International Journal on Oral Health

Minimally Invasive Restoration of Maxillary Incisors with Combined Erosion and Attrition: A Case Report

Case Report

Volume 5 Issue 1- 2025

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Article History

Received: April 26, 2025 Accepted: April 30, 2025 Published: April 30, 2025

Abstract

This clinical report describes the restoration of severely worn maxillary anterior teeth. The patient presented significant palatal erosion, incisal wear, and esthetic concerns. A systematic approach incorporating mounting of diagnostic casts in centric relation, diagnostic wax-up, intraoral mock-up, and conservative tooth preparation guided the treatment plan. Porcelain-fused-to-zirconia full-coverage crowns were selected for their optimal esthetics and mechanical properties. The result was a functional and esthetically pleasing restoration.

Keywords: Tooth Wear, Dental Erosion, All-Ceramic Restorations, Veneered Zirconia, Esthetic Dentistry

Introduction

Tooth wear is defined as the loss of dental hard tissues by mechanisms other than dental caries [1]. It commonly results from a combination of three processes: attrition, abrasion, and erosion [2,3]. The Glossary of Prosthodontic Terms defines:

a)Attrition as mechanical wear due to tooth-to-tooth contact.

b)Abrasion as pathological wear caused by external mechanical forces.

c)Erosion as the chemical dissolution of enamel and dentin by acids not involving bacterial plaque [4].

These mechanisms may also contribute to abfraction, a stress-related loss of cervical tooth structure due to flexural forces [2,3]. Smith and Knight introduced a tooth wear index that classifies lesions from mild to severe but does not distinguish causative factors [5]. Veilati and Belser proposed the Anterior Clinical Erosive (ACE) classification system, specifically addressing chemically eroded anterior maxillary teeth [5]. This report presents the diagnosis and full-coverage restoration of a patient with combination of dental erosion and attrition affecting the maxillary incisors.

Case Presentation

A 38-year-old female presented with the chief complaint of "worn-down front teeth." She was preparing for her wedding and desired an improved smile for her photographs. Her medical history was non-contributory.

Clinical Findings

Clinical and radiographic examinations revealed approximately 40% incisal length loss in the maxillary incisors, corresponding to a Smith and Knight Score 3 (loss of enamel and substantial dentin exposure, without pulpal involvement) [5] (Figures 1-3). Palatal surfaces exhibited complete enamel loss with a narrow peripheral band intact—critical for adhesive bonding. This presentation was consistent with ACE Class IV (loss of palatal enamel, >2 mm incisal loss, no pulp exposure) [6] (Figure 4).

The patient denied symptoms of gastroesophageal reflux disease

(GERD) but admitted to frequent soda consumption and nocturnal bruxism. Her midline diastema has relapsed after previous orthodontic closure. A broad labial frenum extended close to the interdental papilla (Figure 2). The mandibular incisors showed signs of attrition and moderate supra-eruption. Gingival tissues were healthy with a thick phenotype. No periodontal or periapical pathology was observed.

Figure 1: Preoperative Smile view.

Figure 2: Preoperative Intraoral Frontal view showing midline diastema and lower incisal edge position.

Treatment Plan

Full-coverage all-ceramic crowns were planned for the maxillary incisors to restore esthetic, function, and occlusal harmony.

Diagnostic Phase

Mounted diagnostic casts in centric relation enabled precise evaluation of the interocclusal space. A direct intraoral mock-up was created using unbonded composite to establish the proposed incisal edge position.

A diagnostic wax-up was fabricated based on clinical findings, radiographs, and photographs. Using a silicone putty index (Speedex Putty, Coltene), an intraoral mock-up was performed with bis-acryl material (Structure 2, Voco) for esthetic and functional preview (Figure 5).

Following patient approval, conservative tooth preparations were performed according to the additive design. Minimal enameloplasty was performed on the incisal edges of mandibular incisors to create an acceptable restorative space (~1mm) [7]. Provisional crowns were fabricated with bis-acryl resin and delivered using the silicone matrix. The patient was instructed to report any functional or esthetic concerns (Figures 6,7).

Figure 3: Preoperative Peri-apical Radiographs of Maxillary Anterior Teeth.

Figure 4: Preoperative Intraoral Palatal view showing severe wear of the anterior teeth.

Figure 5: Left Profile view of the Mock-up showing the proposed overjet and overbite.

Figure 6: Anterior view of tooth preparations showing the available interocclusal space.

Figure 7: Provisional Restorations- Extraoral view.

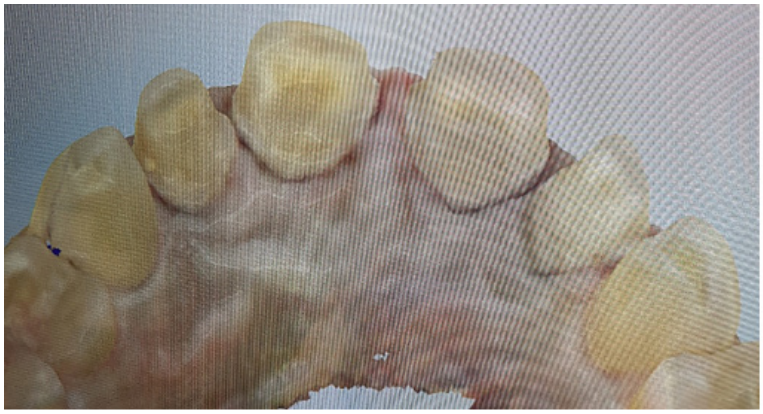

Figure 8: Palatal view of tooth preparations. Digital Scan.

Figure 9: Definitive Restorations showing the relative thickness of the palatal ceramic.

Figure 10: Postoperative Frontal view.

Figure 11: Postoperative Right view in MIP.

Figure 12: Postoperative left view in MIP.

Figure 13: Postoperative intraoral right protrusive view.

Figure 14: Postoperative Palatal view.

Figure 15: Postoperative view showing the conservative Enameloplasty of mandibular incisors.

Figure 16: Postoperative Smile view.

Definitive Restoration

At the follow-up, preparations and provisionals were reevaluated and digitally scanned using an intraoral scanner (iTero Lumina). The dental laboratory was instructed to fabricate porcelain-fused-to-zirconia (PFZ) crowns, combining a zirconia substructure with feldspathic porcelain veneering. 3Y zirconia was selected for its high flexural strength (1200 MPa) and fracture toughness (~5–6 MPa·√m) [7], making it ideal for cases with limited restorative space and functional load. Feldspathic porcelain offered excellent esthetics through translucency, fluorescence, and shading customization (Figure 9).

At the try-in appointment, marginal fit, contact points, occlusion, and esthetics were verified. Since the vertical and horizontal repositioning of the incisal edge of the full-coverage crowns, relative to the preoperative position, would alter the direction and magnitude of the forces, the need for a strong cement was evident. Therefore, the final crowns were adhesively bonded using dual-cure resin cement (RelyX Unicem 2), following standard bonding protocols [8-10].

Discussion

This case highlights the comprehensive management of advanced erosive tooth wear using contemporary high-strength ceramic materials. The main challenges included limited remaining tooth structure, minimal interocclusal space, midline diastema, and high esthetic demands. PFZ crowns offered an ideal solution, balancing esthetic with mechanical performance. Proper diagnosis, additive treatment planning, and effective communication with the patient were essential to treatment success (Figures 10-16).

Conclusion

The use of all-ceramic restorations, guided by minimally invasive principles, enabled the successful rehabilitation of severely worn maxillary incisors. The result met the patient's functional needs and esthetic expectations.

Acknowledgement

The authors would like to thank the dedicated staff at the Randolph Dental Group. Special thanks go to Microdental Laboratories for their expertise and artistic skills.

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