

Restoration of Monolithic Lithium Disilicate Crown in Maxillary Anterior Tooth by Adjusting the Contour of the Provisional Restoration: A Case Report

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임시 수복물의 형태조정을 통한 상악 전치부 단일구조 리튬다이실리케이트 완전도재관 수복 증례

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성공적인 상악 전치부의 수복을 위해서는 주위 치아와 조화로운 보철물의 형태와 색조가 중요하지만 보철물 주위의 치은의 형태 또한 치료결과에 영향을 미친다. 단일구조의 리튬 다이실리케이트 완전도재관은 빛의 투과성이 높으면서도 높은 강도를 유지하여 심미성이 요구되는 부위의 보철수복에 적절하다. 치은의 적절한 외형을 형성하는 방법에는 치은 절제술과 같은 외과적 방법이 있으며, 세밀한 조정 시 임시 수복물의 외형을 조정하는 방법을 사용한다. 28세의 여성 환자가 상악 좌측 중절치의 기존 금속도재관의 탈락을 주소로 내원하여 섬유 포스트와 레진 코어 수복 및 단일구조의 리튬 다이실리케이트 완전도재관의 수복을 계획하였다. 임시 수복물을 이용하여 치은의 외형을 조정하였으며, 임시 수복물의 외형을 이행시켜 기능적·심미적으로 만족스러운 최종 보철물을 얻을 수 있었기에 이를 보고하는 바이다.

Key words : Emergence profile, Gingiva contouring, Maxillary anterior tooth, Monolithic lithium disilicate crown, Provisional restoration

Introduction

Porcelain fused metal prostheses has been used in maxillary anterior dentition.¹ Considering an esthetic perspective, porcelain fused metal fixed partial denture is not the first choice of prosthodontic treatment, and a patient could be suffered other problems, such as galvanism and toxicity.^{2,3} All-ceramic restoration is relatively biocompatible, and has been widely used in areas where high esthetics are required.⁴

Zirconia ceramic has been most frequently used among

all-ceramic restorations due to its high biocompatibility, esthetics, and mechanical properties.⁵ However, zirconia is considered opaque and is indicated for crown copings and fixed dental prosthesis frameworks in the anterior dentition, and is layered with veneering ceramics in the esthetic area.⁶ Chipping and delamination of the veneering porcelain is limited complications and has been reported in multiple clinical studies.^{7,8}

In recent years, monolithic glass-ceramic materials have been developed in order to provide accomplished esthetics without additional a veneering ceramic.⁹ It has been

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reported that greater structural integrity can be accomplished by eliminating the veneered ceramic and its requisite bond interface.^{9,10} The relative strength of the available glass-ceramic material generally has been the limitation.⁹ Lithium disilicate is an esthetic ceramic material with high flexural strength suitable for both heat press and computer-aided design/computer-aided manufacturing (CAD/CAM) technology. A choice of two materials is available for lithium disilicate crowns, IPS e.max Press and IPS e.max CAD (Ivoclar Vivadent, Schaan, Lichtenstein).^{11,12} In a survey conducted in 2015, it was reported that monolithic zirconia ceramic was the most used material for the restoration of posterior single crowns, and lithium disilicate ceramic was the most used material for the restoration of anterior single crowns. These clinical preferences can be attributed to the favorable mechanical properties of zirconia and the esthetic properties of lithium disilicate.¹³

Maxillary anterior dentition is called “esthetic zone” because of its importance on facial appearance and high visibility. An aesthetic needs of the patient as well as functional factor are crucial in the restoration of maxillary teeth. Aesthetic needs are sometimes the first motivation for patients to receive dental treatment, and arousing psychologically positive effects through aesthetic

improvement.¹⁴

A favorable emergence profile is very important for the health of periodontal tissues because it affects the effectiveness of oral hygiene.^{15,16} Especially in the anterior region, proper soft tissue profile which is supported by the proper emergence profile of the prosthesis is crucial for aesthetic treatment results. The soft tissue profile also can be adjusted by surgical methods such as gingivectomy, however; it is more non-invasive that contouring the soft tissue profile by adjusting a provisional restoration. In order to achieve harmonious gingival profile to surrounding teeth, clinician can take advantage of this characteristic and adjust a provisional restoration that guides the soft tissue harmoniously with surrounding structures.¹⁷

In this case report, the aesthetics of the anterior region was improved by the improvement of the soft tissue profile using the provisional restoration and restoring lithium disilicate crown.

Case report

A twenty-eight years old female patient visited to the Kyung Hee University Dental Hospital with dislodgement of a prosthesis and fracture of the abutment tooth on the



Figure 1. Intraoral photograph of frontal view with old porcelain fused metal prosthesis on first visit.



Figure 2. Intraoral photograph of occlusal view of maxillary dentition with fractured abutment tooth on first visit.



Figure 3. Panoramic radiograph on first visit.

maxillary left central incisor by a traumatic accident (Fig. 1, 2). After clinical and radiographic examination (Fig. 3), the tooth was planned to re-endodontic treatment, and restoration of post, core, and crown.

A preliminary impression was taken for provisional restoration with irreversible hydrocolloid impression

material (Aroma Fine Plus; GC Co., Tokyo, Japan). The provisional restoration with index jig was fabricated using autopolymerizing acrylic resin (Alike; GC America Inc., Alsip, IL, USA) (Fig. 4).

A threaded post and cement were clearly removed from the root (Fig. 5), and re-endodontic treatment was performed.

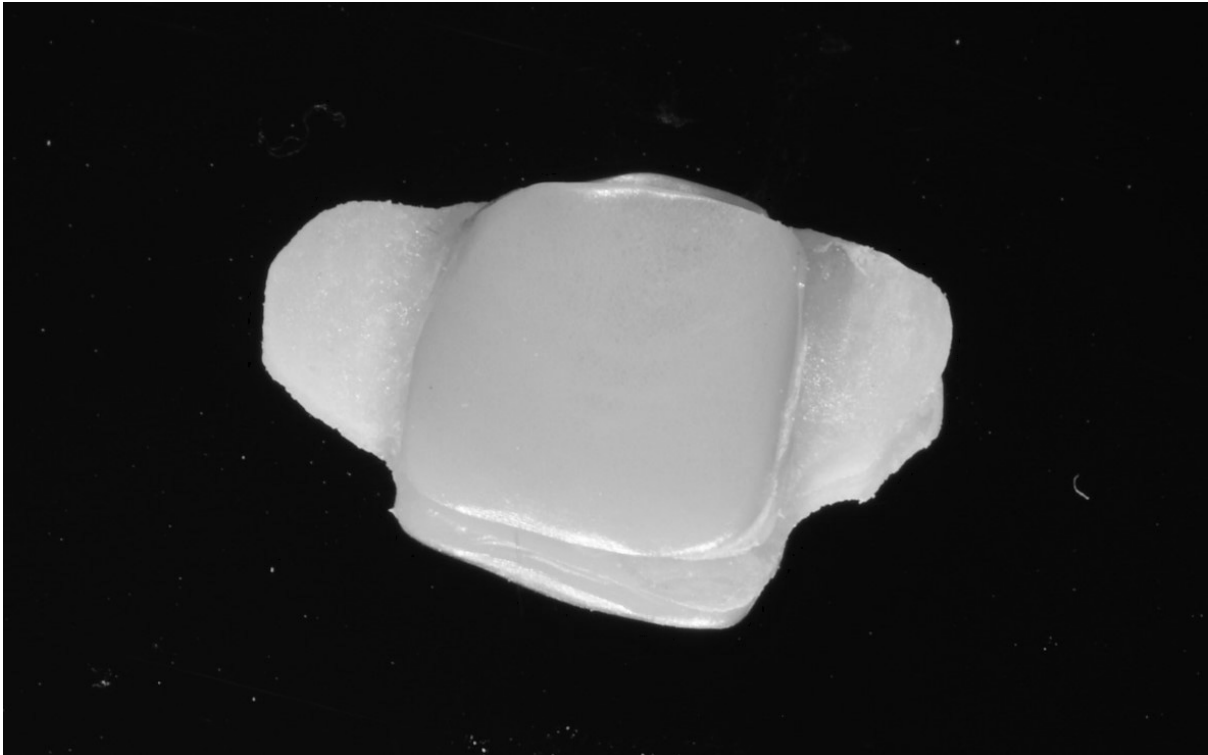


Figure 4. The provisional restoration with index jig was fabricated.

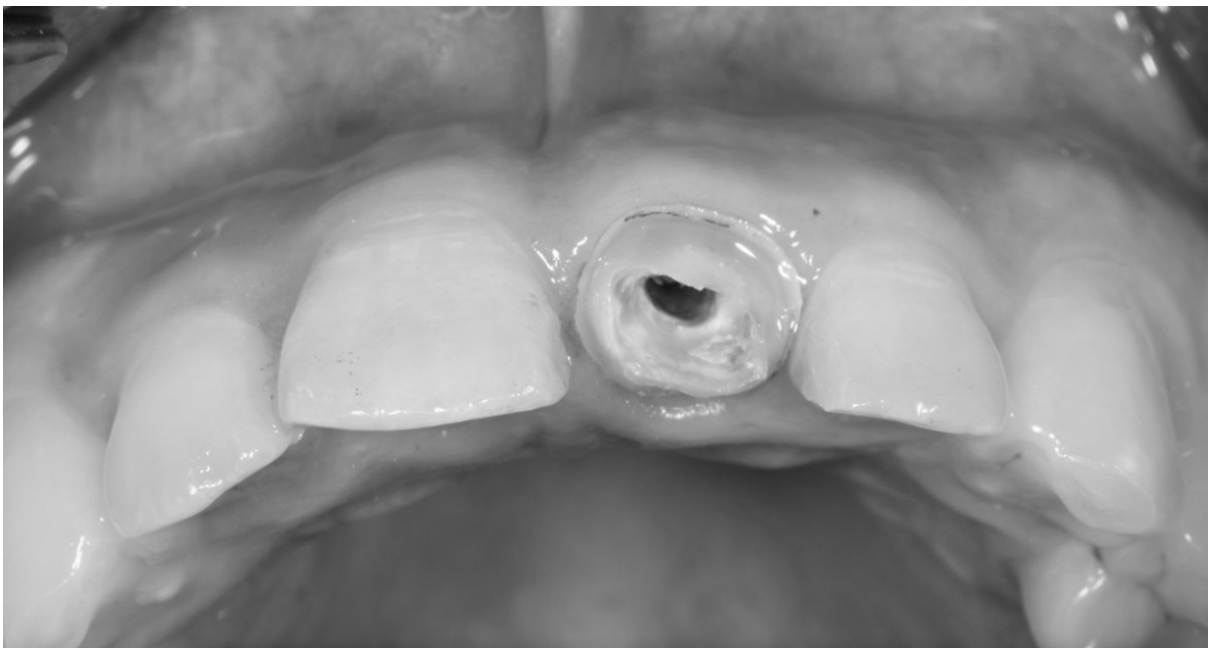


Figure 5. A threaded post and cement were removed from the root of the maxillary left central incisor.

Preparation for post was performed and quartz fiber-reinforced epoxy resin post (DT Light-Post; Bisco, Schaumburg, IL, USA) was cemented with adhesive resin cement (Duo-link; Bisco, Schaumburg, IL, USA) and dual-

cure resin core (Multicore Flow; Ivoclar Vivadent, Schaan, Liechtenstein) were restored after application of 37% phosphoric acid (Fine Etch 37; Spident, Incheon, Korea) and bonding agent (One-Step Plus; Bisco, Schaumburg, IL,



Figure 6. Initial provisional restoration placed on the maxillary left central incisor. Gingival line and contour were not symmetric.



Figure 7. Labial contour of provisional restoration was improved, and gingival line and contour of the maxillary left central incisor were reformed.

USA). The maxillary left central incisor abutment tooth was prepared, and provisional restoration was placed using index of restoration to adjacent teeth. After 2 weeks, the provisional restoration and the gingiva contour were assessed, however, gingiva contour was not symmetric, and the gingival line of the maxillary left central incisor was placed more incisally than the gingival line of the

maxillary right central incisor (Fig. 6). It was planned to modify the contour of provisional restoration, and gingiva contouring was performed 2 times by 2 weeks by improving the labial contour of provisional restoration (Fig. 7).

After 4 weeks, the gingiva contour of the maxillary left central incisor was confirmed, the preparation of the



Figure 8. Preparation of the maxillary left central incisor was finished, and dental shade was selected using shade guide tab.



Figure 9. A master cast was fabricated, and gingiva area was modified using wax.



Figure 10. Monolithic lithium disilicate crown was fabricated using lost-wax hot pressing technique (IPS e.max Press).



Figure 11. Monolithic lithium disilicate crown was cemented on the maxillary left central incisor of patient using resin cement.

maxillary left central incisor was finished, and final impression was taken by 2-step procedure using vinyl polysiloxane impression material (Silagum putty and light body; DMG, Hamburg, Germany) and tooth shade was

taken (Fig. 8). Impression of the provisional restoration was taken for referring the emergence profile and contour of provisional restoration. A master cast was fabricated using Type IV stone (GC Fujirock; GC Europe NV,

Leuven, Belgium), and gingiva area was modified using wax (KIMS MODELLING WAX; KIMSDENT Inc, Seoul, Korea) (Fig. 9). The emergence profile and contour of definitive prosthesis was shaped by referring the provisional restoration. Monolithic lithium disilicate crown was fabricated using lost-wax hot pressing technique (IPS e.max Press) (Fig. 10), and was delivered on the maxillary left central incisor of patient using resin cement (Multilink N; Ivoclar Vivadent, Schaan, Liechtenstein) according to manufacturer's instruction (Fig. 11).

Discussion

Lithium disilicate ceramic is available in a various translucency ingots and blocks that allows to optimize the esthetic results through the translucency of the material and the addition of stains. In-vitro testing of lithium disilicate ceramic suggested that monolithic lithium disilicate restorations can be more fatigue-resistant than veneered zirconia.^{18,19} Clinical retrospective studies have also shown promising results in short-term and medium-term survival rates, esthetic outcome, and wear-friendliness to opposing enamel.^{20,21} It can be processed using the lost-wax hot pressing technique (IPS e.max Press) or CAD/CAM milling procedures (IPS e.max CAD).^{11,12} This pressable lithium disilicate ceramic (IPS e.max Press) consists of approximately 70% of lithium disilicate crystal ($\text{Li}_2\text{Si}_2\text{O}_5$), and it was embedded in a glassy matrix. The glass matrix and crystals are similar to that of the dental structure in a refractive index of light that allows high esthetics result.²² The flexural strength of the lithium disilicate ceramic varies from 360 to 400 MPa.²³ Single lithium disilicate ceramic full-contour crown can be used for the rehabilitation of the anterior and posterior regions, irrespective of adhesive or conventional cementation.²⁴ However the cementation of lithium disilicate ceramic is crucial in fatigue-resistant of flexural strength as well as retention of the prosthesis, and lithium disilicate crown was bonded with resin cement in this case. High survival rates (100%) in 2 to 5 years follow-up with no fractures have been reported for monolithic pressable lithium disilicate ceramic.²⁵ A recent prospective study of lithium disilicate fixed partial denture (FPD) that was assessed the clinical outcomes of 36 lithium disilicate FPDs (84% in posterior region and 16% in anterior region), and reported a 7% fracture rate over 8 years in function.²⁶

Methods for obtaining the optimal gingival contour and line in crown restoration that most often involve the use of a provisional restoration to reform the gingival tissues prior to definitive crown fabrication.²⁷ This article describes a single crown restoration in which desired gingival contour was established using the provisional restoration, and a soft tissue cast was used.

Conclusion

This clinical report describes esthetic treatment outcome of maxillary anterior central incisor using gingival recontouring with provisional restoration, and definitive prosthesis was restored using lithium disilicate ceramic which is reported favorable esthetic and mechanical treatment results. By this, favorable clinical outcome was achieved.

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