



Soft Tissue Closure of Grafted Extraction Sockets in the Posterior Maxilla: The Rotated Pedicle Palatal Connective Tissue Flap Technique

Edgard S. El Chaar, DDS, MS

Contemporary patient expectations have made esthetics a major requisite of all dental treatment plans, especially in situations in which there is a highly visible maxillary arch. Although new restorative materials have greatly improved predictability and esthetic outcomes, management of sequelae subsequent to, or in conjunction with, tooth extractions still remains a clinical challenge. These include possible fracture or loss of the facial plate, progressive vertical and horizontal ridge resorption, severe gingival recession, and loss of the interdental papillae.¹⁻⁵ To prevent compromise of patient function and esthetics, preservation of the natural hard and soft tissue architecture is a primary clinical objective at the time of tooth extraction. This is achieved by using an atraumatic tooth avulsion procedure that preserves residual bone and soft tissue, followed by augmentation procedures to preserve the bone volume and contours of the ridge.

Many techniques have been developed over the last 3 decades to correct postextraction ridge deficiencies,

The sequelae of socket collapse and localized ridge resorption after tooth extraction in the posterior maxilla can adversely affect esthetics, function, and future implant placement. Immediate grafting of extraction sockets may help to preserve natural ridge contours; but lack of available soft tissue can prevent primary closure or exert tension that hampers graft turnover and compromises the visible gingival

scallop. Exposed barrier membranes may also be susceptible to bacterial infection that may lead to secondary graft failure. The rotated pedicle palatal connective tissue flap is a relatively simple technique for soft tissue coverage of grafted sockets without excessive tension. This article presents the technique. (Implant Dent 2010;19:370-377)

Key Words: socket, graft, pedicle, connective tissue

including soft tissue grafts,⁶⁻⁹ which were among the earliest treatment options. Although clinical outcomes with early soft tissue grafting were often impressive, repeated procedures were frequently required before the desired esthetic results could be achieved. Improved surgical procedures for atraumatic tooth extraction and the advent of guided bone regeneration technology have made correction of ridge deficiencies more predictable,¹⁰⁻¹⁶ but graft coverage and containment in extraction sockets remain a clinical challenge. Bacterial contamination of exposed barrier membranes have been associated with infection and graft failure,¹⁷ and use of soft tissue appliances to retain particulate augmentation material may potentially deform graft contours by exerting excessive pressure on the site.¹⁸

Flap manipulation techniques have been developed in an attempt to provide complete soft tissue closure over grafted extraction sockets.¹⁹⁻²²

Many side effects have appeared with these flap manipulations. These include scarring of the soft tissues, loss of keratinized gingival tissue, and complete or partial loss of the natural gingival scallop, which is essential for a natural-looking restoration. It is also important to note that most reported flap manipulation techniques are associated with healed edentulous areas rather than immediate extraction sites.²⁰⁻²¹

This article presents a technique for achieving primary soft tissue closure of grafted maxillary extraction sockets while preserving the natural gingival scallop of the maxilla.

CLINICAL TECHNIQUE

After completing preliminary clinical and radiographic evaluations, patients should be informed about the surgery, postoperative healing, and possible complications and should provide signed informed consent be-

Associate Professor, Department of Periodontics and Implant Dentistry, New York University, Private Practice, New York, NY

Reprint requests and correspondence to: Edgard S. El-Chaar, DDS, MS, 67 Park Avenue 1A, New York, NY 10016, Phone: 212-685-5133, Fax: 212-685-5134, E-mail: edgard@edgardelchaar.com

ISSN 1056-6163/10/01905-370
Implant Dentistry
Volume 19 • Number 5
Copyright © 2010 by Lippincott Williams & Wilkins
DOI: 10.1097/ID.0b013e3181ed06cd

fore treatment. Administration of a prophylactic antibiotic is recommended 1 hour before surgery: amoxicillin (500 mg, 1 tablet), or clindamycin (150 mg, 1 tablet) for patients with hypersensitivity to penicillin-based medications. Immediately before surgery, the intraoral mucosa is cleaned using a hydrogen peroxide swab and outside facial skin is wiped with a povidone-iodine solution. Local anesthesia is administered via buccal and palatal infiltrations.

Use of conventional elevators to apply lateral pressure for tooth luxation can traumatize both the buccal and lingual plates. If a buccal plate is thin, use of extraction forceps to apply buccolingual pressures can cause fracture or complete destruction of the facial plate. Atraumatic tooth evulsion is designed to help preserve all dimensions of the alveolus. The procedure begins with using extraction forceps to gently rotate the tooth for 30 seconds. This stretches the periodontal ligament and initiates bleeding around it. A resulting build-up of hydraulic pressure in the ligament helps to further loosen the tooth. An intrasulcular incision is made with a periosteal knife, thin-ligament knife, or ultrasonic surgical device (Piezosurgery, Mectron Medical Technology, Carasco, Italy) to sever the gingival attachment and most coronal portion of the periodontal ligament around the tooth. Once the tooth is fully mobile, it is gently removed with twisting movements and vertical elevation. This technique can be further simplified by using an instrument that engages the tooth root with a screw and provides mechanical leverage to extract it from the socket (Easy X-Trac System, Titan Instruments, Hamburg, NY).²³

Teeth with multiple roots, such as molars, must often be sectioned and each root segment removed individually. This can be easily accomplished using a high-speed handpiece followed by use of a piezoelectric surgical device to atraumatically extract the 3 roots. Root fracture can occur in cases in which the physiological gripping force of the Sharpey's fibers exceeds the gripping capacity of the extraction instrument or surgeon's strength, and tooth ankylosis can occur

when Sharpey's fibers are absent.²³ To address these issues, the surgeon may need to use more aggressive surgical procedures, such as root sectioning with a high-speed contra-angle and bur, and/or use of a rongeur or chisel and mallet to extract the root fragment.^{23,24}

An evaluation of the socket is performed immediately after tooth extraction. If the buccal wall is intact, the extraction socket can be immediately grafted in layers of cancellous and cortical solvent-dehydrated mineralized collagen allograft (Puros, Zimmer Dental Inc., Carlsbad, CA) and occluded with a bioabsorbable wound dressing (CollaPlug, Zimmer Dental Inc.) according to the method previously described by Wang and Tsao.²⁵ If the buccal wall is thin or has fractured during root removal, reinforcement of the area with a resorbable barrier membrane should be performed during the augmentation procedure.²³ This can be easily accomplished by elevating a partial-thickness soft tissue flap over the buccal wall and placing the barrier membrane beneath it. If the buccal wall is partially or fully lost, a full-thickness flap may be elevated to expose the buccal defect. This may be accomplished by creating a split-thickness incision on the 2 adjacent papillae and, if necessary, extending it to the neighboring teeth. After exposure, a resorbable barrier membrane is placed over the defect to contain the graft material.

Alternatively, flap elevations may be avoided by trimming a resorbable collagen membrane into a keyhole shape (20 mm × 5 mm × 10 mm), or using a collagen membrane pre-trimmed in those dimensions (*e.g.*, Zimmer Socket Repair Membrane, Zimmer Dental Inc.), and placing the small end of the membrane directly into the extraction site so that it extends laterally and apically over the facial plate defect.²⁶ Prepared graft material is introduced into the socket with a sterile syringe or applicator and carefully compressed with a sterile instrument. This will help to eliminate voids in the apical region of the socket and will push the facial tissue labially for better ridge contour. The wide end of the membrane that extends outside of the socket may be further trimmed,

if necessary, and gently folded over the top of the graft material. Absorbable sutures may be added, if desired, to temporarily stabilize the collagen membrane flap. In some cases, mucogingival junction extension incisions followed by reflection of a pouch flap according to the technique of Park and Wang²⁷ can help to provide improved graft retention, minimize membrane exposure, preserve papilla dimensions, and camouflage the graft site for improved esthetics.

In cases in which there is inadequate available tissue for effective mucogingival flap coverage, harvesting of a pedicle palatal tissue flap is initiated by making a horizontal incision 2 mm from the gingival margin of the teeth on each side of the grafted socket. Because the socket is located in the posterior region, the incision should be directed anteriorly to the needed dimension buccolingual to the socket after the horizontal incision is made. A transversal incision is then made to coincide with the mesiodistal dimension of the socket. An epithelial envelope is elevated over the delineated area (Fig. 1, a). The pedicle connective tissue is harvested, elevated, and rotated to cover the grafted socket (Fig. 1, b). Mesial and distal horizontal buccal mattress sutures are placed to stabilize the rotated pedicle palatal connective tissue flap (RPPCTF). Additional sutures may be added, if required. The palatal location where the connective tissue was harvested should also be securely sutured (Fig. 1, c) or sealed with a biologic glue.

The same technique can be used for 2 adjacent molars, premolars, or molar and premolar combination. After atraumatic extraction of teeth and socket grafting (Fig. 1, d), the connective tissue graft is precisely measured, harvested from the palate, and rotated over the site (Fig. 1, e) as previously described. It is always preferable to create the RPPCTF dimensions 1 to 2 mm longer than the actual graft site, so that it can be tacked under the buccal flap with a minimum tension. The same suturing technique is used between the RPPCTF and the buccal flap. In this case, however, simple interrupted loop sutures will extend

