

The Palatal Subepithelial Connective Tissue Flap Method for Soft Tissue Management to Cover Maxillary Defects: A Clinical Report

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This article presents a technique for soft tissue reconstruction and covering defects associated with maxillary implant-supported restorations. A pedicle subepithelial connective tissue flap is prepared from the palatal mucosa near the area to be treated and is displaced into the receptor site. The donor site remains primarily covered. An increase in soft tissue volume is achieved at the receptor site, which is advantageous for various reasons. The pedicle graft has been used for different indications: closure of the alveolus after immediate implant placement, papilla reconstruction, defect and dehiscence repair, and multiple-layer closures after bone grafting and treatment of peri-implantitis. Over a 32-month period, 103 patients were treated with this method. Partial flap necrosis occurred in only 2 patients. All other patients showed significant improvement over the preoperative condition. (INT J ORAL MAXILLOFAC IMPLANTS 2000;15: 415-418)

Key words: endosseous dental implantation, gingivoplasty, guided tissue regeneration, pedicle graft, surgical flaps

In some clinical situations it may be necessary to have extra soft tissue available to reconstruct a defect or to create an esthetic implant restoration. The literature describes different techniques for repairing local defects of the alveolar process through bone grafting and soft tissue grafting.^{1,2} Other authors have reported on various procedures for obtaining soft tissue coverage of augmented areas after the placement of membranes or local bone transplantation.³ Primary coverage is especially important if non-resorbable guided bone regeneration membranes are used, since severe dehiscence with infection can compromise the entire augmented area. Furthermore, in practice the

membrane cannot always be placed as far away as possible from the flap margin, as required by the protocol. In these situations a multiple-layer closure can be very advantageous.

When immediate implant placement is involved, different techniques have been used for obtaining soft tissue coverage. Primary coverage of the alveolus can no doubt be achieved with a trapezoid full-thickness flap utilizing the Rehrmann plastic procedure.⁴ However, in the esthetic region, this procedure may lead to extreme displacement of the mucogingival border.⁵ Consequently, the attached gingiva is shorter, and disorders of the entire soft tissue architecture may occur. Peri-implant attached and keratinized mucosa is not only important from the point of view of periodontal health⁶; its absence often results in color discrepancies of the peri-implant mucosa and can be a great esthetic disadvantage for patients with a high smile line.⁷ For this reason, Landsberg,⁸ Langer,⁹ and Khoury and Happe^{10,11} have reported on different procedures, with and without soft tissue transplantation, to achieve primary soft tissue closure without flap dislocation. Rosenquist⁵ described various techniques using free gingival grafts for primary closure of the alveolus

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after immediate implant placement. Since he sometimes observed necrosis with free grafts, Rosenquist recommended the preparation of a mucosal pedicle flap from the vestibule, folding it through a tunnel below the marginal gingiva and suturing it over the implant to the palatal mucosa. Although this method has been described as being safe and predictable, its application seems to be somewhat awkward. Furthermore, surgery is performed vestibularly to the alveolar process, where scarring might compromise the esthetic outcome.

Besides the tuberosity region, free connective tissue transplants may also be obtained from the palate.¹ On the basis of these considerations, the authors herein present a method for defect repair and soft tissue reconstruction in which the palatal incision is extended up to the receptor site to preserve the pedicle shape of the connective tissue graft. This report presents initial results utilizing this technique.

MATERIALS AND METHODS

Between 1997 and 1999, 103 patients (69 females and 34 males) were treated with the described technique. The youngest patient was 19 years and the oldest was 66 years, with an average of 39.5 years. The technique was used for the following indications: soft tissue closure after various augmentation procedures with and without membranes (Figs 1a and 1b), immediate implant placement, papillae reconstruction, correction of local defects, and treatment of post-augmentation dehiscences or peri-implantitis.

After local anesthesia was administered, a palatal paramarginal incision was made from the molar region to the defect to be covered. The length of the incision depended on the size of the defect. Dissection of the mucoperiosteal flap and the underlying preparation of a subepithelial connective tissue flap to a depth of 5 to 8 mm were then performed. A sharp incision of the subepithelial tissue was then made parallel to the first incision in the same manner to harvest a connective tissue graft, but leaving it attached in the anterior region. The subepithelial connective tissue flap was then elevated (Fig 1c) and rotated to cover the defect or reconstruct soft tissue (Figs 1d and 1e). Because the donor site is situated in a well-vascularized area (palatal artery), heavy bleeding can occur and may require cauterization. Since only a subepithelial connective tissue flap was removed, the palatal wound at the donor site could be totally closed and sutured. Patients were advised to rinse with 0.02% chlorhexidine for two weeks.

RESULTS

The described technique has been used for the following indications: (1) alveolus closure after immediate implant placement in 19 patients; (2) multi-layer flap closure in 18 patients after lateral bone graft, 26 patients after onlay bone grafting, 15 patients following augmentation in combination with e-PTFE membranes, and 8 patients after treatment of peri-implantitis; and (3) reconstruction of large soft tissue defects and reconstruction of papillae in 17 patients.

Bleeding related to flap preparation stopped in most of the patients after the donor site was sutured. However, in 6 patients the bleeding was so severe that electrocautery of the vessel became necessary. Postoperative bleeding was not observed in any of the patients. Visible partial flap necrosis occurred in 2 patients (1 after immediate implant placement and 1 after onlay grafting). In all other patients the wound healed without complication. The augmented connective tissue showed little shrinkage and was covered by epithelium after approximately 2 to 3 weeks. Postoperative morbidity was similar to that after removing a free subepithelial connective tissue graft from the palate.

DISCUSSION

Soft tissue grafts have been successfully used in periodontal treatment for many years to cover areas of root recession and alveolar ridge reconstruction.^{1,3,12} The authors concur with others who have suggested that the use of pedicle grafts presents a much more favorable prognosis than free grafts,⁵ because an important part of the blood supply to the flap is maintained during and after the procedure. Important factors to be considered for the long-term success of free mucosal and connective tissue transplants include primary fixation of the graft, the possibility of revascularization, and revitalization from the receptor site. Close contact to a well-vascularized receptor site positively influences the prognosis of free grafts. A subepithelial connective tissue graft between the mucosa and the periosteum is more predictable and has a much better chance of survival than free grafts over poor or non-vascularized areas such as a bone graft or a non-resorbable membrane.¹⁰ In these situations, pedicle grafts (flaps) are indicated.

Although the technique presented here has also been applied in unfavorable and extreme situations, the results obtained have been satisfactory. Partial flap necrosis occurred in 2 patients (1.9%); the 2



Fig 1a (Above) Large bone defect in the region of the maxillary left canine with the complete loss of labial and lingual plates.



Fig 1b (Right) Clinical situation after bone grafting with reconstruction of the entire alveolar process.



Fig 1c Preparation of an 8-mm-wide subepithelial connective tissue flap from the palatal mucosa.



Fig 1d The palatal connective tissue flap is rotated to cover, in a first layer, the grafted bone.

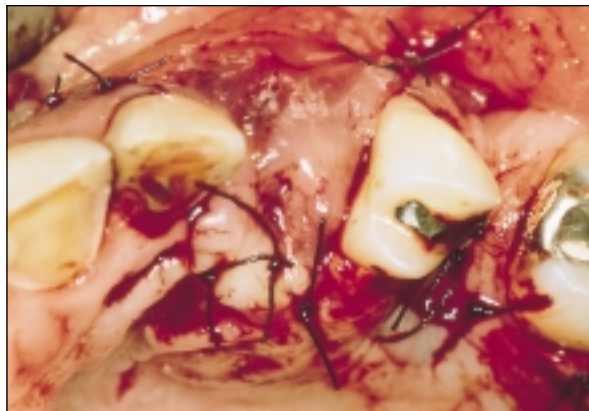


Fig 1e The reflected buccal flap ensures 2-layer coverage of the augmented area.

patients were heavy smokers, and in one instance, the procedure was a second surgery to cover a partially exposed onlay bone graft following wound infection. Two decisive advantages result from the use of pedicle grafts (flap) in comparison with free soft tissue grafts: the flap remains vascularized, and it is much easier to stabilize because of the pedicle. After the distal palatal vessels are severed, the blood supply of the flap is assumed by the mesial strip. In this area, there are small arterial branches that accompany the incisive nerve and ensure blood circulation to the anterior palatal mucosa.

In cases of immediate implantation, the palatal connective tissue flap ensures safe soft tissue closure without compromising esthetics. In addition, augmentation of the soft tissue volume occurs palatally, at the base of the flap. The soft tissue gained can be used later for various soft tissue management techniques (eg, the roll flap technique) as needed for esthetics.^{11,13,14} The palatal connective tissue flap is also advantageous in combination with different bone augmentation methods for the maxilla, with or without membranes. This is especially applicable in regions where dehiscence and gingival necrosis can occur. The flap creates an additional soft tissue layer over the flap margin. This improved soft tissue covering of grafted bone or membranes is one of the most important factors in successful treatment.¹⁵

Bleeding at the donor site may cause problems. However, this complication has also been reported with other techniques for harvesting subepithelial connective tissue.¹ Considering the fact that the donor site remains primarily covered, the risk-to-benefit ratio is better than with other harvesting techniques. The use of a palatal protective template can increase safety, and the potential risk of postoperative bleeding is minimized.

SUMMARY

Based on the authors' experience, the palatal pedicle graft permits safe and reproducible results for the following indications: immediate implant placement, papilla reconstruction, defect reconstruction, dehiscence repair, and multilayer coverage following bone grafting and peri-implantitis therapy.

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