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CASE REPORT

Restoration of Proclined Anterior Teeth with Midline Diastema by Fixed Zirconia Crowns: A Case Report

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ABSTRACT

A midline diastema, or gap between the maxillary central incisors, is often a normal developmental feature in children but may persist into adulthood, becoming an esthetic concern. This case report presents a 37-year-old female with proclined, discolored maxillary anterior teeth and a long-standing 3 mm midline diastema. The patient was dissatisfied with her smile and exhibited lip incompetency. Radiographic and clinical examinations revealed mild horizontal bone loss and signs of healed anterior infection.

Due to the patient's esthetic concerns, time constraints, and reluctance toward orthodontic treatment, a restorative solution was chosen. The treatment plan involved restoring four maxillary anterior teeth (11, 12, 21, and 22) with multilayer zirconia crowns. Tooth preparation emphasized minimal reduction on the mesial surfaces of 11 and 21 to close the diastema, with more reduction labially to address proclination. A digital workflow using intraoral scanning and CAD/CAM technology facilitated precise design and milling of zirconia crowns, which were then veneered, shade-matched, and cemented with glass ionomer cement.

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Zirconia restorations provided improved esthetics, biocompatibility, and mechanical strength. This case highlights how zirconia crowns can effectively address esthetic and functional concerns in patients with midline diastema and proclination when orthodontic treatment is not preferred or feasible.

KEYWORDS

• Proclined anterior teeth • Midline diastema • Fixed zirconia crowns • Anterior aesthetic rehabilitation • Ceramic restorations • Dental proclination correction • Full-coverage crowns • Digital smile design • Minimally invasive dentistry

INTRODUCTION

The midline diastema is a space (or gap) between the maxillary central incisors. The space can be a normal growth characteristic during the primary and mixed dentition and generally is closed by the time the maxillary canines erupt. For most children, the medial erupting path of the maxillary lateral incisors and maxillary canines, as described by Broadbent, results in normal closure of this space. For some individuals the diastema does not close spontaneously. The continuing presence of a diastema between the maxillary central incisors in adults often is considered an esthetic or malocclusion problem[1]. For patients who consider a diastema unacceptable, active treatment is available. However, not all diastemas can be treated the same in terms of modality or timing. The extent and the etiology of the diastema must be properly evaluated. In some cases interceptive therapy can produce positive results early in the mixed dentition[2]. Proper case selection, appropriate treatment selection, adequate patient cooperation, and good oral hygiene all are important.[3]

This case report illustrates use of zirconia crown in discolored proclined anterior teeth with diastema.

CASE REPORT

A 37 year old female patient reported with a chief complaint of anterior proclined teeth with spacing present between the upper front teeth (*Figure* 1). The spacing is present since almost ten years (*Figure* 2). Patient has no complicated medical history. Patient was unhappy with her smile and restrained herself from smiling. Proclination has also resulted into incompetent lips (*Figure* 3). Radiographic investigation shows signs of healing infection in anterior region (*Figure* 4). On intraoral examination spacing of about 3mm was present in between 11 and 21 along with proclination in anterior region (*Figure* 1, 2). It also revealed the slight horizontal bone loss present anteriorly. A group function occlusion was present. Patient complaints discoloration as a gradual process during period of healing. Taking into patients consideration of time boundation and esthetic concern restoration of teeth with layered zirconia was planned. Therefore after thorough evaluation four anterior teeth (both upper centrals and lateral incisors) was included with individual crown.

Figure 1: Pre-operative pictures

Figure 2: Diastema

Figure 3 Proclination

Figure 4: Radiograph

Diagnostic impression with alginate was made and a cast was poured. (*Figure* 5, 6) Patient was first shown the mock up prepared on this cast to give her an arbitrary idea about possible management of proclination. A shoulder finish line was given in tooth preparation. Minimal preparation was done on the mesial side of 11 and 21 so as to limit the spacing between these two teeth (*Figure* 7). Tooth preparation on the labial surface of teeh was done more compared to lingual surface of teeth for managing proclination. Using intra-oral scanner a digital impression was generated (*Figure* 8). Computer aided designing (CAD) was done. After achieving the best possible result in given bounded situation the miling process starts (*Figure* 9). A pre-sinterted zirconia block is milled as per the CAD file. Once copings were made it was layered with the adviced shade. Once it was approved by the patient, crowns were cemented with GIC luting agent (*Figure* 10). Patient was instructed with oral hygiene measures and called for follow up.

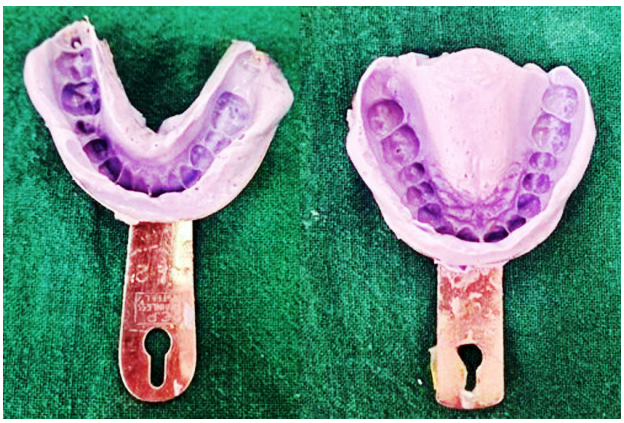

Figure 5: Diagnostic impression

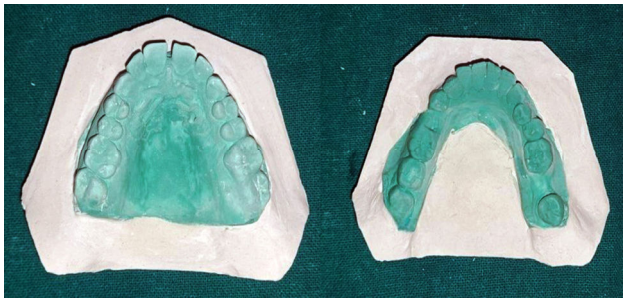

Figure 6: Diagnostic Cast

Figure 7: Tooth Preparation

Figure 8: digital impression

Figure 9: CAD (computer aided design)

Figure 10: Cementation of crowns

Figure 11: Pre-operative and post-operative picture

DISCUSSION

Diagnosing a diastema requires a comprehensive medical/dental history, clinical examination, and radiographic assessment due to the possibility of numerous etiologies.[4] The polycrystalline ceramic material zirconia (Y-TZP Yttria tetragonal zirconia polycrystal) was first used in dentistry in the early 1990s to replace metal framework in the rehabilitation of fixed prosthetics.[5] For a more aesthetically pleasing outcome, zirconia has been used as a core material that is coated over porcelain.[6] Being the hardest and toughest of all dental ceramics, the zirconia framework gives the restoration mechanical resistance. After that, veneering ceramics will be applied in layers over the zirconia core.[7]

Since the patient placed a high value on appearance, the recommended treatment was an all ceramic restoration more specifically, a multilayer zirconia restoration.[6] In certain situations, full coverage zirconia crowns are an appropriate option because they guarantee biocompatibility, color stability, and mechanical resistance.[8]

Computer-aided design/computer-aided manufacturing (CAD/CAM) is the sole method available for creating zirconia restorations in modern dentistry. The advantages of CAD/CAM zirconia ceramic prostheses include exceptional biological stability close to the periodontium and oral tissues, a tooth-like translucent appearance, and a wear pattern that resembles tooth enamel[9]. Lithium silicate ceramics are frequently utilized for veneers, tabletops, single crowns, and small anterior bridges, among other applications. Prosthetic teeth composed of CAD/CAM zirconia provide stable color and long-lasting aesthetics, are biocompatible, and wear down adjacent teeth less frequent.[10] Zirconia restorations are a viable prosthodontic alternative material because of its remarkable mechanical, chemical, and clinical performance.[11] In the maxillary anterior region, zirconia restorations present a viable means of achieving both aesthetic and functional objectives.[12]

CONCLUSION

The presence of maxillary midline diastema is a common esthetic complaint leading patients to seek for a solution. A multitude of treatment modalities are available for the practitioners. The extent of the diastema possibly associated with misalignment are important criteria of success. Diagnostic casts and precise preoperative study are of decisive importance. Using zirconia restorations in the maxillary anterior region offers a potential way to accomplish both functional and cosmetic goal. Orthodontic treatment is considered as the treatment of choice. However, many difficulties are related to this option like the high financial cost, the long-span treatment and the complicated hygiene procedures.

Sometimes orthodontic treatment is insufficient and complementary restorative procedures are necessary when diastema is associated with malformation, dental misalignment and disharmony.

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