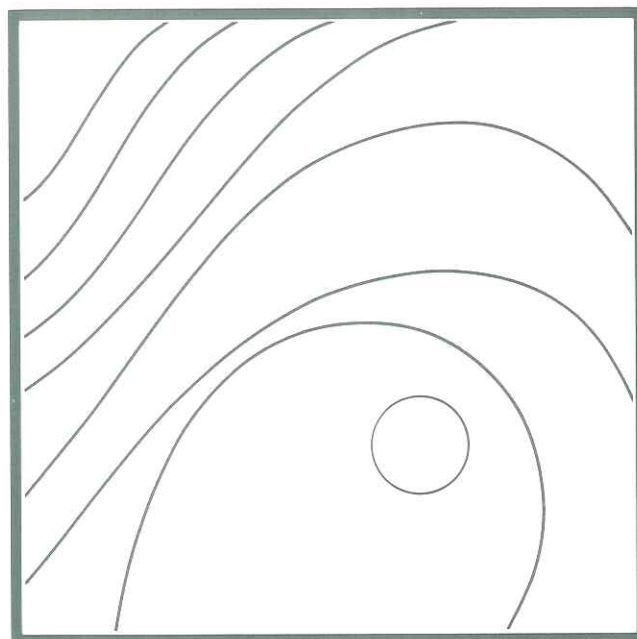


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## Modified Roll Technique for Localized Alveolar Ridge Augmentation



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### Abstract

*A modification of Abram's roll technique is described. A "trap-door" approach is used to reflect and preserve the epithelium that overlies the connective tissue pedicle; the epithelial pedicle is used to cover the donor site. Two case reports illustrate the technique. (Int J Periodont Rest Dent 1992; 12:415-425.)*

Extraction of a tooth often leads to a deficiency in the residual alveolar ridge. This can result from loss of the buccal alveolar plate during extraction, extraction of a tooth with extensive bone loss caused by periodontal or apical pathosis, or developmental defects.<sup>1</sup> Because prosthetic rehabilitation of these patients can be difficult, especially if an anterior tooth is extracted in a patient with a high smile, various techniques have been devised to correct the tissue deformity.

Meltzer<sup>2</sup> presented a case report in which he grafted a wedge of epithelium and connective tissue from the tuberosity to a prepared recipient site. Siebert<sup>3</sup> reported on the use of a full thickness onlay graft to treat an alveolar ridge deficiency. Several authors<sup>1,4,5</sup> have described techniques whereby palatal connective tissue is harvested and grafted to a pouch prepared in the mucosa overlying the alveolar defect. Abrams<sup>6</sup> described a technique in which the epithelium is stripped from a connective tissue pedicle from the palate and is then rolled under the buccal mucosa in order to correct buccolingual ridge defects.

This paper reports on a modification of Abram's roll technique. It involves a "trap-door" approach of reflecting and preserving the epithelium that overlies the connective tissue pedicle and then using the epithelial pedicle to cover the donor site.

### Technique

The first step is to define and reflect the epithelial pedicle. Two full thickness vertical releasing incisions are made from the crest of the ridge toward the palate. These incisions should be roughly parallel to each other to maximize the blood supply to both the epithelial and connective tissue pedicles. The length of the incisions is dependent on the length of connective tissue needed. The incisions should not be placed in the sulci of the teeth adjacent to the edentulous space, but rather should be placed 2 mm from the sulcus to preserve the papillae and attachment. The two vertical incisions are joined by a shallow incision along

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the crest of the ridge. This shallow incision is then used as a starting point for the reflection of the epithelial pedicle. A flap of epithelium and connective tissue is reflected toward the palate until the ends of the vertical incisions are reached (Figs 1a to c). This flap should be at least 0.6 mm thick to ensure complete removal of the epithelium from the underlying connective tissue.<sup>7</sup>

Once the epithelial flap has been reflected, the connective tissue pedicle can be developed. With the epithelial flap fully reflected, an incision is made along what will be the base of the connective tissue pedicle, through the connective tissue, to bone. The connective tissue pedicle is now bounded laterally by the vertical incisions made initially for the epithelial pedicle and apically by this incision. A knife such as the Merrifield or Kirkland is used to reflect the connective tissue pedicle. Beginning at the apical end of the pedicle and reflecting coronally, the connective tissue is separated from the underlying bone (Fig 1d).

Once the connective tissue is reflected to the crest of the ridge, the knife is used to create a pouch between the buccal mucosa and the alveolar ridge. The connective tissue pedicle is then rolled into the buccal pouch and secured with sutures. It is recommended that one suture be placed on either side of the connective tissue pedicle, engaging both the buccal mucosa and the underlying pedicle. On the palate the epithelial pedicle is replaced over the bone and secured with sutures (Fig 1e).

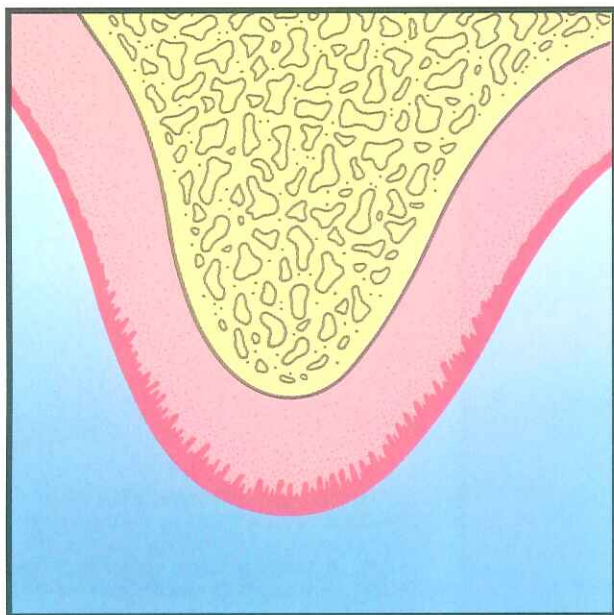
Periodontal dressing can be placed on the palatal aspect of the provisional restoration and pushed buccally to "plump" the buccal tissues if necessary.

Compared to Abram's original technique, this modification offers three advantages: (1) it maximizes the amount of connective tissue that can be rolled to the buccal aspect; (2) it minimizes the amount of exposed connective tissue or bone; and (3) it therefore minimizes postoperative discomfort. Abrams described elevation of either a full thickness or partial thickness flap from the de-epithelialized zone. If a partial thickness flap is elevated, connective tissue that could potentially be rolled to the buccal aspect is sacrificed to cover bone. If the surgeon needs to maximize the amount of tissue moved buccally, a full thickness flap can be used; however, this will leave bone denuded, which must fill in during healing.

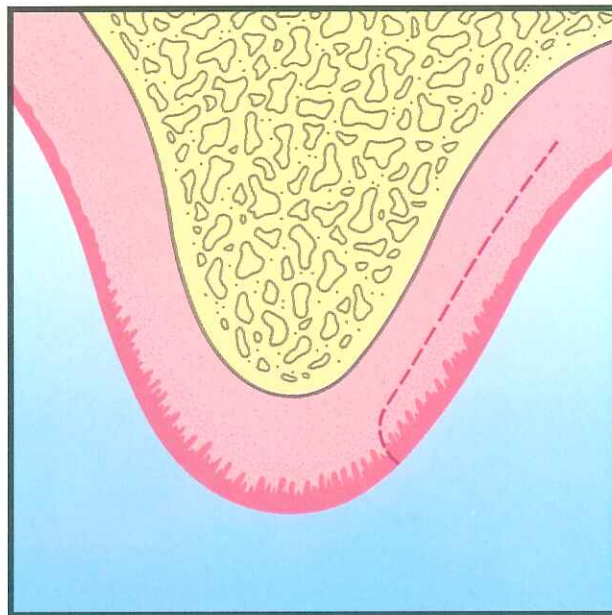
By modifying Abram's technique to retain the epithelial pedicle, the practitioner can maximize the volume of connective tissue rolled to the buccal aspect and leave the bone covered. This should result in faster healing of the donor site and less postoperative discomfort.

Two cases using the modified roll technique are illustrated in Figs 2 and 3.

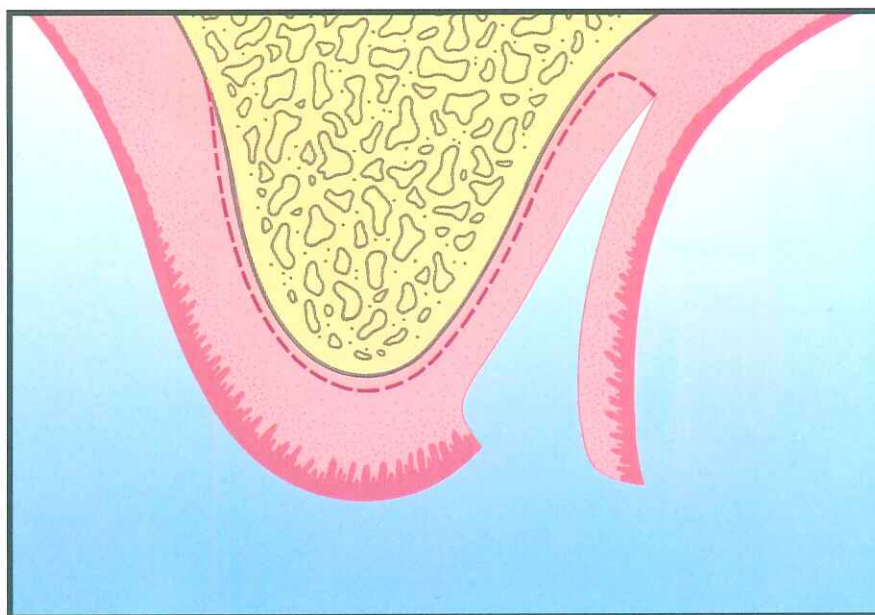




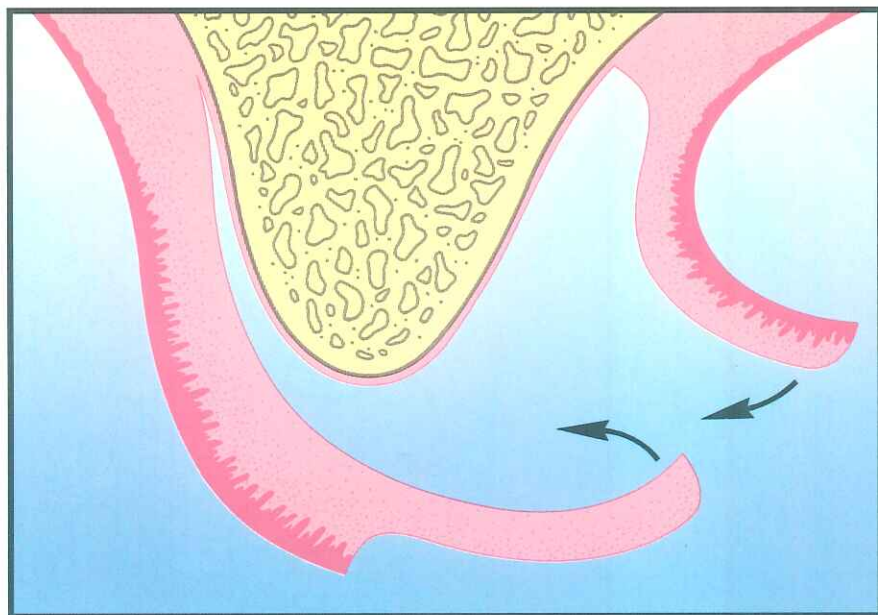
*Fig 1a Edentulous ridge where augmentation is desired.*



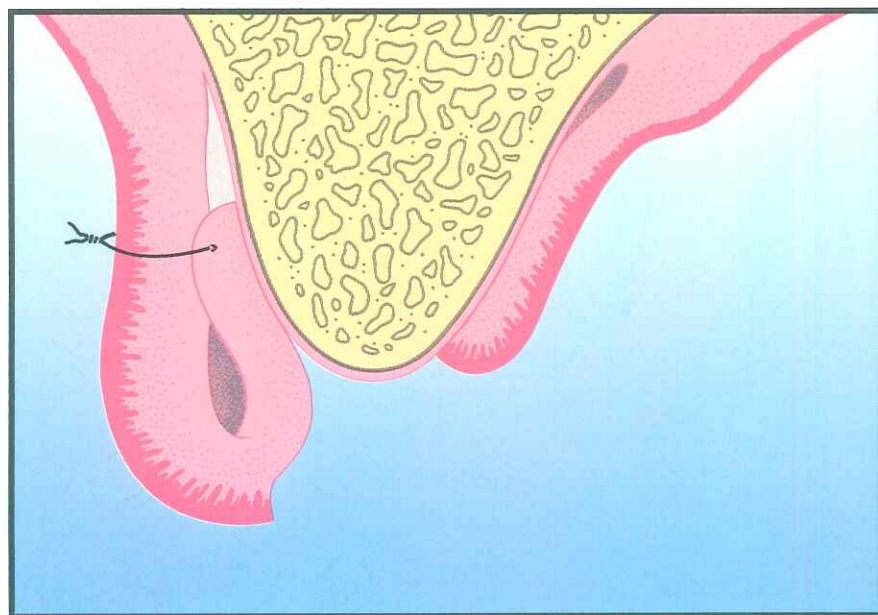
*Fig 1b A pedicle of epithelium and connective tissue, at least 0.6 mm thick, is reflected toward the palate to expose the underlying donor connective tissue.*



*Fig 1c An incision is made horizontally along the apical extent of the connective tissue pedicle. This is used as the starting point in the reflection of the connective tissue pedicle.*



*Fig 1d (arrows) The connective tissue pedicle is reflected toward the buccal aspect to expose the alveolar bone of the palate. A tunnel is made underneath the buccal periosteum to make room for the donor tissue.*



*Fig 1e The connective tissue pedicle is rolled to the buccal aspect and secured between the periosteum and the bone. The epithelial pedicle is replaced on the palate to cover the denuded donor site.*



*Fig 2a* Preoperative view of a 52-year-old man who lost his maxillary left lateral incisor and canine several years earlier in a motor vehicle accident. Acrylic resin provisional restorations have been placed.



*Fig 2b* Occlusal view of the ridge showing the buccolingual dimension of the defect.



*Fig 2c* A shallow incision is made slightly palatal to the crest of the ridge. This will be the free end of the epithelial pedicle. Parallel vertical full thickness incisions, extended to the desired length of the donor tissue, are made on the palate.

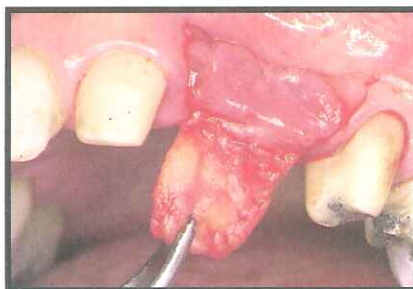


*Fig 2d* The vertical incisions are extended buccally so as to avoid the sulcular area. These will increase the mobility of the flap.

*Fig 2e* The epithelial pedicle is reflected toward the palate to expose the underlying connective tissue.



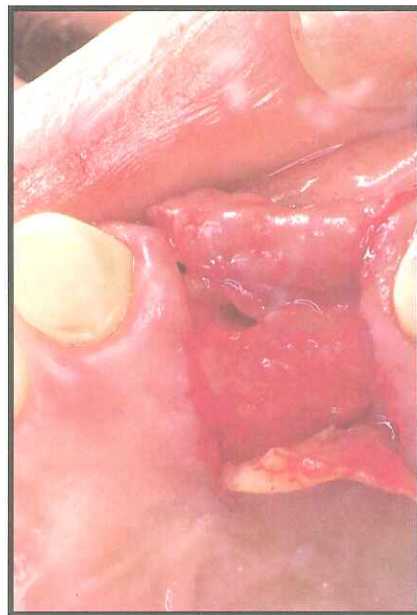
*Fig 2f* The connective tissue pedicle is reflected from the palate. Note that the palatal connective tissue is part of the buccal flap.







*Fig 2g* Buccal and palatal tissues are reflected, enabling visualization of the underlying traumatic osseous defect.



*Fig 2h* The connective tissue pedicle is rolled to the buccal aspect, between the periosteum and the bone.

*Fig 2i* The epithelial pedicle is replaced over the denuded palatal donor site.



*Fig 2j* Flaps are sutured laterally to stabilize the tissue.





*Fig 2k* Buccal view immediately postoperatively. Gingival texture was altered by previous accident.



*Fig 2l* The provisional restoration is relieved to eliminate any pressure on the tissues.



*Fig 2m* One-month postoperative view. The tissues are still slightly edematous.



*Fig 2n* Two-month postoperative view. Defect has been corrected. (Compare with Fig 2b.)



*Fig 2o* At 2 months the palatal donor area has healed.



*Fig 2p* The completed restoration in place. Because the ridge defect has been corrected, the apical aspect of the pontics are normal in relation to the adjacent teeth.



*Fig 2q* The palatal donor site is indistinguishable from the adjacent tissues.





*Fig 3a* Preoperative view of a 29-year-old woman who was left with a buccolingual defect following extraction of the maxillary right first premolar.

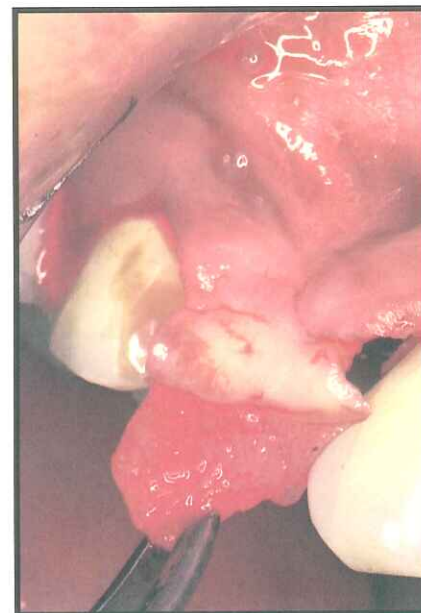


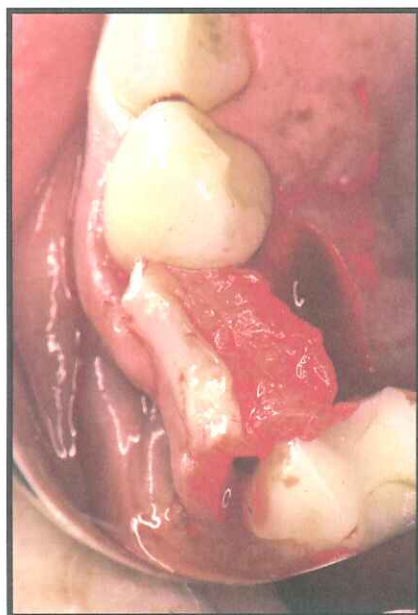
*Fig 3b* Occlusal view, showing the extent of the defect.

*Fig 3c* A shallow, horizontal incision is made palatal to the crest of the ridge, and full thickness vertical incisions are made to define the lateral borders of the epithelial and connective tissue pedicles.

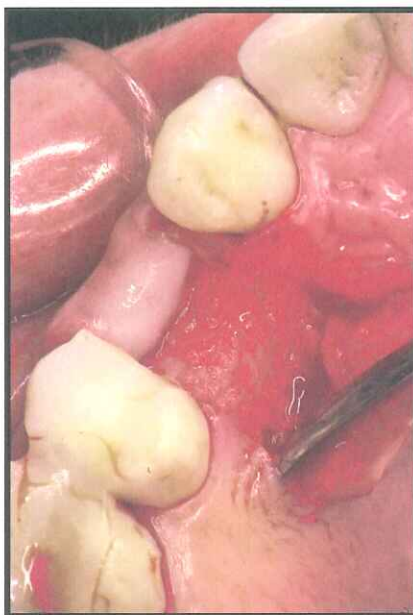


*Fig 3d* A connective tissue pedicle is reflected toward the buccal aspect, and an instrument is used to tunnel beneath the buccal periosteum to create a space for the palatal connective tissue.

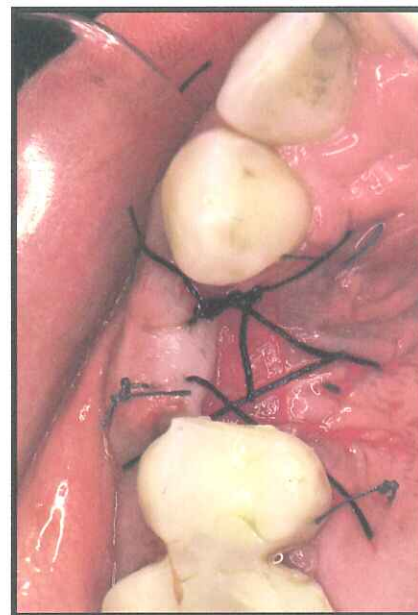




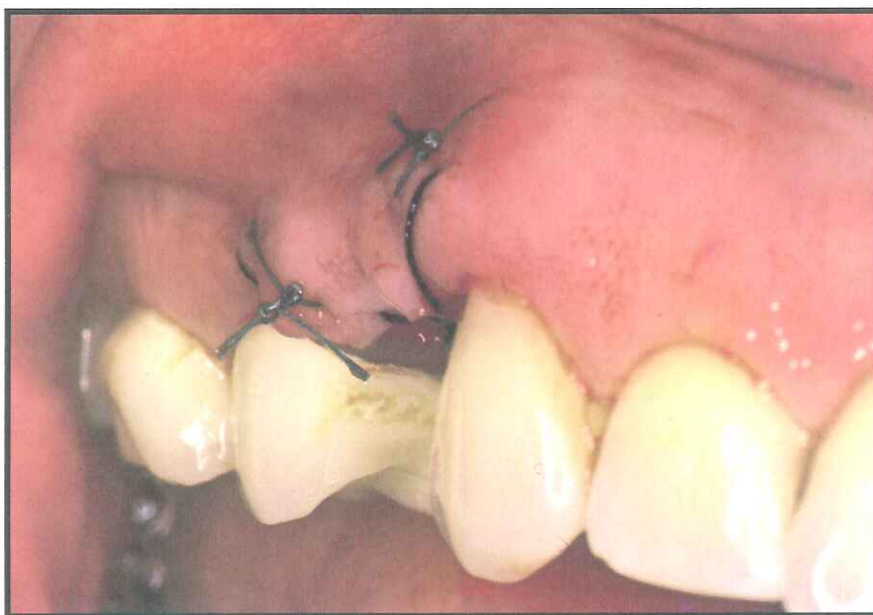
*Fig 3e* The connective tissue is then rolled under the buccal flap between the periosteum and the bone.



*Fig 3f* Exposed palatal bone will be covered by the epithelial pedicle (reflected).

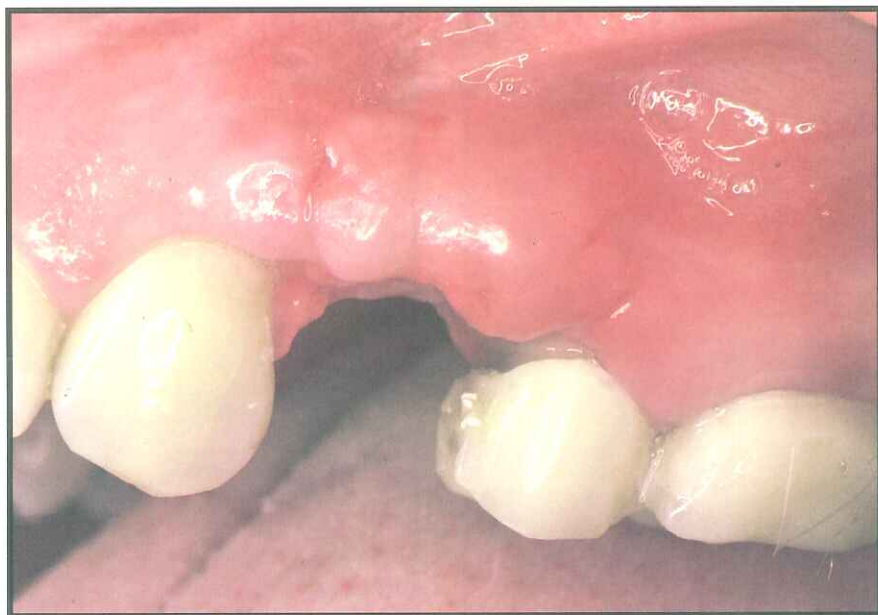


*Fig 3g* Flaps are sutured. Note the minimal amount of exposed bone once the palatal flap is replaced.



*Fig 3h* Buccal view immediately post-operatively.





*Fig 3i* Buccal view 1 week after suture removal. Tissue is edematous and healing appears normal.



*Fig 3j* Occlusal view at 1 week shows the palatal tissue to be healing nicely. Granulation tissue is seen in the area left exposed following the procedure.

*Fig 3k* Final postoperative view at 1 year. The ridge defect has been corrected. (Compare with Fig 3b.)



*Fig 3l* Final prosthesis in place. (Compare with Fig 3a.)





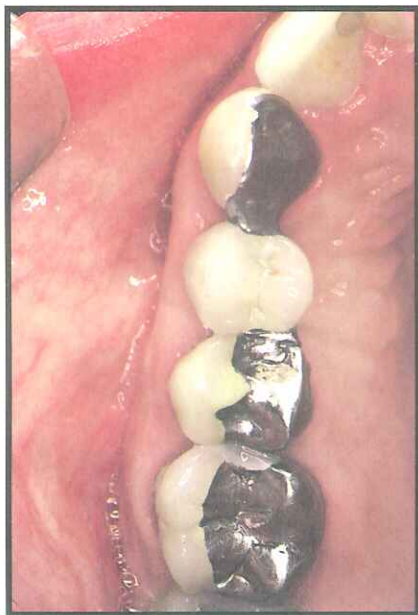


Fig 3m The occlusal view shows the natural buccal contour over both the teeth and the edentulous ridge. Note that the palatal donor site is completely healed. The prosthesis is a combination bonded fixed partial denture interlocked into posterior complete-coverage retainers.



Fig 3n Final view with prosthesis in place. A highly esthetic result has been achieved.

### Acknowledgment

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