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CASE REPORT / OLGU SUNUMU

Prepless Direct Midline Diastema Closure in a Single Visit: 18 months Follow-up Report

Orta Hat Diastemasının Tek Seansta Preparasyonsuz Tedavisi: 18 Aylık Takip Raporu

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Abstract

Maxillary midline (major) diastemas, which are common aesthetic problems for the patients may frequently occur due to high frenulum junctions. Direct prepless composite resin restorations can be economical and successful after the treatment of abnormal frenum. The present paper reports a case of maxillary major diastema due to high frenulum, which was treated with non-invasively direct composite resin restorations after frenectomy and office bleaching procedures. The success of the final restorations were assessed in 3 month, 9 month and 18 month follow ups.

Keywords: Aesthetic dentistry, midline diastema, prepless restoration

Öz

Hastalar için yaygın estetik problemlerden biri olan maksiller orta hat diastemaları, yüksek frenulum bağlantısı kaynaklı oluşabilir. Direk preparasyonsuz kompozit rezin restorasyonlar, normal olmayan frenum bağlantısı tedavisinden sonra ekonomik ve başarılı olabilir. Bu yayında, yüksek frenulum nedeniyle meydana gelen bir maksiller majör diastema vakası bildirilmiştir. Diastema, frenektomi ve ofis tipi beyazlatma prosedürlerinden sonra invaziv olmayan direkt kompozit rezin restorasyonları ile tedavi edilmiştir. Restorasyonların başarısı 3 ay, 9 ay ve 18 ay takiplerinde değerlendirilmiştir.

Anahtar kelimeler: Estetik Diş Hekimliği, orta hat diasteması, preparasyonsuz restorasyon

Introduction

Aesthetic outlook has become as important as function and phonation with increasing social awareness. Midline (major) diastema is one of the reasons of aesthetic problems for the patients. The etiology is usually multifactorial such as labial frenulum, microdontia, mesiodens, dental malformations and genetic factors. Treatment options for rehabilitation of these unwilling spaces are more varied with the recent developments in adhesive dentistry. In today's dentistry, the diastemas can be closed permanently and aesthetically with direct composite resins without any preparations.

Methods

In this case report, a 23-year-old male patient applied to Marmara University Faculty of Dentistry, Department of Restorative Dentistry Clinic. According to the clinical examinations, a major diastema due to high frenulum junction was considered (Figure 1,2). As having no contraindications, treatment plan was considered as the following procedures respectively: frenectomy, office bleaching and direct-prepless diastema closure with composite resin.

Figure 1. Initial

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Figure 2. Initial

At the first appointment, frenectomy operation was planned to solve the reason of the midline diastema and the operation was done in Department of Periodontology, Faculty of Dentistry, Marmara University. Periodontal tissue healing was completed in six weeks. Three sessions of vital office bleaching, 20 minutes for each, was done with 40% hydrogen peroxide gel (Opalescence Xtra Boost, Ultradent, USA). Restorative treatment was arranged two weeks after the vital bleaching (Chemical composition of the materials were shown in Table 1). Firstly, the most proper shades of a supra-nano spherical inorganic filler containing resin composite, were selected by using the 'Button Technique' and selected as 'A1B' and 'NE' shades (Estelite Asteria, Tokuyama Dental, Japan) (Figure 3,4). After isolation with rubber dam (Figure 5), the whole enamel surfaces were etched selectively with 36% phosphoric acid (DeTrey Conditioner 36, Dentsply, Germany) for 30 seconds, rinsed and slightly dried. Following that an universal adhesive agent (Universal bond, Kuraray Noritake, Japan) was applied to the etched surfaces and polymerized for 20 seconds with a LED polymerization unit (Valo, Ultradent, USA). A specific anterior transparent matrix system (CoForm Strips, Directa, Sweden) was used to create the emergence profiles of the restorations[14] (Figure 6). 'NE' shade resin was used for enamel and 'A1B' shade resin was used for dentin replacements. Glycerin gel (Air Barrier, GC, Japan) was applied to eliminate the oxygen inhibition layer (Figure 7). All the composite increments were applied with layering technique and polymerized for 10 seconds for each layer according to the manufacturer's instructions. Polishing discs (SofLex, 3M ESPE, USA) were used for marginal, interdental strips (Epitex, GC, Japan) were used for interdental polishing (Figure 8, 9, 10, 11) and only two spiral polishing twists in two different grains (Twist Dia, Kuraray, Japan) were used for labial surface polishing (Figure 12, 13). The patient was called for the follow-up appointments at 3 month (Figure 14, 15), 9 month (Figure 16, 17) and 18 month (Figure 18).

Table 1. The composition of the materials used. 3,9,11,18

	Composition	Manufacturer
Estelite Asteria	Filler: 82 WT% Supra-Nano Spherical Filler (200 nm SiO2-ZrO2) Base resin: Bis-GMA, Bis-MPEPP, TEGDMA, UDMA	Tokuyama Dental, Japan
Clearfil Universal Bond	Bis-GMA, HEMA, ethanol, 10-MDP, hydrophilic aliphatic dimethacrylate, colloidal silica, dl-camphorquinone, silane coupling agent, accelerators, initiators, water	Kuraray Noritake, Japan
DeTrey Conditioner 36	Contains 36% orthophosphoric acid	Dentsply, Germany
Opalescence Xtra Boost	Potassium hydroxide 10–20, sodium fluoride 5–10, potassium nitrate 15–25	Ultradent, USA

Figure 3. Shade Selection / High contrast

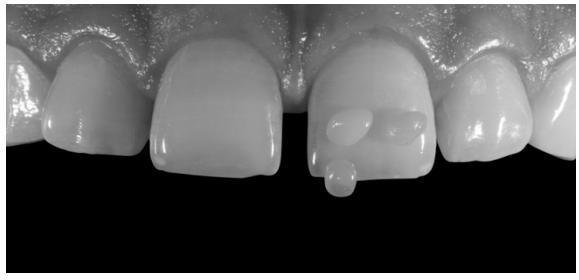

Figure 4. Shade Selection / Black & White

Figure 5. Isolation

Figure 6. Adaptation of interdental strips

Figure 7. Glycerine application

Figure 8. Coarse

Figure 9. Medium

Figure 10. Fine

Figure 11. Extra Fine

Application of interdental polishing strips respectively

Figure 12. Immediate after the restorations

Figure 13. Immediate after the restorations

Figure 14. 3 months recall

Figure 15. 3 months recall

Figure 16. 9 months recall

Figure 17. 9 months recall

Figure 18. 18 months recall (Fracture Detected)

Results

The final restorations were evaluated according to the modified United States Public Health Service (USPHS) criterias at 3rd, 9th, 18th months recalls (Table 2).

Restorations were scored as "Alpha", based on clinical examination at 3rd month re-call. At 9th and 18th months controls, marginal discoloration on cervical margin of tooth #21 was detected. At 18th month surface textures on both teeth were slightly worn away. Also a fracture was observed on mesio-incisal margin of tooth #11 thus the anatomical form was considered as slightly on contoured. The fracture was corrected at 18 month follow-up and the patient was called for the further follow-ups.

Table 2. Modified USPHS Scores of 3, 9, 18 month-follow-ups[20]

Category	Score	Criteria	Re-call (Month)		
			3	9	18
RESTORATION	Alpha (A) Bravo (B) Charlie (C)	Restoration is present Restoration is partially lost Restoration absent	A	A	B
MARGINAL INTEGRITY	Alpha (A) Bravo (B) Charlie(C) Delta (D)	Resin-enamel interface is excellent; restoration closely adapted to the tooth No crevice is visible at margins Crevice at margin, enamel exposed Restoration is mobile, fractured or missing	A	A	A
MARGINAL DISCOLORATION	Alpha (A) Bravo (B) Charlie (C) Delta (D)	No discoloration on the margin between the restoration and the tooth structure Slight staining can be polished away Obvious staining cannot be polished away Gross staining	A	B	B
ANATOMICAL FORM	Alpha (A) Bravo (B) Charlie (C) Charlie (C)	Restoration continuous with existing anatomical form and margins Restoration is slightly overcontoured or oncontoured Restoration is undercontoured, dentin or base exposed Restoration is missing	A	A	B
SECONDARY CARIES	Alpha (A) Charlie (C)	No evidence of caries contiguous with the margin of the restoration Caries evident contiguous with the margin of the restoration	A	A	A
SURFACE TEXTURE	Alpha(A) Bravo (B) Charlie (C) Delta (D)	Smooth surface Slightly rough or pitted Rough, cannot be refinished Surface deeply pitted, irregular grooves	A	A	B
SHADE MATCH	Alpha (A) Bravo (B) Charlie (C) Delta (D)	Restorations matches the shade and translucency of adjacent tooth structure Discoloration between restoration and tooth structure within the normal range of tooth Discoloration between restoration and tooth structure outside the normal range of tooth Unacceptable color, shade and translucency	A	A	A
POSTOPERATIVE SENTITIVITY	Alpha (A) Bravo (B) Charlie (C)	No postoperative sensitivity Postoperative sensitivity Postoperative sensitivity with treatment need	A	A	A

Discussion

Al-Rubayee reported midline diastema incidence as 28%, in maxillary 22.5%, in mandibular 2.3%, and in both arches 3.2%). The majority of females (87.5%) found with median diastema is one of the reasons of un-esthetic outlook.[1] Midline diastema often occurs with band of thick heavy fibrous tissue lies between central incisors.[8] Dental material arch length discrepancy has a multifactorial etiology such as; missing teeth, microdontia, macrognathia, peg-shaped laterals, thumb sucking, tongue thrusting, soft tissue and hard tissue pathologies (cysts, tumors and odontomas).[12] The diastemas can be closed restoratively, orthodontically or with combination of both. Clinical parameters such as number and size of the diastemas, play a key role in that.[7] The restorative approach includes direct composite and indirect ceramic treatments.[2] Recent composite resin materials have improved mechanical and optical properties, hence are aesthetic, stable and have a longevity of adhesion mainly to enamel.[8] The physical and chemical improvements have also optimized the color stability and improved the wear resistance of the composite resins.[8,10] Diastema closure with direct composite resins is a clinically proven treatment procedure today.[6] Moreover, in this method also no preparation is needed if only proper enamel adhesion is caried out.[6]

In this case, prep-less resin composite restoration was selected as the treatment method for a major diastema closure. Composite layering concept including the use of two separate composite shades was considered to restore the natural alike tooth anatomy.[5] A supra-nano inorganic filler containing resin composite, Estelite Asteria was used to emulate the natural dental layers. Improved physical properties (inorganic filler silica-zirconia 71% volume / 82% weight; flexural strength 101MPa) of this resin have possibly increased the durability of the restorations.[13] That also increased the resistance to surface wear though slight surface abrasions on both restorations were detected at 18th month recall which are predictable for any composite resin restoration in such time period. The fracture of the restoration on tooth #11 at 18th month was due to an acute trauma while chewing as the patient explained, which is also acceptable. As one of the main advantages of composite resin restorations is direct easy repair, the fracture was corrected in a single visit by using composite repair protocols.[19] Very small sized fillers (inorganic filler size, 200nm) improved the polishability of the resin hence decreases the surface roughness. This explains the high, long-term resistance to discoloration under the conditions of the case presented.

In dentistry, three external bleaching techniques are used: night guard (home) bleaching, in office bleaching and over the counter whitening products.[15] When compared to night guard bleaching, in office bleaching technique has many advantages such as handling by dentist, avoidance of soft tissue exposure, reduced treatment time and immediate results.[16] This technique requires the application of hydrogen peroxide in high concentration for a short time.[17] Office bleaching technique was used in this study.

A fracture on tooth# 11 was corrected at 18 month follow-up by using standard composite repair protocols.[19] Air abrasion, silane, adhesive agent and composite resin (A1B, NE) were used respectively for the repair (Figure 19, 20).

Figure 19. Correction of the Fractured Restoration

Figure 20. Correction of the Fractured Restoration

The patient's aesthetic problem was resolved with a conservative way including office bleaching and direct resin composite restorations without any preparations. At 18 month recall except a small mesio-incisal fracture on tooth #11, the modified USPHS scores of the restorations were considered as acceptable.[20] The fracture was repaired at the same visit and the patient was called for further follow-ups.

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