

Prosthetic Restoration with Multidisciplinary Approach to Anterior Edentulous Areas Related with Diastemas: Case Report

Diastemaların Eşlik Ettiği Ön Bölge Diş Eksikliğinde Multidisipliner Yaklaşım ile Protetik Restorasyon

Selma ŞEN,^a
Gözlem CEYLAN,^a
K. Devrim İŞÇİ^b

Departments of
^aProsthodontics,
^bOrthodontics,
Ondokuz Mayıs University,
Faculty of Dentistry, Samsun

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Yazışma Adresi/Correspondence:
Selma ŞEN
Ondokuz Mayıs University,
Faculty of Dentistry,
Department of Prosthodontics,
Samsun
TÜRKİYE/TURKEY
dtselmakuru@yahoo.com

ABSTRACT Missing maxillary lateral incisors create an esthetic problem with specific orthodontic and prosthetic considerations. Multidisciplinary planning of the treatment can contribute to success and esthetic of the restorations. In this clinical report anterior edentulous area was restored with glass-infiltrated aluminium oxide ceramic restorations after orthodontic and periodontal treatment. A thirty-year-old male patient came to Ondokuz Mayıs University, Faculty of Dentistry, Samsun, Turkey complaining from the unesthetic appearance based on the diastemas. In this case orthodontic treatment was applied before prosthetic rehabilitation because of the diastemas. In-Ceram alumina fixed partial dentures were used to restore maxillary anterior teeth after orthodontic treatment. In this clinical report multidisciplinary approach and treatment procedures with In-Ceram alumina fixed partial dentures were described to restore maxillary missing anterior teeth. Also metal-fused porcelain restorations were applied in mandibular posterior regions.

Key Words: Interdisciplinary communication; in-Ceram alumina; orthodontics; diastema

ÖZET Üst çene lateral kesici dişlerin eksikliği ortodontik ve protetik uygulamalarda estetik problemler oluşturur. Tedavinin multidisipliner planlanması restorasyonun estetik ve başarısına katkıda bulunabilir. Bu klinik raporda periodontal ve ortodontik tedavi sonrası anterior dişsiz ön bölge cam infiltre edilmiş alüminyum oksit seramik restorasyonlarla restore edilmiştir. Otuz yaşında bir erkek hasta diastemalarının sebep olduğu estetik olmayan görünüşünden rahatsız olduğu gerekçeyle Ondokuz Mayıs Üniversitesi Diş Hekimliği Fakültesine başvurdu. Bu olguda, protetik tedaviden önce alt ve üst çenedeki diastemaları düzeltmek amacıyla ortodontik tedavi uygulanmıştır. Ortodontik tedaviden sonra In-Ceram alumina restorasyonlar üst çenedeki eksik dişlerini restore etmek amaçlı kullanılmıştır. Bu klinik raporda, üst çenedeki dişsizlik olgusunda uygulanan multidisipliner yaklaşım ve tedavi prosedürleri anlatılmıştır. Ayrıca alt çenedeki eksiklikler ise metal destekli restorasyonlar ile tamamlanmıştır.

Anahtar Kelimeler: Multidisipliner iletişim; In-Ceram alumina; ortodontik tedavi; diastema

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Early loss of permanent tooth may cause various malocclusions and unesthetic appearance due to the migration of neighbour teeth to the extraction side. In some cases, prior to the prosthetic restorations space of the lost tooth needs to be opened by orthodontic treatment.¹

Missing maxillary lateral incisors present challenging treatment planning and mechanotherapy problems for orthodontists, prosthodontists and general practitioners. Two treatment approaches commonly taken are; creating adequate space to replace the missing lateral incisors or closing spaces

and reshaping canines to simulate the presence of lateral incisors.²

The use of a conventional fixed partial denture (FPD) to replace the missing tooth may result in anterior teeth that are too wide, an overcontoured emergence profile, and altered length-to-width relationship of the teeth. The diastema resulting from the missing lateral incisors require a treatment option to approximate the central incisors orthodontically and create a space in which the FPD, resin-bonded fixed partial denture (RBFDP), or implant-supported prosthesis may be placed.^{3,4}

The natural appearance of ceramic restorations has made them attractive to patients and clinicians for decades. Because of the relatively low tensile strength and brittleness of the porcelain, it has been generally fused to a metal substrate to increase resistance to fracture. However, this metal base can affect the esthetics of the porcelain by decreasing the light transmission through the porcelain and by creating metal ion discolorations. In addition, some patients have allergic reactions or sensitivity to various metals.^{5,6}

The use of all ceramic fixed partial dentures to restore anterior edentulous area may offer the advantages of increased biocompatibility, natural appearance, lower plaque accumulation and superior esthetics.⁷ The disadvantages associated with metal-fused porcelain restorations have prompted the development of all-ceramic systems that do not require metal. The need for improved fracture strength of all-ceramic restorations led to the development of ceramics with an increased alumina content. The aluminium oxide serves as reinforcement of the glassy matrix, comparable to leucite crystals.⁸

In-Ceram alumina (Vita Zahnfabrik, Bad Sackingen, Germany) is a slip-cast aluminous porcelain. It is indicated for single anterior and posterior crowns and anterior three-unit bridges. The advantages of the glass-infiltrated core material are its lack of metal, its high flexural strength and its excellent fit. The disadvantages include the opacity of the core, the unsuitability for conventional acid etching and the need for specialized equipment.⁹

This clinic report describes a multidisciplinary approach and treatment procedures with In-Ceram alumina fixed partial dentures to restore maxillary missing anterior teeth. Also metal-fused porcelain restorations were applied in mandibular posterior regions.

CASE REPORT

A thirty-year-old male patient came to Ondokuz Mayıs University, Faculty of Dentistry, Samsun, complaining from the unesthetic appearance based on the diastemas (Figure 1). Clinical and radiographic examinations revealed that his upper lateral incisors and lower first molars and also right second premolar were missing. So he had diastemas in both anterior region (Figure 2).



FIGURE 1: The view of the patient prior to treatment.



FIGURE 2: Panoramic radiography of the patient.

In his clinical examination, the following findings were reported: He had no systemic diseases, also no significant extraoral findings. His oral hygiene was poor. He had canine guidance occlusion and diastemas in both anterior regions because of missing teeth. Except an amalgam restoration on the left upper first molar he had not any other restorations.

First of all, treatment planning was explained to the patient and his consent form was gained and then he received periodontal treatment. His oral health was reestablished in the both arches. Then impressions of maxillary and mandibular arches were made with an irreversible hydrocolloid (CA 37; Cavex, Amsterdam, Holland) and dental stone (Die-Keen; Heraeus Kulzer Inc, South Bend, USA, Indiana) in order to obtain the planning models.

Diagnostic wax-up was performed to see the treatment alternatives and also discussed with the patient. Diagnostic wax-up showed that orthodontic treatment was really essential.

At the beginning of the orthodontic treatment (Figure 3), there were nearly 9 mm diastemas in the maxillary arch, and 4 mm diastemas in the mandibular arch. In both sides, maxillary/mandibular canine-relationships with full Angle Class II were observed. Both arches were bonded with 0.022 slots MBT brackets (GAC Int. Inc. Bohemia, USA), 0.016 sentalloy arch wires (GAC Int. Inc. Bohemia, USA) were applied and with these arches, power chains (American Orthodontics, Sheboygan, USA) were used for closing the spaces in the mandibular arch. In the maxillary arch, spaces were opened for lateral incisors with open coils (GAC Int. Inc. Bohemia, USA).

The canines were distalized for closing diastemas; and at the end of the orthodontic treatment the Class II relation was changed to the neutral one and an adequate canine relationships in the arches were carried out.

After the orthodontic treatment (Figure 4) the brackets in the mandibular arch were debonded and it was decided to restore edentulous areas in the mandibular arch with metal-fused to ceramic

FPDs firstly and then 0.0175 twisto-flex arch wires (GAC Int. Inc. Bohemia, USA) were used to prevent the relaps of the teeth.

In the maxillary arch with all-ceramic FPDs were used to restore edentulous areas. After debonding procedure, any retention appliance for maxilla was not used as the teeth were firstly splinted with the temporary restorations and then permanent FPDs from canine to canine.

Maxillary centrals and canines were prepared with 1.2 mm circumferential chamfer finish line (Intensive Prep Set; Intensive SA, Grancia, Switzerland) (Figure 5). After gingival retraction (Ultrapack #00; Ultradent, Salt Lake City, Utah, USA), vinyl-polysiloxane impressions (Elite H-D Zhermack Italy) of the prepared teeth were taken and immediately poured with a type V dental stone



FIGURE 3: The beginning of the orthodontic treatment.



FIGURE 4: After the orthodontic treatment.



FIGURE 5: Preparation of the anterior teeth.



FIGURE 6: All-ceramic FPDs fabricated with In-Ceram alumina slip-casting technique.

(Glastone Dental Stone; Dentsply Co, Milford, Del, USA.).

The master casts were mounted in a semi-adjustable articulator (Dentatus ARH-type; Dentatus AB, Stockholm, Sweden) by using an interocclusal registration and face-bow (Quick Mount Face-Bow; Whip Mix Corp, Louisville, Ky. USA), The all-ceramic FPDs were fabricated with In-Ceram alumina slip-casting technique (Figure 6).

The habitual intercuspal position of the patient was maintained and occlusion was evaluated for protrusive and lateral movements. After orthodontic and prosthetic treatment canine relationships in the arches were carried out.

Final FPDs were applied on the teeth using an adhesive luting composite cement according to the

manufacturer instructions (Panavia F 2.0, Kuraray Med.Okayama, Japan). The patient was recalled one week later for control.

DISCUSSION

The presence of the anterior extensive diastemas based on the missing lateral incisors is a difficult esthetic problem to resolve. Teamwork between the orthodontist, prosthodontist is important when establishing overall treatment planning for the success and esthetic result of the restorations.

In the present literature, two treatment approaches commonly were taken into account. In some of them, adequate space has been created to replace the missing anterior teeth and then restorative treatments have been applied by closing the spaces closed and also, the canines have been reshaped to simulate the presence of lateral incisors.^{10,11}

The treatment options may include an implant-supported prosthesis, FPD, or RBFDP. Before making a decision, the dental relationship, the tooth size-arch length discrepancy, the shape and color of the adjacent central incisors and canines, and the level of cooperation expected must be considered.¹²

In this case, before the prosthetic treatment, orthodontic treatment was seemed to be a prerequisite process. However, the patient was impatient about the restorations. For persuading the patient and also to see how his teeth could be restored without orthodontic treatment, a diagnostic wax up was performed. The final wax-up resulted in anterior teeth that are too wide and altered length-to-width relationship of the teeth. So the patient accepted to receive an orthodontic treatment before prosthetic rehabilitation.

After orthodontic treatment, he was offered some treatment options such as implant retained prosthesis, all ceramic fixed partial dentures, or resin bonded fixed partial dentures for anterior missing teeth.

Implant-supported prostheses may be used successfully in the oral rehabilitation of partially edentulous patients but such treatment option is

expensive and time-consuming for patients and poor quality alveolar bone and/or systemic diseases such as diabetes and osteoporosis may make difficult its applicability.^{13,14} In this case the patient refused implant retained prosthesis because of the longer healing-period and also financial problems.

As the patient was not enjoying of the appearance of his upper central incisors and also the patient preferred FPDs, the preparation of the present

anterior teeth seemed to be compulsory. They were restored with In-Ceram alumina all-ceramic restorations, because of their natural appearance, superior esthetic, high strength, and good marginal fit in the case of anterior bridges.¹⁵ However, in this case because of financial problems, this type of treatment could be applied only for anterior edentulous regions. The mandibular posterior regions were restored conventionally with metal-fused ceramic restorations.

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