

Limited Adult Orthodontics Contributes to Overall Function and Esthetics of Lithium Disilicate Restorations

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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.

Introduction

Many adult patients are hesitant to accept orthodontics as part of their restorative treatment.

However, creating a stable and well-aligned foundation is often a prerequisite to minimally invasive dentistry. Orthodontics prior to restoration reduces biomechanical and functional risks, potentially minimizing the number of restorations and amount of necessary preparation.^{1, 2} According to a literature review completed by Buttke and others, two-thirds to three-fourths of adults possess some form of malocclusion, yet adults constitute only 15 percent of all orthodontic patients.³

Patients refuse orthodontic treatment for a variety of reasons, including cost, time constraints, concern about possible pain or discomfort, and apprehension about social acceptance.³ However, less-expensive partial or limited orthodontic treatments can achieve similar occlusal outcomes in a shorter amount of time. While conventional orthodontics may accomplish perfect occlusion, sometimes patients' goals do not require this extensive treatment.

Adults can live for years with a malocclusion, failing to recognize their occlusal deviations as a problem. A patient requesting

improved esthetics may only require some orthodontic alignment to establish a stable foundation, and it is important for the dentist to create a treatment plan that avoids overtreatment.

For example, excellent stability and function can be just as practically attained in a posterior crossbite as it is with normal intercuspation.⁴ The anterior occlusal relationship (e.g., establishing anterior guidance and canine guidance) is more important for the case's success than correcting a posterior crossbite.

Clinical presentation

A 67-year-old male presented with chipping and fractured anterior teeth and was very dissatisfied with his smile (Fig. 1). He explained that his financial clients used to always tell him that he looked too young to do his job, but now he felt as if his clients thought he looked too old. After diagnostic and orthodontic records were captured, a comprehensive examination was completed.

The clinical evaluation revealed that the patient's occlusion was not conducive for functional success over time (Figs. 2 & 3). Clinicians are now seeing more patients with fractured or failed restorations because occlusal problems either were not corrected

initially or actually developed as a result of a restorative treatment.⁵

The anterior maxillary and mandibular teeth were severely worn, chipped, and breaking, which interfered with anterior guidance (Fig. 4). The patient exhibited arch-form discrepancies, esthetic issues, and failing dentistry (Figs. 5 & 6). The patient also had two fractured posterior teeth and exhibited a posterior crossbite (Fig. 7). Without intervention, multiple teeth would soon or eventually fail or fracture, increasing the patient's negative perception of his cosmetic issues.

Although the patient's goal was to look younger, a stable and predictable foundation was necessary in order to improve his esthetics for the long term. Pre-prosthetic orthodontics (complete or limited) followed by restorative dentistry was recommended to establish a stable foundation for long-term success. Although restorative dentistry alone could be completed for the interim, it was not a predictable long-term solution.

Extraction of the third molars was also recommended to allow more room for proper alignment. Eruption of the lower third molars has been found to exert a force on the neighboring teeth.^{6, 7} More recent studies have hypothesized that the third molar may conduct an anterior component of force down the dental arch, which can result in tooth rotation and misplacement. It was the author's opinion that extraction of the three remaining third molars was necessary, since they could potentially cause occlusal interference issues after completion of the case.

The dentist and orthodontist discussed the case, and while complete orthodontics would have provided a full-mouth change, it would take more time than the patient would accept. The orthodontist predicted that after one year of treatment using limited orthodontics, the mandatory occlusal and functional issues could be corrected to the point where an esthetically pleasing case would also physically withstand masticatory forces.

Prior to starting orthodontics, the fractured teeth #14 and #20 were provisionalized



Fig. 1
Preoperative full-face view of 67-year-old patient who desired a more youthful appearance.



Fig. 2
Preoperative smile view revealing asymmetries and excessive wear.



Fig. 3
Left-lateral preoperative view of the patient's smile.



Fig. 4
Retracted preoperative view revealing harmful occlusal relationships.



Fig. 5
Preoperative retracted view revealing broken incisal edges and poor esthetics.



Fig. 6
Occlusal view of the preoperative maxillary arch with fractured molar and severe wear on the anterior teeth.



Fig. 7
Preoperative occlusal view of the mandibular arch with two fractured teeth and severe wear on the anterior teeth.



Fig. 8
Anterior view after the completed orthodontics improved alignment and overjet.



Fig. 9
Occlusal view of the maxillary arch after completed orthodontics improved arch form.

(Protemp, 3M ESPE), with the provisionals seated with adhesive resin cement (RelyX, 3M ESPE) for a secure bond throughout the duration of the orthodontic treatment. The unnecessary and potentially interfering teeth #1, #17, and #32 were then extracted. The orthodontic treatment was started and progressed smoothly for the next year.

At the conclusion of orthodontic work (Fig. 8, pg. 45), centric relation and centric occlusion were checked to ensure there was no interference to closure from the remaining posterior crossbite (Fig. 9, pg. 45).

Diagnostic photographs and impressions were made in order to fabricate a wax-up of the proposed final restorations. The teeth were prepared with a series of diamond burs (Komet USA), and shades were taken for the final restorations (040) (Figs. 10 &

11). The wax-up and a matrix (Sil-Tech, Ivoclar Vivadent) were used to create the new provisional restorations (Luxatemp, DMG America). Using composite polishers (Astropol, Ivoclar Vivadent), the provisional restorations were polished (Fig. 12).

After one week, the provisionals were checked for function and esthetics, and photographs were taken (Fig. 13). The patient requested specific changes and the appropriate adjustments were made to the provisional models. The changes were also incorporated into the laboratory wax-up for the final restorations.

Due to the previous tooth fractures, the final restorations required a high-strength material to withstand mastication forces. Lithium disilicate (IPS e.max, Ivoclar Vivadent) was selected because of its flexural

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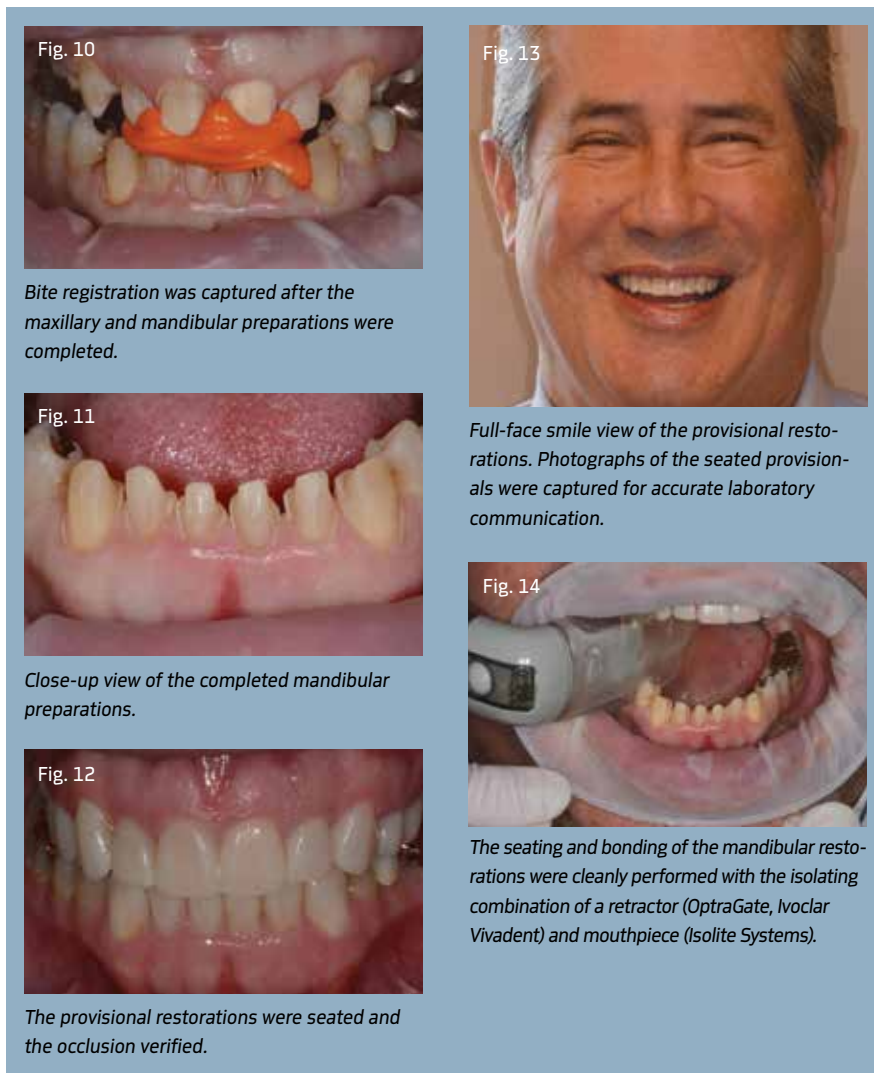
strength and enhanced esthetics for both posterior and anterior restorations. The restorations were fabricated, cut back, and layered in the laboratory, and returned to the practice.

Isolation was essential when seating this case because the teeth needed to be kept dry to achieve effective bonding. A retractor (OpraGate, Ivoclar Vivadent) worked well for the preparation and seating of the maxillary arch. However, the saliva ducts behind the lower incisors and the likely movement of the tongue threatened to compromise seating of the mandibular arch and the entire case. Combining a retractor and a mouthpiece (Isolite Systems) created an ideal working field, as well as facilitated suctioning of saliva and tongue retraction (Fig. 14).

The teeth were cleaned with chlorhexidine pumice (Consepsis, Ultradent Products), and the restorations were tried in using a try-in gel (Variolink Veneer, Ivoclar Vivadent). After approval, the teeth and restorations were cleaned again. The teeth were etched (Ultra-Etch, Ultradent Products), rinsed, and then dried.

Desensitizer (Systemp.desensitizer, Ivoclar Vivadent) was applied to the preparations and air-thinned. Adhesive (ALL-BOND 3, Bisco) was then placed on the preparations, air-thinned, and light-cured with an LED curing light (Bluephase, Ivoclar Vivadent) for 15 seconds. Luting composite in shade

Continued on p. 48



Continued from p. 46

+1 (Variolink Veneer, Ivoclar Vivadent) was applied to the teeth.

The restorations were tacked in place for two seconds using a 2mm light guide seated in the curing light (Bluephase, Ivoclar Vivadent). Excess cement was removed with a brush (Sable Cat's Tongue, Princeton Art). Using floss, additional cement was carefully removed interproximally, and a glycerin-based gel (Liquid Lens, Danville Materials) was applied. The restorations were then cured for 20 seconds per side.

Finishing and polishing were completed with a series of fine diamonds (Komet USA) and a porcelain polishing kit (Optrafine, Ivoclar Vivadent).

The final restorations created a highly esthetic and functional result (Figs. 15 & 16). The occlusion was verified to ensure ideal function (Figs. 17 & 18). After only a year of orthodontic treatment and then seating of the final restorations, the patient was very pleased with the results (Figs. 19 & 20).

Conclusion

Orthodontics is a key component to many adult restorative cases and must be considered a critical component to maintaining conservative dentistry.

Offering patients alternative options to conventional orthodontics—such as limited orthodontics—can encourage patients to choose orthodontics as part of their restorative treatment plan. Fixing malocclusion with orthodontics also potentially avoids aggressive preparation, saving healthy tooth structure.

When a patient desires only enhanced esthetics, it is the dentist's responsibility to ensure that the patient's treatment achieves not only enhanced esthetics, but also improved functionality and longevity through the most conservative treatment option possible.

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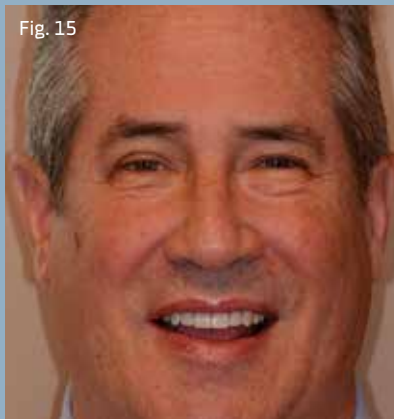


Fig. 15 Full-face postoperative view of the patient after the completed orthodontics and restorative treatment.



Fig. 16 The patient's restored smile appeared brighter and whiter.



Fig. 17 Postoperative anterior occlusal view revealing improved anterior occlusion.



Fig. 18 Postoperative retracted view of anterior teeth showcasing the restored incisal edges and cosmetic improvements.



Fig. 19 Maxillary occlusal view of the final restorations.



Fig. 20 Left-lateral smile view of the final restorations.