm along this sextant. While a band of keratinized tissue of approximately 1-2mm was appreciated, the zone of attached gingival tissue was only < 1mm wide (Figure 1). The dental history was significant for a childhood and early adult habit of brushing the teeth with a back-and-forth scrub motion utilizing a hard toothbrush.

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The patient was instructed on proper tooth brushing technique and encouraged to use a soft or extra-soft toothbrush. Although the patient was asymptomatic for dentinal sensitivity, he was concerned with poor esthetics due to this gingival
recession. Treatment plans were presented, and the patient elected to proceed with periodontal plastic surgery to attempt root coverage and increase the zone of attached tissue. Of significant concern was the presence of a shallow palate. In order to obtain an adequate quantity of tissue, both sides of the palate would have to be harvested. However, the patient declined having two surgical sites, so an acellular dermal allograft (AlloDerm®) was selected as an alternative due to the extensive amount of material required to graft the involved sextant.

Prior to surgery, the patient rinsed for 60 seconds with a 0.12% chlorhexidine mouthrinse. After local anesthesia was achieved, a full thickness flap was elevated from the facial of tooth #30 through the mesial of tooth #27, where a vertical releasing incision was utilized (Figure 2).

The facial papillae were degranulated and the sextant was grafted with AlloDerm®. The AlloDerm® was oriented with the basement membrane side against the bone and teeth, while the connective tissue side faced the overlying flap (Figure 3).

The entire strip of AlloDerm® was utilized (1.0cm x 2.0cm). After positioning the graft at the mesial and distal ends with a simple interrupted “tacking” suture, the AlloDerm® was further secured with sling sutures around teeth numbers 28 and 29 and immobilized in the periosteum apically (Figure 4).

The overlying flap was sutured coronally with 5-0 Monocryl™ sutures (Figure 5). No periodontal dressing was utilized. The AlloDerm® was completely covered by the overlying flap, except for 0.5-1.0mm of AlloDerm exposed at tooth #27.

The patient was provided routine post-surgical care instructions, which included avoidance of the surgery site for 3 weeks. Chlorhexidine (0.12%) mouthrinse was prescribed to use twice daily. In order to maximize its anti-inflammatory properties and additionally provide analgesia, the patient received thirty 800mg ibuprofen tablets to be taken three times daily until gone.
The patient’s post-surgical course was within normal limits. At one week post-surgery (Figure 6), the patient voiced no complaints.

Healing was judged to be progressing rapidly. Root coverage of 100% was appreciated from tooth #30 to tooth #28, but 0.5-1.0mm of root exposure remained at tooth #27 where the acellular dermal allograft had not completely covered the exposure. When evaluated at two weeks post-surgery (Figure 7), healing was progressing well. At this stage, it was felt that 100% root coverage might be appreciated at teeth numbers 30 and 28, while only 0.5mm of root exposure would be the result at teeth numbers 29 and 27. The patient was instructed to continue to avoid mechanical oral hygiene in this sextant.

At three weeks after surgery (Figure 8), healing was judged to be similar to that seen earlier.

It was determined that the tissues were mature enough to initiate routine homecare, so the patient was instructed to begin flossing the mandibular right sextant and to use an extra-soft toothbrush dipped in the 0.12% chlorhexidine mouthrinse for the next two weeks. After five weeks of healing, the patient was then instructed to discontinue the chlorhexidine and begin using a dentifrice.

After three months of healing (Figure 9), the patient was re-evaluated. Healing of the root coverage procedure was judged to be very good. Significant root coverage was gained at all four teeth grafted with only 0.25-0.5mm of roots exposed along the sextant. Furthermore, probing depths were reduced to 1-2mm. Although there was not an appreciable change in the band of keratinized tissue, a clinically significant gain in tissue thickness was present. From an esthetic viewpoint, the patient was pleased with the result.

Discussion
The grafting technique demonstrated in this report is consistent with periodontal plastic surgery as described by Sullivan and Atkins, Miller, and others. The goal is to perform surgery as atraumatically as possible at the recipient and donor sites. In addition, hemostasis, graft coverage with an overlying mucosal flap, and stability of the graft were consistent with the subepithelial connective tissue graft described by Langer and Langer in 1985.
The indications for the connective tissue graft are as follows:27

1. Inadequate donor site for a horizontal sliding flap;
2. Isolated wide gingival recession;
3. Multiple root exposures;
4. Multiple root exposures in combination with minimal attached gingiva; and
5. At sites where ridge augmentation is desired.

In the present case, multiple roots were exposed with minimal attached gingiva.

Only recently has AlloDerm®, an acellular dermal matrix graft, become available for both medical and dental use. The tissue is surgically removed from a donor under sterile operating room conditions. The allograft is processed to remove the epidermal layer and all cells within the dermis. The resultant graft is an acellular dermal matrix with normal collagen bundling and organization and an intact basement membrane complex. Since the AlloDerm® process removes all cells, the components necessary for survival and transmission of virus are removed. Furthermore, the removal of cells leaves no components to cause rejection or inflammation that can result when unprocessed tissue transplants are used. Additionally, the graft is freeze-dried. There has never been a reported case of HIV transmission from a transplant that has been freeze-dried.28

AlloDerm® has been used successfully in many different circumstances. Wainwright29 as well as Lattari and co-workers30 reported its successful use in the management of full-thickness burns. AlloDerm® was judged to be advantageous since it reduced the amount of donor skin required, maximized the available dermis, and decreased morbidity at donor sites. Wainwright29 was also able to confirm with histologic and electron microscopic evaluation of biopsies that host cells infiltrated into AlloDerm® along with neovascularization of the allograft. Kridel, et al.31 used AlloDerm® in both private practice and university settings for repair of septal perforations. All cases were deemed successful, with 11 of 12 demonstrating complete closure. This group reported that this allograft was thicker and easier to suture than autografts. Tobin and Karas32 utilized acellular dermal matrix grafts as a safe and effective means of mild to moderate augmentation of lips for plastic surgery.

Dental use of AlloDerm® has included increasing the zone of keratinized tissue around teeth and implants, root coverage, and ridge preservation procedures.33,34,35,36 In general, healing is reported to proceed uneventfully with results being deemed clinically successful.

In this case presentation, four adjacent teeth with root exposure that ranged up to 4.5mm was treated with a single allograft. Healing was uneventful. The results were judged to be very successful as both the band of attached tissue was increased and root coverage was obtained. The main advantages of an acellular dermal allograft are:

1. unlimited supply,
2. available in various sizes,
3. no second surgery site needed thus decreasing patient morbidity.
References


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