

PARTIAL THICKNESS DOUBLE PAPILLA FLAP WITH CONNECTIVE TISSUE GRAFT — CASE REPORTS

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ABSTRACT

Various methods have been described to achieve root coverage. While aesthetic results from using pedicle grafting procedures is usually superior to the use of free gingival grafts, the major restriction to pedicle grafting procedures is related to the need for an adequate donor area adjacent to the area to be treated.

The double papilla technique evolved from treating defects where while tissues adjacent or apical to the defect alone may be inadequate for the grafting purpose, the sum of the tissue mesial and distal to the defect is adequate for that purpose. Moreover, as only minimal advancement or rotation of the flap is needed, it may be used in areas with shallow vestibules and in palatal areas.

It combines the aesthetic results of a pedicle graft with the predictability and usefulness of a free gingival graft and is an effective and predictable method of obtaining aesthetic root coverage.

Introduction

Mucogingival Surgery or Periodontal Plastic Surgery may be defined as "surgical procedures performed to correct or eliminate anatomic, developmental, or traumatic deformities of the gingiva or mucosa".¹

One common therapeutic goal in mucogingival surgeries is root coverage in areas with localised or generalised soft tissue recessions, particularly if they are associated with compromised aesthetics, root sensitivity or shallow root caries lesions.² In areas with thin gingiva, a further goal would be to increase the bucco-lingual thickness of the soft tissues to reduce the risk of gingival recession.³ This is especially so in cases where the tooth has restorations, such as a crown with sub-gingival margins⁴ or if the tooth is to undergo labial orthodontic movement.⁵

Various methods have been described to achieve root coverage. These procedures for root coverage may be classified as either pedicle soft tissue grafts or free soft tissue grafts.² Pedicle graft procedures, depending on their direction of transfer, may be grouped as (i) rotational flaps (such as lateral sliding flaps or papilla flaps) or (ii) advanced flaps, with or without rotation or lateral movement.⁶ Within the group of pedicle graft procedures, guided regeneration procedures may also be included. Free soft tissue grafts can be performed as a full thickness or a sub-epithelial connective tissue graft, both usually taken from the palate.

A recent review³ of publications of pedicle flap procedures with well documented clinical results revealed that on average, 56–74% coverage of defects has been achieved after 3–18 months. One study with coronally repositioned flap and citric acid treatment of the root surface showed 98% mean coverage of the root surfaces and complete coverage in 86% of the teeth treated.⁷ This study's results were markedly different from those reported in other studies, but may serve as an indication of the possible success perimeter.

With the use of free gingival grafts, the percentage root coverage obtained ranged widely between 11 and 100%.³ With the technique of free subepithelial graft and a coronally repositioned flap, the average percentage root coverage ranged from 57–71%.³

Two important factors that influence root coverage outcomes are the height of interdental bone and interdental soft tissue adjacent to the defect.⁸ Once there is loss of interdental bone and interdental soft tissues around the defect, only partial coverage can be expected. With regards to the success or failure of free gingival grafting, Miller⁹ (1987) further stated that the establishment and maintenance of a plasmatic circulation between the recipient bed and the free graft during the initial phase of healing was critical to preserving the vitality of the graft tissue. The depth and width of the defect, and therefore the amount of avascular tooth surface in contact with the graft during initial healing period, will also affect outcomes.

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While aesthetic results from using pedicle grafting procedures (with or without sub-epithelial connective tissue graft) is usually superior to the use of free gingival grafts,¹⁰ the major restriction to pedicle grafting procedures is related to the need for an adequate donor area adjacent to the area to be treated. In the case of a coronally repositioned flap, there must be adequate tissue apical to the defect. In the case of the obliquely positioned graft, adequate tissue must be present adjacent, either mesial or distal, to the defect. The depth of the vestibule is another consideration as it affects the extent to which advancement and rotation of the pedicle is possible.

This report aims to introduce and explain the use of a particular pedicle flap technique which may be used in cases where there is limited available keratinised tissue or vestibular depth adjacent to the recession defect of concern.

Double Papilla Flap Pedicle Graft

The double papilla technique evolved from treating defects where while tissues adjacent or apical to the defect alone may be inadequate for the grafting purpose, the sum of the tissue mesial and distal to the defect is adequate for that purpose.¹¹ Moreover, as only minimal advancement or rotation of the flap is needed, it may be used in areas with shallow vestibules and in the palate.

The partial thickness double papilla pedicle graft technique was first proposed by Cohen and Ross¹² in 1968. The indications of the procedure included recession areas with intact healthy papilla adjacent to the defect. The contra-indications included the adjacent papilla being relatively small or the presence of a gingival groove in the papilla.

This method however did not gain popularity. Hall¹¹ (1984) stated that the double pedicle graft had "very low predictability in most practitioners' hands". Many of the graft seem to split down the middle with time. The 1989 World Workshop in Clinical Periodontics¹³ concluded that "the double papilla pedicle has very limited usefulness". Its weaknesses were its poor predictability and the technical skills required to perform the procedure successfully.

To address the cleft formations commonly seen with the double papilla graft, Nelson¹⁴ (1987) proposed a technique that combines a free connective tissue graft with a full thickness double papilla pedicle graft. He reported mean root coverage of 91% and a significant reduction of cleft formations. While the results tended to be thicker than the results of pedicle grafts alone, there was no mention in that study of needing secondary gingivoplasty.

Harris¹⁵ further proposed the use of a partial thickness double pedicle flap rather than a full thickness one overlying a free connective tissue graft. Conceptually, a partial thickness flap design made sense since it would allow the connective tissue graft to receive vascular

supply both from the recipient bed and from the flap overlying it.

Case Report A

A 42-year-old, healthy, non-smoking female patient presented at the dental surgery with palatal gingival recession of the tooth 21. The recession occurred 10 years ago, after a localised "gum boil" healed. She has received several rounds of root planing by her previous dentists. Her incisor relation is in Class III. She complained of increased tooth sensitivity and difficulty in performing oral hygiene in the area of the recession.

Clinical examination revealed localised gingival recession 6mm in depth and 4mm in width on the palatal of tooth 21. Radiographic examination showed normal interdental bone heights. A decision was made to carry out a root coverage procedure. The double pedicle flap with connective tissue graft technique was used, as it was difficult to rotate or advance palatal tissues.

It is important that the cause of the recession be addressed before any surgery is carried out. Two common causes of gingival recession, plaque induced periodontal inflammation or trauma from tooth brushing, should be controlled before any surgery is carried out. In this case, periodontal infection was controlled before the surgery was carried out.

The following description is a modification of the surgical technique as described by Harris.¹⁶ After adequate anaesthesia is obtained, the exposed root surface is thoroughly planed by means of curettes. The goal is to eliminate any calculus, bacterial deposits, surface endotoxins and soft tooth structure. Additionally, any root prominence that can be reduced without removal of excessive tooth structure is removed.

The exposed root surfaces may at this time may be treated with either 1% citric acid or with a tetracycline solution (125mg per milliliter of saline). While the need is controversial, many clinicians use some form of root modification on the root surface when attempting root coverage procedures.⁹ This may be influenced by the suggestion that demineralisation of the root surface, exposing the collagen of the dentin, will facilitate the deposition of cementum by inducing mesenchymal cells in the adjacent tissues to differentiate into cementoblasts.¹⁷ However, studies by Oles et al¹⁸ (1985) and Caffesse et al¹⁹ (1987) comparing the efficacy of laterally repositioned flaps with and without root conditioning showed no beneficial effect of the use of citric acid. Moreover, in a controlled study in dogs, there was no difference in the amount of root coverage between recession sites treated with coronally repositioned flaps and citric acid or similar flaps and saline.²⁰ On the other hand, root resorption appears to be a common finding in roots treated with acid based root-modification agents.²⁰⁻²² The authors' preference is not to use any root modification agents while performing root coverage procedures.

Incisions are made to create the double papilla and a recipient bed with butt joint margins. A pair of partial thickness horizontal incisions are made starting at the cemento-enamel junction mesial and distal to the defect and extending towards the adjoining tooth, stopping

approximately 0.5mm from the adjoining tooth. At the termination of the horizontal incisions, partial thickness vertical relieving incisions are made in an apical direction with the blade angled perpendicular to the gingival surface so that butt joints are created.

Sulcular incisions are made to join both papillae adjoining the tooth. On one mesio-distal half of the sulcus, an inverse bevel incision is performed, while at the other half, an external bevel incision is performed. A partial thickness flap from the half with the inverse bevel incision is reflected and brought across the tooth to be sutured to the other pedicle (by 6-0 resorbable Vicryl sutures). The two joined pedicles are then reflected together.

A sub-epithelial connective tissue graft is harvested from the palatal aspect of the maxillary premolars or the retromolar pad by use of a "trap door" approach.¹⁴ A horizontal incision is made approximately 3mm apical to the soft tissue margin in the pre-molar area. The mesio-distal extension is determined by the graft size required. Two vertical relieving incisions, the length again, determined by the size of the graft required, is then made. This would form the outline of the trap door. A sharp partial thickness dissection is made and a "trap door" made of the palatal mucosa opened. The underlying connective tissue is reflected from the palate with a small periodontal elevator and placed on moist gauze. The thickness of the harvested connective tissue should be 1-1.2mm. Any glandular or adipose tissue present in the graft need not be removed.

The graft is sutured onto the recipient site with 6-0 Vicryl sutures at the corners of the graft and other sutures are placed to passively and intimately inlay the graft with the recipient bed. The previously joined pedicles are sutured over the connective tissue graft with a 6-0 Vicryl sling suture. Sutures may be further placed along the relieving incisions to stabilised the flap.

Gentle pressure is exerted against the graft after the careful suturing to expel blood between the graft and the recipient site. The intimate contact between the graft and the recipient site is important to allow for the "plasmatic circulation" that is critical for providing nutrient to the graft during the initial healing phase. A palatal plate with periodontal dressing was used to protect the wound.

The patient received oral antibiotic, 0.2% chlorhexidine mouthwash and oral analgesic. Antibiotics are given at the surgeon's discretion. It is recommended that the patients be seen at 1, 2, 4, 8 and 12 weeks for post-operative care. At the 1-week post-operative visit, the dressing and the suture over the donor area are removed. At the second week post-operative visit, while sutures are resorbable, if the wound is deemed to be stable, sutures that are unnecessary for the wound stability are removed to aid maintenance of oral hygiene. At this and all subsequent visits, plaque was removed from teeth in the surgical area.

Result: Wound healing, including that of the donor site was uneventful. Complete root coverage was achieved, and at 10 months appears to be stable.

Case Report B

A 37-year-old healthy, non-smoker male patient was referred for management of gingival cleft of tooth 32.

Clinical examination revealed recession of 4mm on the buccal of teeth 32 and 31 as well as recession of 2mm on the buccal of tooth 41. Tooth 32 has a gingival cleft that extends 6mm apically. The buccal tissue bio-type was of a thin character. Radiographic examination showed horizontal bone loss around the lower anterior teeth of around 1.5mm.

It was decided that a mucogingival procedure be carried out to achieve 2 objectives. The primary objective was to thicken the buccal soft tissue, and the secondary objective was root coverage. Patient was warned that in view of the attachment loss present, it is unlikely that complete root coverage can be achieved.

Before surgery was carried out, the patient was instructed to use a toothbrush with soft bristles as well as an atraumatic tooth-brushing technique that creates minimal apical pressure on the gingival soft tissue.

As in the previous case, after anaesthesia was achieved, the teeth 32, 31 and 41 were root-planed. Incisions were made to create the double papilla and a recipient bed with butt joint margins on tooth 32. It was decided that for 31 and 41, root coverage would be achieved with placement of connective tissue graft without any pedicle flap advancements, as in the technique described by Bruno.²³ After the papilla adjoining the defect on tooth 32 were joined together, a partial flap was reflected with relieving incisions located on the distal of 32 and mesial of 41.

While it is not relevant in this particular case, if there were a frenum near the tooth being treated, superficial dissection would have been performed as part of the flap design so as to relieve any potential tension on the graft site.

A palatal connective tissue graft was harvested with a collar of epithelium and placed intimately and passively over the defects. While the epithelium was excised from the part of the graft covering over the defect on 32, the epithelium was left alone over teeth 31 and 41.

The previously raised partial thickness flap was finally replaced over the connective tissue graft with a 6-0 Vicryl sling suture.

Oral medications and post-operative care was carried out as above.

Result: At 1 year, the treatment resulted in the successful elimination of the gingival cleft, with increased thickness of the buccal soft tissue. Complete root coverage of the recession defect was observed on tooth 32.

Partial root coverage was obtained for the teeth 31 and 41. It may be partly attributed to the loss of attachment present. As the patient was told of this expected result before treatment, and since the primary objective of the therapy (management of the gingival cleft on tooth 32)

was achieved, he was very satisfied with the treatment outcome.

Discussion

While the double pedicle flap first proposed by Cohen and Ross¹² had unpredictable long-term results,¹³ the modified flap design with connective tissue graft suggested by Harris¹⁵ appeared to have addressed this limitation. In a study of 100 consecutively defects treated by this technique, Harris²⁴ reported that incomplete root coverage occurred in 11% of the cases, with only 4% of the defects having a greater than 0.5mm of recession after therapy.

The most common clinically significant complication encountered at the defect site was a bulky result.²⁴ The colour match is not perfect in all cases, and scar lines could sometimes also seen. However, the mismatch in colour and the scar lines were judged to be less pronounced than in cases treated with a thick free gingival graft. Both these problems were reported to diminish over time.²⁴

The main source of post-operative pain, similar to all grafting procedures requiring a palatal donor site, is at the donor area.¹⁶ The advantage of a sub-epithelial connective tissue graft over a free gingival graft is that the uncovered wound area is significantly smaller with the former. An acrylic palatal plate that covers over the donor site is useful in reducing discomfort experienced by patients.

Conclusion

The choice of mucogingival surgical technique depends on the clinical situation and operator preference. However, the partial thickness double pedicle graft with connective tissue can be a useful technique in a variety of clinical situations.¹⁶ It combines the aesthetic results of a pedicle graft with the predictability and usefulness of a free gingival graft and is an effective and predictable method of obtaining aesthetic root coverage.

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Case Report A

Figure 1: Buccal view.



Figure 2: Pre-operative recession on tooth 21, after root planing was performed. Note incisions to outline pedicle flap.

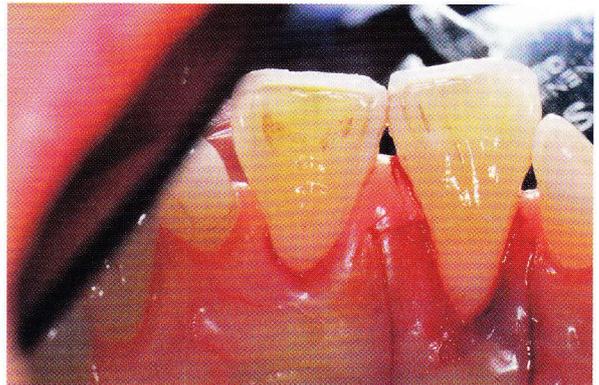


Figure 3: The pedicles were sutured together before reflection of the partial thickness flap.



Figure 4: Harvested connective tissue graft.

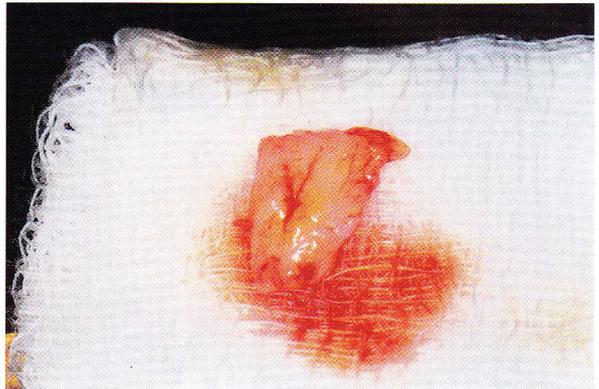


Figure 5: Pedicle flap sutured over connective tissue graft. Note that in this case, the tips of the 2 papillas were not sutured together. It is not advisable to place a suture too close to the tip of the papilla when the width of the papilla is too narrow. The flap over the premolar areas was the donor site for the graft.



Figure 6: A palatal plate was used to protect the wound.

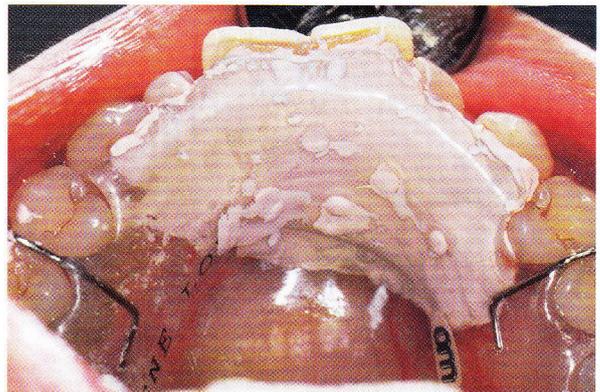


Figure 7: Post-operative 1 week.



Figure 8: Post-operative 2 weeks.

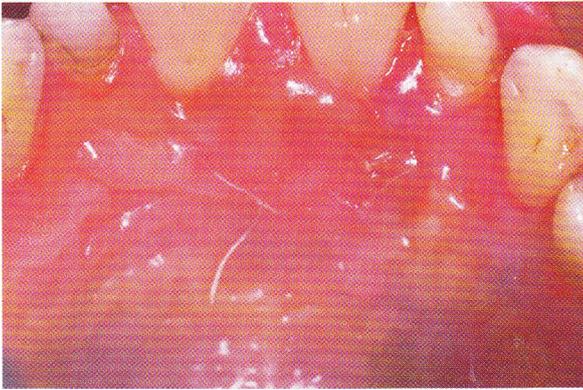


Figure 9: Post-operative 10 months.



Case Report B

Figure 10: Pre-operative view of recessions and gingival cleft.



Figure 11: Connective tissue graft with epithelium collar.

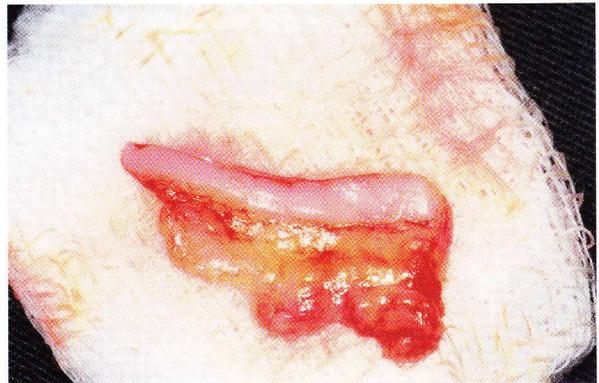


Figure 12: Connective tissue graft sutured onto recipient site. The epithelium collar over tooth 32 will next be removed.

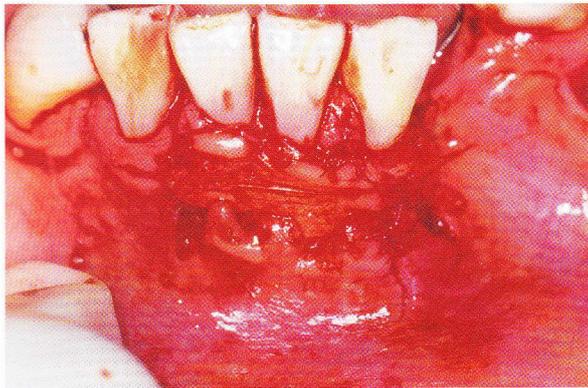


Figure 13: Pedicle flaps sutured over the connective tissue graft.

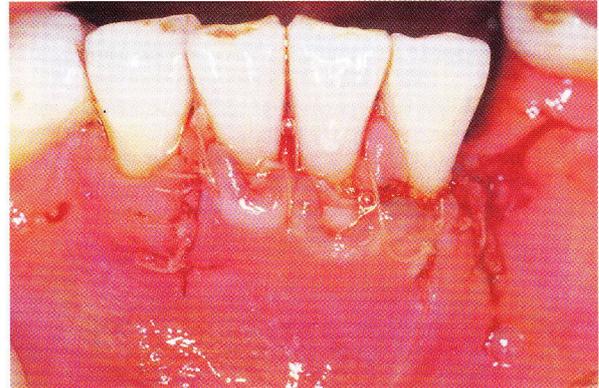


Figure 15: Post-operative 1 year. On tooth 32, complete coverage of buccal gingival recession as well as the elimination of the gingival cleft was achieved.

