A Complication of Orthodontic Therapy: Localized Facial Recession and Loss of Attached Gingiva Treated by Grafting

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Localized gingival recession and root exposure are problems that occasionally confront the orthodontist and compromise therapy. There is often rapidly deteriorating gingival health when this defect occurs in the lower anterior region among children with severe dental crowding and forward displacement of the teeth. A high labial frenum attachment has been incriminated and as such the defect has come to be termed a so-called frenum problem.[1] Actually, it would be more appropriately identified as an attached gingiva problem since either the loss of or the failure to develop this specialized bound gingiva allows muscle fibers from the vestibular apparatus to insert into the free gingiva. Constant muscular tension apparently contributes to apical migration of the tissue. The recession is usually accompanied by gingival inflammation characterized as hyperemia and edema in the presence of tooth-borne plaque. As the receding tissue drops below the free gingiva on the associated teeth, the inflammatory response seems to accelerate.

Newer methods are now available to handle the problem, and the purpose of this presentation is to acquaint the orthodontist with this information concerning causation, mode of treatment, and the patient response to the procedures. Therapy in the past consisted of severing the muscle attachments which proved less than predictably successful as the fibers tended to realign themselves nearly at the same level as before sectioning. If one views treatment in terms of gingival anatomy, then the intent would be to reestablish attached gingiva. This, in turn, would restrict the muscle fibers and hold them from the free margin. Secondly, it would be ideal to regain the lost gingiva and cover the root surfaces to the cementoenamel junction. Newer periodontal therapeutic procedures can accomplish the former and sometimes meet the latter criterion.

METHODS OF TREATMENT

Prevention is the primary goal of periodontal therapy, but when periodontal disease has destroyed tissue and exposed the root surfaces to the oral environment, preventive measures are no longer applicable. The problem mentioned above is a mucogingival defect. For the most part, attached gingiva is absent, the base of the gingival sulcus ends in or near alveolar mucosa, and muscle attachments adversely influence the margin of the tissue surrounding the tooth. The basis for the problem seems to be the factitious relationship of attached gingiva, alveolar mucosa and muscle fiber insertions. Presently, the gingival graft appears most successful in handling this type of problem. Treatment returns attached gingiva to its correct position as the most coronal component of the soft tissues about the teeth. The graft tissue may be derived from an immediately adjacent area and rotated into its new position without fully severing its blood supply; this is known as a pedicle graft.[2,3] Tissue may also be garnered from another portion of the mouth such as the palate, and transferred to the treatment site. This is a free gingival graft because the ac-

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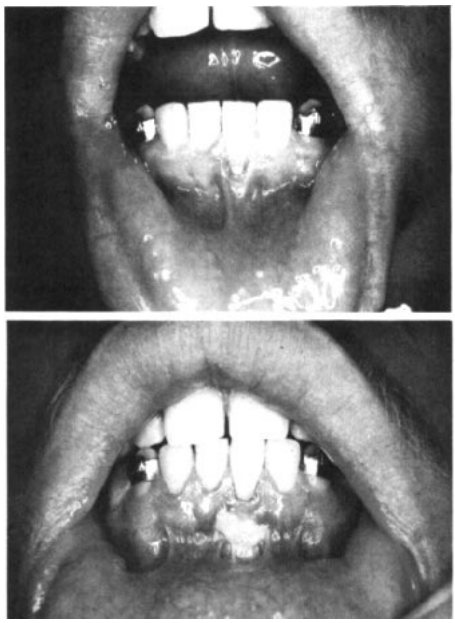

Fig. 1 A loss of attached gingiva and and extreme muscle tension seems to have resulted in localized gingival recession and root exposure. The gingival tissues are hyperemic and edematous secondary to plaque deposition. Two years after a free gingival graft was performed to eliminate encroachment of the muscle fibers upon the free gingiva, measurable improvement is apparent. Note that the gingival margins of the four incisors are now in closer proximity. The tissue about the left central incisor has migrated coronally while the free graft remains in the same position where it was placed at the time of surgical correction. There is also some indication that the gingiva about the untreated teeth has migrated apically over the two year period to a position nearer the cemento-enamel junctions.

quired tissue no longer has its own vascular source.[4-6]

The examples of treatment given here utilize the free graft method and this is by no special design. Indication for the proper procedure and when to apply the appropriate technique is not the purpose of this paper; that information is obtainable from contemporary periodontal writings.[7]

The first case is a young man of 16 years in the final phases of orthodontic therapy. The initial illustration demonstrates loss of attached gingiva, gingival recession, and excessive muscle tension of the free margin (Fig. 1, above). Exposure of the root surface exists and plaque related hyperemia and edema of the gingiva is most obvious around the defect. Treatment consisted of initially preparing the repair site by scaling and root planing along with instruction in personal oral hygiene. Following local anesthetic administration, incisions were made with sharp instruments to separate the epithelium and underlying connective tissue from the periosteum. A piece of mucosa was removed from the palate in quantity sufficient to cover the wound area created around the lower central incisor. This tissue was sutured to place and covered with a periodontal dressing. At an appropriate later date, the dressing and sutures were removed. Oral hygiene instruction which had been introduced was reinforced. Prior to the actual cutting procedure, bacterial plaque irritation must be minimized through capable personal care, and continuing adherence to those measures is necessary to maintain periodontal health. The results of treating this mucogingival defect are obvious in the photograph taken two years later (Fig. 1, below). The graft of palatal mucosa has remained identifiable as relates to its texture and color. It has capably functioned as attached gingiva in that excessive muscle tension no longer exists at the free margin. In fact, the gingiva is once again located close to the cemento-enamel junction. It seems important to stress that the graft as originally placed was not positioned over the exposed root surface. In this instance it appears as though the small remnants of attached gingiva that remained following the surgical procedure proliferated and migrated in a coronal direction. The assumption here is that this was made

possible by reducing interference from muscle tension. The benefits received include both relief from excessive muscle forces on the gingiva and coronal migration of the tissue. One should expect the former in this type of treatment, but the latter, while welcome, is not predictable. The illustration also serves to confirm that we have not observed migration of grafted tissue. Gingiva grafted freely will usually not remain viable if placed over a denuded root surface. The pedicle type treatment might be attempted if coverage is a high priority situation.

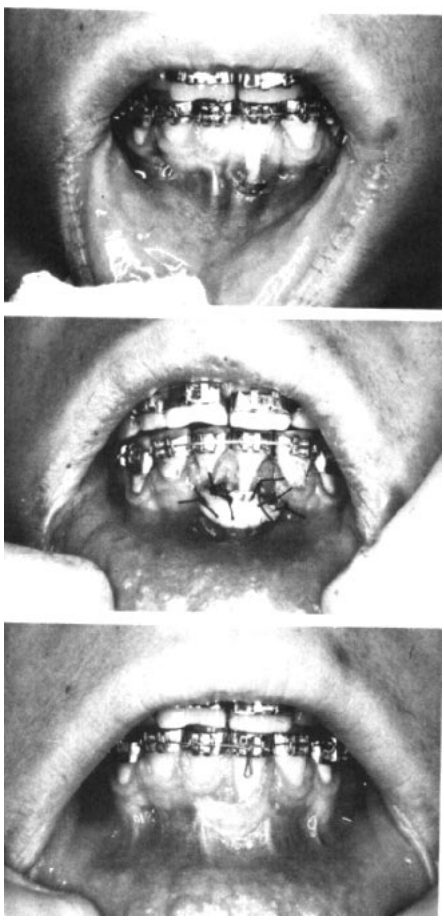

Fig. 2 This young female shows profound involvement of the left central incisor. Considerable gingival inflammation accompanied the mucogingival defect. Subsequent repair with a free gingival graft resulted in both improved health and aesthetics. Follow-up should be continued beyond the six months illustrated here to observe progressive healing or possible recurrence in view of the small residual cleft that remains.

The second case is a young female in the throes of orthodontic therapy; the left central incisor has a mucogingival problem which is threatening the health and maintenance of this tooth (Fig. 2). A free graft from the palate was utilized. The illustration (Fig. 2, middle) emphasizes the site at which the tissue was positioned and sutured to place. It is important that the graft be placed over tissue especially prepared to receive palatal mucosa. Only a small segment of the exposed root was covered. A short six month period of healing demonstrates the effectiveness of palatal mucosa when it functions as attached gingiva at a foreign site (Fig. 2, below). It is likely that the small cleft area near the midline was created when a tiny segment of the graft became necrotic due to failure of vascularization of the tissue at its new site in sufficient time to allow for the mucosa to remain viable. The free graft can be depended upon to reduce muscle tension and prevent further degeneration of the lesion, but it is not always a treatment which will cover exposed root surfaces.

The third example is an adult with an extensive problem involving all of the anterior teeth along with the left and right premolars (Fig. 3, above). This 26 year-old female had combined orthodontic and surgical treatment. Chin prominence was minimal and grafting procedures were initiated to build bulk for better aesthetics. An intraoral incision a few millimeters from the free gingival margin of the anterior teeth resulted in an unanticipated healing deformity. The muscle fiber attachments were displaced so high that

Fig. 3 This adult female was treated both surgically and orthodontically. The pretreatment photograph illustrates muscular involvement of the free gingival margin (Fig. 3, above). The receded gingiva would blanch and become displaced when moderate pressure was applied to the lip. A thin band of palatal mucosa grafted into the area has eliminated the destructive effects brought about by the loss of attached gingiva and high insertion of muscle fiber attachments (Fig. 3, below).

lip extension produced blanching and retraction of the gingival margins. The root surfaces were clearly exposed and it is possible that the defect was not entirely treatment-related since some recession probably existed prior to any intervention. Correction consisted of removing two long, narrow pieces of palatal mucosa and placing them in a surgically prepared bed below the existing thin rim of attached gingiva. Isolated muscle fibers were stripped from the periosteum so that the graft tissue was not implanted over their insertions. An immediate relief of muscle tension on the marginal gingiva occurred and observation two years later reveals persisting benefit (Fig. 3, below). Exertional pressure on the lip is not conducted to the attached gingiva; there is no blanching or withdrawal which might indicate that the graft tissue is not a capable barrier for high muscle reattachment. In this instance, the procedure as designed functions admirably in a preventive sense, but there is no real evidence that reattachment occurred in the sense that the gingival tissues have begun to migrate incisally and cover the exposed root surfaces.

Conclusion

It has been the purpose of this paper to acquaint orthodontists with methods available to handle localized gingival recession and excessive muscle tension on the free margin of an individual tooth or group of teeth. It could conceivably occur and be treated in other parts of the mouth but, for purposes here, the lower anterior region, which is the most commonly affected, has been used as the example. This type of lesion is not to be confused with the defect that sometimes occurs with the maxillary central incisors. These teeth can become involved with a wide fibrous tissue band extending from the vestibule to the incisive canal area.[8]

The success of the graft procedure seems to relate to a reestablishment of attached gingiva and the ability of the grafted tissue to prevent the muscle fibers from encroaching upon the free margin. When mature, the gingiva is once again a tightly bound type replacing loose alveolar mucosa. Appraising the success of this treatment requires both the short and long term factor. If the graft does not become immediately viable and sloughs, there has been no gain in benefit and will require retreatment. If the graft does flourish in its new environment, it will need to perform permanently as attached gingiva. If the muscle fibers tend to extrude and grow beneath the graft, the

tissue will become movable and benefit is minimal because it is not acting as attached gingiva. Again, it should be emphasized that the treatment procedure may not cover the exposed root surface to the extent that one would wish. Placing the tissue graft over the root surface removes it from a vascular source and it is unlikely to remain viable. A remaining thin rim of attached gingiva may possibly move incisally in small increments over the subsequent months or years, but this response is variable and cannot be depended upon. Seldom will one find total replacement so that the free margin resides at the cemento-enamel junction once again. Though this would be the ultimate for cosmetic success, it is not necessary to assure functional success.

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REFERENCES

1. Rose, G. J.: Receding mandibular labial gingiva on children. *Angle Orthodont.*, 37:147-150, 1967.
2. Grupe, H. E.: Modified technique for the sliding flap operation. *J. Periodont.*, 37:491-495, 1966.
3. Cohen, D. W. and Ross, S. E.: The double papillae repositioned flap in periodontal therapy. *J. Periodont.*, 39:65-70, 1968.
4. Nabers, J. M.: Free gingival grafts. *Periodontics*, 4:243-245, 1966.

5a. Sullivan, H. C. and Atkins, J. H.: Free autogenous gingival grafts. I. Principles of successful grafting. *Periodontics*, 6:121-129, 1968.

b. ———: Free autogenous gingival grafts. III. Utilization of grafts in the treatment of gingival recession. *Periodontics*, 6:152-160, 1968.

6. Pennel, B. M., Tabor, J. C., King, K. O., Towner, J. D., Fritz, B. D. and Higgason, J. D.: Free masticatory mucosa graft. *J. Periodont.*, 40:162-166, 1969.
7. Ward, V. J.: A clinical assessment of the use of the free gingival graft for correcting localized recession associated with frenal pull. *J. Periodont.*, 45:78-83, 1974.
8. Edwards, J. G.: The diastema, the frenum, the frenectomy: A clinical study. *Amer. J. Orthodont.*, 71:489-508, 1977.