

Quick, Conservative and Highly Esthetic Treatment Planning for Severe Anterior Tooth Wear

by Brent Engelberg, DDS

Abstract

Severe tooth wear can lead to functional and esthetic complications. For young patients who desire a quick, conservative, and highly esthetic treatment plan, alternatives to orthodontics and invasive restorations are necessary. Using occlusal equilibration, very thin lithium disilicate veneers, and composite resin, this case presentation demonstrates a logical treatment plan that works well to ensure proper function, occlusion, and restoration of the patient's esthetics.

Learning objectives

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

- Describe the steps necessary for treatment of severe tooth wear.
- Identify different types of tooth wear.
- Explain the complications associated with tooth wear.

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Introduction

Although tooth wear frequently accompanies aging, parafunctional activities can exacerbate deterioration, leading to compromised esthetics and function.

According to National Health and Nutrition Examinations Survey data, between 2003-2004, 80 percent of adult subjects showed evidence of tooth wear.¹ Additionally, a literature review in the International Journal of Prosthodontics found that the percentage of adult patients presenting with severe tooth wear increased from 3 percent at 20 years of age to 17 percent at 70 years of age.²

Severe or excessive tooth wear is identified when the patient expresses function or esthetic concerns, wear is disproportionate to the patient's age, symptoms of discomfort are present, or the dentist deems the rate of tooth wear to be severe.³

Tooth wear results from three processes: abrasion, attrition, and erosion.⁴

Abrasion is produced by the interaction between teeth and other materials, and erosion is the dissolution of hard tissue by acidic substances.⁴ Unlike abrasion and erosion, attrition results from improper tooth-to-tooth contact.⁴ Occlusal and incisal attrition may result from physiological wear and may be severe if parafunctional habits such as bruxism or clenching exist.⁵

Excessive occlusal attrition can lead to functional and esthetic problems.⁶⁻⁸ Thus, managing tooth wear and attrition is critical and complex.⁹ With tooth wear, dental professionals must derive an accurate diagnosis and determine the precise stage to implement active intervention, as opposed to passive monitoring and management.³ Avoiding intervention of anterior attrition can lead to further posterior complications (e.g., attrition, lesions, loss of vertical dimension of occlusion, etc.).¹⁰

However, early restorative intervention may cause unnecessary damage to healthy tooth structure during tooth preparation.

Additionally, a lack of understanding about how to restore severely worn tooth structure to maintain functionally and esthetically stable teeth further compounds the difficulties associated with tooth-wear management.³

Treatment options for severe tooth wear include occlusal positioning, vertical dimension increase, and restoration.¹¹ Restoration of severely worn anterior dentition requires clinicians to be familiar with normal anatomical proportions and relationships.⁷ Clinicians must not only restore the esthetics of the anterior teeth, but also functionality in order to ensure restoration

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longevity. Properly planned anterior restorations have been shown to provide good predictability, load resistance, longevity, and preservation of healthy tissues.¹²

Although many clinicians recommend orthodontics to realign occlusion and establish a healthy foundation after severe tooth wear, many younger patients desire a less expensive and quicker alternative. These include minimally invasive treatments (e.g., minor occlusal adjustments) and protection with nighttime appliances to ensure a high probability of long-term success.

Addressing posterior teeth deflections



Fig. 1
Initial presentation of a 29-year-old male with a diastema, occlusal complications, and tooth wear.



Fig. 2
Preoperative smile photograph demonstrating wear and a diastema.



Fig. 3
Initial retracted view, indicating lower incisor wear and lateral long axis angulation of the maxillary central incisors.



Fig. 4
Initial lateral view indicating lower incisor wear and mesial rotations of the maxillary central incisors.



Fig. 5
A diagnostic wax-up was created using an additive-reductive technique.



Fig. 6
The areas out of arch form on the facial and palatal surfaces were reduced on the diagnostic wax-up.



Fig. 7
The completed additive-reductive wax-up indicated where reduction and addition were necessary.



Fig. 8
A green stent was fitted to the preoperative model to indicate where initial reduction should be completed.



Fig. 9
The green stent was placed in the mouth prior to preparation to show precisely where initial reduction was necessary.



Fig. 10
The preparations were completed with the distal contact of the central broken in order to add to the mesial of the lateral.

that may create occlusal avoidance—leading to chipping and excessive wear—prior to restoring the anterior teeth will also help stabilize occlusion.¹³ Additionally, newer, stronger, and highly esthetic materials such as lithium disilicate can be used for those patients who want conservative dentistry and an alternative to orthodontics.

Thus, the success of restorative treatment of severe tooth wear, once proper occlusion is achieved, is predicated on appropriate material choice, proper adhesive bonding, and predictable fabrication techniques that yield durable and esthetic restorations. Lithium disilicate allows for very thin and conservative fabrication and natural-like esthetics. Pressing to investment during fabrication ensures that the very thin, waxed restorations do not break during investment or transport.

Restorations bonded to enamel, as opposed to dentin, protect the composite restoration against cavo-surface discoloration and deterioration in marginal adaptation.¹⁴ As a gold-standard in adhesives, using a 4th generation total-etch predictably achieves stable bonds, although universal adhesives have demonstrated improved clinical success.

Case presentation

A 29-year-old male presented with the chief complaints of chipped upper incisors, worn lower incisors, and a diastema between the central incisors, which were larger in size and rotated (Figs. 1 & 2). The lower incisors presented with severe incisal wear compared to the patient's age, indicating an occlusal abnormality (i.e., posterior interferences to closure) and habitual issues (i.e., bruxing and/or nail biting) (Figs. 3 & 4). The patient requested esthetic treatment, but function and occlusion also needed to be addressed.

The patient's young age made it important to treat the substantial wear responsibly, as well as idealize function for

the case. After a comprehensive evaluation, the patient was diagnosed with functional anterior wear and esthetic flaws.

Continued anterior wear could lead to posterior issues (i.e., lesions, malocclusion, etc.) and persistent patient insecurity about the esthetics of his smile. Recommended clinical treatment included occlusal equilibration, porcelain veneers,

The patient's young age made it important to treat the substantial wear responsibly, as well as idealize function for the case.

and/or composite veneers/bonding. Orthodontics could also be performed, along with reshaping the lower incisors and limited composite bonding.

The patient, however, declined orthodontics and requested a conservative yet quicker solution. The proposed treatment plan included occlusal equilibration, maxillary anterior porcelain veneers, and mandibular cosmetic and functional bonding, followed by wearing a nighttime bruxing appliance.

At the first appointment, diagnostic photographs, a comprehensive evaluation (i.e., occlusal analysis, TMJ evaluation, periodontal charting, oral-cancer screening, and evaluation of existing dentistry), radiographs, and impressions were completed. The diagnostic impressions were used for an additive-reductive wax-up (Figs. 5-8) and reduction stent fabrication. The occlusal equilibration was completed using a deprogramming period involving a leaf gauge and a combination of diamond burs.



Fig. 11
Retracted view of the provisional maxillary veneers and lower completed composite restorations.



Fig. 12
Full-smile view of the provisional restorations.



Fig. 13
The provisional restorations were checked for occlusion, function, and esthetics.



Fig. 14
The restorations were pressed to investment and then cut back and layered.



Fig. 15
The laboratory completed the layering and surface texture for lifelike esthetics.



Fig. 16
The completed veneers were as thin as 0.3mm on the facial surface.



Fig. 17
After the veneers were completed in the laboratory, they were returned for final placement.



Fig. 18
The final restorations were placed, closing the diastema and improving the tooth proportions and alignment.



Fig. 19
The lateral retracted view reveals the tissue harmony of the maxillary veneers and the completed lower teeth.



Fig. 20
The completed smile view. The patient was very pleased with the results.

Using green stents and great laboratory communication through the diagnostic wax-up, preparations were completed precisely. For the porcelain veneers, initial facial reduction of any tooth structure protruding from the arch form was completed using the green stent as a guide (Fig. 9 see p. 122). The teeth were further prepared with diamond burs, and the preparations were polished with polishing discs (Fig. 10 see p. 122). Veneer temporaries were fabricated using temporization material in shade A1.

The mandibular incisors (teeth #23-26) were lightly prepared where dentin was visible and unsupported or sharp enamel was present. The teeth were cleaned with chlorhexidine pumice, and a total etch technique was used. Etchant, desensitizer, and dental adhesive were applied to the teeth prior to placing A1 body and enamel shades of composite. A glycerin-based gel was applied prior to the final cure (Figs. 11 & 12), after which the completed composite restorations were polished.

One week later, the provisional maxillary veneers were evaluated and approved (Fig. 13). The final porcelain veneers were pressed to investment material to allow for very thin facial surfaces—as thin as 0.3mm. These veneers were cut back and layered to a final shade in the B1/040 range (Figs. 14-17).

The final restorations were seated after removing the provisionals and checking the veneers for fit and color accuracy using a try-in gel. A total-etch technique was completed using the same materials as the composite bonding, with the exception of treating the intaglio of the veneers with silane (Figs. 18-20). At the same visit, an impression was made for a mini-deprogrammer-type bruxing appliance for nighttime use.

Three weeks later, the restorations and occlusion were evaluated and photographs were taken. The appliance was delivered, and the patient was instructed to use the mini-deprogrammer at night to avoid damaging the final restorations.

Conclusion

Although tooth wear is prevalent among American adults today, severe tooth wear can cause patient discomfort, poor esthetics, and damage to existing dentition and function. Esthetic, functional, and affordable solutions are available to restore the functionality and esthetics of worn dentition, and are especially appropriate with younger patients. Patients with severe tooth wear must be offered a conservative and esthetic treatment option instead of more aggressive and invasive procedures, and when conservative orthodontic treatment is declined. Understanding function,

natural-like esthetics, and appropriate materials will prove beneficial for clinicians performing this type of treatment. ■

References

1. Okunseri C, Wong MC, Yau DT, et al. The relationship between consumption of beverages and tooth wear among adults in the United States. *J Public Health Dent.* 2015 Apr 28. Doi: 10.1111/jphd.12096. [Epub ahead of print].
2. Van't Spijker A, Rodriguez JM, Kreulen CM, et al. Prevalence of tooth wear in adults. *Int J Prosthodont.* 2009;22(1):35-42.
3. Mehta SB, Banerji S, Millar BJ, et al. Current concepts on the management of tooth wear: part 1. Assessment, treatment planning and strategies for the prevention and the passive management of tooth wear. *Br Dent J.* 2012;212(1):17-27.
4. Addy M, Shellis RP. Interaction between attrition, abrasion and erosion in tooth wear. *Monogr Oral Sci.* 2006;20:17-31.
5. Zeighami S, Siadat H, Nikzad S. Full mouth reconstruction of a bruxer with severely worn dentition: a clinical report. *Case Rep Dent.* 2015;2015:531618.
6. Turner KA, Missirlian DM. Restoration of the extremely worn dentition. *J Prosthet Dent.* 1984;52(4):467-74.
7. Patel RM, Baker P. Functional brown lengthening surgery in the aesthetic zone; periodontic and prosthodontic considerations. *Dent Update.* 2015;42(1):36-8, 41-2.
8. Abdel-Aziz T, Zandinejad A, Metz M, et al. Maxillary and mandibular rehabilitation in the esthetic zone using a digital impression technique and CAD/CAM-fabricated prostheses: a multidisciplinary clinical report. *Oper Dent.* 2015;40(4):350-6.
9. Van't Spijker A, Kreulen CM, Creugers NH. Attrition, occlusion, (dys)function, and intervention: a systematic review. *Clin Oral Implants Res.* 2007;18 Suppl 3:117-26.
10. Padmanabhan S, Reddy VA. Inter-disciplinary management of a patient with severely attrited teeth. *J Indian Soc Periodontol.* 2010;14(3):190-4.
11. Muts EJ, van Pelt H, Edelhoff D, et al. Tooth wear: a systematic review of treatment options. *J Prosthet Dent.* 2014;112(4):752-9.
12. Pontons-Melo JC, Pizzatto E, Furuse AY, et al. A conservative approach for restoring anterior guidance: a case report. *J Esthet Restor Dent.* 2012;24(3):171-82.
13. Ruiz JL. The three golden rules of occlusion. *Dent Today.* 2010;29(10):92-3.
14. Berry TG, Osborne JW. Dentin bonding vs. enamel bonding of composite restorations: a clinical evaluation. *Dent Mater.* 1989;5(2):90-2.

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Author Bio



Dr. Brent Engelberg graduated from the Indiana University School of Dentistry before establishing his current practice in Arlington Heights, Illinois. Dr. Engelberg not only seeks out educational opportunities for himself but also strives to educate other dentists. He co-directs his multidisciplinary dental study club in the Chicago suburbs, which attracts many local and national speakers. He is widely published in professional dental journals on the subject of esthetics and cosmetic dentistry and teaches other dentists cosmetic procedures through his courses. Dr. Engelberg lives a happy life in Lake Forest, Illinois, with his wife and three children. He extends a special thank you to Dane Barlow for his outstanding ceramic work in this case.

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- 1. According to a 2003-2004 national survey, how many adults in the United States exhibit tooth wear?**
 - a. 50 percent
 - b. 60 percent
 - c. 70 percent
 - d. 80 percent
- 2. It is considered severe tooth wear when which of the following occurs?**
 - a. The dental patient expresses function or esthetic concerns
 - b. Wear is disproportionate to the patient's age
 - c. The rate of tooth wear is deemed to be severe by the patient's dental professional
 - d. All of the above
- 3. Attrition results from:**
 - a. The interaction between teeth and other materials
 - b. Improper tooth-to-tooth contact
 - c. The dissolution of hard tissue by acidic substances
 - d. None of the above
- 4. Treatment options for severe tooth wear do not include:**
 - a. Diagnostic waxing
 - b. Occlusal positioning
 - c. Extraction
 - d. Vertical dimension increase
- 5. Parafunctional habits lead to what kind of tooth-wear process?**
 - a. Attrition
 - b. Abrasion
 - c. Erosion
 - d. Dissolution
- 6. Early intervention of anterior tooth wear may lead to:**
 - a. Posterior complications
 - b. Damage to healthy tissues
 - c. Loss of vertical dimension of occlusion
 - d. Further attrition
- 7. This type of treatment for tooth wear provides good predictability, load resistance, longevity, and preservation of healthy tissues.**
 - a. Diagnostic waxing
 - b. Occlusal positioning
 - c. Restoration
 - d. Orthodontics
- 8. Younger patients typically desire treatments that are:**
 - a. Conservative
 - b. Esthetic
 - c. Cost-effective
 - d. All of the above
- 9. Which of the following steps were not used in this case presentation to restore the patient's dentition?**
 - a. Diagnostic wax-up
 - b. Green stent for preparation
 - c. Increase in vertical dimension of occlusion
 - d. Porcelain veneers
- 10. The lithium disilicate veneers were as thin as _____ on the facial.**
 - a. 0.3mm
 - b. 0.4mm
 - c. 0.5mm
 - d. 0.7mm

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