Treatment of Multiple Adjacent Gingival Recessions with the Tunnel Subepithelial Connective Tissue Graft: A Clinical Report

This article describes a surgical periodontal plastic procedure for the coverage of multiple adjacent gingival recessions. This surgical technique is based on the construction of a tunnel under the gingival tissue by means of a sulcular incision beyond the mucogingival line without raising the papillae. A large connective tissue graft obtained from the palatal mucosa is introduced through this tunnel, covering the adjacent gingival recessions. A suturing technique to allow this graft to slip through the tunnel under the gingival tissues and to secure and stabilize the graft covering the recessions is described. Twelve-month postoperative results are presented from 21 teeth that were treated with this technique. 100% root coverage was achieved in 66.7% of the recessions treated, with a mean root surface coverage of 91.6%. This study suggests that the use of this surgical procedure allows the treatment of multiple adjacent recessions in a single procedure with adequate early healing and highly predictable root coverage results.

Different surgical cosmetic techniques for the coverage of exposed roots caused by gingival recession have been developed and improved since more and more patients demand procedures to improve their esthetic appearance. Different surgical techniques have proven efficient in the treatment of this condition: good results in root coverage and gain in clinical attachment have been reported with free gingival grafts\(^1\); sliding flaps either laterally,\(^2\) coronally,\(^3\) or transpositionally\(^4\); connective tissue grafts\(^5-6\) (CTG); and recently, guided tissue regeneration.\(^7\)

For these procedures, the CTG has been very frequently used because of its demonstrated advantages, which include improved color blending, reduced morbidity in the donor site, and high degree of clinical success. However, most of the time CTGs have been used in combination with coronally positioned flaps, which necessitate incisions on the
buccal flap, these may retard the early esthetic result. To avoid these incisions on the recipient site, the envelope technique was advocated. The advantage of this procedure is the fast early healing that results from the absence of these external incisions.

Most of these surgical procedures have been advocated and clinical results have been reported in the literature for the treatment of isolated gingival recessions. For the treatment of multiple adjacent gingival recessions, however, very seldom have procedures been presented and their clinical outcomes reported. Therefore, the purpose of this clinical report was to show the preliminary results obtained with a modification of the CTG and envelope techniques for the treatment of multiple adjacent gingival recessions in the anterior areas of the mouth.

Procedure

This surgical procedure involves a CTG placed in a multienvleope recipient bed (tunnel). This tunnel is made of a supraperiosteal bed under a pedicle flap without any external incisions. A CTG is then placed and secured through this tunnel, covering the adjacent exposed roots. The surgical procedure is shown in Fig 1. A step-by-step description of the proposed surgical procedure is exemplified by the case reports presented.

Patient 1 is shown in Fig 2 and patient 2 is shown in Fig 3.

The most common indications for CTGs are esthetic demands from the patients, Miller Class I and II recession, dental hypersensitivity because of exposed cementoenamel junction (CEJ), and the necessity to augment a narrow band of keratinized gingival tissue. The relative contraindications that may limit the results of the connective tissue autograft are heavy smoking, impaired healing response from the patient, Miller Class III or IV recession, or the existence of an extremely thin periodontium that would limit the amount of donor tissue. The specific indications for surgical intervention with the tunnel CTG include multiple adjacent
Fig 2a  Severe gingival recession on maxillary left lateral incisor, canine, and premolar in patient 1.

Fig 2b  Preserved papillae are raised with a partial-thickness incision (also see Fig 1a).

Fig 2c  Tunnel is created beyond the MGJ underneath the papillae of the treated teeth (also see Fig 1a).

Fig 2d  Donor tissue is placed over the treatment area to ensure that there is enough tissue (also see Figs 1b and 1c).

Fig 2e  Graft held by both sutures is ready to slide through the tunnel by means of a pull on both sutures (mesially and distally) and the help of a dull instrument (also see Fig 1d).

Fig 2f  After sliding it through the tunnel, graft is sutured with 2 square knots.

Fig 2g  Twelve-month healing of the treated recessions.

Fig 2h  Right side of the maxilla in patient 1 shows wide recession involving central and lateral incisors and canine.

Fig 2i  Twelve-month healing of the treated recessions on the right side of the maxilla in patient 1.
Fig 3a  Preoperative view of patient 2. Gingival recession in the maxilla affects both first premolars, both canines, both lateral incisors, and left central incisor. There is a very narrow band of keratinized tissue on both canines and both lateral incisors and a very thin periodontium.

Fig 3b  Twelve-month healing of the treated recessions.

Fig 3c  Right lateral view of the treated recessions after 12 months of healing. Large amount of keratinized tissue and very high percentage of root coverage are evident even though the recessions were Miller Class III.

Fig 3d  Left lateral view of the treated recessions after 12 months of healing. Note that 4 teeth were treated during the same surgical procedure.
recessions (Figs 2a, 2h, and 3a), situations in which very early healing is needed for esthetic demands, or a need to reduce the number of surgical interventions.

Preparation of the recipient bed

A tunnel under the buccal aspect of the gingival tissue is first created. Similar to any other graft, a sulcular partial-thickness incision is made through each recession area, undermining the tissue far beyond the mucogingival junction (MGJ) so that there is enough relaxation of this pedicle flap to allow the entrance of the CTG underneath. The partial dissection is then extended laterally through the papillae between the treated teeth without severing them (Fig 1a). This incision must also be extended 3 to 5 mm mesial and distal from the lateral teeth to allow space for the seating of the mesial and distal aspects of the CTG. Great care should be taken when going through the MGJ to avoid perforation of the flap; the large convexities in this area of the maxilla make perforation a danger, since most surgical instruments are straight in shape. The other difficulty is establishing the same plane of dissection under the whole flap to create a regularly shaped tunnel.

Preparation of the donor site

The second step is to harvest a CTG from the palatal mucosa that is long enough to cover the whole tunnel area. This graft is procured in the conventional way. The donor tissue area usually extends from the distal aspect of the canine to the most distal aspect of the tuberosity, sometimes even involving the buccal aspect of the tuberosity (t). Since the amount of donor tissue needed for this procedure may become quite large, familiarity with the anatomic limitations of the palate and the location of the greater palatine neurovascular bundle is recommended. (s)

Suturing

The most difficult part of this procedure is sliding the graft through the tunnel. To overcome this difficulty, 2 sutures are first placed, 1 at the most mesial and the other at the most distal aspect of the tunnel (Figs 1b and 1c). The needles pass underneath the tunnel and exit through the largest or most central gingival recession, the one through which the grafting tissue will be introduced.

With these 2 sutures already inside the tunnel, the graft is bitten on both ends with vertical mattress sutures. The entrance of these vertical mattress sutures should always be on the buccal aspect of the graft. Both suture needles are then taken backward through the tunnel to a position close to the initial puncture sites, so that the distal needle returns to the distal end of the tunnel and the mesial needle returns to the mesial aspect of the tunnel through 2 new bite points (Fig 1d). When the graft is held by the suture material, it can be pushed inside the tunnel through the most central recession. Insertion is facilitated by pushing with a dull instrument (4R-4L curette or dissector) and pulling at the same time, with the help of an assistant, on both sutures at each end. In this way the graft gently slides under the tunnel. If the flap has been adequately elevated, it can be positioned coronal to the CEJ (Fig 2e). A simple square knot will secure the graft in its desired position (Fig 2f). Mild compression with a sterile gauze with saline is recommended for 5 minutes before completing the surgical procedure.

Postoperative instructions and healing

The patient is instructed not to implement any oral hygiene procedures that may disturb the surgical area during the first postoperative week. A 0.12% chlorhexidine rinse is prescribed for this early healing phase. Sutures are removed at 7 to 8
The following outcome variables are reported below: initial vertical recession, final recession, reduction of recession, and root coverage expressed as the percent reduction of the recession. The descriptive statistics were based on calculations for the mean, standard deviation (SD), mode, range, and frequency distribution of the observed values. Comparative analysis of the recessions before and 1 year after treatment was performed using the Student's t test for paired data, after the application assumptions had been checked.

Results

Table 1 shows the evolution of the outcome variables measured with the proposed surgical technique. Before therapy, the mean vertical recession in the 21 treated teeth was 3.4 mm (SD 1.36); the most frequent recession was 2 mm (8 teeth). Ten of the treated teeth had an initial recession ≥ 4 mm (47.6%) and eleven teeth had recessions that ranged from 2 to 3 mm (52.4%). Of the 21 recessions, 19 could be considered Miller Class I or II, and 2 were Class III as a result of tooth malposition.

One year after the proposed surgical procedure, there was a mean reduction of recession of 3 mm (SD 1.5), which represents a mean root coverage.
of 91.6%. These differences are highly statistically significant ($P = 0.0001$) (Table 1). After 12 months only 1 of the recessions (4.8%) maintained a residual recession of 2 mm, while the recessions of the remaining 20 treated teeth were ≤ 1 mm (95.2%). There was a reduction of 1 to 2 mm in 9 teeth (42.9%) and of 3 mm or more in 12 teeth (57.1%). For 1 tooth 50% coverage was achieved, 6 teeth (28.6%) had between 75% and 90% coverage, and 14 teeth (66.7%) had 100% root coverage at the end of treatment.

Discussion

Most of the soft tissue grafting surgical techniques previously described in the literature have treated 1 or 2 gingival recessions in the same procedure. This tunnel subepithelial autograft has the capability of treating several adjacent gingival recessions in the same surgical appointment.

The advantages of this technique are those demonstrated by CTGs and those offered by the envelope technique, with the specific advantage of early initial healing since no external incisions are made on the surgical site. Because of this fast healing, the procedure is highly recommended in patients who need to be back to public life as soon as possible. Two weeks after the surgical treatment the color matching is very homogenous and no surgical incisions or suture marks are visible.

The only disadvantage to this technique when compared to other autograft procedures is the long recipient bed preparation time. Technical difficulties include avoiding flap perforation once the dissection goes beyond the MGJ, establishing the same plane of dissection under a large pedicle flap, and avoiding severance of the base of the papilla at the same time. This requires a large amount of skill and patience. As surgical instruments become smaller, this preparation time will get shorter. Therefore, microsurgical instruments are highly recommended.

The suturing technique proposed might be confusing at first because of the presence of too many large suture tails in the surgical area. To avoid this problem, the use of 2 different suture colors is suggested. Both sutures must be monofilament to avoid tearing the pedicle flap when the sutures are pulled to slide the graft tissues under it.

The clinical results obtained are comparable to results from published reports using similar surgical procedures. In the first patient, only 1 of the 6 treated teeth had a residual 1 mm recession after 12 months. Because the patient was a heavy smoker (20 cigarettes a day), the results were very satisfactory. In patient 2 over 95% root coverage was obtained even though tooth malposition and CEJ discrepancies were present. According to Miller's criteria, since Class III recessions are a result of these discrepancies they are less prone to full root coverage. Nevertheless, a high percentage of root coverage and a large band of keratinized tissue was achieved in this patient. The only recession that achieved only 50% coverage was a mandibular premolar in patient 2. This may be because of the necessity of extra sutures on the graft material to hold it up during healing and to compensate for gravity if the tunnel is too deep compared to the width of the grafting tissue.

The nature and quality of the attachment of the transplanted tissue on the root surface is not well known. One concern about the use of CTGs over large gingival recessions such as those treated in this report is the possible creation of a resorption process on the treated root surface. This concern arises from regeneration studies that describe root resorption after intimate contact between living connective tissue and a denuded root surface in the absence of other cellular compartments. We have not seen any such occurrence in our patient population. On the other hand, Pasquinelli described the histologic achievement of new attachment on a gingival recession
that was treated with a CTG after extraction for orthodontic reasons. He showed the formation of new cementum and fibrous attachment apparatus under the grafted tissue. There is not currently enough information about which conditions modulate the healing pattern; therefore, more research is needed in this area.

This study suggests that the use of the proposed surgical technique allows the treatment of multiple adjacent recessions in a single surgical procedure with adequate early healing and highly predictable root coverage results.

References


