

The Esthetic Management of a Patient with a Flat Periodontium and Bone Loss in the Maxillary Anterior

Patients who present for esthetic treatment with a flat periodontium typically have teeth that are square in appearance and short in length, but with a normal contact height of 5 mm to 6 mm. This appearance is often the result of an alteration in the normal eruptive process, or it may be a variation from normal for an individual patient.¹ Generally speaking, if these patients are seeking esthetic enhancement, crown lengthening on the facial surface only via either gingivectomy or osseous surgery can result in a very pleasing result with a normal tooth length, papilla height, and contact height (Figure 1 through Figure 4).²

A much greater challenge exists in the patient who has a flat periodontium and has had bone loss in the maxillary anterior.³ As the bone loss occurs, the gingival tissues may recede in an apical direction, leaving behind open gingival

embrasures and potentially excessively long teeth. Esthetic restoration of these teeth results in rectangular and unattractive final restorations that have excessively long contacts and minimal papilla height. This appearance occurs because of the flat nature of the periodontium. It is the scalloped nature of the normal periodontium that allows a pleasing, tapered, cervical tooth form to be created without leaving open gingival embrasures. As the periodontium flattens out, the clinician is left with the choice of either having ideal tooth form and open gingival embrasures, or closing the gingival embrasures and getting square- or rectangular-appearing restorations (Figure 5 through Figure 7). In some patients who have both a flat periodontium and bone loss but not excessively long teeth, it is possible to perform facial crown lengthening to enhance

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Figure 1—The classic appearance of a patient with a flat periodontium due to aberrant tooth eruption.



Figure 2—The elevation of a full-thickness flap reveals bone covering the CEJ of the teeth.



Figure 3—Bone was removed to expose 2 mm of root apical to the CEJ.



Figure 4—A postoperative photograph showing the esthetic enhancement from a simple facial crown-lengthening surgery.



Figure 5—A patient with a flat periodontium and the bone loss illustrating the open gingival embrasures and long teeth due to recession.



Figure 6—A view of the tooth preparations illustrating the flat nature of the periodontium.



Figure 7—The final restorations. The decision was made to close the gingival embrasures, resulting in extremely long contacts and very rectangular-looking teeth.

the scalloped nature of the periodontium and improve the overall appearance of the final restorations by making the papilla height greater, which minimizes the rectangular appearance from the long contact (Figure 8 and Figure 9). But in patients where the papilla has receded to a distance of 8 mm or more from the incisal edge, it is almost impossible via facial crown lengthening to create what would be considered a pleasing crown form, because removing enough facial tissue to create a pleasing papilla results in an excessively long tooth. What is necessary to improve the esthetics of these patients is to move the papilla in a coronal direction, thus reducing the overall length of the contact, followed by facial crown lengthening to increase the apparent height of the papilla and to create a more pleasing tooth form. At this point in time, because we lack the surgical techniques to augment interproximal bone predictably in a coronal direction or to augment interproximal soft tissue predictably in a coronal direction, the only treatment choice available to accomplish these goals is a combination of orthodontic extrusion to move the anterior teeth and periodontium in a coronal direction followed by periodontal surgery to reestablish the correct tooth length and gingival architecture.⁴

Case Presentation

The patient presented with a chief complaint of wanting to enhance the appearance of her smile (Figure 10). She had a history of seeing a periodontist for bone loss and previously had some excessive pocket depth. In addition, all of the maxillary teeth had full-coverage metal-ceramic restorations. The first step in the treatment planning

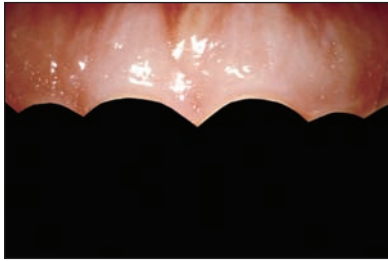


Figure 8—The gingiva from the patient in Figure 7 illustrating the lack of gingival scallop.



Figure 9—A normal gingival scallop from a patient with an ideal dentition. One treatment option for the patient in Figure 7 would have been to do facial crown lengthening to create the gingival scallop seen in this photograph; however, doing so would have resulted in teeth that were excessively long.

process was to diagnose the current situation, evaluating what was correct and what would need to be changed. Esthetically, the incisal edge position, incisal plane, and occlusal plane were all in an acceptable position. This is an important consideration in any patient where the contact length is excessive, because an easy treatment option (if it is available) is to shorten the incisal edges of the teeth to reduce the length of the contact, and then crown lengthen

the facial to reestablish the correct tooth length. In this patient, however, attempting to shorten the incisal edges would have resulted in the creation of a reverse smile line relative to the maxillary posterior teeth, and therefore was not considered as an option. The gingival esthetics across the maxillary anterior were flat, with only a 1-mm to 1.5-mm gingival scallop. In addition, there was an uneven gingival display between the patient's left and right



Figure 10—The initial smile view of a patient with a flat periodontium who desired an esthetic enhancement.

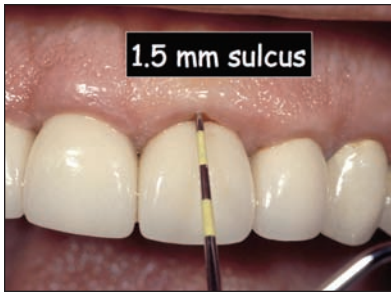


Figure 11—A normal facial sulcus depth of 1.5 mm.

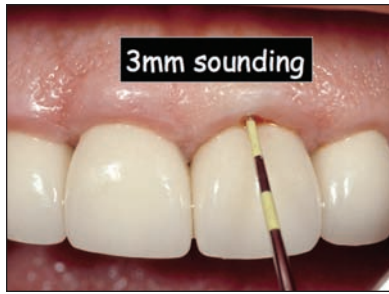


Figure 12—A normal facial sounding depth of 3 mm.



Figure 13—A normal interproximal sulcus depth of 2.5 mm.

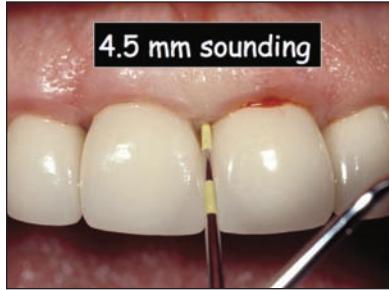


Figure 14—A normal interproximal sounding depth of 4.5 mm.

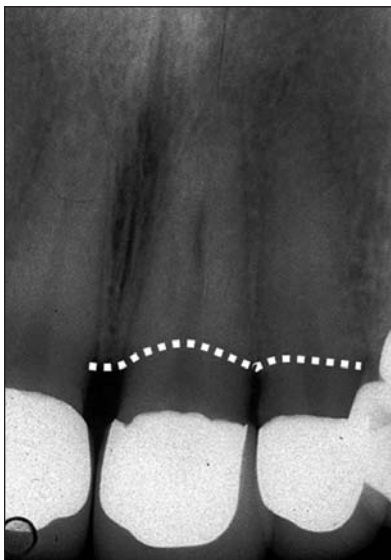


Figure 15—With normal gingiva-to-bone relationships, the problem is the flat nature of the bone, as can be seen in this radiograph.

The first step in the treatment planning process was to diagnose the current situation, evaluating what was correct and what would need to be changed.

sides, and the gingival levels on all the incisors were coronal to the gingival margin on the right canine. Evaluating the individual anterior teeth esthetically revealed that the central incisors were 9.5 mm in length, 8.5 mm in width, and, from the incisal edge to the interproximal papilla, the contact was 8 mm long. The lateral incisors also had a contact length near 8 mm. Biologically, the facial sulcus on all of the anterior teeth probed 1.5 mm, with a 3-mm sounding depth, indicating an average 3 mm of facial gingiva above the facial crestal bone. Interproximally, the sulcus depth averaged 2.5 mm with an average sounding depth of 4.5 mm, indicating an average of 4.5 mm of interproximal papilla above the interproximal crest of bone (Figure 11 through Figure 14). A radiographic evaluation showed no evidence of any periapical pathologies, and an evaluation of the crestal bone revealed almost no osseous scallop (Figure 15).

In treatment planning this patient's esthetic options, two things became evident. First, the maxillary incisors needed to have their gingival margins moved in an apical direction, not just to enhance the overall tooth length but also to improve the gingival scallop; and, second, if ideal esthetics were desired it would

be beneficial to reduce the length of the contact by moving the interproximal papilla in a coronal direction. Moving the facial gingiva in an apical direction to solve the first problem could be easily accomplished with periodontal surgery; removing 1.5 mm to 2.5 mm of the gingiva and bone would produce a central incisor 11 mm to 12 mm in length with a width-to-length ratio between 75% and 80%, which most people would find acceptable. This also would increase the apparent height of the papilla from the existing scallop of 1 mm to between 3 mm and 4 mm. The problem, however, was that the contact would remain 8 mm in length—double the height of the papilla—leaving the appearance of a fairly rectangular final tooth form. Accomplishing the second goal of moving the papilla in a coronal direction would require orthodontics to erupt the maxillary incisors, reducing the incisal edge length as the teeth move coronally, thereby shortening the overall contact length. After the orthodontic eruption, the papilla would be positioned in an ideal location and then periodontal surgery could be performed on the facial gingiva and bone to reestablish tooth length and papillary form. The patient was presented both treatment options and chose the more complex but ideal option of using orthodontic eruption and periodontal surgery to get the best result.

The treatment sequence between all of the clinicians was critical for this patient. Although orthodontics had to be performed in order to erupt the teeth prior to the periodontal surgery, it was not possible for the orthodontist to perform the eruption until the existing restorations were removed, the preparation length was adjusted, and temporaries were placed. The initial phase of treatment consisted of removing all of the maxillary restorations and correcting the overall length of all of the tooth preparations.

Upon removal of the existing crowns, several of the preparations on the anterior teeth were found to be 5 mm in length; if these were not shortened, the orthodontist would need to grind through the temporaries and into the tooth preparations during the eruptive



Figure 16—At the first appointment, the old restorations were removed, revealing tooth preparations 5 mm in length.



Figure 17—The tooth preparations were reduced to 3 mm in length to allow for the orthodontic eruption.



Figure 18—The provisional restorations prior to shortening and polishing illustrate the classic appearance of a patient with a flat periodontium, long contacts, and rectangular-appearing teeth.



Figure 19—After polishing and cementation, the incisor provisionals were relieved to allow for orthodontic eruption.

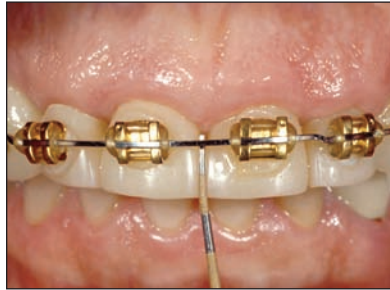


Figure 20—At the completion of orthodontics, the incisal edges were level with the occlusal plane and the papilla was 5 mm from the incisal edges.



Figure 21—Using the existing provisional as a reference, the ideal gingival margin location was measured.



Figure 22—A gingivectomy was done on all of the anterior teeth to the ideal gingival margin position, re-creating the correct length of tooth and the papillae.



Figure 23—After the gingivectomy, the tooth preparations were carried to the gingival margins.



Figure 24—A new provisional was then fabricated, illustrating the more pleasing tooth length and form.

process. Because the ultimate goal of the orthodontics for this patient was to establish a contact length of 5 mm to 6 mm from the incisal edge to the tip of the papilla, the preparations were shortened to 3 mm in overall height.

Provisional restorations were then created, leaving the four incisors as one unit, separate from the remainder of the maxillary arch. In addition, the four incisor temporaries were permanently cemented and the occlusion was relieved 1.5 mm to 2 mm to allow space for the orthodontic eruption to begin (Figure 16 through Figure 19). The patient then went to the orthodontist and had the appliances placed. The instructions to the orthodontist were to continue

erupting the teeth and shortening the incisal edges until the incisal edges were level with the occlusal plane and the contact length was 5 mm. This would require approximately 3 mm of eruption, which would take place over 5 to 6 months, very slowly, so as to bring the bone and gingiva to the desired level with the teeth.

When the incisal edges appeared to be in the correct location and the distance from the incisal edge to the papilla was 5 mm, the orthodontic movement was stopped and stabilized for 8 to 12 weeks (Figure 20). The next step in the process was to correct the gingival margins. This was done as a two-step procedure. First, the author performed a

gingivectomy on the anterior teeth using the incisal edges of the existing temporaries as a reference to create a tooth length of 11 mm on the centrals and 9 mm on the lateral incisors. The incisor temporaries were cut off and the teeth were prepared to the level of the gingivectomy. A new set of temporaries was then placed but no bony alterations were performed (Figure 21 through Figure 24). This allowed the final tooth form and size to be viewed prior to the patient committing to any removal of facial bone. The patient and the author both agreed that the tooth form, proportion, and overall length was pleasing, and the patient was sent to the periodontist for the final bony recontouring.

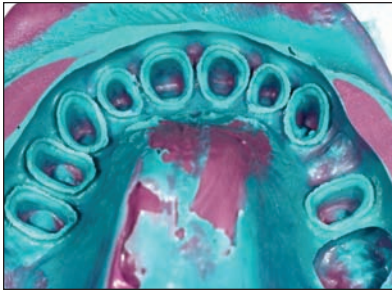


Figure 25—Three months after the periodontist had altered the bone to match the new gingival position, final impressions were made.



Figure 26—The final preparations with two layers of #1 cord in place prior to making the final impression

After the periodontal surgery, the patient healed for 12 to 16 weeks before beginning the final restorative process. At that time, the maxillary provisionals were removed, the tooth preparations were refined, and the final impressions were made (Figure 25 and Figure 26). In addition, a facebow transfer and bite records were made before relining the existing provisional restoration and re-cementing it. The final restorations consisted of cemented all-ceramic crowns in the maxillary anterior, and a metal-ceramic bridge in the maxillary right posterior. Follow-up of

this patient has been completely uneventful, with no maintenance issues or periodontal issues to address. In addition, the patient and her family were extremely pleased with the outcome (Figure 27 through Figure 30).

The purpose of this article has been to present a treatment option that can greatly improve the final esthetic appearance for patients who have had bone loss in the maxillary anterior that has resulted in a flat periodontium and square-looking teeth. Not every patient who presents with this condition will require the orthodontic eruption that

was performed in this case; if the incisal edge to papilla distance is 6 mm to 7 mm most patients can be treated just by periodontal surgery to crown lengthen the facial surfaces of the teeth and get a very acceptable result. But, any time the crown lengthening necessary to improve the gingival scallop would result in excessively long teeth, the combination of orthodontic extrusion first and followed by periodontal surgery can almost always create a more ideal final result.

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Figure 27 and Figure 28—A comparative view of the lateral smile pre- and posttreatment.



Figure 29 and Figure 30—A comparative view of the frontal smile pre- and posttreatment.