Correcting Soft Tissue Deficiencies Prior to Esthetic Dental Procedures

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Abstract

Adequate zones of attached, keratinized tissue are important for the periodontal health of the natural tooth system and surrounding bone. This principle becomes more significant in periodontal/prosthetic and cosmetic dental procedures. Additionally, in tooth replacement procedures, adequate zones of attached, keratinized tissue can lead to a healthy implant/gingival complex. Correction of deficient gingival tissues by either autogenous or allogenic tissue grafts has been well documented in the literature. This article describes acellular dermal tissue grafting in conjunction with correcting and altering the natural tooth system prior to the finalization of prosthetic procedures.

Obvious advantages exist in utilizing acellular dermal matrix grafts.

Introduction

The esthetic enhancement of the natural dentition is a significant component of the contemporary dental practice. Proper zones of attached, keratinized tissue can lead to a balanced, harmonious gingival complex that can complement the ceramic alteration of the natural tooth, or tooth replacement with dental implants. In areas where there is a lack of attached keratinized tissue, in addition to root surface exposure, consideration must be given to correcting the deficient tissue contours prior to any tooth alteration and/or implant placement procedures. Various procedures to correct deficient gingival contours have been well documented in the dental literature.

Figure 1: Preoperative view, maxillary right.

Figure 2: Preoperative view, maxillary anterior.

Review of the Literature

The increasing of zones of attached gingival tissue using palatal donor tissue and the free gingival grafting procedure was introduced by Bjorn almost a half century ago.[1] Use of palatal donor tissue in the form of a free soft tissue autograft for root coverage procedures was reported by Miller.[2] Additional procedures were reported utilizing lateral[3] or coronal[4-6] repositioning of the adjacent attached gingivae via a pedicle flap, or the coronal repositioning of previous grafted tissue.[7-8] Miller also reported gingival grafts placed over root surfaces to correct areas of deep-wide gingival recession.[9] Further surgical advancements led to utilizing subepithelial connective tissue from the palate to obtain root coverage.[10-11]

One of the impediments to patients accepting soft tissue procedures to correct gingival loss is the trauma from harvesting palatal donor tissue. Depending on the volume of tissue required to correct the recession present, multiple harvesting procedures may be required. Also, an inadequate amount of connective tissue may be present, and the patient's medical status may play a role in whether he or she is a good candidate for the palatal donor site surgery. As a result of some of these concerns, corrective gingival surgery expanded to the use of acellular dermal matrix grafts as a substitute for palatal connective tissue grafts.[12] Harris reported a comparative study of root coverage obtained with an acellular dermal matrix versus a connective tissue graft.[13] He observed no clinical or statistical difference between the two materials. Henderson and colleagues reported on predictable multiple-site root coverage using an acellular dermal matrix autograft,[14] with additional clinical documentation of dermal matrix grafts and their successful use in root coverage procedures.[15-19] Allen described a tunneling technique whereby a surgical pouch is created, the acellular dermal matrix is placed into the pouch, and the pouch is then coronally repositioned to cover the graft completely.[20]

Obvious advantages exist in utilizing acellular dermal matrix grafts. The avoidance of harvesting the palatal tissues is a major benefit to patients undergoing this type of treatment. For the surgeon, to have unlimited amounts of tissue available and to be able to treat multiple sites at one surgical visit makes the surgical procedure more efficient. Furthermore, the high quality of the donor tissue, in addition to its natural esthetic appearance and patients' improved acceptance of therapy, makes this tissue an ideal replacement procedure for palatal soft tissue grafting.

Case Report

A 54-year-old non-smoking female presented for correction of deep, wide gingival recession in the maxillary anterior (Figs 1-3). The patient's desires were to correct the gingival recession, balance the heights of contour of the tissues, and possibly to undergo esthetic enhancement of the maxillary anterior with veneer restorations.

Treatment Plan

The treatment plan was to increase the zone of keratinized tissue in addition to root coverage in the maxillary anterior. The patient was given the option of utilizing her palatal tissue as a donor site, or the use of acellular dermal matrix tissue;

Figure 3: Preoperative view, maxillary left.

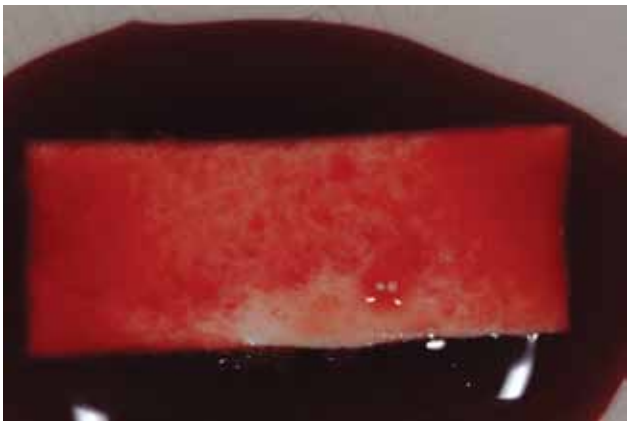

Figure 4: Acellular dermal matrix rehydrated and enriched with PRP.

Figure 5: Root preparation, teeth ##9-11.

Figure 6: Root preparation, teeth #9, #10.

she opted for the latter as the graft to be utilized.

Treatment

Following the technique outlined for fabrication of platelet-rich plasma (PRP),[21] blood was harvested from the patient's anticubital fossa, and the process was initiated. The dermal matrix tissue was then trimmed for each of the surgical sites to be treated. The horizontal dimension of the graft should extend 2 to 3 mm beyond the last tooth where recession is present at each end of the surgical site, whereas the vertical dimension should be 6 to 8 mm. Once the graft was properly trimmed and sized, it was submerged in a solution of non-activated PRP for rehydration. This was accomplished while the surgical site was being prepared (Fig 4).

After administration of an appropriate local anesthetic, root preparation was accomplished by scaling and root planing with hand instrumentation, and rotary instruments, followed by burnishing of the roots with 24% ethylene diaminetetra acetate (EDTA) and citric acid solution (pH1) (Figs 5 & 6).

Following the surgical technique previously referenced,[20] with modifications to the technique, intrasulcular incisions were made around each tooth to be treated (to a minimum of one tooth on each side of the affected teeth). The incision was not carried through the entire papillae apical to the contact point, being contained roughly between the mesial and distal line angle of each affected tooth. After the incisions were made, instruments to create a tunnel under each of the incised portions of the papillae were utilized to elevate the base of the papil-

Figure 7: Acellular dermal matrix placed into "pouch."

Figure 8: Acellular dermal matrix secured.

Figure 9: Pouch coronally advanced and dermal matrix covered.

lae. The pouch was then created by blunt dissection using a mucoperiosteal elevator, extending the reflection apically past the mucogingival junction, and laterally to the facial aspect of the tunneled papillae. Occasionally, the papillae may separate in this process, as occurred in this case. Deepening and mobilization of the pouch was then accomplished by sharp supraperiosteal dissection, which allowed for the pouch to be coronally advanced and to cover the dermal tissue completely.

The AlloDerm (Biohorizons Inc.; Birmingham, AL), which had been rehydrated and enhanced with the non-activated PRP solution, was then placed into the surgical pouch with the basement membrane adjacent to the root surface (Fig 7). The dermal matrix was then secured with 6.0 polypropylene sutures (Ethicon; Sommerville, NJ) (Fig 8). The graft should be positioned at the cemento-enamel junction. The pouch was then coronally advanced to cover the dermal matrix graft completely; it can be secured with 5.0 Monocryl (Ethicon) or 6.0 polypropylene sutures (Fig 9).

The two-and-a-half week postoperative clinical view can be seen in Figures 10-12. Note the rapid soft tissue healing and maturation. At six weeks postoperative, tissue plasty was accomplished to blend the thickened keratinized tissue, in addition to placement of Class V composite restorations at teeth #5, #6, and #11 in order to create a new restorative margin on the root surfaces.

The two-month postoperative view is shown in Figures 13-15. Please note the color match of the tissue, balance of the facial heights

Figure 10: Two-and-a-half week postoperative view, maxillary anterior.

Figure 11: Two-and-a-half week postoperative view, maxillary right.

Figure 12: Two-and-a-half week postoperative view, maxillary left.

of contour, and zones of attached keratinized tissue present.

Conclusion

Adequate zones of keratinized, attached tissue are important for long-term periodontal health and maintenance. Restorative and/or cosmetic dental procedures benefit from having this type of periodontal environment. Soft tissue grafting and augmentation procedures have been developed and perfected over the last 30 years. Incorporation of acellular dermal matrix grafts have simplified the procedure and made it more patient-friendly, allowing patients who have avoided palatal donor harvesting to have the procedure accomplished by using a safe and effective biomaterial. Acellular dermal matrix tissue has proven to be equal to palatal connective tissue for root coverage procedures in randomized, controlled clinical studies.[12,16-19] Tal and colleagues reported that the use of AlloDerm, under a coronally advanced flap, produces an esthetic outcome superior to that achieved with a palatal connective tissue graft.[18]

Dermal matrix grafting possesses distinct advantages over palatal connective tissue due to the following factors:

- avoidance of the palatal donor surgical site
- multiple teeth can be treated at one visit
- unlimited amounts of donor tissue are available
- high quality of the donor tissue
- ability to match, or be superior to, the results observed with autogenous palatal tissue grafts.

Reestablishing the proper soft tissue quality prior to restorative intervention contributes to more predictable outcomes for tooth en-

Figure 13: Two-month postoperative view, maxillary right.

Figure 14: Two-month postoperative view, maxillary anterior.

Figure 15: Two-month postoperative view, maxillary left.

hancement and replacement procedures. Dermal matrix grafts provide a safe, reliable option to palatal donor connective tissue.

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