ABSTRACT

In this case involving a 29-year-old woman with a history of stomach-acid–related reflux and extensive loss of tooth structure, the patient desired to regain the smile she “used to have.” The treatment goals throughout the process were to manage risk, use minimally invasive procedures, and improve the prognosis in each of the four dental categories—periodontal, biomechanical, functional, and dentofacial. The treatment plan utilized a systematic approach to sequentially restore and protect the young woman’s dentition. It included esthetic crown lengthening, establishing the ideal esthetic position of maxillary anterior and posterior teeth, addressing the mandibular plane of occlusion, and achieving optimal function.

RECURRENT exposure of tooth structure to stomach acid can produce devastating results at any age, but when it affects people in their 20s, the ramifications are even more significant. A long-term treatment plan that is predictable and affordable can be challenging to both the patient and dentist. In this case, the author followed a systematic method as taught by the Kois Center (www.koiscenter.com), which included a range of elements, from documentation and careful planning to patient discussion and implementation, as well as the instruments needed to achieve the desired outcome. Evaluating and respecting patient risk and prognosis enabled this complex case to be broken down into steps to achieve a predictable, long-term, satisfying result.

This case, which demonstrates the sequential restoration and protection of a relatively young but dilapidated dentition, emphasizes the value of thorough and careful planning. It also shows the importance of being mindful of minimally invasive procedures as well as patient financial limitations. The result was successful in both achieving desired goals while recognizing and accepting that certain areas of the patient’s dentition may need ongoing care as it matures.

CLINICAL CASE OVERVIEW

Patient History and Chief Complaint: A 29-year-old woman presented for comprehensive examination and evaluation for treatment. Her concern was the extensive loss of tooth structure and the chipping of her upper front teeth (Figure 1). The patient, a controlled asthmatic who has had severe stomach-acid–related reflux over the past 11 years, was under the care of a physician. Her dental history included wisdom teeth extractions and routine dental examinations and prophylaxis. Over the previous several years, the tooth chips and pits had been repaired with direct composite restorations.
A 29-year-old woman presented with extensive loss of tooth structure and chipping of her maxillary front teeth. Radiographs showing sound bone levels throughout. Although both load testing and immobilization tests of the temporomandibular joints (TMJ) were negative, a slight click of the right TMJ was noted upon opening. Additionally, there was tenderness in the right masseter muscle. A maximum opening of 45 mm was measured, with no deviation upon opening or closing.

The functional diagnosis was occlusal dysfunction. It is important to note that the attrition was primarily due to chemical erosion rather than functional forces. The functional symptoms of clenching and muscle tenderness were secondary to the unstable occlusion that resulted from the erosion.

Risk: Moderate
Prognosis: Fair

Dentofacial: The patient presented with medium lip dynamics and gingival display at her broadest smile. Significant maxillary gingival asymmetry and disharmony was noted. It was determined by her face that lengthening tooth No. 9 by 1 mm would be the most esthetic position for her maxillary incisal edge.
Risk: Moderate
Prognosis: Fair

Treatment Goals:

- Manage the biomechanical risk and improve the prognosis by both restoring and protecting the structurally compromised teeth.2

Fig 1. A 29-year-old woman presented with extensive loss of tooth structure and chipping of her maxillary front teeth. Fig 2. Radiographs showing sound bone levels throughout.
Utilize minimally invasive conservative tooth preparation designs wherever possible in an effort to minimize any further structural compromise to the teeth.

- Manage the functional risk by treating the dysfunction and establishing a stable position of maximum intercuspation with bilateral simultaneous and equal intensity contacts.

- Establish horizontal symmetry of the maxillary gingival architecture.

- Provide the patient with a smile that she used to have (Figure 8).

**TREATMENT PLAN**

- The optimal position of maxillary anterior and posterior teeth was established utilizing the Kois Dento-Facial Analyzer system and the Panadent platform (www.panadent.com) (Figure 9).³

- Core-supported, cohesively retained, all-ceramic restorations were planned for all maxillary teeth, with minimal buccal and lingual reduction and subgingival finish lines.

- The mandibular plane of occlusion was addressed by adding enough restorative material to the posterior occlusal plane to compensate for the lost tooth structure, level the occlusal plane, and manage the biomechanical risk.

- Esthetic crown lengthening was planned to achieve symmetry and gingival harmony, and also to provide more sound tooth structure and preparation length to decrease the risk of biologic width violation.

- A connective tissue grafting procedure was planned to correct the buccal recession of tooth No. 19.

It should be noted that orthodontic treatment to include intrusion of the maxillary anterior teeth to achieve gingival symmetry and create restorative space for the maxillary incisors was presented as an option to the patient. This course of treatment was discussed but was declined by the patient.

**TREATMENT PHASES**

**Phase 1: Hygiene**

Adult prophylaxis and oral hygiene instructions were provided. The patient was placed on CariFree® (Oral BioTech, www.carifree.com) maintenance rinse to increase the pH of the oral environment and a 6-month maintenance interval.

**Phase 2: Planning and Crown Lengthening**

With the help of photographs and mounted models, the Panadent platform was used to first evaluate, then design the desired esthetically driven plane of occlusion. The desired gingival alteration and associated osseous reduction for each tooth was calculated.⁴ ⁵ A gingivectomy was done first to achieve the desired contour, symmetry, and harmony. This was followed by the required osseous
reduction (Figure 10). The tissue was repositioned ideally to reestablish a normal crest dentogingival complex. Following surgery, the tissue was allowed to heal for 4 months.

**Phase 3: Initial Restorative Phase**

With the esthetic and functional endpoint in mind, a Kois deprogrammer was delivered and used to establish the desired vertical and horizontal relationship of the anterior teeth. The mandibular molars and second premolars were minimally prepared for indirect composite onlays to achieve the desired vertical dimension of occlusion and to utilize an additive strategy to restore the lost tooth structure. Composite onlays were chosen at this stage to manage the cost of treatment for the patient.

More definitive, cohesively retained, all-ceramic restorations with subgingival finish lines would need to be considered if continued damage related to acid erosion was discovered. The master model was mounted in centric relation (CR) at the established vertical dimension of occlusion. Six Gradia® onlays (GC America Inc., www.gcamerica.com) were fabricated. The restorations were cemented using light-cured resin cement (RelyX™ Veneer, 3M ESPE, www.3MESPE.com), and direct composites were placed on the buccal cusps of teeth Nos. 21 and 28 to further level the mandibular plane of occlusion. The incisal edges of the lower anterior teeth were adjusted to achieve harmony, and the occlusion was fine-tuned with the aid of the Kois deprogrammer.

**Phase 4: Restorative**

After 4 months of healing time following the crown lengthening, a full-contoured diagnostic wax-up was done with models mounted in the newly established occlusal vertical dimension. Silicone putty was used to create a matrix and deliver a mock-up for the patient. After confirming the maxillary incisal edge position, teeth Nos. 3 through 14 were prepared. Bone sounding was done for all teeth, and the finish lines were prepared within the guidelines for this normal crest dentogingival complex to avoid biologic width violations. Provisional restorations were fabricated in three segments, inserted, and equilibrated in CR. Jaw relation records were taken for the purpose of laboratory communication.

A final impression was taken, and the provisional restorations were cemented. After 5 days and reevaluation of function, a face-bow record with the Kois Dento-Facial Analyzer, an impression of the provisional restorations, and photographs were obtained and forwarded to the dental laboratory (Figure 11).

Pressed e.max lithium disilicate crowns (IPS e.max® Press, Ivoclar Vivadent, www.ivoclarvivadent.us) were fabricated, tried in, and delivered (Figure 12 and Figure 13). The final occlusion was equilibrated using the Kois deprogrammer.
Coupling of the cuspids; bilateral, equal-intensity, simultaneous contacts; and a well-managed guidance pathway were all achieved in the final result, changing the function from occlusal dysfunction to acceptable function (Figure 14 and Figure 15). The patient’s biomechanical prognosis was improved from high- to medium-risk by incorporating minimally invasive preparation protocols (Figure 16 and Figure 17).

**CONCLUSION**

The treatment goal throughout the process was to manage the risk and improve the prognosis in each of the four dental categories. The biomechanical risk was managed by providing coverage of the exposed dentin and rebuilding the eroded structures with minimal tooth reduction throughout the treatment. Functional risk and prognosis for this patient were both improved by achieving acceptable function.

Although the medical risk will always be a concern for this patient, lack or delay of treatment could have been catastrophic in her case due to the poor biomechanical prognosis. With careful management of risks and ensuring that each improvement was not gained at the expense of other diagnostic parameters, the patient was restored (Figure 18) to the smile she “used to have.”

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**REFERENCES**

Fig 17. The mandibular arch showing the composite onlays to be stable and functional. Fig 18. Posttreatment photograph shows significant improvement in overall esthetics, display, and gingival harmony. The appearance of the patient’s smile is reflective of the smile she had in high school.

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