

THE PEDICULATED CONNECTIVE TISSUE GRAFT: A TECHNIQUE FOR IMPROVING UNAESTHETIC IMPLANT RESTORATIONS

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Clinicians are often faced with the treatment of complex aesthetic dilemmas around implants, which can be caused by improper fixture placement and inadequate soft tissue management. Even the most aesthetic porcelain crown restoration will have an undesirable appearance if the soft tissue architecture is deficient. Although some implant fixtures may need to be trephined and the site grafted and retreated, this is a long process and may have an unpredictable outcome. One alternative is to attempt soft tissue augmentation around the unaesthetic restoration. Cases will be used to demonstrate the use of the pediculated connective tissue graft to augment deficiencies in soft tissue around previously restored implants in the maxillary aesthetic zone.

Key Words: implants, aesthetic, soft tissue, pediculated connective tissue graft

The evolution of osseointegrated implants for single-tooth restorations was a natural progression in tooth replacement. Unfortunately, clinicians are now beginning to observe adverse results of implant placement in the aesthetic zone. Common causes for these unaesthetic restorations include improper implant placement and inadequate soft tissue management around the implant and restoration. Although some implants should be trephined and replaced, the patient is often confined to lengthy treatment involving bone grafting, implant replacement,

and a new restoration. Another possibility is the use of distraction osteogenesis to move the fixture and soft tissue to improve the outcome. In the aesthetic zone, these procedures may jeopardize adjacent structures. There is no guarantee that this prolonged retreatment will produce a significantly improved result.

Various forms of the connective tissue graft have been used in the aesthetic zone to preserve sites following tooth extractions,¹⁻⁴ to augment edentulous ridges,⁵⁻⁷ and during immediate implant placement.⁸⁻¹⁴ This article will demonstrate three unaesthetic cases that were enhanced with the use of the pediculated connective tissue graft (PCTG) while preserving the original implant. Restoration yielded an improved aesthetic result due to the enhanced soft tissue architecture.

Case 1: Improper Soft Tissue Management

A 45-year-old female patient previously received implant replacement of tooth #8(11). The soft tissue profile



Figure 1. Case 1. Preoperative facial view demonstrates visible implant platform and deficient gingival tissues in the marginal and interproximal regions.

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was deficient, the platform of the fixture was visible, and considerable black space was present between the central incisors following placement of the provisional restoration. Although repeated surgeries were attempted to improve the soft tissue profile, the result was unsatisfactory. The patient was referred to the author in order to discuss potential soft tissue augmentation around the existing fixture. The site was deficient in the gingival margin and interproximal area (Figure 1).

Tissue Augmentation

The crown and abutment were removed from the fixture, and an internal cover screw was placed in the fixture to permit the implant to "self cover." In approximately three months, the implant was uncovered using a palatal approach.^{15,16} A labial pouch was created with split-thickness dissection. A 2-mm healing abutment was subsequently placed on the fixture. A PCTG was dissected near the first molar (Figure 2),^{4,5} and its width was dictated by the site to be augmented and the depth of the palatal vault. Shallow donor sites did not allow placement of a wide graft without risk of heavy bleeding. The length and width of graft was scribed to the bone with a sharp blade. The pedicle was elevated from the bone (Prichard Elevator, Hu-Friedy, Chicago, IL). Care was taken to keep the pedicle intact, with its base just lingual to the site to be augmented, and the pedicle was released enough to allow tension-free placement over the site.^{4,5,11,13} The pedicle graft was then flipped over the 2-mm abutment, tucked into the pouch, and sutured periosteally (Figure 3). The end of the pedicle reached a minimum of 3 mm apical to the platform of the implant. The labial flap was approximated as much as possible to cover the pedicle graft and sutured to the palate. An orthodontic appliance (ie, Essex appliance) with a bonded tooth was inserted. The use of this appliance eliminated potential palatal pressure that could have diminished blood supply to the flap and the PCTG. The site was allowed to heal for 4 months and was then evaluated to determine if further augmentation was required (Figure 4). Since the 2-mm abutment was covered with tissue, a punch uncovering was performed at 4 months to uncover the area and a 4-mm healing abutment was placed to keep the area uncovered.¹⁶ Restoration was

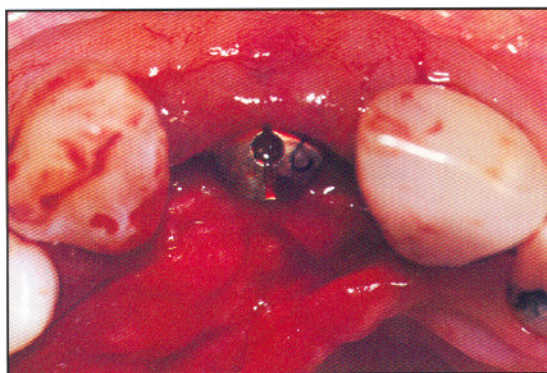


Figure 2. A pediculated connective tissue graft was harvested and prepared for placement over the 2-mm abutment.

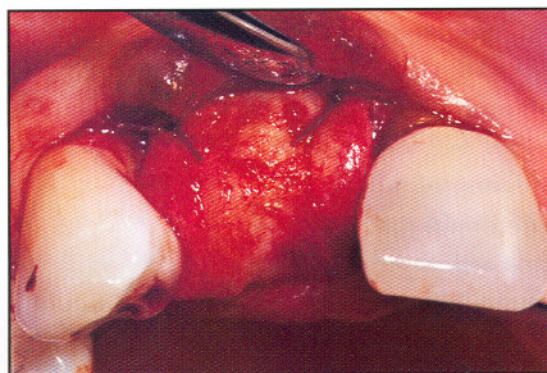


Figure 3. The pedicle graft was placed over the abutment and secured within the pouch with 5-0 gut sutures.



Figure 4. The tissues were allowed to heal for 4 months and evaluated.

initiated 3 weeks later, and the restorative clinician molded the site with a provisional restoration for 2 months before a final impression was taken and the definitive restoration was placed (Figure 5).



Figure 5. Postoperative appearance demonstrates complete tissue healing and aesthetic integration of the definitive restorations.



Figure 6. Case 2. Preoperative view 2 years following initial implant treatment demonstrates unaesthetic restorations with visible fixture platforms.

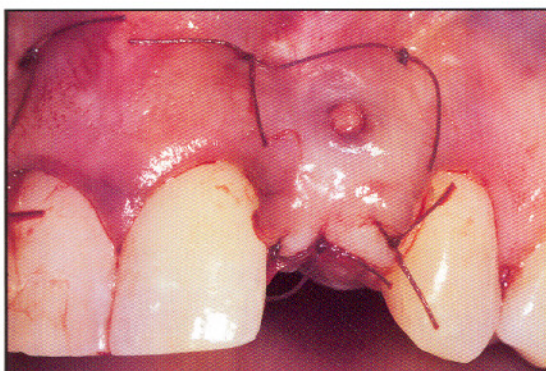


Figure 7. The pedicle graft was placed into a labial pouch 3 mm apical to the platform.

Case 2: Labially Angled Implants

A 35-year-old female patient presented with congenitally missing lateral incisors. The teeth were replaced with osseointegrated implants two years previously and

unaesthetically restored (Figure 6). The patient was referred to the author for soft tissue augmentation. Clinical and radiographic evaluation revealed that the preexisting fixtures were apically and labially malpositioned. The resulting gingival margins were 4 mm apical to the ideal gingival level, and the fixtures were visible. Considerable labial and coronal augmentation was necessary to achieve an aesthetic result.

The preexisting restorations were removed, fixture level impressions were taken, and internal cover screws were placed. Two months later, PCTGs were employed from both sides of the palate. The 2-mm healing abutments were placed, and the PCTG was tucked into a labial pouch and sutured approximately 3 mm apical to the top of each fixture (Figure 7). The tissue was evaluated 4 months postoperatively (Figure 8). Punch uncovering was performed to the top of the 2-mm healing abutments. Bonded teeth with an ovate pontic form were placed into the prepared sites over the 2 mm healing abutments (Figure 9). Three months later, the bonded teeth and healing abutments were removed, and provisional restorations were screwed into the original fixtures. The soft tissue architecture was molded for four months, and the definitive all-ceramic restorations (Procera, Nobel Biocare, Yorba Linda, CA) were seated (Figures 10 and 11).

Case 3: Improper Positioning of Adjacent Implants

An 18-year-old female patient lost teeth #10(22) and #11(23) due to trauma. Osseointegrated fixtures were placed, and considerable gingival level disharmony with the adjacent natural teeth was observed following uncovering. The patient also demonstrated a high smile line. A conventional connective tissue graft had been placed to attempt coronal gingival margin augmentation. Although the graft augmented the site in a labial dimension, no coronal gain was evident, and the gingival levels remained unaesthetic (Figure 12). The patient was unhappy with the restorative result. A removable provisional restoration was fabricated to fit over the healing abutments. After considerable discussion with the patient and prosthodontist, it was decided that aesthetic restoration of both fixtures with crowns would be difficult

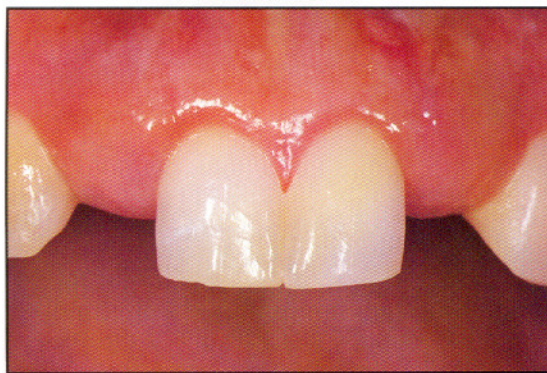


Figure 8. Tissue healing was evaluated prior to punch uncovering 4 months postoperatively.



Figure 9. Bonded restorations were provided with an ovate pontic form and placed into the prepared sites.



Figure 10. Postoperative appearance following placement of the definitive restorations demonstrates improved tissue condition and aesthetics.



Figure 11. Postoperative facial appearance demonstrates aesthetic integration with the patient's natural smile line.

to achieve and that the development of ideal gingival margin levels and papillae between the restorations would be complicated. The patient preferred to avoid a clip-on removable partial denture with gingival-colored porcelain and was not willing to pursue distraction or trephination therapy.

The treatment plan consisted of tissue augmentations, putting fixture #10 to "sleep," and placement of a cantilever pontic on fixture #11. A PCTG was employed via the aforementioned protocol. The internal cover screw, however, was left in site #10, and a 2-mm abutment was placed on site #11 (Figure 13). After four months of healing (Figure 14), site #11 was uncovered, and the 2-mm healing abutment was removed. A small incision was made over the #10 pontic site to allow placement of an ovate pontic. A prefabricated provisional restoration was inserted at the time of the uncovering. The ovate pontic would develop the site further and attempt to

compress the papilla against the distal aspect of tooth #9 (Figure 15). The tissue was molded with the provisional restoration for 4 months before final impressions were taken and the final restoration was seated. A small amount of gingival-colored porcelain was also incorporated to enhance the final result (Figures 16 and 17).

Discussion

The PCTG allows successful development of vertical soft tissue augmentation. Although conventional connective tissue grafts can improve the buccal aspect of compromised sites, coronal gain remains unpredictable. The results shown in the three aforementioned cases required wide, long, and thick PCTGs. It is important that the PCTG be adequately released to allow tension-free placement over the site and be positioned 3 mm apical to the implant platform. The depth and thickness of the palate will affect the surgeon's ability to achieve



Figure 12. Case 3. Preoperative facial view demonstrates an unesthetic gingival condition surrounding the 4 mm healing abutments on teeth #10(22) and #11(23).

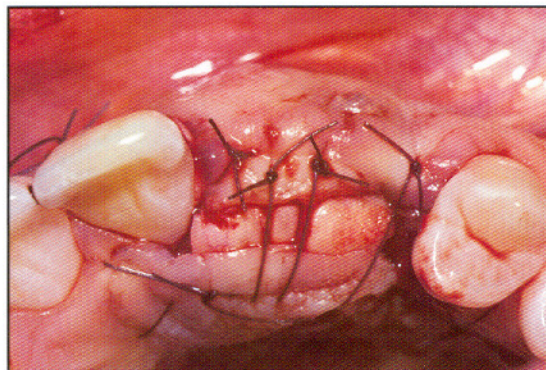


Figure 13. A pediculated connective tissue graft was placed. Care was taken to maintain the internal cover screw in tooth #10, and a 2-mm abutment was placed on tooth #11.



Figure 14. The tissue was allowed to heal for 4 months.

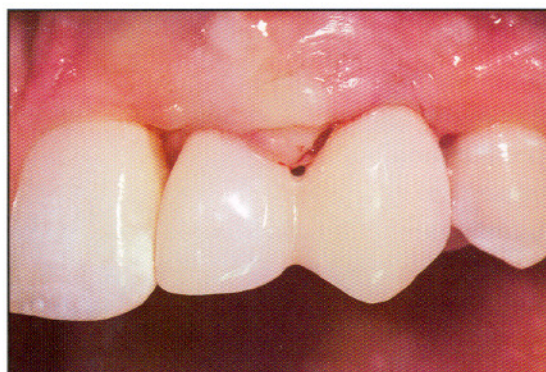


Figure 15. At the punch uncovering, the provisional restoration was seated to allow tissue healing of the ovate pontic site and interdental papillae.

ample tissue without postoperative sequelae (eg, bleeding, palatal necrosis).

Provisionalization of these augmented sites can be a challenge. The use of an Essex appliance allows considerable adjustment without breakage and minimal-to-no pressure at the donor site. Although the slight palatal bump occasionally created with this technique may cause complications due to the change in palatal architecture, it can be reduced by minor tissue thinning. This tissue is highly vascular, and prolonged bleeding can even occur following a simple punch uncovering. An accurate assessment of the fixture location is critical. If the fixture is placed overly deep and apical, establishment of an ideal gingival margin by soft tissue augmentation may cause excessive sulcular depth. In Case 3, it was decided to bury the fixture in the #10 site. If the ideal gingival margins were created, there would have been 6 mm to 7 mm of sulcular depth to the head of the implant, which

would be difficult to maintain in a state of health. In addition, establishment of an ideal papilla between the fixtures would be complicated. In Case 1, the fixture was not placed to the adequate depth apically. Following augmentation and coronal gain of soft tissue around the implant, it was not possible to maintain the gingival margins of the central incisors at the same level. If the fixture is labially inclined more than 30°, it may be best to trephine the fixture and start over. Maintaining the augmented gingival margin is very difficult. The author's experience has demonstrated that the gingival margin will recede over a period of time in spite of the use of angulated abutments and soft tissue augmentation.

Conclusion

The difficulty in treating the aforementioned cases emphasizes the importance of proper implant position and overbuilding the soft tissue architecture around the site. They



Figure 16. Postoperative view following definitive restoration. A small amount of tinted porcelain was applied to the gingival regions of the restoration to ensure an aesthetic result.



Figure 17. The definitive restorations demonstrated harmonious integration during natural smile.

demonstrate the compromises a restorative clinician faces when implant placement is less than ideal and the soft tissue framework is inadequate. The PCTG is an excellent technique that can be used for vertical and labial augmentation of soft tissue. It can be employed to improve unaesthetic soft tissue structures around implants and can also be used to augment deficient ridges where pontics are scheduled. The three cases presented herein illustrate the use of this technique for soft tissue augmentation around previously treated unaesthetic implant restorations.

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