

The use of gingival autografts that contain submucosa in the repair of mucogingival defects in maxillary molars: Case reports

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Many studies have shown that deep and wide gingival recessions can be predictably covered by free gingival autografts. Most of the autografts in these studies were performed on single-rooted teeth. This article presents a rationale for a new technique that repairs this type of defect in maxillary molar areas by means of thick masticatory mucosa autografts that intentionally include not only the lamina propria, but also portions of the submucosa. In addition, a new suturing approach that allows adequate adaptation of the donor tissue to the recipient site and permits relocation of the graft is proposed. This new approach has been shown to be a significant advantage in the anatomically problematic maxillary molar area. (Quintessence Int 1993;24:693-700.)

Introduction

There is evidence that narrow, shallow areas of gingival recession can be repaired by gingival autografting procedures.¹⁻³ The concept that root surfaces exposed by deep and wide gingival recessions cannot be predictably covered by gingival autografts^{1,2} has been successfully challenged by the use of thick (1.5 to 2.0 mm) autografts of masticatory mucosa.⁴⁻⁸ In studies in which thick masticatory mucosa autografts were used, small amounts of submucosa containing fatty or glandular tissues were often included in the donor tissue.⁶⁻⁸ Although the biologic mechanisms are not fully understood, it is apparent that the integration of these grafts over deep and wide recessions is enhanced. This finding is in contrast to the results of Sullivan and Atkins,¹ who claimed that the use of thinner grafts (0.75 to 1.25 mm), which exclude the deeper portions of the lamina propria and submucosa, increases the survival rates of gingival autografts.

Most of the grafts in the aforementioned studies were performed on single-rooted teeth. Therefore, there remains a paucity of information pertaining to the grafting of wide and deep recessions in maxillary molar areas. The purpose of this article is to present a new technique that repairs this type of defect in the maxillary molar areas by using thick masticatory mucosa autografts that intentionally include not only the lamina propria but also portions of the submucosa.

Surgical technique

The surgical techniques used are based on those described by Miller⁴ in 1982 and Holbrook and Ochsenbein⁷ in 1983. Briefly, partial-thickness recipient sites are prepared and extended approximately 4 mm lateral and 3 to 5 mm apical to the surgically exposed recession. Where possible, butt joints are made in the interdental and recipient borders to accommodate the thick edge of the autograft.^{4,7}

The autografts are obtained from the palate between the first premolar and second molar. The dimensions of each graft correspond to those of the recipient site. Tissue thickness varies between 2.5 to 3.0 mm, always including some fatty and glandular tissue from the submucosa. Grafts are never trimmed or smoothed (Figs 1a and 1b).

Root surfaces are thoroughly debrided and planed until they feel smooth and hard; this is accomplished

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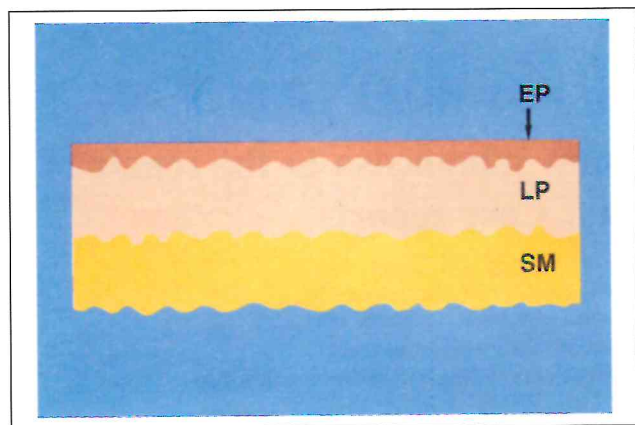


Fig 1a The gingival autograft that contains submucosa is composed of (EP) epithelium; (LP) lamina propria; (SM) submucosa.

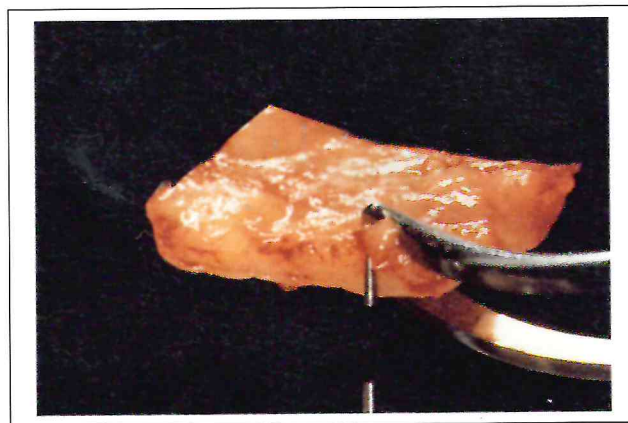


Fig 1b A typical 3-mm-thick gingival autograft containing submucosa, showing the lamina propria, the submucosa, and an unsmoothed undersurface.

with both hand instruments and 12-fluted finishing burs. Although root surfaces are generally flattened to some degree, this is not a primary intention of the root-planing process.

Placement, fixation, and adaptation of grafts in maxillary molar regions is difficult because of limited access and visibility and because of anatomic impediments, such as the protuberance of the root of the zygoma, the loose nature of the periosteal bed, and the pull of the buccinator muscle. To position the graft with greater ease, a modification of the horizontal suture described by Holbrook and Ochsenbein⁷ is used (Figs 2a to 2e). This modification, the horizontal sliding mattress suture, permits the graft to slide laterally or to be rotated to the exact position required after it is sutured in place. Appropriate fixation may then be accomplished by using circumferential sutures as described by Holbrook and Ochsenbein.⁷

Both donor and recipient sites are protected with periodontal dressings (Coe-Pak, Coe Laboratories) during the first postoperative week. Following suture removal on day 7, the donor sites are usually covered again for a second week.

Case reports

Case 1

A 19-year-old man complained of pain in the area over the mesial root of the maxillary right first molar.

Examination revealed gingival recession measuring 4 mm, probing depth of 5 mm, and bleeding on probing (Figs 3a to 3c). A free gingival autograft with submucosa included was chosen to treat both the gingival deformity and the periodontal problem (Fig 3d). Clinical examination 3 years postsurgery showed a solid band of attached gingiva and no pocketing or signs of inflammation. Only minimal root coverage was achieved⁹ (Fig 3e).

Case 2

This patient presented for treatment with marked recession on the maxillary first molar and second premolar. The inflamed tissues bled easily on probing (Fig 4a). In spite of acceptable home care and regular professional cleanings, it was not possible to resolve the marginal gingivitis associated with those teeth. This was probably due to the patient's inability to perform adequate brushing in this receded area with its inconsistent gingival margins and shallow buccal vestibule. The main treatment objectives were improvement of the gingival contour to achieve a more easily maintainable gingival topography,⁹ treatment of the periodontal pockets, deepening of the buccal vestibule, and augmentation of the gingiva. The procedure chosen was the gingival autograft with submucosa (Figs 4b to 4e). The 3-year follow-up showed improved gingival morphology and no signs of inflammation (Fig 4f).

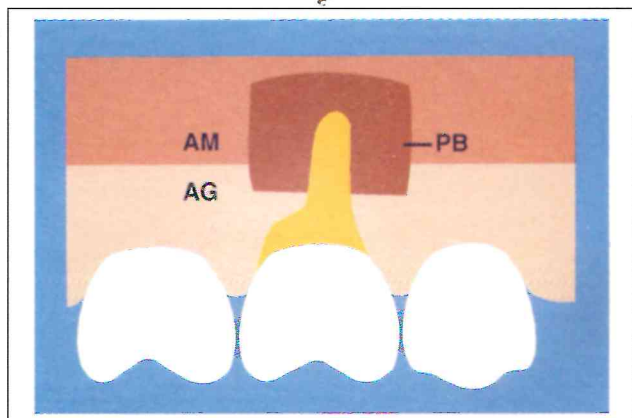


Fig 2a The recipient site is extended approximately 4 mm lateral to and 3 to 5 mm apical to the surgically exposed recession. (PB) periosteal bed; (AM) alveolar mucosa; (AG) attached gingiva.

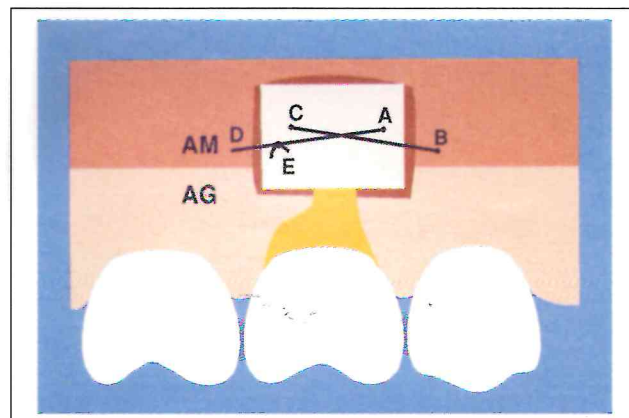


Fig 2b The horizontal sliding mattress suture. The suture needle enters the graft at point A and traverses the adjacent periosteum to exit at point B. It is then brought distally to enter the graft at point C and traverses the periosteum distally to exit at point D. The suture is tied to its tail at point E.

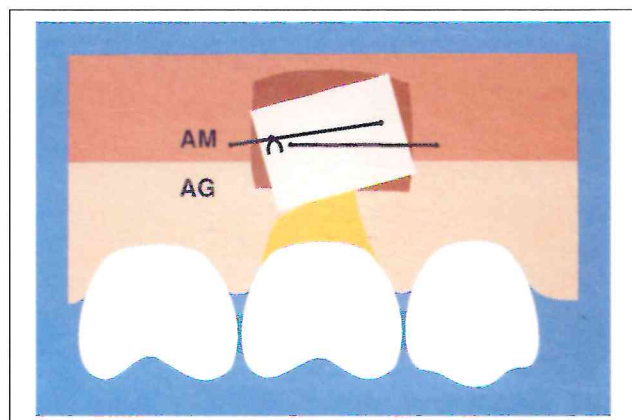


Fig 2c After completion of the horizontal suturing, some rotation of the graft may result. This can be easily corrected by rerotating the graft to the desired position (see Fig 2e). (AM) Alveolar mucosa; (AG) attached gingiva.

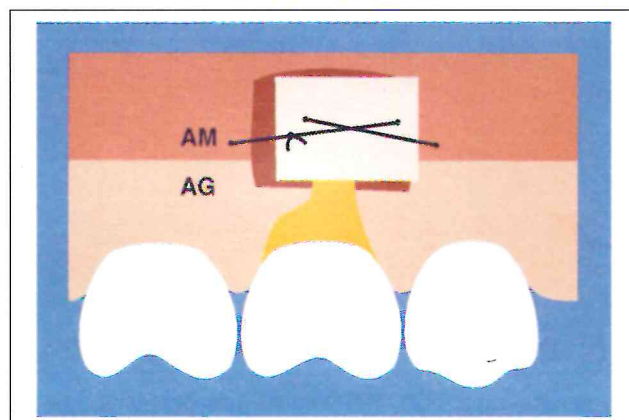


Fig 2d After completion of the horizontal suturing, the graft may be located laterally. This can be easily corrected by sliding the graft to the desired position (see Fig 2e). (AM) Alveolar mucosa; (AG) attached gingiva.

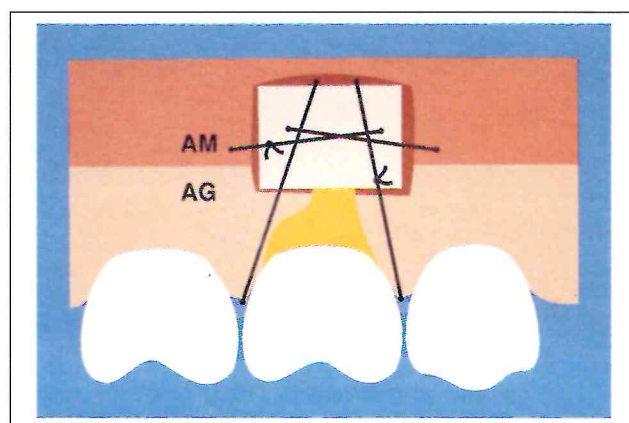


Fig 2e Final fixation and adaptation are achieved by adding the circumferential suture. (AM) Alveolar mucosa; (AG) attached gingiva.

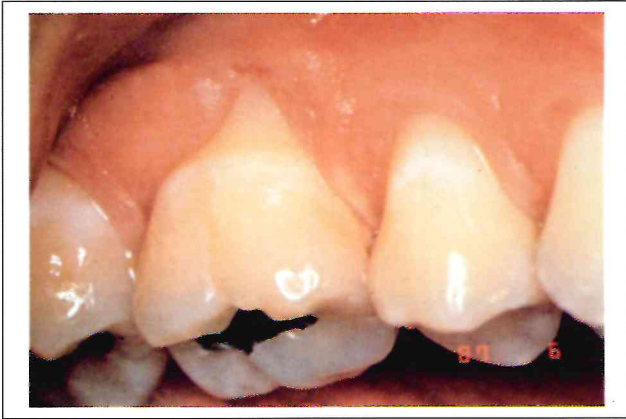


Fig 3a Gingival recession over the mesial root of the maxillary first molar. Note the toothbrush injury in the receded gingiva.

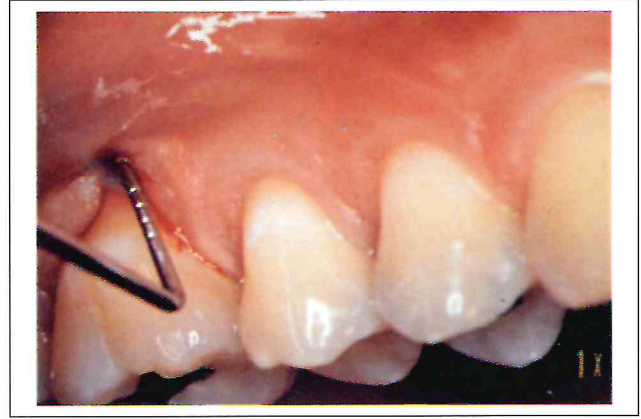


Fig 3b A deep bleeding pocket is revealed on probing.

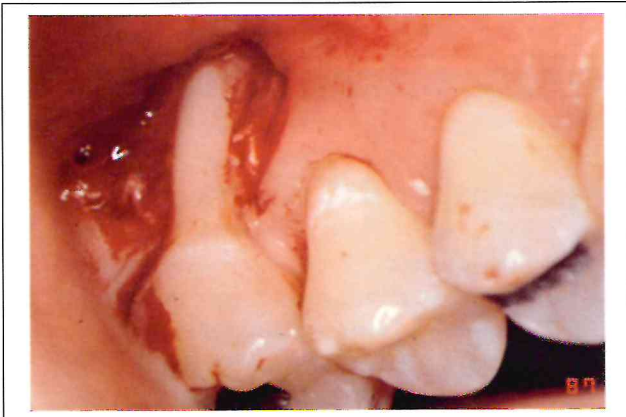


Fig 3c Removal of pocket wall reveals denudation of the root almost to its apex. Note remarkable root width and convexity.

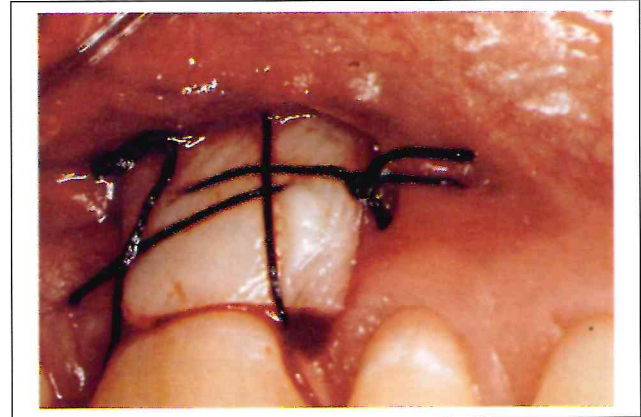


Fig 3d Graft sutured into position with horizontal sliding mattress and circumferential sutures.

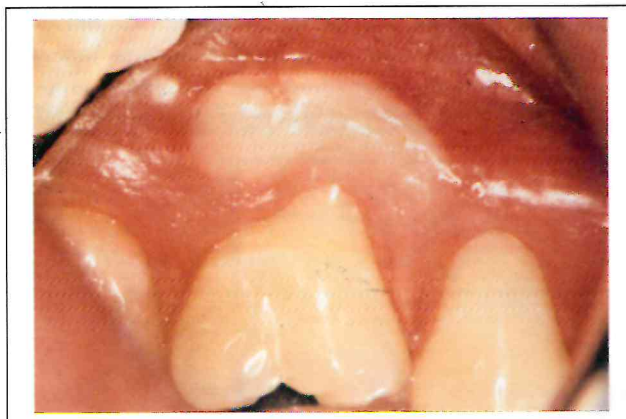


Fig 3e Tooth 3 years after healing. Note the improved gingival contours and augmentation.

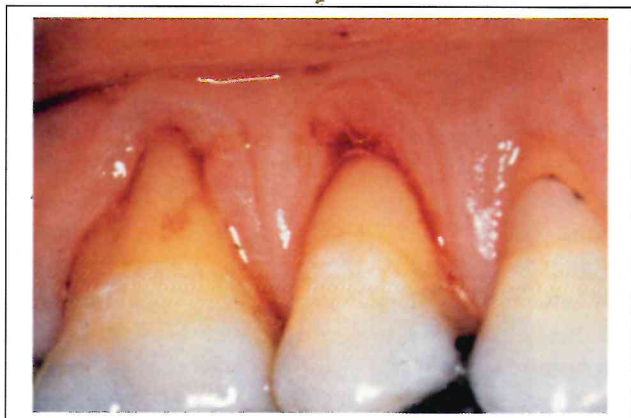


Fig 4a Persistent bleeding on probing 1 year after initiation of nonsurgical periodontal therapy.

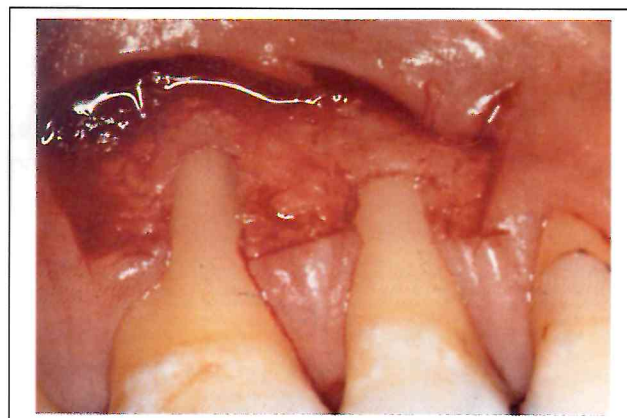


Fig 4b The recipient site illustrating butt-joint preparation in the papillae and mesial and distal borders. Note the increased depth of the recession as it is completely exposed.

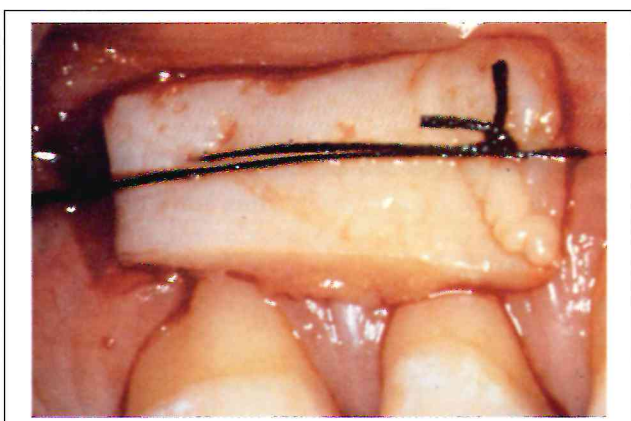


Fig 4c Graft held in position by the horizontal sliding mattress suture. Note the undesirable mesial deviation of graft.

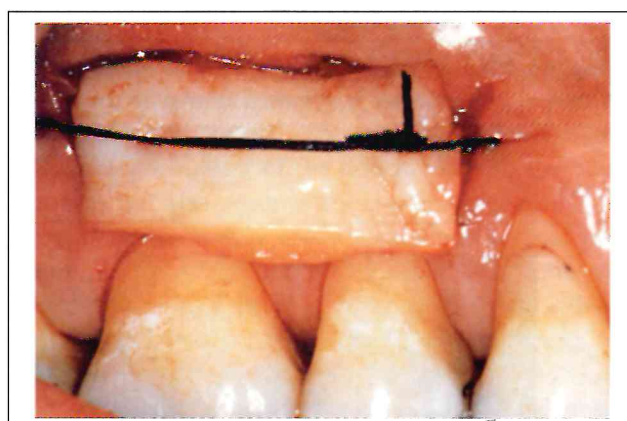


Fig 4d The graft has been relocated distally, but is still positioned too far coronally and therefore is a little off the recipient bed.

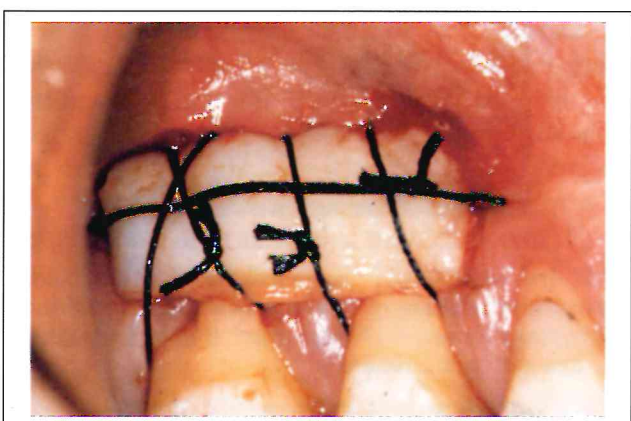


Fig 4e An accurate position of the graft is finally achieved with the use of circumferential sutures.

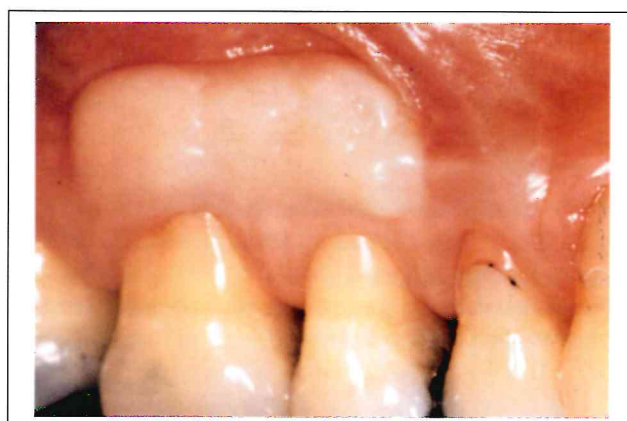


Fig 4f The 3-year postsurgical result reveals improved gingival topography and no bleeding on probing.



Fig 5a Gingival recession associated with the maxillary first molar. The vestibule in the area is shallow.



Fig 5b Recipient site preparation showing increase in depth of recession.



Fig 5c Site 2 years after surgery. There has been a dramatic change in the shape of the lesion. Note the solid band of gingiva and deeper vestibule.

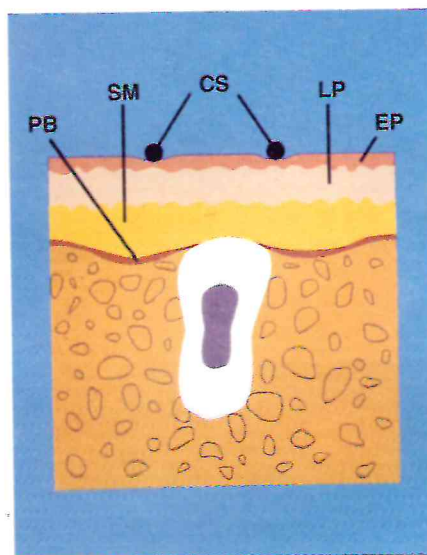


Fig 6 The fatty/glandular submucosa is pliant and blends into the curved surface of the recipient site. (EP) epithelium; (LP) lamina propria; (SM) submucosa; (PB) periosteal bed; (CS) circumferential suture.

Case 3

A 22-year-old man had multiple recessions related to aggressive toothbrush abuse. Some teeth exhibited a V-shaped cleft that was extremely difficult to maintain plaque free. The shallow vestibule in the area of the maxillary first molar further interfered with appropriate home care, resulting in perpetuation of gingival inflammation and hidden recession on the buccal surface of that tooth⁹ (Figs 5a and 5b). Treatment objectives included elimination of the pockets, improvement of the gingival architecture, and deepening of the vestibule, all of which could be achieved by using a gingival autograft that contained submucosa. A 2-year follow-up showed a dramatic change in the morphology of the original lesion, a deeper buccal vestibule, and a solid band of gingiva (Fig 5c).

Discussion

In their classic article on the use of free gingival autografts, Sullivan and Atkins¹ stated that "if the fat [contained in the submucosa of the anterior palate] is inadvertently included in the graft, it will act as a barrier both to diffusion and revascularization and, therefore, should be removed..." This unequivocal statement has strongly enforced the belief that residual fatty tissue should be completely removed from all grafts.^{1,2,5,8,10} Thus, for many years only thin grafts (0.75 to 1.25 mm) were considered suitable for gingival augmentation and root coverage.¹⁻³

Recent studies have shown that thicker grafts (1.5 to 2.0 mm) produce more predictable root coverage.^{5-8,11} However, most clinicians still feel that the fatty tissue should be trimmed.^{5,7,8,10} Grant¹² found that in dogs "fatty tissue in the donor segments survived transplantation and an adequate even abundant circulation actually does exist in palatal adipose tissue." Seibert,¹³ discussing thick onlay grafts for ridge augmentation, also advocated the inclusion of the entire submucosal layer with its fatty content. The rationale for this rather unique approach was the recognition that the "submucosal zone of the palatal graft is composed of loosely arranged connective tissue into which plasma from the recipient site may diffuse readily, and capillary shoots can grow with greater ease and rapidity than into the densely collagenized zone of the lamina propria." Seibert's clinical observation led him to state firmly that total integration of the grafted connective tissue may be con-

sidered predictable only when the fatty submucosal layer is included in the graft.

In the three cases presented, submucosa was intentionally included on as much surface of the graft as possible. Although the clinical objectives in the cases presented were different than those in Seibert's ridge augmentation study,¹³ there were some similar observations:

1. The donor tissue was pliable and easy to adapt and suture to the recipient site.
2. The donor tissue survived well.

In the present cases, no attempt was made to smooth the undersurface of the submucosa, because the fatty layer appears to act as a cushion that is pliant and tends to blend into irregular surfaces of the recipient site (Fig 6).

To overcome anatomic problems in the maxillary molar area, it was necessary to use the horizontal sliding mattress suture. This suture not only allows adequate adaptation of the donor tissue to the recipient site, but also permits relocation of the graft. The circumferential suture enables accurate vertical positioning of the graft and ensures that the pliant graft is closely and accurately adapted to the recipient surface. No attempt is made to stretch the grafts as was advocated by Holbrook and Ochsenbein in 1983.⁷

O'Leary et al,¹⁴ in their study on the incidence of recession in young males, found that maxillary first molars are the most frequently affected teeth. Elliot and Bowers¹⁵ reported in their study on human skulls that maxillary left first molars are the most frequently involved with alveolar bony defects, such as dehiscences and fenestrations. Although this theory is not proven, these lesions may be responsible, together with plaque-induced inflammation and toothbrush abuse,¹⁶ for the type of pathosis treated in the cases presented. Early signs of clefting over the mesiobuccal roots of maxillary first molars should be treated conservatively. Should these measures prove unsuccessful, gingival autografts that contain submucosa can be used to improve the morphology and health of the periodontium in areas associated with gingival recession.

Acknowledgments

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References

1. Sullivan HC, Atkins JH. The role of free gingival grafts in periodontal therapy. *Dent Clin North Am* 1969;13:133-148.
2. Mlinek A, Smukler H, Buchner A. The use of free gingival grafts for the coverage of denuded roots. *J Periodontol* 1973;44:248-254.
3. Matter J, Cimasoni G. Creeping attachment after gingival grafts. *J Periodontol* 1976;10:574-579.
4. Miller PD Jr. Root coverage using a free soft tissue autograft following citric acid application. Part I. Technique. *Int J Periodont Rest Dent* 1982;2(1):65-70.
5. Miller PD Jr. Root coverage using a free soft tissue autograft following citric acid application. Part II. Treatment of the carious root. *Int J Periodont Rest Dent* 1983;3(5):39-51.
6. Miller PD Jr. Root coverage using a free soft tissue autograft following citric acid application. Part III. A successful and predictable procedure in areas of deep-wide recession. *Int J Periodont Rest Dent* 1985;5(2):15-37.
7. Holbrook T, Ochsenbein C. Complete coverage of the denuded root surface with a one-stage gingival graft. *Int J Periodont Rest Dent* 1983;3(3):8-27.
8. Bertrand PM, Dunlap RM. Coverage of deep, wide gingival clefts with free gingival autografts: Root planing with and without citric acid demineralization. *Int J Periodont Rest Dent* 1988;8(1):65-77.
9. Smukler H, Machtei E. Gingival recession and plaque control. *Compend Contin Educ Dent* 1987;8:194-198.
10. Corn H, Marks M. Gingival grafting for deep-wide recession — a status report. I. Rationale, case selection and root preparation. *Compend Contin Educ Dent* 1983;4:53-64.
11. Borghetti A, Gardella JP. Thick gingival autograft for coverage of gingival recession: A clinical evaluation. *Int J Periodont Rest Dent* 1990;10:217-229.
12. Grant D. Presented to the American Academy of Periodontology, Atlanta, Sept 1983.
13. Seibert JS. Reconstruction of deformed, partially edentulous ridges, using full thickness onlay grafts. Part I. Technique and wound healing. *Compend Contin Educ Dent* 1983;4:437-453.
14. O'Leary TJ, Drake RB, Crump PP, Allen MF. The incidence of recession in young males: A further study. *J Periodontol* 1971;42:264-267.
15. Elliot JR, Bowers GM. Alveolar dehiscence and fenestration. *Periodontics* 1963;1:245.
16. Smukler H, Landsberg CJ. The toothbrush and gingival traumatic injury. *J Periodontol* 1984;12:713-719. □



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