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Case Report

Rehabilitation of a Missing Lateral Incisor with a Fiber-reinforced Adhesive Bridge: Case Report

Deniz Mızrak[*1], **Mine Betül Üçtaşlı**[2]

[1]*Res. Assist. Department of Restorative Dentistry, Faculty of Dentistry, Gazi University, Ankara, Türkiye.*
[2]*Prof. Dr. Department of Restorative Dentistry, Faculty of Dentistry, Gazi University, Ankara, Türkiye.*

ABSTRACT

Introduction: Hypodontia, particularly the congenital absence of maxillary lateral incisors, often compromises dental esthetics and function, necessitating case-appropriate treatment approaches. Fiber-reinforced adhesive bridges offer a conservative alternative when fixed prostheses or implants are unsuitable, especially in growing adolescents.

Case Report: This case report describes the interdisciplinary management of a 16-year-old female patient presenting with a congenitally missing maxillary right lateral incisor following orthodontic treatment. A direct fiber-reinforced adhesive bridge using a braided glass fiber system was fabricated after minimal palatal preparation of the abutment teeth, combined with composite restorations to enhance anterior esthetics. The procedure restored the patient's smile, function, and phonation while preserving healthy tooth structure.

Conclusion: Fiber-reinforced adhesive bridges represent a practical, esthetic, and conservative interim solution for anterior tooth replacement in young patients, offering comfort and repairability until definitive treatment becomes feasible.

Keywords: Dental esthetic; Fiberglass; Hypodontia

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Corresponding author: Dt. Deniz Mızrak
Dentistry, Biskek Ave. 1. St. No:4, 06490, Emek, Ankara, Türkiye.
E-mail: denizbarlas@gazi.edu.tr

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INTRODUCTION

Congenital absence of teeth, known as hypodontia, is the most common developmental anomaly in humans. The condition can range from the loss of just one permanent tooth to the complete absence of all permanent dentition, referred to as anodontia.[1] Hypodontia may present as an isolated finding (non-syndromic) or may be associated with a variety of hereditary syndromes, among which the different types of ectodermal dysplasia are the most frequently encountered.[2]

Approximately 1.7% of the population is affected by maxillary lateral incisor hypodontia, and is more common in females than in males. In patients missing one or more of these teeth, the shape and position of the remaining natural teeth can significantly influence smile aesthetics, often making treatment necessary.[3]

In patients with hypodontia, the primary goal of any treatment is to achieve an outcome that is aesthetically pleasing, functional, healthy, and cost-effective in both the short and long term. When planning treatment with a patient-centered approach, several general factors should be considered, including the patient's age at presentation, dietary habits, oral hygiene status, the condition of the existing teeth,

level of cooperation, and overall treatment cost.[3] Assessing these elements is essential not only for determining whether treatment is necessary but also for identifying the most appropriate timing for intervention.[4]

Advances in adhesive systems have enabled more conservative treatment approaches in dentistry, allowing the preservation of healthy tooth structure whenever possible. Although conventional fixed partial dentures offer a long-lasting solution for single-tooth replacements, they require significant preparation of the adjacent teeth, compromising their structural integrity.[5] Dental implants, considered the ideal option for single-tooth replacement, also have certain drawbacks such as high cost, contraindications in growing children and adolescents, and limited suitability for patients with poor systemic health.[6]

Fiber-reinforced adhesive bridges are used in the restoration of teeth lost due to trauma or unsuccessful endodontic treatment, in cases where the periodontal prognosis of the adjacent teeth is questionable, in patients who cannot tolerate local anesthesia or who cannot undergo long treatment procedures for medical reasons, in situations requiring a fixed space maintainer after orthodontic treatment, and in implant cases where a temporary restoration is needed before loading.[7]

In fiber-reinforced adhesive bridges, the pontic can be shaped and applied using either direct or indirect techniques, utilizing the patient's extracted natural tooth, a prefabricated acrylic tooth, or composite resin. However, they are not recommended in cases with long edentulous spans, deep bite relationships, or when the abutment teeth have large restorations or diastemas.[8]

In this case report, the aim is to present the interim restoration of a congenital missing lateral tooth in an adolescent patient using a fiber-reinforced adhesive bridge, planned to re-establish the patient's aesthetics, function, and phonation until a definitive treatment can be performed.

CASE REPORT

A 16-year-old female patient with a congenitally missing maxillary right lateral incisor and a microdontic maxillary left lateral incisor was referred to our clinic following orthodontic treatment. During the anamnesis, the patient reported dissatisfaction with the esthetics of her smile. Intraoral and radiographic examinations revealed an old, discolored composite restoration and root canal treatment on tooth 21, no restorations on the other anterior teeth. Healthy periodontal tissues were examined showing no evidence of occlusal attrition or parafunctional activity (Fig. 1a, 1b, 1c). Considering the patient's age, a fixed prosthetic treatment was not suitable; therefore, a fiber-reinforced adhesive bridge was planned for the missing lateral incisor, a direct composite restoration for the maxillary left anterior region, a composite laminate veneer for tooth 21, and diastema closure for tooth 22. After the treatment plan and alternative options were explained, informed consent for the fiber-reinforced adhesive bridge procedure was obtained from the patient's legal guardian.

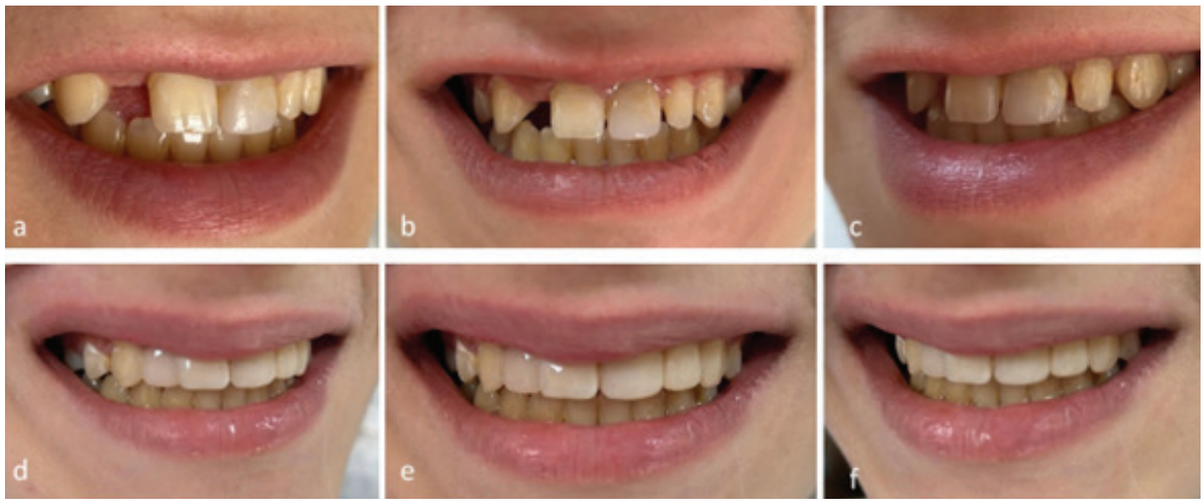

Figure 1. Pre-treatment smile (a,b,c), post-treatment smile (d,e,f).

After treatment planning, the patient's occlusion was checked and shade selection was performed. Following split-dam isolation, tooth 11 was isolated with PTFE tape, and 0.5 mm of enamel was removed from the buccal surface of tooth 21 under water cooling. The enamel surfaces of the left maxillary anterior teeth were etched with 37% phosphoric acid for 30 seconds, rinsed for 30 seconds, and gently air-dried. A universal adhesive system (G-Premio Bond, GC, Tokyo, Japan) was applied to the etched enamel surfaces and light-cured for 10 seconds using an LED curing unit (D-Light Pro, GC).

Using a polyester strip and a wedge, direct composite restorations were applied on teeth 21 and 22 with universal composite system (Estelite Asteria, Tokuyama, Tokyo, Japan) body A1B and enamel NE shades (Fig.1f).

For the restoration of the missing right lateral incisor, after split-dam isolation (Fig. 2a, 2b), minimal palatal preparations (1 mm depth) were performed on teeth 11 and 13 using a round bur under water cooling. The prepared cavities were etched with 37% phosphoric acid for 30 seconds, rinsed for 30 seconds, and air-dried. G-Premio Bond was applied and light-cured for 20 seconds. A piece of braided glass fiber (Interlig, Angelus, Londrina, PR, Brazil) of appropriate length was cut, adapted into the prepared palatal cavities on both teeth, and light-cured for 40 seconds (Fig. 2c). The exposed fiber mesh was covered with an injectable composite (G-ænial Universal Injectable, GC) to seal it from the oral environment. After isolating the gingival region of tooth 12 with PTFE tape, a sectional metal matrix band was placed vertically, and a palatal shell was created using G-ænial Injectable composite (Fig. 2d). Subsequently, the lateral incisor form was built incrementally with Asteria A1B and NE composites, using modeling liquid (Modeling Liquid, GC) and a modeling brush (Modeling Brush Flat, GC) (Fig. 2e).

After completing all restorations, occlusion was checked, ensuring that the pontic had no contact with the mandibular teeth. Finishing and polishing were performed using yellow-band flame-shaped and round-ended composite finishing burs and diamond-impregnated silicone discs (Twist Dia Spiral Wheels, Kuraray, Okayama, Japan).

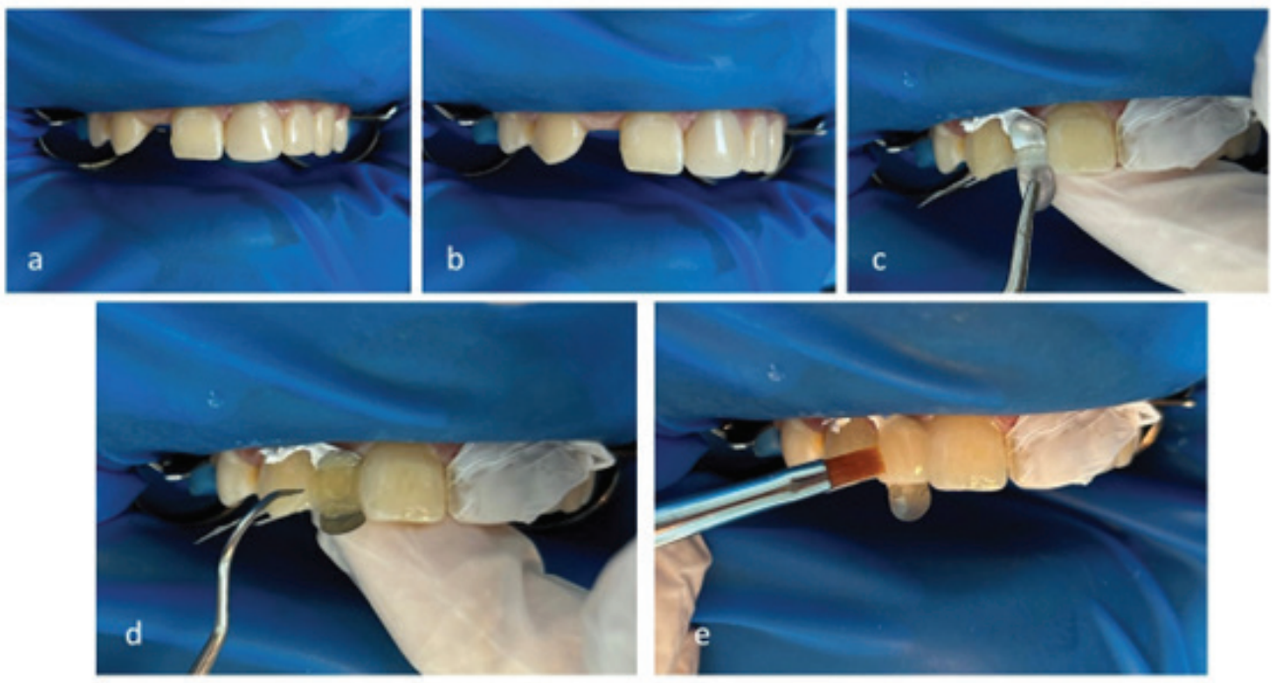

Figure 2. Split-dam isolation (a,b), application of braided fiber to the adjacent teeth (c), obtaining a lateral incisor–shaped pontic by incrementally applying composite resin (d,e).

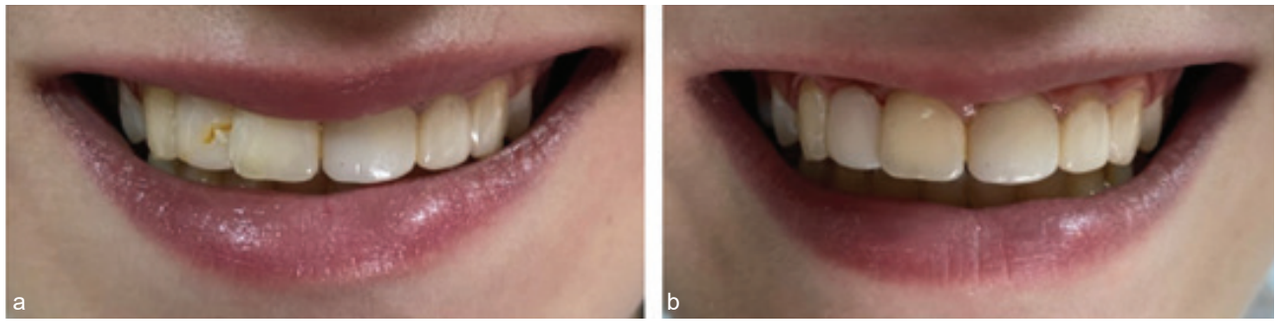

Figure 3. 2-year follow-up (a), after re-polishing procedures (b)

During the 6-month and 1-year follow-up appointments, no failures were observed except for slight discoloration on the composite surfaces; however, at the 2-year follow-up, chipping and discoloration were observed on the composite pontic surface (Fig. 3a), and a fracture was noted at the distal connector of the fiber-reinforced adhesive bridge.

Since the patient had not yet completed the growth period and the fiber-reinforced adhesive bridge needed to be maintained until implant treatment could be performed, the fiber-reinforced adhesive bridge was repaired, and the discolorations were removed by polishing (Fig. 3b).

DISCUSSION

Various treatment options are available for the replacement of anterior tooth loss, including implants, conventional fixed bridges, retainers, and adhesive bridges as an alternative approach.

Fiber-reinforced adhesive bridges are more esthetic than metal-supported adhesive bridges and require only minimal preparation on the abutment teeth. Since they are metal-free, they are safe for patients with metal allergies and pose no risk of corrosion. Compared with other adhesive bridge systems, they also cause less wear on the opposing arch. When applied using the direct technique, the treatment can be completed in a single appointment, and the restoration can be easily repaired if necessary.[9]

Despite these advantages, their resistance to occlusal forces is lower than that of other types of adhesive bridges. Their color stability is not ideal, and they require a technique-sensitive application. They are contraindicated in patients for whom adequate moisture control cannot be achieved, in cases involving multiple missing teeth, and in individuals with parafunctional habits.[10]

Various types of fibers are used in minimally invasive dental treatments, and among them, polyethylene and glass fibers are the most commonly preferred due to their superior mechanical and aesthetic properties. Studies have shown that, because of their translucency, esthetic appearance, and ability to bond to dentin, glass fibers are the most suitable option for dental applications compared with other fiber types.[11] The reinforcing effect of fibers varies depending on their orientation (unidirectional, braided, or woven), the amount of fiber (by volume), and whether they are pre-impregnated with resin.[12]

Interlig Angelus is a braided glass fiber impregnated with light-cured composite resin material with a high flexural strength and favorable elastic behavior, contributing to enhanced mechanical performance of composite restorations. It is a metal-free material with translucent, transparent, inert, and biocompatible characteristics. When used in combination with composite resins, it can yield highly satisfactory esthetic results. This material can be used for periodontal splinting, trauma stabilization, orthodontic applications, and fabrication of temporary or permanent bridges.[13]

In a study evaluating the survival rates of anterior fiber-reinforced adhesive bridges, a 7.5-year survival rate of 97.7% was reported for 175 restorations.[14] In another study, fiber-reinforced adhesive bridge restorations were placed in 29 patients, and after a mean follow-up period of 42 months, the overall survival rate was found to be 75%, while the functional survival rate reached 93%.[15]

The most common site of fracture in fiber-reinforced adhesive bridges is the connector area between the pontic and the abutment tooth.[16] In this high-stress region, cavity preparation on the proximal surface is recommended to achieve adequate connector height and thickness.[17] Moreover, it has been shown that restorations with minimal tooth preparation exhibit longer longevity compared with restorations fabricated without any preparation.[18]

Several studies have also reported higher fracture rates—and therefore higher failure rates—in adhesive bridges placed after orthodontic treatment, likely due to the increased tendency for relapse.[19,20]

In the presented case, despite minor complications observed during follow-up, the fiber-reinforced adhesive bridge provided satisfactory esthetics and function throughout the growth period, supporting its role as a reliable interim solution until definitive implant therapy becomes feasible.

CONCLUSION

In summary, the fabrication of fiber-reinforced adhesive bridge offers a valuable alternative for the temporary or definitive replacement of a missing tooth. It is non-irritating, easy to maintain, and typically requires little to no removal of healthy tooth structure. Additionally, the restoration can be repaired, adjusted, or removed without causing harm to the supporting teeth. However, long-term clinical studies are still needed to determine whether this method can reliably serve as a permanent treatment option.

Eksik Lateral Dişin Fiber Destekli Adeziv Köprü ile Rehabilitasyonu: Olgu Sunumu

ÖZET

Giriş: Hipodonti, özellikle maksiller lateral kesici dişlerin konjenital eksikliği, dental estetik ve fonksiyonu olumsuz etkileyerek vakaya uygun tedavi yaklaşımlarını gerekli kılar. Fiber destekli adeziv köprüler, özellikle büyüme gelişimi devam eden genç hastalarda sabit protezlerin veya implantların uygun olmadığı durumlarda konservatif bir alternatif sunar.

Vaka Raporu: Bu olgu sunumunda, ortodontik tedavi sonrası konjenital olarak sağ üst lateral kesici dişi eksik olan 16 yaşındaki bir kadın hastanın multidisipliner yönetimi açıklanmaktadır. Dayanak dişlerde minimal palatinal preparasyon sonrası direkt fiber destekli adeziv köprü hazırlanmış ve estetiği artırmak amacıyla anterior bölgeye kompozit restorasyonlar uygulanmıştır. Bu işlem, sağlam diş dokusu korunarak hastanın gülüş estetiğini, fonksiyon ve fonasyonunu yeniden kazandırmıştır.

Sonuç: Fiber destekli adeziv köprüler, genç hastalarda anterior diş eksikliklerinin geçici tedavisinde estetik, konforlu ve konservatif bir çözüm sunarak kesin tedavi mümkün olana kadar etkili bir seçenek oluşturmaktadır.

Anahtar Kelimeler: Dental estetik; Fiberglas; Hipodonti

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