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Case Report | **Conservative Dentistry and Endodontics**

Harmonizing the Smile: Esthetic Diastema Closure with a Crown–Veneer Approach - A Case Report

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Abstract

A 25-year-old male presented with spacing between the maxillary anterior teeth and a compromised crown on tooth 21 following trauma 5 years prior. Clinical examination revealed an Ellis Class II fracture in tooth 11 and a full-coverage crown on tooth 21 with vital pulp in both teeth. Considering the patient's esthetic concerns, an indirect restorative approach was planned, involving endodontic treatment of tooth 21, followed by placement of a lithium disilicate (IPS e.max) crown on tooth 21 and a veneer on tooth 11. Treatment included conservative crown removal, root canal therapy, tooth preparation, digital impression, laboratory fabrication, and adhesive cementation of the restorations. The procedure resulted in planned, involving endodontic treatment of tooth 21, followed by placement of a lithium disilicate (IPS e.max) crown on tooth 21 and a veneer on tooth 11. Treatment included conservative crown removal, root canal therapy, tooth preparation, digital impression, laboratory fabrication, and adhesive cementation of the restorations. The procedure resulted in optimal esthetics, proper occlusion, and patient satisfaction. This case highlights the predictable use of lithium disilicate restorations for esthetic rehabilitation of anterior teeth following trauma.

Keywords: Maxillary anterior teeth, Midline diastema, Lithium disilicate (IPS e.max), Porcelain veneer, Full-coverage crown.

INTRODUCTION

A confident smile plays a vital role in an individual's personality. With increasing emphasis on dental esthetics in modern society, the demand for attractive and healthy smiles has grown. Advances in cosmetic dentistry now offer conservative and highly esthetic restorative treatment options.

Maxillary midline diastema is a common aesthetic complaint from patients. It is a space bigger than 0.5 mm between the proximal surfaces of the two central incisors [1]. During primary and mixed dentition, the spacing might be a typical growth characteristic. When the permanent maxillary canines emerge, the space is usually closed. However, the diastema does not close on its own for certain people. It can be among the worst things about how one feels about their dental appearance. Functional goals are secondary to aesthetic and psychological goals when it comes to treatment [2].

Diastemas can be treated in a multitude of ways including orthodontic closure, restorative therapy, surgical correction or multidisciplinary approach depending upon the particular case and the etiology of diastema [3]. The restorative closure of diastemas can be achieved by using any of the techniques mentioned; direct composite veneers, indirect composite veneers, porcelain laminate veneers, all ceramic crowns, metal ceramic crowns and composite crowns [4].

This case report describes the esthetic management of a maxillary midline diastema using a conservative crown–veneer approach with lithium disilicate restorations, achieving harmonious smile esthetics and functional rehabilitation.

CASE PRESENTATION

A 25-year-old male patient presented to the Department of Conservative Dentistry and Endodontics at K.D. Dental College & Hospital with the chief complaint of spacing between the maxillary anterior teeth and an visually unappealing crown in one tooth for the past 5 years. His medical history was non-contributory. He reported a history of trauma 5 years earlier, which resulted in fracture of one anterior tooth that was subsequently rehabilitated with a porcelain-fused-to-metal (PFM) crown. At present, the patient sought esthetic correction to improve his smile.

Figure 1: Pre operative Clincal Photograph

Figure 2: Pre operative Radiograph

Intraoral examination revealed the presence of a crown in tooth 21 and an Ellis Class II fracture in tooth 11(Fig-1). Pulp vitality testing using a cold test elicited a positive response in both teeth 11 and 21, suggestive of vital pulp tissue. Preoperative radiograph demonstrated a full-coverage crown on tooth 21 and the periapical area appeared within the normal limits (Fig-2).

The patient was counseled regarding the various treatment modalities available for the management of midline diastema and associated esthetic concerns. These included orthodontic correction followed by replacement of the existing restoration, restorative closure using direct composite resin, and indirect esthetic rehabilitation with ceramic restorations such as porcelain laminate veneers and all-ceramic crowns. The benefits, limitations, and expected outcomes of each treatment option were discussed. In view of the patient's preference for an immediate and predictable esthetic result and the presence of a compromised crown on tooth 21, an indirect restorative approach employing a lithium disilicate (IPS e.max) crown on tooth 21 and a lithium disilicate veneer on tooth 11 was selected. Written informed consent was obtained prior to treatment.

The treatment was initiated with removal of the existing crown on tooth 21. The crown was sectioned sequentially on the facial, incisal, and palatal surfaces along its long axis using a tungsten carbide crown-cutting bur (Eagle Dental Burs) in a high-speed handpiece under copious water coolant. Sectioning was performed from the cervical margin toward the incisal edge until the luting cement layer was exposed, taking care to avoid damage to the underlying tooth structure. A blunt hand instrument was then introduced into the sectioned grooves, and controlled wedging force was applied to separate and dislodge the crown. The sectioned crown fragments were subsequently removed, and residual luting cement was carefully cleaned from the tooth surface (Fig-3). A post–crown removal radiograph demonstrated an attempted access opening in the coronal portion of tooth 21; however, no evidence of periapical pathology or root fracture was observed (Fig-4)

Figure 3: Clinical Photograph after crown removal

Figure 4: Radiograph after crown removal

Considering the presence of an attempted access cavity preparation evident on the radiograph, endodontic treatment was planned for tooth 21. Local anesthesia was achieved using 2% lignocaine with 1:100,000 epinephrine, after which the tooth was isolated using a rubber dam. Endodontic access was conservatively refined with a round diamond bur in a high-speed handpiece under copious irrigation. Canal patency was initially negotiated with a #10 K-file. The working length was determined using an electronic apex locator and further validated with a radiographic method, establishing a final working length of 21 mm (Fig -5). Biomechanical preparation of the root canal was performed using the NeoEndo (Dentsply) rotary system. After establishing canal patency with a #10 K-file, sequential instrumentation was carried out up to the 25/6 % following the manufacturer's recommended rotational speed and torque settings. Irrigation was performed copiously throughout the instrumentation process using 3% sodium hypochlorite (NaOCl) to ensure effective debridement and disinfection of the canal system. Following BMP, the canal was irrigated with 17% ethylenediaminetetraacetic acid (EDTA) solution for 1 minute to remove the smear layer, followed by a final flush with sterile saline. A radiograph was taken with the master cone in place to confirm accurate working length and apical fit, ensuring that the cone reached the apical terminus without overextension (Fig-6). After drying the canal with sterile paper points, the root canal was obturated with gutta-percha cone and a zinc oxide eugenol-based sealer (Dentsply) to ensure proper sealing of the canal system. The access cavity was restored with glass ionomer cement (Type II, GC Gold Label; GC Corporation, Tokyo, Japan) (Fig-7).

Fig. 5: Working Length

Fig. 6: Master Cone

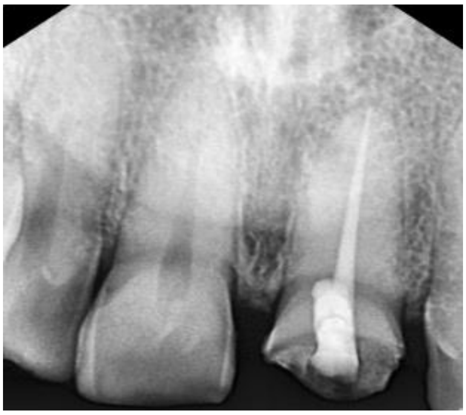

Fig. 7: Obturation with post endo

Fig. 8: Crown Preparation of 21 and venner preparation of 11

Fig. 9: Shade selection

At the subsequent appointment, both teeth 11 and 21 were prepared under split rubber dam isolation to maintain a clean and dry operative field. The dam was anchored on the first premolars of both quadrants, with an interproximal cut from canine to canine to allow unobstructed access and visualization of the anterior teeth. Tooth 21 was prepared for an IPS e.max full-coverage crown, with occlusal reduction of 1.5–2.0 mm and axial reduction of 1.0–1.5 mm using a tapered round-end diamond bur (Mani, Japan), and a 0.8–1.0 mm chamfer margin was created with a round-end shoulder diamond bur (Eagle Dental, USA). Tooth 11 was prepared for an IPS e.max veneer, with 0.5–0.7 mm facial reduction, 0.3–0.5 mm gingival chamfer, and incisal reduction of 1.0–1.5 mm using a fine-grit diamond bur (Mani, Japan). All line angles were rounded, and surfaces polished to optimize ceramic adaptation (Fig-8). Shade selection was performed using the Ivoclar shade guide, and both teeth were recorded as shade A2(Fig-9). Following preparation and shade recording, digital impressions of both teeth were obtained using the 3Shape TRIOS (3Shape, Copenhagen, Denmark).

Fig. 10: Fabricated crown and veneer

Fig. 11: Try in

Fig. 12: Etching with 37% phosphoric acid

At the third appointment, the crown and veneer, fabricated in the dental laboratory (Fig -10), were received and tried in under split-dam isolation to assess fit, marginal adaptation, and esthetics (Fig -11). The prepared tooth surfaces were etched with 37% phosphoric acid (Ivoclar, Liechtenstein) for 15 seconds, rinsed, and gently air-dried (Fig-12) A bonding agent (Adper Single Bond 2, 3M ESPE, USA) was applied to the etched surfaces (Fig-13) and light-cured according to the manufacturer's instructions.

The internal surfaces of the lithium disilicate restorations were etched with 3% hydrofluoric acid (IPS Ceramic Etching Gel, Ivoclar, Liechtenstein) for 20 seconds (Fig -14), rinse thoroughly, and dried. A silane coupling agent (Monobond Plus, Ivoclar,

Fig. 13: Bonding of etched surface

Fig. 14: Application of HF

Fig. 15: Application of silane coupling agent

Fig. 16: Clinical photograph after cementation

Liechtenstein) was applied to the etched ceramic surfaces and allowed to react for 60 seconds (Fig-15). The restorations were then seated using a dual-cure resin cement (Variolink Esthetic DC, Ivoclar, Liechtenstein), and excess cement was carefully removed. Each restoration was light-cured from multiple directions to ensure complete polymerization. Occlusion was checked, and final adjustments were made, completing the definitive cementation of the IPS emax Venner and crown. Post-cementation, clinical photographs were taken to document the final esthetics (Fig- 16) and a periapical radiograph was obtained to confirm proper seating and marginal adaptation of the restorations (Fig -17).

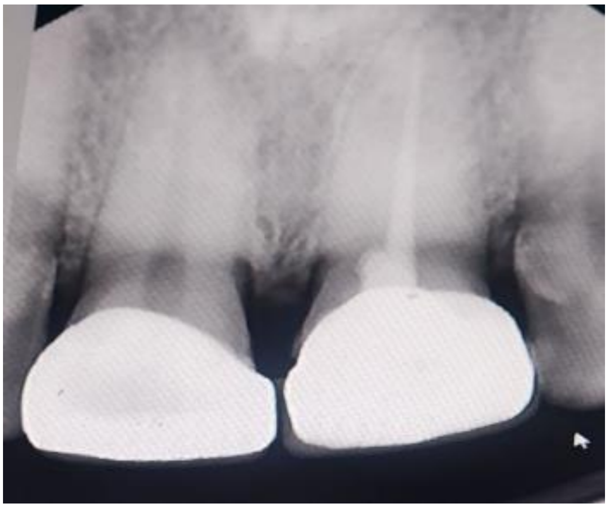

Fig. 17: Radiograph after cementation

DISCUSSION

The closure of a maxillary anterior diastema has become one of the aesthetic demands of patients. Faced with these aesthetic demands, the practitioner must set up a comprehensive treatment plan that simultaneously responds to aesthetic and functional considerations. This requires good communication between the patient and the entire treatment team. Maxillary anterior diastemas can negatively affect smiles and have adverse psychological effects on an individual's social and professional life. The following variables may be involved in the etiology of diastema: hereditary issues include congenitally missing teeth, abnormalities in the size of the teeth and jaw, additional teeth, and frenum attachments, while developmental issues include inappropriate habits, periodontal disease, tooth loss, and collapse of the posterior bite. Finding the cause of diastemas is the first step in treating them [5].

When it comes to conservative diastema closure, the materials most frequently used for veneering are ceramic and composite resin. Among the available ceramics, lithium disilicate (LDS) has demonstrated superior mechanical properties, high survival rates and lower complication rates, making it a widely preferred choice for aesthetic rehabilitation [6].

A key factor contributing to the longevity of lithium disilicate is adhesive bonding to enamel, which enhaces fracture resistance and retention [7].

Preservation of enamel, conservative preparation, and strict adhesive protocols are essential for the long-term success of ceramic restorations. Following removal of the PFM crown, endodontic treatment was performed to eliminate potential pathology while preserving root integrity and providing a sound foundation for definitive restoration.

The combined use of an IPS e.max crown for the compromised tooth (tooth 21) and an IPS e.max veneer for the adjacent vital tooth (tooth 11) allowed correction of both functional and esthetic deficiencies.

Post-cementation evaluation through clinical photography and radiography confirmed satisfactory seating, marginal adaptation, and esthetic integration of the restorations. Radiographic assessment remains essential in verifying correct fit and detecting any residual gaps or structural issues that could compromise long-term outcomes.

In summary, this case underlines the importance of comprehensive diagnosis, patient-centered treatment planning, and precise execution of contemporary adhesive restorative techniques. When combined with lithium disilicate ceramic technology, such an approach can reliably achieve functional rehabilitation and high esthetic satisfaction in anterior esthetic cases. Future follow-up will be necessary to monitor the restorations over time and ensure long-term success.

CONCLUSION

Lithium disilicate restorations provide a predictable and esthetic solution for rehabilitating anterior teeth with spacing and compromised crowns, ensuring functional and cosmetic satisfaction.

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