

A Periodontal-Restorative Approach to Achieving an Esthetic Outcome in Worn Dentition



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Abstract

Esthetic dentistry demands more of clinicians than just simple knowledge of tooth anatomy and the proper dimensions of teeth. Dentists must also know and understand the proper positions of the teeth in relation to the gingiva, the lips, and the entire face. Esthetic measurements are not the only important factors. Other considerations need to include a patient's phonetics and function. An example of a situation where this knowledge and awareness is imperative is in the case of the worn dentition (eg, attrition, abrasion, etc). This article addresses a simple case of how a patient's esthetics have been compromised as a result of erosion as well as parafunctional activity (toothbrush abrasion) and how the patient was eventually restored with an interdisciplinary approach between the restorative dentist and the periodontal surgeon.

Learning Objectives

After reading this article, the reader should be able to:

- identify the best treatment option for lengthening worn dentition.
- describe tooth anatomy and the relationship of the teeth to the gingiva, lips, and face to establish an esthetic outcome.
- evaluate complete harmony between the face, lips, gingiva, and teeth without compromising phonetics, function, and comfort.

Many patients schedule dental consultations for esthetic treatment. During consultation, the dentist often discovers that the cosmetic complaint stems from an oral condition. This article will focus on the various steps used to establish an esthetic outcome in a worn dentition. It also will highlight the considerations given to not only tooth anatomy, but also to the relationship of the teeth to the gingiva, lips, and entire face while simultaneously fulfilling the requirements for proper phonetics, function, and comfort.

Clinical Presentation

A 37-year-old woman presented to the office with excessive incisal wear and a primary goal of attaining longer teeth that also would be "whiter and brighter." She decided to seek cosmetic dental treatment because she

wished to have the "teeth she used to have in her 20s." The patient explained that as a result of acid reflux disease, the "backs" of her teeth had become very sensitive and worn.

Clinical Findings and Diagnosis

The patient was in good periodontal condition with regard to probing depths, bleeding on probing, and mobility. Tooth No. 11 had 2 mm of recession with an adequate band of keratinized gingiva; this mucogingival defect was classified as a Miller class I recession defect.¹⁻³

The facial profile was brachycephalic (Figure 1). An evaluation of the smile revealed that less than 2 mm of the incisal edges of the central incisors were displayed in repose. The esthetic line of the upper lip was less than 2 mm apical to the free gingival margin, and the bicuspid and first molars were displayed in the buccal corridors of her smile (Figure 2).

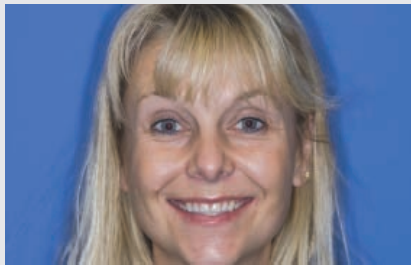


Figure 1—Pretreatment full-face smile view. Note the brachycephalic facial profile.



Figure 2—Close-up view of pretreatment smile.



Figure 3—Pretreatment retracted view. Note the gingival asymmetry and square shape of teeth Nos. 6 through 11, and the recession defect on tooth No. 11.

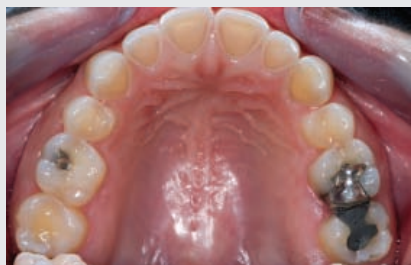


Figure 4—Pretreatment occlusal view of the maxillary teeth. Note the erosion on the lingual surfaces of teeth Nos. 6 through 11.



Figure 5—Pretreatment occlusal view of the mandibular teeth.



Figure 6—Diagnostic wax-up cast (top) compared with the pretreatment model (bottom).

Esthetically, gingival asymmetry was evident between the gingival forms of the upper anterior teeth (Figure 3). Along with this asymmetry were clinical crowns (teeth Nos. 6 through 11) that were square in shape partly as a result of attrition and erosion but also because of altered passive eruption.

Based on these findings, the diagnosis of altered passive eruption combined with attrition from para-functional activity was suggested to have caused the square appearance of the patient's upper anterior teeth⁴ and her overall displeasure with her smile. Erosion was noted on the lingual surfaces of teeth Nos. 6 through 11 (Figure 4). No erosion was noted on the mandibular teeth (Figure 5). To complicate things further, tooth No. 11 also presented with a recession

defect (presumably from toothbrush abrasion) that disrupted the symmetry and harmony of the other anterior teeth (Figure 3). Occlusal evaluation revealed an anterior open bite as well as a lack of anterior guidance during mandibular protrusive movement.

Fabrication and Execution of the Treatment Plan

From an esthetic standpoint, several questions were posed:

1. How long should the teeth be?
2. Should the teeth be lengthened by adding to the worn incisal edges or by crown lengthening?
3. How should the teeth be shaped?
4. Should teeth Nos. 6 through 10 be lengthened to establish gingival harmony with tooth No. 11, which is receded, or should the gingiva of tooth No. 11 be low-

ered to complement the other anterior teeth?

To answer how long the teeth should be requires an awareness of the ideal width-length ratio, beginning with the central incisors. For central incisors, the ideal width-length ratio is between 67% and 80%.^{5,6} Because the patient presented with square-shaped (50% width-length ratio) central incisors, combined with a brachycephalic profile, we proposed a tooth length of 11 mm and a more tapered tooth shape. Tapered 11-mm incisors would provide the desired longer teeth that also would complement the patient's smile and facial structure.

After establishing the length of the central incisors, the same length was chosen for the canines with the dimensions of the lateral incisors being



Figure 7—Retracted view of provisional restorations before periodontal surgery.



Figure 8—Buccal view of the provisional restoration on tooth No. 11 communicating the desired gingival margin to the periodontal surgeon.



Figure 9—Flap reflection of tooth No. 11 revealing the dehiscence and recession defect.



Figure 10—Placement of peptide enhanced bone grafting material under the flap and over the dehiscence.



Figure 11—Final suturing after vertical translation of tooth No. 11.



Figure 12—Postoperative view, 2 weeks after vertical translation.

diminished slightly at both the incisal and cervical parameters.

After establishing the tooth lengths, the decision had to be made whether to achieve the length by adding to the incisal edges or by crown lengthening the teeth. Because the teeth had both attrition and altered passive eruption, either option would be available. To help with this decision, we established the position of the incisal edge. Two clinical measurements were used. The average woman displays up to 4 mm of the incisal edges of the central incisors in repose.⁴ This patient only displayed 2 mm; therefore, the incisal edges could be lengthened, at least from an esthetic standpoint.

From a functional and phonetic perspective, we knew that the incisal

edges of the central incisors should coincide with the wet-dry mucosal junction of the lower lip when the patient makes the “f” sound.⁴ The incisal edges of this patient’s central incisors were about 2 mm short of this wet-dry border. After making these observations, it was determined that the incisal edges should be lengthened. In addition, the decision also was made to gain the additional desired length by performing a simple gingivectomy. This would minimize the amount of gingiva that is displayed during the patient’s fullest smile. Therefore, the desired treatment for this patient called for lengthening the incisal edges by 2 mm in the final restorations while also gaining an additional 2 mm in length by performing a gingivectomy.

This would create a final central incisor length of 10.5 mm to 11 mm.

After establishing the desired tooth lengths, the treatment plan for tooth No. 11 would be to cover the recession with periodontal plastic surgery to complement the other teeth in the esthetic zone.

Before beginning treatment, a diagnostic wax-up was used to help visualize the final outcome (Figure 6). After obtaining the patient’s approval, treatment proceeded. Gingivectomy was performed on teeth Nos. 6 through 11 to establish the cervical dimensions of the teeth. Then, the teeth were prepared for full-coverage ceramic restorations and provisionalized to establish the desired incisal edge positions (Figure 7). The recession on tooth No. 11

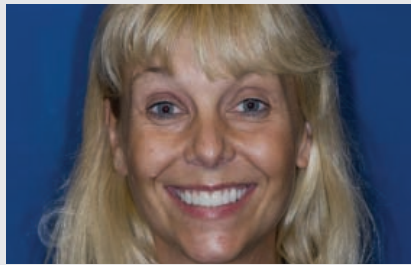


Figure 13—Posttreatment full-face smile view. Note the harmony between the face, lips, and gingiva.



Figure 14—Close-up view of posttreatment smile.



Figure 15—Posttreatment retracted view. Note the symmetrical gingival levels, the longer canines, and the well-shaped but slightly shorter incisors.



Figure 16—Posttreatment maxillary occlusal view. The full-coverage restorations restored lost enamel and eliminated sensitivity.



Figure 17—Posttreatment mandibular occlusal view.

was still present in the patient's high esthetic line (Figure 8).

After a healing period of 8 weeks, during which the patient was able to evaluate her provisional restorations for esthetics, phonetics, function, and comfort, the patient was treated with periodontal plastic surgery on tooth No. 11 to cover the recession. The margin of the provisional restoration on tooth No. 11 was placed at the desired gingival level (using the diagnostic wax-up as a guide) to properly communicate the expected result to the periodontist. The periodontist used the vertical translation technique to cover the recession and place the gingival margin at the proper level (Figures 9 through 12). Other periodontal surgery techniques were considered,

such as the subepithelial connective tissue graft,⁷ but the vertical translation approach was used to provide the maximum esthetic outcome while minimizing patient discomfort.⁸ The graft was allowed to heal for 12 weeks before making the final impression and restorations.

Evaluation of Results

Overall, the patient was very pleased with the final result. Her phonetics, function, and comfort were maintained throughout the process. Her transition was aided by wearing the provisional restorations. This provisional phase of treatment was valuable because it allowed the patient to provide proper feedback before the final restorations were delivered. The provisionals also were a vital tool for

communicating to the periodontal specialist where the final restorative margins would be located, allowing the periodontist to properly correct the gingival recession to the desired level.

The patient's final smile was much more confident (Figure 13). In her high esthetic line, the upper lip and the gingival margins of her upper teeth were coincident—even though they were already coincident before treatment and her gingival margins were raised 2 mm during the course of treatment. In her full smile, her lower lip cradled the incisal edges of her upper teeth. This relationship was accomplished by lengthening the edges of teeth Nos. 6 through 11 by 1 mm to 2 mm (the central incisors were lengthened 2 mm at the edges). There was no step up or down when looking at the gingival margins of her anterior teeth compared with the posterior teeth, and there was no dead space in the posterior corridors of her smile (Figure 14).

The patient's gingival levels were now symmetrical. The central incisors and canines were the longest, most prominent teeth in the esthetic zone with the lateral incisors being slightly

diminished. Tooth No. 11 was surrounded with an adequate band of keratinized and attached gingiva and also appeared to have contours that complemented the remaining teeth, despite previously having gingival recession (Figure 15). The eroded lingual surfaces of teeth Nos. 6 through 11 were successfully treated with full-coverage restorations that not only restored the lost enamel but also eliminated any sensitivity (Figures 16 and 17).

Regarding her face, the patient's previously short, brachycephalic facial profile appeared longer. The patient claimed to have a younger, more youthful appearance as a result. She

also was pleased with the shade, color, and shape of her restorations.

Conclusion

With proper planning and input from the entire dental team (in this case a restorative dentist and a periodontist), predictable esthetic outcomes that address multiple facets of the smile may be delivered. Other specialists that may be included in similar situations are the orthodontist and oral surgeon. An interdisciplinary approach is often helpful, if not mandatory, to achieve complete harmony between the face, lips, gingiva, and teeth without compromising phonetics, function, and comfort. ©

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1. **To identify the best treatment option for lengthening this patient's worn dentition, what questions were posed by the restorative dentist?**
 - a. How long should the teeth be?
 - b. Should the teeth be lengthened by adding to the worn incisal edges or by crown lengthening?
 - c. How should the teeth be shaped?
 - d. all of the above
2. **For central incisors, the ideal width-length ratio is between:**
 - a. 20% and 33%.
 - b. 35% and 48%.
 - c. 52% and 65%.
 - d. 67% and 80%.
3. **The average woman displays up to how much of the incisal edges of the central incisors in repose?**
 - a. 2 mm
 - b. 4 mm
 - c. 6 mm
 - d. 8 mm
4. **The incisal edges of the central incisors should coincide with the wet-dry mucosal junction of the lower lip when the patient makes which sound?**
 - a. "f"
 - b. "t"
 - c. "s"
 - d. "w"
5. **The desired treatment for this patient called for:**
 - a. lengthening the incisal edges by 3 mm.
 - b. lengthening the incisal edges by 11 mm.
 - c. gaining 3 mm in length by performing a gingivectomy.
 - d. lengthening the incisal edges by 2 mm in the final restorations while also gaining an additional 2 mm in length by performing a gingivectomy.
6. **Before beginning treatment, a diagnostic wax-up was used to:**
 - a. help visualize the final outcome.
 - b. make custom bleaching trays.
 - c. make reversible hydrocolloid trayforms.
 - d. form porcelain temporaries.
7. **The periodontist used which technique to cover the recession and place the gingival margin at the proper level?**
 - a. horizontal translation
 - b. vertical translation
 - c. subepithelial connective-tissue graft
 - d. commercially available calcium sulfate barrier
8. **The graft was allowed to heal for 12 weeks before:**
 - a. the patient could floss.
 - b. the patient could use a water irrigating device.
 - c. preparing the teeth.
 - d. making the final impressions and restorations.
9. **What were a vital tool for communicating to the periodontal specialist where the final restorative margins would be located?**
 - a. provisionals
 - b. digital photographs
 - c. periodontal charts
 - d. multiple radiographs from different angles
10. **Which were this patient's longest, most prominent teeth in the esthetic zone?**
 - a. central incisors only
 - b. canines only
 - c. central incisor and canines
 - d. Relative arch position determines the specific tooth on case-by-case basis.

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