



Multidisciplinary Care: Periodontal Aspects to Treatment Planning the Anterior Esthetic Zone

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ABSTRACT The field of periodontology has changed dramatically during the past 30 years. The goal of periodontal therapy is not only to establish and maintain the dentition and the periodontium free of any oral infections, but also to provide an environment with optimal function and esthetics. Esthetics has become an integral portion of the overall treatment goal in periodontics. This article discusses the role of periodontal plastic and reconstructive surgery in treatment planning the anterior esthetic zone in interdisciplinary dental care.

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The signs of periodontal disease are often varied and complex. In order to determine a meaningful treatment plan, a proper diagnosis is essential. This can only be determined through a comprehensive examination and collection of the precise clinical characteristics of the patient's overall periodontal condition. In performing the periodontal examination and developing a treatment plan, care must be taken to consider all aspects of the patient, including their overall functional status.

Consultation with other specialists (restorative dentist, oral surgeon, orthodontist, endodontist) regarding the restorative and endodontic health, and any occlusal, skeletal, and space problems, is required. All the treating specialists on the team need to collabo-

rate their findings. An evaluation and understanding of the etiology of the pathologic process is extremely important. A correct diagnosis with long-term prognostic information is mandatory to develop an interdisciplinary treatment plan. This article will review periodontal aspects of treatment planning with an emphasis on the anterior esthetic zone.

The American Academy of Periodontology has developed parameters on a comprehensive periodontal examination.¹ These parameters are discussed below.

First in any examination should be a review of the patient's medical history. Those systemic conditions or behavioral characteristics that may contribute or predispose to periodontal disease should be noted and discussed with the patient. Such conditions include but are not limited to diabetes, smok-



FIGURE 1A. Thin and scalloped periodontium.



FIGURE 1B. Thick and flat periodontium.



FIGURE 2. Healthy smile with high smile line.

ing, hypertension, and pregnancy.

A review of the dental history is also important. This information should include the patient's main reason for seeking treatment as well as past dental treatment and previous radiographs. Has the patient been compliant and has the patient received adequate follow up care is also important information to know.

Extraoral and intraoral structures should be examined and evaluated. Any temporomandibular joint issues should be discussed. The oral mucosa, lips, floor of the mouth, muscles of mastication, salivary glands, palate, and the oropharynx should all be evaluated.

An evaluation of the teeth should include observation of missing teeth, condition of restorations, caries, tooth mobility, tooth position, occlusal and interdental relationships, signs of parafunctional habits, and if applicable, pulpal status.² Proximal contact relationships are also important to note as some open contacts can impact food, which can contribute to the progression of disease. Any furcation involvements should be evaluated and noted.

A comprehensive periodontal examination includes the hard and soft supporting tissues of the dentition. Clinical findings and radiographic findings need to be evaluated. Radiographs should be evaluated to help determine the status of the periodontium and dental implants. Radiographs should be diagnostic and based on the needs of the patient. Clinically, the patient's tissue biotype is classified according to how thick or thin the supporting bone and gingival soft tissues are defined.

Becker and Oschenbein classified three distinct types; pronounced scalloped, scalloped, and flat.³ A thin periodontium will be pronounced scalloped or scalloped. A thick periodontium will present with flat gingival architecture, and usually be supported by thick buccal and lingual plates of alveolar bone. A thin skeletal pattern with scalloped architecture will have root dehiscence and fenestrations even in a healthy periodontium (FIGURES 1A-B).

Periodontal soft tissues should also be evaluated for the presence of bleeding on probing and, if present, the extent and type of exudates should be noted. The presence and distribution of deposits, such as plaque, calculus, and stain should also be recorded.

If periodontal disease is present, it is important to establish the attachment level (probing depths and gingival recession) as well as any contributing factors such as mucogingival problems (lack of keratinized attached tissue and frenum involvement) and furcation involvement, which will alter the prognosis of the teeth. It is critical to measure not only probing depths and attachment levels, but to identify the level of the crestal alveolar bone by "sounding to bone." This is extremely important in the esthetic zone, when considering restorative margin placement and future implant placement.⁴

Esthetic Parameters and Treatment Options

In the esthetic zone it is extremely important to identify the position of the midline, and the amount of teeth and the soft tissues visible not only from the

TABLE 1

Esthetic Keys

- Midline
- Incisal edge position
- Incisal plane/smile line
- Occlusal plane
- Gingival level

frontal view but also from the lateral view, both with the lip at rest and when smiling. Uneven gingival architecture, the position of teeth relative to the arch shape and opposing occlusion will all affect and dictate the decision-making process. The position of the incisal edge relative to facial proportions and lip dynamics is critical (FIGURE 2 AND TABLE 1).

It is important to identify the problems that will affect the desired esthetic outcome.

Esthetic periodontal defects include:

- Residual gingival/periodontal defects
- Violations of biologic width
- Gingival asymmetries
- Inadequate amount of gingiva
- Gingival recessions
- Deficient pontic areas
- Frena impinging on the gingival margin
- Excessive gingival display
- Deficient interproximal papillae

Proper gingival esthetic involves initially the restoration of periodontal health. The ultimate goal of periodontal therapy is to preserve the natural dentition, periodontium, and peri-implant tissues in health, comfort, esthetics,



FIGURE 3A. Soft tissue inflammation due to overcontoured restorations.



FIGURE 3B. Soft tissue resolution after initial therapy and placement of provisional restorations with ideal contours (Courtesy of Carol Lam, DDS).



FIGURE 4. Violation of biologic width (gingival attachment) with inflammatory soft tissue response.

and function.¹ Treatment of periodontal diseases typically consists of initial nonsurgical debridement followed by re-evaluation, during which the need for additional treatment is evaluated.

Gingival and/or Periodontal Defects

Conventional nonsurgical treatment of periodontal disease consists of mechanical tooth debridement both supra and subgingivally along with instruction in proper home care methods (FIGURES 3 A-B). The primary objective of debridement, i.e., scaling and root planing (SRP) is to restore periodontal health by removing pathogenic products that induce inflammation (i.e., plaque, calculus, and endotoxin) from periodontally involved root surfaces. Scaling and root planing may also alter the microbial composition to a flora more compatible with periodontal health. However, patient cooperation is paramount. Subgingival debridement without adequate oral hygiene measures results in a limited response.⁵⁻⁷

While the primary objective of debridement is to remove pathogenic products, there are numerous difficulties with achieving this task. Difficulties with adequate debridement include difficulty with access and visualization, no definitive end point, and operator experience. Sites with deep periodontal pockets, grooves, furcations, and concavities are difficult to access with periodontal instrumentation and thus periodontopathic bacteria may remain in those sites.

Other obstacles have to do with the bacteria themselves. The authors' current view of bacteria is that of a biofilm.⁸⁻¹⁰

According to this concept, bacteria do not exist as free-floating bacteria, but as attached bacteria in biofilms. Bacteria in biofilms have a unique position in that they develop a synergistic relationship, cooperate with each other, and form protective barriers of exopolysaccharides. In addition, biofilm bacteria are relatively inactive metabolically and exert more resistance to antibiotics than free-floating bacteria and are thus more difficult to eradicate. Subgingival plaque in biofilm can evade the defense mechanisms of the host and diminish the effect of chemotherapeutic agents.

As a result of the difficulties described above, conventional mechanical root debridement does not usually eradicate all pathogenic bacteria from the subgingival ecosystem.¹¹⁻¹³ As a result, some propose that patients receive antibiotics at the time of hand scaling and root planing. This blanket use of antibiotics is not necessary for most patients because they usually respond well to nonsurgical treatment without antibiotics. In addition, it has been shown that without the proper removal of subgingival deposits, the use of subgingival medicaments is not useful.¹⁴

Furthermore, recent studies have concluded that surgery may provide a better long-term outcome with less need for adjunctive treatments. Long-term treatment of patients with nonsurgical therapy with or without antibiotic therapy may result in a situation that even surgery is not designed to correct. Most forms of periodontal surgery achieve best results in the early to moderate severities of disease.

In the esthetic zone, it is sometimes better to make compromises and understand that residual pocket depths may be maintainable. Nonsurgical therapy can keep interproximal papilla intact and is more desirable as compared to the esthetic problems associated with pocket elimination and the creation of "black triangles."

Not all patients respond well to therapy nor are able to maintain a healthy periodontium over time. Factors contributing to a less than optimal result usually include poor compliance with oral hygiene regimens and failure to return for regular maintenance care. Inadequate debridement may account for some treatment failures or reinfection, however, the presence of systemic conditions or local risk factors may also have a significant impact on the success or failure of treatment. Occlusal trauma, deep inaccessible pockets, overhangs, and poor crown margins can also contribute to recurrent disease.

Over the past few years, much has been learned about the relationship between risk factors and the development and progression of periodontal disease. Studies have identified smoking, diabetes, stress, genetic factors and behavioral issues as possible risk factors for periodontal disease.¹⁵⁻¹⁹ In noncompliant patients, those who smoke, or have diabetes can prove challenging to treat.

Violations of Biologic Width

The biologic width is defined as the dimension from the crest of the alveolar bone to the base of the sulcus, which includes the combined width of the con-

nective tissue and epithelial attachment²⁰ (FIGURE 4). His dimension was measured at 2.04 mm by Gargiulo and colleagues.²¹ It is important to keep in mind this dimension is an average of a range of attachment heights and does not necessarily reflect any one clinical situation. Also, there are several variations in dimension of the biologic width between individuals as well as within the same person, depending on the location of the tooth in the dental arch.²²

Vacek et al. demonstrated that some individuals have an average biologic width of 0.75 mm, whereas others have an average of 4.3 mm. The human variability of the biologic width makes it difficult for the restorative dentist to work with each component of the dentogingival complex (DGC). Kois measured the total DGC in 100 healthy patients with the free gingival margin at or coronal to the cemento-enamel junction (CEJ) of unrestored anterior teeth. Based on his clinical findings, the total DGC was classified in normal crest, high crest, and low crest. Eighty-five percent of patients had a normal crest relationship where the gingival margin was located 3 mm from the osseous crest; 2 percent had a high crest with the FGM located less than 3 mm from the osseous crest; and 13 percent had a low crest with the FGM located more than 3 mm from the FGM (TABLE 2).

Once a tooth is prepared apical to the base of the sulcus, and the margin of a restoration is placed into the biologic width, specifically the connective tissue attachment, the biologic width is violated and the long-term gingival health is compromised.

Low crest DGC are susceptible to recessions, whereas high crest DGC are at risk for biologic width violation when the margin is placed more apically below the free gingival margin. Therefore, the

TABLE 2

Restorative/Periodontal Interface

	Population	Dimension of DGC	Risk when placing subgingival margins
Normal Crest	85%	= 3 mm	Minimal
High Crest	2%	< 3 mm	Biologic width violation
Low Crest	13%	> 3 mm	Recession

(Modified from Kois JC, *Restorative/Periodontal Interface*.²⁸)

location of the osseous crest in relation to the gingival margin and future restorative margin is the most critical reference point for both the periodontist and restorative dentist.²³ In order to prevent a violation of the biologic width during intracrevicular tooth preparation, the authors recommend the following protocol:

1. Sound to osseous crest
2. Determine the crest relationship (normal, high, low)
3. Prepare tooth with margin position placed coronally based on osseous crest relationship, and apically 3 mm coronal to bone
4. Follow scallop of FGM prior to tissue retraction

When the biologic width is violated, the treatment options involve osseous surgery as well as orthodontic extrusion based on the location of the violation, facially, or interproximally. An apically positioned flap with osseous recontouring is indicated when the FGM can be moved apically with no aesthetic compromise or when the violation only involves the facial line angles. It is important to determine which osseous crest relationship the patient presents with prior to surgery in order to position the FGM of the flap at the proper location in relation to the osseous crest. The biologic width will re-establish to its original vertical dimension by six months following surgery.²⁴

The marginal periodontal tissues show a tendency to grow in a coronal direction when the biotype is thick.²⁵ Therefore, definitive crown preparation

should not be made for at least three months after surgery, and sometimes when the periodontal biotype is thin, not before six months.²⁶ After surgery, it is even more important for the restorative dentist to use the osseous crest as a reference point during crown preparation, and to always follow the scallop of the free gingival margin.

When the biologic width violation involves the interproximal tissue, the tooth can be extruded out of the periodontium exposing sound tooth structure.²⁷ Gingival fiberotomy is performed every week in order for the tooth to move out of the alveolar housing. The tooth should be stabilized for a least 10 to 12 weeks, and the final bone and soft tissue position should be evaluated for any additional flap and osseous surgery.

In conclusion, the biological width must be carefully evaluated prior to any restorative and periodontal procedures, keeping in mind that the average dimension of 3 mm does not apply to all patients.

Gingival Asymmetries

Horizontal gingival symmetry is defined as the position of the gingival margins of the central incisors and canine bilaterally situated 1 mm above the gingival margins of the lateral incisors²⁹ (FIGURES 5A-D).

The cause of gingival asymmetries of the maxillary incisors and canines include wear combined with compensatory eruption, altered active eruption, altered passive eruption, trauma at an early age preventing normal tooth

eruption, drug-induced gingival overgrowth, gingival hyperplasia due to local irritants like orthodontic bands and brackets, tooth position (facially or palatally), and root prominence.³⁰

Treatment options for uneven gingival symmetry include:

1. Orthodontic extrusion with periodontium³¹
2. Orthodontic intrusion³²
3. Soft tissue grafting for root coverage³³
4. Surgical crown lengthening³⁴

These treatment modalities can be accomplished simultaneously in order to obtain the ideal gingival esthetic.

GINGIVAL RECESSIONS, INADEQUATE AMOUNT OF GINGIVA, ABERRANT FRENA, AND DEFICIENT INTERPROXIMAL PAPILLAE

Gingival recessions are due to either periodontitis, or to mechanical factors, primarily toothbrushing³⁵ (FIGURES 6A-B). Recession due to horizontal attachment loss (periodontitis) affects all tooth surfaces and is irreversible, whereas facial recession is reversible with periodontal reconstructive procedures.³⁶ Complete coverage of facial recession defects can be achieved only when there is no interproximal loss of bone. Miller described a classification of recession defects, taking into consideration the anticipated root coverage that is obtainable³⁷:

■ **CLASS I.** Marginal tissue recession not extending to the mucogingival junction. No loss of interdental bone or soft tissue.

■ **CLASS II.** Marginal tissue recession extends to or beyond the mucogingival junction. No loss of interdental bone or soft tissue.

■ **CLASS III.** Marginal tissue recession extends to or beyond the mucogingival junction. Loss of interdental bone or soft tissue is apical to the cemento-enamel junction, but coronal to the apical extent of the marginal tissue recession.



FIGURE 5A. Gingival asymmetry.



FIGURE 5C. Gingival asymmetry. Note missing No. 7 with cuspid in lateral incisor position.



FIGURE 6A. Marginal tissue recession with esthetic concerns.

■ **CLASS IV.** Marginal tissue recession extends beyond the mucogingival junction. Loss of interdental bone extends to a level apical to the extent of the marginal tissue recession.

ROOT EXPOSURE

Complete root coverage can be achieved with class I and II defects, while only partial coverage can be expected in class III recessions. No root coverage can be obtained in class IV defects. A recent meta-analysis showed that the subepithelial connective tissue graft is a highly effective procedure for covering gingival recessions as well as increasing the amount of keratinized tissue.³⁸



FIGURE 5B. Crown lengthening surgery was performed prior to placement of new restorations (Restorations: Ken Ho, DDS).



FIGURE 5D. Final restorations after crown lengthening surgery (Restorations: Abdi Sameni, DDS).



FIGURE 6B. Soft tissue grafting was performed with successful root coverage.

Studies show a mean defect coverage ranging from 57 percent to 98 percent with a mean for all studies of 84 percent.³⁹ Wennstrom et al. showed improved results with recession defects less than 5 mm, as compared to sites with greater than 5 mm attachment loss.³⁹

The subepithelial connective tissue graft technique involves a split thickness flap technique. The graft is harvested on the palatal aspect of the maxillary premolars or from the retromolar pad by the use of a “trap door” approach, and stabilized with sutures over the recession defects. The coronally positioned envelope flap is sutured to cover as much of the graft as possible.^{40,41}

When a tooth presents with a lack of quantity (< 2 mm) and quality (thin) of gingiva, the placement of a subgingival restorative margin may, in the presence of subgingival plaque, induce an inflammatory reaction, which results in an apical displacement of the gingival margin.⁴²

Furthermore, when orthodontic tooth movement is planned in a labial position, there is a risk of alveolar bone dehiscence.⁴³ To prevent any further recession, the thickness of the gingival margin has to be improved as well as the tissue height with either a connective tissue graft or thick free gingival graft technique.

FRENA

A hyperplastic frenum can obstruct diastema closure, and should be relocated. The frenectomy has been the most common surgical procedure to remove a frenum. With the frenectomy, the attachment of the frenum to gingiva and periosteum is severed, and the insertion of the frenum is relocated several millimeters up onto the alveolar mucosa.⁴⁴

DEFICIENT INTERPROXIMAL PAPILLAE

There are several causes for the loss of papilla height and the presence of “black triangles.” The most common reason is chronic periodontitis; however, abnormal tooth shape, improper proximal contours, and traumatic oral hygiene procedures can cause black spaces. There are no predictable surgical procedures at the present time to augment a papilla. Orthodontic treatment options including extrusion, parallelizing of the roots of adjacent teeth, and mesiodistal enamel stripping can help minimize black triangles.⁴⁵ Restorative options, including direct as well as indirect restorations, can change the gingival embrasure form of the tooth by moving the interproximal contact toward



FIGURE 7A. Ridge collapse with class III defect (frontal view).



FIGURE 7C. Ridge collapse with class III defect (occlusal view).



FIGURE 7B. Final implant supported restorations following ridge augmentation (Restorative dentist: Seon Ha, DDS).



FIGURE 7D. Ridge augmentation following implant placement for improved gingival architecture.

the papilla and closing the black space.

Deficient Pontic Areas

Following extractions of anterior teeth, there is always a certain amount of bone resorption. Abrams et al. have shown that the loss of anterior teeth resulted in 91 percent of ridge deformities⁴⁶ (FIGURES 7A-D; TABLE 3). The most prevalent defect was a combination labiolingual and apicocoronal type of deformity. According to Siebert, ridge defects are classified into three different classes⁴⁷:

- **CLASS I.** Loss of buccolingual width but normal apico-coronal height

- **CLASS II.** Loss of apico-coronal height but normal buccolingual width

- **CLASS III.** A combination of loss of both height and width of the ridge

If the prognosis of teeth is deemed hopeless due to periodontal, endodontic or nonrestorability factors, then anticipating the amount of future ridge collapse needs to be estimated. In this case, it is extremely important to identify the tissue biotype and the underlining missing bone, which will help determine the prognosis and steps necessary to preserve or rebuild

the desired soft and hard tissue architecture after tooth loss. Thick tissue is much more forgiving, easier to manipulate and provides a more predictable esthetic outcome, as compared to thin tissue, which is more likely to shrink. Deciding when to extract a tooth is easy when it is hopeless, but often times more heroic attempts to save teeth that are broken down with a questionable prognosis is not as simple. In order to preserve the alveolar bone for implants, sacrificing teeth (early extraction) requires a change of thinking as compared to previous philosophical treatment decisions.

Ridge augmentation procedures should be carefully planned in close consultation with the restorative dentist in order to obtain an optimal esthetic outcome. Prior to initiating the treatment, the following factors should be determined:

- Amount of tissue required to eliminate the ridge deformity
- Type of graft procedure to be used
- Timing of various treatment procedures
- Design of the provisional restoration

TABLE 3

Ridge Augmentation Procedures

Technique	Indications	Contraindications	Advantages	Disadvantages
Pedicle graft	Mild cl I defect	Insufficient palatal donor tissue available	One surgical site	Limited tissue available
Subepithelial connective tissue graft	Mild cl I, II, III defect		Multiple augmentation possible; stable after shrinkage	Remote surgical site; limited amount of tissue available; shrinkage for the first 6 weeks
Full-thickness onlay graft	Moderate to severe cl II and III defect		Multiple augmentation possible; stable after shrinkage	Remote surgical site; limited amount of tissue available; color match
Soft and hard tissue graft	Severe cl I, II, III defects		Unlimited bio-material available	Requires primary closure

The authors recommend that the provisional be made prior to surgery and the provisional restoration should be a blueprint of the final restoration meeting the esthetic guidelines previously described in the article. It is the responsibility of the periodontist to augment the ridge to meet the provisional prosthesis in the most exact manner possible. Ridge augmentation treatment options include:

1. PEDICLE GRAFT PROCEDURES:

- Roll flap procedure⁴⁸
- Pediculated connective tissue graft⁴⁹

2. FREE GRAFT PROCEDURES:

- Pouch graft procedure⁵⁰

- Interpositional graft procedure⁵¹

- Onlay graft procedure⁵²

3. GUIDED BONE REGENERATION PROCEDURES⁵³

4. COMBINATION OF SOFT AND HARD TISSUE AUGMENTATION

The use of pedicle graft procedures is indicated for correction of a single tooth ridge defect with minor horizontal and vertical loss, whereas in cases of larger defects free graft procedures should be chosen. The onlay graft procedure is indicated primarily for large class II and class III defects in the presence of mucogingival problems includ-

ing lack of gingiva in width as well as high frenum attachment and tattoo.

Severe defects are corrected with a combination of soft and hard tissue augmentation procedures including guided tissue regeneration.

Excessive Gingival Display

Often, patients will seek treatment with a periodontist to correct their gummy smiles (FIGURES 8, 9A-B, 10A-F; TABLES 4 AND 5). It is important that the proper diagnosis be formulated in order for the periodontist to obtain a successful treatment outcome. Sixty-nine percent of the population has an average smile line, which limits the amount of gingiva that can be seen when a person smiles. Eleven percent of patients have a high smile line, which exposes a significant amount of gingiva.⁵⁴

Treatment options for the correction of excessive gingival display (EGD) should be based on a careful analysis of the dentofacial structures, and include surgical crown lengthening, orthodontics, and orthognathic surgery. The differential diagnosis of EGD should incorporate the following features:

1. Short upper lip
2. Hypermobile lip
3. Vertical maxillary excess (FIGURE 8)
4. Anterior overeruption
5. Wear and compensatory eruption



FIGURE 8. Vertical maxillary excess showing healthy periodontium with symmetrical gingival contours. If the patient wants correction, then orthognathic surgery is required.



FIGURE 9A. Average smile line showing short clinical crowns with altered eruption.



FIGURE 9B. Smile following combination of treatment including surgical crown lengthening, orthodontic movement to close the diastema and bonding restorations.



FIGURE 10A. Presurgery: Altered eruption with uneven gingival contours.



FIGURE 10B. Preosseous view of altered eruption. Note level of osseous crest relative to CEJ.



FIGURE 10C. Postosseous surgery.



FIGURE 10D. Initial postop: One week healing.



FIGURE 10E. Final result after crown recontouring and restorative bonding (Restorative dentist: Robert Wheeler, DDS).



FIGURE 10F. Final smile.

6. Altered active eruption

7. Altered passive eruption

If EGD is due to insufficient length of the clinical crowns, it is important to evaluate if the teeth present any wear. When the incisal edge is worn, the diagnosis is compensatory eruption.⁵⁵ The treatment consists of orthodontic intrusion if the roots are short, and/or surgical crown lengthening when the roots have a normal length.

If the teeth have no wear, the diagnosis is either altered passive or altered active eruption.⁵⁶ In altered active eruption, the crest of bone is at the level of the CEJ, the anatomical crown having not fully erupted out of the alveolar bone. Usually the periodontium is of the thick biotype combined with a bony ledge. The treatment should consist of an apically positioned flap with osseous recontouring. In altered passive eruption, the alveolar crest has a normal relationship with the CEJ, but the gingiva does not recede normally, leaving a short clinical crown. The periodontium might be of a thin biotype, and full exposure of the anatomical crown can be accomplished sometimes with a gingi-

vectomy, and sometimes with an apically positioned flap with ostectomy, depending on the amount of gingiva present.

In other individuals who have excessive display of gingiva with normal size and shape of the teeth, and the location of the gingival margins is perfectly normal, the EGD is often caused by the following: short upper lip, hypermobile lip, vertical maxillary excess, anterior overeruption.

If there is excess tooth display at rest, and the person presents normal facial proportions, and the upper lip is short (<22 mm), no treatment can correct the gummy smile. If the tooth display at rest is normal and is combined with excessive gingiva visible anteriorly and posteriorly while smiling, and the facial proportions are normal, the diagnosis is hypermobile lip. Consultation with a plastic surgeon to augment or reposition the lip can be of benefit to correct the EGD due to a hypermobile lip.

If there is excessive gingival tooth display at rest, and the person presents a long midface, the diagnosis is vertical maxillary excess. Periodontal surgery will not correct the problem,

but rather the maxilla must be impacted by orthognathic surgery.

When the excessive gingival display is located only anteriorly, it is due to a class II malocclusion combined with anterior overeruption. The treatment includes orthodontic intrusion as well as surgical crown lengthening and restorative dentistry.

Conclusion

Periodontal therapy is an extremely important part of all of our patients oral health. Establishing a logical treatment plan can only occur if the initial diagnosis is correct. The diagnosis will lead to a prognosis for each tooth and the overall dentition. After completion of active periodontal therapy, it is important to create a healthy periodontium that can be maintained with ideal home care and regular recall (periodontal maintenance) appointments. In the esthetic zone it is important to understand all the factors that affect the smile and that relate to uneven gingival contours (asymmetry). Establishing the ideal smile requires careful selection of the appropriate procedures prior to placement of restora-

TABLE 4

Condition, Etiology, and Clinical Findings for EGD

Condition	Etiology	Clinical Findings
Altered passive eruption	FGM fails to recede to the level of the CEJ during tooth eruption	FGM located incisal to the CEJ
Altered active eruption	Osseous crest fails to resorb 2 mm apical from CEJ	FGM located incisal to the CEJ
Wear and compensatory eruption	Pathologic attrition, erosion	FGM located at the level of the CEJ
Vertical maxillary excess	Skeletal, developmental	Long midface combined with EGD Normal clinical crown length
Short upper lip	Length of lip < 22 mm	EGD Normal clinical crown length
Hypermobility lip	Muscular capacity of orbicularis oris to raise the upper lip higher than average	EGD anterior and posterior while smiling Normal facial proportions Normal clinical crown length
Anterior overeruption	Class II malocclusion	EGD only anterior while smiling Normal clinical crown length

TABLE 5

Treatment Modalities for EGD

	Short Lip	Hypermobility Lip	VME	Anterior Overeruption	Wear and Compensatory Eruption	Altered Active Eruption	Altered Passive Eruption
Periodontics				●	●	●	●
Orthodontics				●	●		
Orthognathic surgery			●				
Plastic surgery	●	●					

tions. Often this requires a coordinated effort between the restorative dentist and the other specialists. ■■■■

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