Use of Mucogingival Surgical Procedures to Enhance Esthetics

Edward P. Allen, D.D.S., Ph.D.*

The scope of mucogingival surgery traditionally has been limited to problems associated with an insufficient width of keratinized gingiva as seen in marginal tissue recession, frenal or muscle pull, and inadequate vestibular depth. Many advances in mucogingival techniques for the management of these problems have been developed in recent years. The technical improvements have allowed the periodontist to provide quality esthetic care along with the more traditional role of promoting the preservation of the teeth.

Certainly, the primary objective of periodontal therapy continues to be preservation of the dentition; however, such an objective is no longer acceptable without consideration of esthetic consequences. For many years periodontal surgery has been associated with creating esthetic problems due to its emphasis on pocket elimination. However, it should be understood that the disease itself is disfiguring and that great care must be exercised during surgery to minimize the unesthetic impact of therapy.

In addition to providing esthetic surgical therapy when treating periodontitis, the periodontist can utilize mucogingival surgical techniques to improve esthetics in patients with problems other than periodontitis. Such problems usually involving the maxillary anterior gingiva include: (1) excessive gingival display with insufficient clinical crown length; (2) asymmetry of gingival margins; (3) improper relationship of gingival margins; (4) flat marginal contour; (5) localized marginal tissue recession; and (6) localized alveolar ridge deficiency.

EXCESSIVE GINGIVAL DISPLAY

Excessive gingival display is a condition characterized by excessive exposure of maxillary gingiva during smiling, commonly called gummy

*Clinical Associate Professor, Department of Periodontics, Baylor College of Dentistry, Dallas, Texas; Adjunct Professor, Department of Periodontics, University of Nuevo Leon, Monterrey, Mexico
smile or high lip line (Fig. 1). This condition is primarily caused by a skeletal deformity in which there is a vertical maxillary excess, a soft tissue deformity in which there is a short upper lip, or a combination of these two deformities.

However, another cause of excessive gingival display is insufficient clinical crown length (Fig. 2). Evaluation of clinical crown length in cases of excessive gingival display is important because it may be the sole cause of the problem and/or the major factor in the esthetics of the case. When proper clinical crown length is achieved, there is a dramatic improvement in esthetics, which often negates the need for orthognathic treatment of the skeletal deformity.

Improved esthetics is attained by gingival contouring to expose more clinical crown. This results in a concomitant decrease in gingival exposure, thereby significantly altering the ratio of crown to marginal tissue in favor of the teeth (Fig. 3).

Gingival contouring may be accomplished by soft tissue excision or by flap procedures, depending upon the amount of soft tissue reduction needed, the width of keratinized gingiva present, and the need for osseous reduction. Other factors to be considered are the presence of full coverage restorations and the restorative treatment plan following mucogingival surgery. Careful and complete periodontal and restorative evaluation is necessary to select the proper surgical procedure.

The clinical examination should include determination of the following: clinical crown length, anatomic crown length, keratinized gingiva height,

Figure 1. Excessive gingival display. Teeth with normal clinical crown length; the excessive gingival display is due to vertical maxillary excess.

Figure 2. Excessive gingival display. Teeth with insufficient clinical crown length. The esthetics may be improved dramatically in this case by surgical exposure of more clinical crown.
1. Excessive gingival display with normal clinical 
   attachment height; the excessive gingival 
   tissue is naturally caused by a combination of these factors. 

   a. Insufficient tooth length in cases 
   b. Insufficient bone support 

   This treatment usually consists of a gingival recession or 
   tissue reduction for osseous exposure of the roots. 

   The goal is to expose more of the teeth, favoring 
   gingival exposure, all tissue in favor of full coverage 
   gingival. 

Figure 3. Excessive gingival display with insufficient clinical crown length. 

A. With an exposure of 8 mm of tooth length and 5 mm of marginal tissue upon smiling, there is a ratio 
   of tooth exposure to tissue exposure equal to 1.6:1. 

B. By reduction of 3 mm of marginal tissue, the length of the tooth is now a more normal 11 mm and the ratio of tooth to tissue 
   becomes 5.5:1 for a dramatic improvement in appearance. 

   The height of keratinized gingiva is determined by measuring the distance from the gingival margin to the cementoenamel 
   junction (CEJ), respectively. The alveolar crest is located by probing through the sulcus. Reduction of gingiva apical to the CEJ can be done only where full coverage 
   restorations are planned postoperatively. In patients with full coverage restorations, the margin of the restoration is treated as the CEJ in planning 
   surgical treatment.
remaining after the surgical reduction and that do not require osseous reduction. This technique provides for the least risk of loss of papilla height, the least discomfort, the most predictable result, and the most rapid healing. The most satisfying results occur when utilizing a steep internal-beveled incision from the mesial line angle to the distal line angle of the tooth, blended with an external-beveled reduction of the interdental papillae. A wedge of tissue is neatly removed from the facial aspect of the tooth by placing an incision in the sulcus to meet the base of the initial incision at the crest of the bone. After removal of the soft tissue wedge, the gingiva is compressed against the tooth for 2 minutes. Proper adaptation may require extension of the initial incision 2 to 3 mm apical to the alveolar crest. A very minimal rebound occurs if the marginal tissue is properly thinned in this manner (Fig. 4).

Postoperative care is directed toward elimination of regenerating soft tissue at the coronal margin. The patient is instructed to begin light brushing of the surgical sites on the second postoperative day. The patient should be seen on the third postoperative day for removal of any marginal fibrin clots and instruction in cleansing of the margin with a wooden toothpick. By the seventh postoperative day the surgical sites should appear clinically normal. Restorative procedures should be delayed until 6 to 8 weeks postoperatively.

**Flap Procedure**

A flap procedure is required in cases in which reduction of soft tissue would leave less than 3 to 5 mm of keratinized gingiva and in cases requiring osseous reduction. It is not unusual to find a thickened bony margin or a cluster of small exostoses at or near the CEJ in patients with insufficient clinical crown length. Simple soft tissue excision may result in an initial thickening of the clinical crowns, but it will be lost as the marginal tissues rebound or regenerate due to the proximity of the thick marginal bone.

A full thickness mucoperiosteal flap may be contoured, thinned, and elevated for either repositioning or apical positioning to preserve the keratinized gingiva, and the underlying bone may be observed and reduced as needed. The interdental papillae must be handled in such a way as to prevent shrinkage and loss of height. This may be accomplished by retention of the papillae when a palatal flap is not needed. The facial flap can be designed to reflect a thinned, scalloped flap with the inclusion of only a thin facial portion of the interdental papilla. Upon apical positioning, the papilla tip on the flap must be positioned apical to the tip of the remaining interdental papilla. With careful technique, there will be no loss of papilla height. In situations that also require reduction of palatal soft tissue, simple excision of marginal soft tissue with maintenance of the interdental papilla.

---

**Figure 4. Surgical technique for gingival contouring.** A. A steep, internal-beveled incision is made to, or slightly apical to, the alveolar crest. The incision extends from the mesial line angle to the distal line angle of each tooth, in an elliptical contour to expose the amount of clinical crown desired. The height of contour is placed distal to the midline of the crown. B. A sulcular incision is made to the depth of the initial incision to free the marginal wedge of gingiva. C. The interdental papilla is thinned by external-beveled excision.
not require osseous or loss of papilla height, and the most rapidizing a steep internal-labial line angle of the mesial of the interdental the facial aspect of the the base of the initial the soft tissue wedge, ites. Proper adaptation n apical to the alveolar inal tissue is properly

of regenerating soft ructed to begin light active day. The patient removal of any marginal margin with a wooden ical sites should appear e delayed until 6 to 8

reduction of soft tissue and in cases requiring ed bony margin or a tients with insufficient nay result in an initial as the marginal tissues hick marginal bone. ntoured, thinned, and oning to preserve the observed and reduced d in such a way as to mplished by retention The facial flap can be he inclusion of only a apical positioning, the e tip of the remaining ill be no loss of papilla latal soft tissue, simple the interdental papilla

op, internal-beveled incision extends from the mesial line ar to expose the amount of he midline of the crown. B, free the marginal wedge of i excision.

Figure 4 See legend on opposite page
Figure 5. Patient with excessive gingival display and insufficient clinical crown length.

A. The central incisors measure 9 mm and have a square appearance. B. The initial incision is being made on the right central incisor. The contouring has been completed on the left central incisor. C. Marginal wedge before removal. D and E. The central incisors have been lengthened to 10.5 mm and the height of contour is distal to the midline. F. The bicuspids appear short and require marginal tissue reduction because of the patient’s wide smile. G. Bicuspids after gingival contouring. H. Appearance after completion of surgery. I and J. At one week postoperatively, healing is clinically complete and the 10.5 mm length of the central incisors is maintained. K. Two weeks postoperatively, a pleasing appearance has been achieved. The teeth are of proper length and the gingival margins are in harmony with the upper lip.
is recommended. In rare instances that require a palatal flap, the papilla should not be thinned, but rather, retained to reduce postsurgical shrinkage.

Postoperative care is similar to that described above with the exception that healing is delayed depending upon the degree of flap reflection and the amount of osseous surgery required. Restorative procedures should not begin until 3 to 6 months after surgery.

Electrosurgery is not recommended due to the potential damage to thin facial bone and the inability to precisely thin the gingival margins to prevent rebound.

Technical Considerations

When performing a reduction procedure by any technique, the surgeon strives to produce an ideal gingival matrix about the teeth. In this ideal, the gingival margin of the central incisors is symmetric and at either the same level or approximately 1.0 mm apical to the gingival margin of the lateral incisors. The gingival margins of the cuspids should be approximately 1.0 mm apical to the gingival margins of the lateral incisors, and a line drawn from the gingival crest of one cuspid to the gingival crest of the other cuspid should be parallel to the interproximal line. The gingival margin is more esthetically pleasing on the incisors when it peaks slightly distal to the midline of the tooth, thus producing a distal inclination rather than having a semilunar form. Ideally, the smile should expose minimal gingiva apical to the central incisors and cuspids, and the gingival contour should be in harmony with the upper lip. In cases of a very wide smile, gingival contouring must extend to the bicuspids to complete this harmony. In order to achieve maximum reduction of gingiva, the central incisors and cuspids may be exposed to an overall length of 11 to 12 mm. The overall length of the central incisors should be approximately 1.5 mm greater than the lateral incisors (Fig. 5).

Harmony of the gingiva with the CEJ is also important. Precise location of the CEJ should be determined by probing prior to surgery. When excisional procedures are utilized, great care must be exercised to prevent exposure of the root surface. In flap procedures, the surgeon has more latitude in precise placement of the flap margin at the CEJ.

Of course, in patients who will have full coverage restorations placed on all teeth in the area of the gingival contouring, concern about exposure of tooth structure apical to the CEJ becomes secondary to achieving ideal length and lip harmony.

GINGIVAL ASYMMETRY

Symmetry of gingival margins is an important aspect of anterior periodontal esthetics. Ideally, the position of the gingival margin of an anterior tooth matches that of its contralateral mate. Asymmetry is esthetically acceptable when minimal, but is rarely acceptable when it involves the maxillary central incisors. Fortunately, this problem is easily corrected by excision of excessive gingiva internally or externally or by a localized apically positioned flap procedure (Figs. 6-8). The same indications for
selection of the appropriate procedure apply to this problem as to the previously described problem.

**IMPROPER RELATIONSHIP OF GINGIVAL MARGINS**

Occasionally, patients are seen in which the relationship of adjacent gingival margin positions and tooth length does not follow the ideal as described above. In this case, something is esthetically wrong, but the exact problem is not as obvious as in the preceding cases. Close analysis of relative tooth lengths and gingival margin position and contour can reveal subtle, but important, discrepancies. An example of this kind of problem is a case of cuspid transposition in which the cuspids occupy the positions of congenitally missing lateral incisors (Fig. 9). The gingival margin of the cuspid is positioned more apical than that of its adjacent central incisor and bicuspid teeth. Corrective procedures in such situations are often limited to reshaping of the cuspid to more closely resemble a lateral incisor. Odontoplasty is very important in the esthetic management of these cases, but attention to the position of the gingival margins is equally important in patients with a high lip line. Correction of the gingival margin position may be accomplished by contouring of the gingival margins of the adjacent teeth in most cases. If reduction of soft tissue is contraindicated, extrusion of the cuspids will position their marginal tissues more coronal with respect to the adjacent teeth.

**FLAT MARGINAL CONTOUR**

In patients with excessive gingival display or high lip line, an esthetic problem exists if the gingival margins are relatively flat (Fig. 10). A flat margin may occur where interdental papillae are blunted or lost. Although surgical restoration of lost gingival papillae remains elusive, gingival contouring may help reduce the undesirable esthetic impact of this defect. By following the gingival contouring principles described above, the surgeon may achieve an apparent reappearance of interdental papillae, a more pleasing marginal contour, and a more natural clinical crown form. Placement of full coverage restorations following this procedure can produce dramatic esthetic improvement and has proven useful in the esthetic management of advanced periodontitis cases.

**LOCALIZED MARGINAL TISSUE RECESSION**

Gingival asymmetry may also be due to localized marginal recession. It is thus apparent that when localized marginal recession is an esthetic problem, it can be effectively treated except in cases of loss of interdental bone and soft tissue height. Recent technical advances have resulted in predictable root coverage by gingival grafting in most cases (Fig. 11).

In some circumstances, particularly those in which recession has
Figure 6. Gingival asymmetry. A, Analysis of the patient's smile reveals an unesthetic appearance owing to asymmetry of the maxillary anterior teeth with lack of harmony with the upper lip and loss of the right cuspid and first bicuspid. B, The central incisors are of unequal length and square in appearance. The gingival margin of the lateral incisor is irregular. C and D, Following a flap procedure for reduction of facial exostoses and lengthening of the clinical crowns to correct the asymmetry. E, A pleasing, esthetic smile after healing and completion of restorative treatment. F, Final appearance 6 months postoperatively. (Prosthesis courtesy of Dr. Thomas E. Newton, Dallas, Texas)
Figure 7. A, Slight but unacceptable asymmetry of the central incisors. B, Following lengthening of the right central incisor and the cuspsids by flap procedure, an esthetically pleasing, symmetrical gingival contour is achieved.

Figure 8. A. Gross asymmetry of the left and right maxillary anterior segments following placement of fixed prosthesis replacing the left central and lateral incisors. B, Following surgery to lengthen the right cuspid, lateral incisor, and central incisor and placement of a new fixed prosthesis, symmetry has been restored. (Prosthesis courtesy of Dr. Jesse T. Bullard, Dallas, Texas)
Figure 9. A, Cuspids transposed orthodontically into the lateral incisor position resulting in an unesthetic smile. B, Analysis of the gingival margins reveals a reversal of the usual relationship of the "lateral incisor" with its adjacent teeth. C, The proper marginal relationship is restored by lengthening of teeth adjacent to the transposed cuspids. D, A dramatic improvement in appearance is seen prior to restorative treatment.

Figure 10. A, A patient with flat marginal contour of the left central incisor, missing right central and lateral incisors with loss of ridge contour and loss of interdental papillae height. B, Following localized ridge augmentation with hydroxyapatite implantation and contouring of the marginal gingiva around the left central and lateral incisors, a more pleasing ridge form and tooth length with reappearance of the papillae is seen. (Prosthesis courtesy of Dr. Susan Holler, Arlington, Texas)
resulted from improper oral hygiene techniques or occlusal factors,9 recession may occur in the presence of a healthy, thick, wide band of keratinized gingiva. As a first step in treatment, the etiologic factors must be controlled, then the recession corrected if required by esthetics (Fig. 12).

The most esthetically effective mucogingival procedure for correction of localized gingival recession is the coronally positioned flap.9 It may be used to treat single or multiple sites, although multiple sites become more technique-sensitive.

Successful, predictable treatment of gingival recession by the coronal positioned flap requires 3 to 5 mm of keratinized gingiva in an apicocoronal dimension at the base of the recessed area with a minimal thickness of 1.5 mm. There should be comparable measurements of the gingiva facial to the teeth adjacent to the recessed site to be treated. Lesser dimensions of keratinized tissue in these areas reduce the predictability of this procedure.

With adequate dimensions of keratinized gingiva, the coronally positioned flap can be a very useful procedure esthetically. The color and the morphology of the positioned tissue blends with adjacent tissue so that it is difficult to detect the healed surgical site. These factors provide an important advantage for this procedure over free autogenous grafts when esthetics is of primary concern (Fig. 13).

The recommended technique involves thorough root planing to remove cementum followed by citric acid demineralization as described by Miller10
for free autogenous grafts. Care is taken not to damage the marginal tissue since it is to be totally retained for coronal placement. Next, a measurement of recession is taken from the CEJ to the gingival margin. This measurement is used to determine the placement of vertical releasing incisions, which begin at a point on each interdental papilla at a distance from the tip of the papilla equal to the recession measurement. A split-thickness flap is then elevated by sharp dissection close to the periosteum until past the mucogingival junction. Once the dissection is within the mucosa, an even thickness of the flap is maintained rather than following the contour of the alveolar process. Extension of the flap into the labial mucosa may be necessary to free the flap sufficiently to allow for passive placement of the flap margin at the CEJ. Next, the surfaces of the interdental papillae are de-epithelialized to allow for overlay of the papillae of the flap, and the flap is sutured at or slightly coronal to the CEJ (Fig. 14).

This same procedure is quite useful in completing root coverage following a partially successful free autogenous graft (Fig. 15). Care must be taken not to fenestrate the flap at the mucogingival junction, but otherwise the procedure is performed as described above. By utilizing the coronal positioned flap as a second stage surgery, complete root coverage can be achieved in virtually all cases except class IV recession.

Postoperative care for coronal positioned flaps is similar to that for free autogenous grafts used for root coverage. The patient is seen at 7 to 10 days postoperatively only can begin at postoperatively. T.

LOCALI

Localized alveolar tooth are lost traumatically and either congenitally missing disease, and excess.

When this deciduous with a high lip in the dentition. Until several deficient ridge, and in pontic design. It a source of serious
nage the marginal tissue at. Next, a measurement is taken. This measurement is taken from the tip of the tooth to the incisal edge. The distance from the incisal edge to the gingival margin is then used to determine the height and thickness of the flap.

Figure 13. A. Recession involving the maxillary anterior teeth with adequate gingival height and thickness for successful coronal positioning. B. The root surfaces have been planed and demineralized with saturated citric acid. Note the minimal damage to the gingival margin. C. The flap has been coronally positioned over the right lateral incisor with one flap and the left central incisor, lateral incisor, and cusp with another flap. D. At 6 weeks postoperatively, complete root coverage is seen. An exceptionally natural esthetic appearance can be predicted with this technique.

days postoperatively, brushing of the surgical site in an incisal direction only can begin at this time. Flossing is not recommended until 3 weeks postoperatively. The patient is advised to exercise great care in preventing any trauma to the surgical site for the first 3 weeks. Restorative procedures should not begin until 3 months postoperatively.

LOCALIZED ALVEOLAR RIDGE DEFICIENCY

Localized alveolar ridge deficiencies due to excessive bone loss when teeth are lost traumatically pose difficult restorative problems, both functionally and esthetically. Similar problems are encountered in cases of congenitally missing teeth, developmental defects, advanced periodontal disease, and excessive ridge resorption subsequent to extraction of teeth.

When this deficiency occurs in the maxillary anterior area in a patient with a high lip line, it presents a serious challenge to the restorative dentist. Until recent years, little attention was given to repair of the deficient ridge, and restorative treatment was accomplished by compromise in pontic design. The final result was often disappointing to the dentist and a source of serious distress to the patient. The possible impact of such
Figure 14. Coronal positioned flap technique. A, Recession of the maxillary cuspid. B, The initial incisions are placed obliquely on each interdental papilla at a distance from the tip of the papilla equal to the amount of root exposure. C, A split thickness flap is raised, maintaining an even thickness as the dissection enters the mucosa. 
Illustration continued on opposite page
Figure 14 Continued D. Vertical incisions are made to outline an enlarged recipient bed and the surface is stripped of epithelium by sharp dissection to the tips of the papillae. E. A modified sling suture is placed by passing the suture through the papilla of the flap, through the interdental papilla, around the palatal aspects of the tooth, through the adjacent interdental space in order to pick up the remaining flap papilla, passing back through the remaining interdental papilla, back around the palatal aspects, and through the interdental space to tie the suture. F. Intermittent sutures are placed obliquely between the flap and the adjacent tissue to suspend the flap and in the area apical to the mucogingival junction to fix the flap to the periostium in order to reduce the apical pull on the flap.
Figure 15. A, Recession labial to the maxillary right central incisor following surgical exposure and orthodontic positioning. B, Free autogenous graft placed to cover the root and augment the papilla. C, Eight weeks postoperatively, root coverage was not achieved although adequate keratinised gingiva is now available for coronal positioning. D, Extensive dissection into the labial mucosa was required to free the flap for coronal positioning due to mucosal scarring from previous surgery to expose the incision. E, One year postoperatively, complete root coverage has been achieved. F, A favorable esthetic appearance is seen when smiling.
deformities on a patient's self-esteem must be appreciated and addressed in treatment of this important esthetic problem.

Fortunately, a number of techniques for successful rebuilding of localized alveolar ridge deficiencies have been reported recently. These include soft tissue grafting, both superficially and internally, and hydroxypatite implantation. Abrams described a de-epithelialized connective tissue pedicle or roll technique, which is used for restoring minor defects in an apicocoronal dimension. This technique requires sufficient soft tissue thickness without deep evisceration, directly over and palatal to the defect site.

A technique for placing an oversized graft obtained from the tuberosity into a surgically prepared site in the deficient ridge was originally described by Meltzer. Later, techniques for utilizing fibrous connective tissue grafts obtained from the palate and placed into a surgically prepared pouch over the ridge defect were described. These techniques were especially useful for moderate defects in a buccolingual dimension. Selbert reported a full thickness onlay grafting technique for augmentation of moderate to severe ridge defects in both apicocoronal and buccolingual dimensions (Fig. 16). Allen and coworkers reported use of a palatal pedicle flap technique for implantation of hydroxypatite particles in treatment of moderate to severe defects in both dimensions.

Modifications of reported procedures are continually taking place, and specific indications for various techniques are emerging. Often, multiple procedures are required to satisfactorily complete the ridge augmentation (Figs. 17 and 18). A careful mucogingival evaluation of each individual situation and careful treatment planning are necessary for success. Most of the procedures are technique-sensitive and require careful communication between the surgeon and the restorative dentist and between the therapist and the patient. A complete review of this problem and its treatment has recently been reported by Siebert and Cohen.

Following ridge augmentation procedures, an evaluation regarding the need for gingival contouring should be made. Often, an incomplete ridge augmentation can be offset by lengthening the clinical crowns of teeth adjacent to the ridge. This improves symmetry and enhances the appearance of the papillae. Careful attention to clinical crown length and symmetry is essential to achieving the best possible esthetic result (Figs. 10 and 18). Total treatment of these cases involves a blending of esthetics and function to produce a superior restorative result and enhance the quality of life for the patient. The reward to the patient is enhanced self-esteem and to the dentist a deep sense of satisfaction for contributing to the patient's general well being.

**SUMMARY**

The procedures outlined herein deal primarily with improving esthetics. The importance of esthetics in periodontics is most apparent in patients with a high lip line. Current mucogingival procedures provide the surgeon with the capability to have a major role in the total treatment of complex restorative cases.
Figure 16. A, Pretreatment view of maxillary anterior fixed prosthesis compromised by loss of ridge contour. B, Ridge defect is seen after removal of bridge in preparation for ridge augmentation. C, Onlay graft sutured in place. The graft thickness ranged from 1 mm at the margins to 6 mm in its central area. D, Two years postoperatively, note the amount of augmentation that has been achieved. The augmented ridge restored the illusion of a midline papilla and permitted the use of shorter pontic teeth, improving the overall esthetics of the finished case. (Courtesy of Dr. Jay Selbert, Philadelphia, Pennsylvania)
Figure 17. Localized alveolar ridge deficiency. A, Loss of contour apicocoronally. B, Loss of contour buccolingually. C, Connective tissue graft with epithelial surface measuring 8 × 11 mm and 6 mm in thickness, obtained from the tuberosity. D, Donor site sutured. E, Graft sutured within surgically enlarged defect site. F, Original ridge contour restored at the time of surgery. G and H, Ten days postoperatively no shrinkage is noted.
Figure 18. Same case as Figure 17. A, Augmented site at 6 weeks postoperatively. Note significant shrinkage has occurred. B, Second stage augmentation with hydroxyapatite implantation. C, At 6 weeks postimplantation, no shrinkage has occurred. D, Marginal tissue reduction improves gingival contour while lengthening the clinical crowns of the right and left cuspids and the right central incisor to assure symmetry of the final fixed prosthesis. E, At 7 days postoperatively, all surgical sites appear normal. F, Following multi-stage surgery and placement of a fixed prosthesis a pleasing, esthetic result is achieved. (Prosthesis courtesy of Dr. James L. Richards, Garland, Texas)
Periodontal considerations must be included as an integral part of esthetic dentistry. A complete examination of the patient must include a thorough periodontal evaluation. In addition to the usual detection of periodontal pockets and inflammation indicative of periodontal disease, the examination should include a thorough mucogingival evaluation for detection of the following: (1) inadequate keratinized gingiva; (2) gingival recession; (3) excessive gingival display; (4) insufficient clinical crown length; (5) asymmetric gingival margins; (6) flat marginal contour; (7) improper gingival margin relationships; (8) lack of harmony of gingival margins with the lip line; and (9) alveolar ridge deficiencies.

Mucogingival surgical procedures should be performed after control of all etiologic factors and in concert with the restorative therapy so that the surgery can produce the most desirable esthetic result.

It must be understood that the location and contour of the gingival margin and its relationship to adjacent margins are as important to the final esthetic result as the location, form, and relationship of the incisal margins of the anterior teeth. Attention to the total dental display as framed by the smile, with appropriate mucogingival analysis and treatment, is necessary to achieve the most satisfying esthetic results.

ACKNOWLEDGMENT
The author extends grateful appreciation to Dr. J. Y. Cho for preparation of the artwork. Special appreciation is expressed to Dr. Barnett N. Bookatz and Dr. William C. Hurt for their critique of the manuscript and to Mrs. Vicki Strong for her assistance in preparation of the manuscript.

REFERENCES