

Prosthodontic Management of Anterior Open Bite: Case Report

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INTRODUCTION

Anterior open bite (AOB) is defined as a vertical gap between the maxillary and mandibular incisor teeth in centric relation due to either congenital or developmental deformity. This clinical condition may involve only a dental component or in some cases both skeletal and dental components. Vertical malocclusion develops as a result of the interaction of many different etiologic factors including thumb and finger sucking, lip and tongue habits, airway obstruction, and true skeletal growth abnormalities. The treatment of open bite depends on whether a skeletal or the dental component is involved. A simple open bite case can be corrected by controlling habits, use of appliances, and sometimes with orthodontic correction. A complex case of open bite is often associated with skeletal involvement and thus, requires surgical correction. In both simple and complex cases, prosthodontic intervention can fulfill the esthetic demands of the patient to a higher expectation. In the following case report: a 49-year old male patient reported to the Prosthodontic Department of NYUCD complaining of poor esthetics. A clinical examination and review of radiographs presented the following: anterior open bite, presence of missing teeth (#10), and lack of function. The patient wanted a significant dento-facial improvement in a short span of time and did not consider orthodontic treatment as an option due to the length of treatment. This presents a clinical situation that needed prosthodontic intervention to correct the open bite and provide both esthetic and function. Modern dental bonding restoration systems offer more predictable outcomes for prosthodontic treatment of malocclusion in general and anterior open bite in particular. In this case report, different steps of treatment with all ceramic restorations has been explained in addition to an in-depth analysis of the plan and outcomes of treatment.



Figure 1. Anterior open bite



Figure 2. Final outcome lateral views

CASE HISTORY & DIAGNOSIS

- 49-year old patient presented to the NYUCD Prosthodontic Department with the chief complaint of "I want a better smile."
- Upon initial examination, it became clear that the upper and lower anterior teeth did not meet (anterior open bite).
- Anterior open bite measured to be -1.5 mm (negative) overbite in canine occlusion with class I molar and canine relationship on both right and left side.
- #8 was chipped and #9 was fractured.
- Patient's left lateral incisor (tooth #10) was missing.
- Abfraction lesion on #5 was visible in the smile line.
- Convex facial profile and a competent lip.
- Class I recession on #20-29 which cannot be viewed from frontal view due to lip coverage.
- Large carious lesion on #17 into the pulp.

TREATMENT DISCUSSION & EXECUTION

Prior to cosmetic rehabilitation, all carious lesions and periodontal evaluation were addressed. The sequence of treatment was started with an emergency phase to address a carious lesion extending into the pulp on tooth #17, which was extracted. Next, a periodontal evaluation was performed. The patient did not present with significant pocketing or bleeding on probing suggesting that his oral hygiene was appropriate for fixed restorations.

Tooth #9 was previously endodontically treated and demonstrated darkening in color at the cervical third due to an amalgam core placement. The amalgam core was removed and a prefabricated post and was placed to retain a resin core build-up. The patient did not want to proceed with a surgical implant to replace #10.

Instead, a three-unit zirconia bridge layered with E-max would be utilized to replace #10 with a modified ridge lap pontic using #9 and #11 as abutments. This specific material was chosen after careful consideration due to research that outlines zirconia frameworks with layered E-max being demonstrated to show exceptional color matches when masking a dark tooth (Aboushelib et al., 2010). Layered zirconia restorations also demonstrate high fracture resistance or low fracture rates (Abdulmajeed et al., 2017). To match the esthetics of the ceramic bridge from #9-11, Zirconia crown layered with E-max was planned for #8, and E-max veneers were planned for teeth #6 and #7. E-max restorations are made from lithium desilicated ceramic, and demonstrate durability, translucent color, and exceptional esthetics.



Figure 3. Open bite on diagnostic casts versus restorations



Figure 4. #5 Abfraction restored



Figure 5. Ceramic occlusal and straight view

Treatment Execution

Prior to any tooth preparation, pre-operative photographs were taken in addition to preliminary impressions. Diagnostic casts were hand articulated due to posterior occlusion and mounted on a semi-adjustable articulator. A diagnostic wax-up was completed and used as a tool to communicate with the patient regarding the final outcome in addition to planning the necessary reduction required to place restorations. Diagnostic casts and wax-up were marked with important landmarks such as the midline and inter-canine distance. Gingival zeniths presented with optimal locations, and thus a gingivoplasty was deemed unnecessary. The smile line was approximated. The length of the teeth were determined using the incisal edges of the lower anterior teeth as a guide.

As a result, the open bite was closed sufficiently so that the patient was left with an esthetic result that he was confident with. The anterior overjet was within the acceptable 1-2 mm range.

Silicone reduction guides were fabricated using the diagnostic wax-up to aid in assessing the incisal, buccal, and lingual reduction during the preparation phase. Note that the VDO was not changed throughout the procedure as the patient did not present with wear or a collapsed bite. Prior to preparation, shade was taken using the Vita 3D Shade Guide. Shade 1M2 was chosen based on patient preference. Preparation was done with chamfer finishing line and verified with preparation guide. Bite registration was recorded using acrylic GC Pattern Resin. Preparation was temporized with Luxa-temp (DMG) shade A1. Incisal edge of anterior teeth and anterior guidance for temporary restorations were verified with phonetic and esthetic guidelines to prevent posterior interferences in laterotrusive movement. The temporaries were finished, polished, and occlusion was checked. The temporaries were cemented with Durelon (3M) cement. Impression of final temporary was taken and sent to lab along with final impression of preps for optimal communication. Two E-max veneers #6, #7, and Zirconia core with layered E-max for crown and bridge #8, #9-#11 was ordered.

Cement Protocol

In this reconstruction, there were two different ceramic systems with different cementation protocol. **Silicate ceramics** have unique chemistry such that once it is etched with hydrofluoric acid (HF) and bonded, the porcelain has improved physical properties. Etchable glass ceramics have a well-defined cementation protocol that consists of HF acid etching, silanization, and use of resin cement. Porcelain veneers are typically fabricated from silicate ceramics, which are more translucent than oxide ceramics and can be etched using HF acid so that these thin veneers can be better bonded to the tooth. The cement choice for porcelain veneers is a light-cured composite resin cement. These cements are usually provided in kits that contain an etch-and-rinse adhesive, a porcelain primer, and the light-cured cement in shades that are matched to the ceramic. We used Choice 2-luting cement kit (Bisco). **Oxide ceramics** are fabricated with metal oxides (Zirconia or alumina). These are resistant to fracture. Oxide ceramics are resistant to etching. Using specialized air abrasive aluminum oxide/silicate coated particles, sand blasting can make the surface more adhesive. The easiest cements to use with zirconia restorations are RMGIs and self-adhesive composite resin cements. Some manufacturers provide a separate surface primer for zirconia prior to using a resin cement. For cementation of our crowns, we used Unicem (3M), a self-adhesive resin cement.

CONCLUSION

Based on the patient's chief complaint, the treatment plan with phases was created in order to provide the patient with anterior esthetic results that would improve functionality and his confidence. Despite orthodontic treatment and surgical treatment using an implant restoration being viable alternative options for the patient, prosthodontic rehabilitation was pursued due to the patient wanting a result within a short span of time.