

# A minimally invasive treatment approach: Fiber reinforced adhesive bridges

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## ÖZET

**Minimal İnvaziv Tedavi Yaklaşımları: Fiberle Güçlendirilmiş Adeziv Köprüler**  
Son yıllarda adeziv sistemlerdeki gelişmeler ve fiberlerin diş hekimliğinde kullanım alanı bulması farklı tedavi seçeneklerini gündeme getirmiştir. Geleneksel olarak tek diş eksikliklerinde sabit protez veya implant destekli protezler düşünülür. Fakat bu tedaviler hem laboratuvar aşamaları olduğu için zaman alıcı hem de hastaya maliyet getiren tedavilerdir. Fiberle desteklenmiş adeziv köprü uygulamalarında ise tek seansta ve ekonomik olarak tedaviler yapılabilir. Bu makalede diş eksikliğine bağlı estetik şikayetlerle kliniğimize başvuran 2 hastada fiberle güçlendirilmiş adeziv köprü uygulaması ve estetik sonuçları anlatılmaktadır.

**Anahtar Kelimeler:** konservatif, dental köprü, fiberle güçlendirilmiş rezin.

## SUMMARY

Recent developments in adhesive systems and use of fibers in dentistry have made the various treatment options available. Single missing tooth is conventionally treated with fixed dental prosthesis or implant supported prostheses. Nevertheless, these treatment options are time-consuming and high costing for patients as they are subjected to the laboratory phase. On the other hand, fiber reinforced composite applications are performed in one session thereby enabling economic treatments. We have disclosed the fiber reinforced adhesive composite application and its aesthetic results in 2 patients referring to our clinic due to aesthetic complaint arising from missing teeth.

**Key words:** conservative, dental bridge, fiber reinforced resin.

## Introduction

Fibers existing in nature in the cellular walls of plants and trees, and giving flexibility and durability to them are used in numerous sites of the industry in order for reinforcing the materials (1,2). These materials are also used in dentistry well due to their mechanical and binding properties.

Fibers used in dentistry are classified as glass, polyethylene, aramid and carbon fibers (3).

The most substantial feature of the glass fibers is that it is excellently binding, aesthetic, transparent and compatible with the tissue (1,2). There are types such as E-glass, s-glass, c-glass and m-glass. In order to reinforce poly (methyl methacrylate), e-glass (electrical glass) type together with composite resins is preferred to be employed (3).

Polyethylene fibers have natural colors, and they are biocompatible, as well as being resistant to hydrophobic and melting. Its low surface energy and its low degree of wetting are its greatest disadvantages. During its manufacturing stage, polyethylene fibers are saturated or they may be in forms requiring for saturation (3,4,6).

Aramid fibers are traded as "Kevlar". Due to its yellow color, they cannot be used in sites where aesthetic is of importance. They do not require an agent such as silane but they show higher degree of wetting. Their negative responses to toxicity studies as well as inability for polishing are their disadvantages (4).

Carbon fibers are not commonly used as they are not aesthetic due to their black color. Carbon fibers are often preferred in fabrication of sport tools and motor of rocket, and combined with poly (methyl methacrylate) for use in dentistry (3,4). Even though its aesthetic is not good, as it is biocompatible and its mechanical and physical properties are well designed, they were preferred in dental procedures for some time (4,5).

With the developments in adhesive technology for single missing tooth, and use of better composites and fibers in dental procedures, aesthetic and conservative prosthesis procedures are implemented within a shorter period and cost effectively (7). Indications and contraindications of fiber reinforced adhesive composites are as follows:

### Indications;

- 1- In patients for whom local anesthesia is not indicated,
- 2- As splint for the teeth with periodontal problems,
- 3- Completion of missing teeth for prosthetic aim,
- 4- As a holding agent after orthodontic treatment,

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5- As a temporary restoration until the loading is performed in implantation procedures (8,9,10).

Contraindications;

1. In case of deep bite in teeth,
2. In patients presenting with malocclusion,
3. In patients with para-functional habits,
4. In case of long sites with missing teeth,
5. In patients presenting with inadequate tooth tissue (11,12,13,14).

We have presented the fiber reinforced adhesive composite procedure applied with direct method in 2 patients applying to Gülhane Medical Faculty Department of Restorative Dentistry and Endodontics, in this case report.

### Case Report 1

35 year old female patient applied to our dental clinic with missing of upper right first premolar (Figure 1.A). She had aesthetic problems and anxiety. We decided to treat with glass fiber reinforced composite bridge. We performed this procedure upon the request of our patient who was economically not in good state, and this procedure was performed as an alternative to implant or ceramic composite. A composite dental body fitting with the tooth color of the patient was prepared with strip crown. Retentive cavities comprising palatal surface of the upper right canine, mesial and occlusal surface of the right upper second premolar tooth were prepared. These cavities were exposed to adhesive (Prime&Bond NT, Dentsply, Germany) and cured with LED light for 10 seconds. Flowing composites (Esthet.X Flow, Dentsply) and nano-hybrid composite resin (3M ESPE Z550) as well as glass fiber (Interlig, Angelus) were inserted into the cavity and was cured with LED light for 20 seconds. A mesio-distal directed cavity to which glass fiber could be inserted was opened. The composite body was inserted upon the fiber thereby enabling the final shape of the restoration (Figure 1.B). Composite restoration was completed with the completion procedures we always carried out.



**Figure 1A.** Preoperative view of intra-oral **Figure 1B.** Final view of fiber reinforced adhesive bridges

### Case Report 2

A 40 year old female patient applied to our clinic in order to ruling out the aesthetic problem arising from the missing of first premolar tooth in her upper right jaw (Figure 2.A). Following the intraoral examination of the patient, radiographic and model analyses were done and treatment alternatives were presented. Our patient rejected implant treatment due to economic problems and her anxiety. The patient rejecting the conventional bridge restoration due to its multiple sessions, requiring tooth cutting, and its high cost was decided to be exposed to fiber reinforced composite bridge which is both aesthetic and conservative approach. A pontic from strip crown, in tooth

color was made from nano-hybrid composite (Tetric N-Ceram, Ivoc). A pontic was integrated with neighboring teeth and crest. Palatal and lateral surfaces of the neighboring teeth were etched with 37% phosphoric acid. Adhesive agent (Prime&Bond NT, Dentsply) was applied and cured with LED light for 10 seconds. In order to determine the fiber length to be used, the space of missing tooth and palatal surfaces of the lateral teeth were measured with dental floss and fiber length was cut by considering this size. Before the fibers (Interlig, Angelus) were placed on the cast, a thin layer of flowing composite was applied at the retainer area. The pontic was placed on the edentulous region. Then, the polyethylene fiber was inserted into the fluid composite from the palatal and some more fluid composite was inserted, as well. It was polymerized with LED light. The completion protocol in composite restorations was applied thereby concluding the treatment (Figure 2.B).



**Figure 2A.** Preoperative view of intra-oral **Figure 2B.** Final view of fiber reinforced adhesive bridges

### Discussion

There are few clinical reports on the fiber reinforced adhesive bridges. Implants, conventional dental bridges and fiber reinforced adhesive bridges performed with minimal invasive methods could be planned as treatment options complying with the expectations of dentist and patient presenting with missing teeth which lead to aesthetic problems and phonation disorders (15). Even though fiber reinforced adhesive bridges in case of single tooth missing are applied as temporary restoration in anterior teeth, in those patients for whom right indication is established, it is possible to apply permanent restoration, as well (16).

The advantages of the fiber reinforced adhesive bridges include short-time application, aesthetic application with composite resins, no undesired color as no metal construction material was available, and no harms upon the neighboring teeth as performed with minimal invasive method and its being recycle (15,16,17). Its disadvantages include fracture risk during chewing and fragile techniques required for manufacturing (18).

Doğan et al (19) reported in their case report in which glass fiber was used that no malfunctions and aesthetic loss were detected in the 1 year of follow up of the fiber reinforced composite.

Kumbuloglu O. et al (20) in their 5-25 years of clinical follow ups performed with fiber adhesive composites reported that success ratio of metal constructed adhesive composites was 76% and this ratio was 93% in the fiber reinforced composite restorations. Our cases also did not present with any problems in the end of 2 years. On the other hand, we consider that longer clinical follow up be realized in order for accepting the restoration as successful.

### Conclusion

In the event that right indication is available, fiber reinforced adhesive composites are an easy, conservative and cost ef-

fective treatment option for treating the single tooth missing. Tooth missing is ruled out in single session without damaging the neighboring teeth. Aesthetic and teeth function following this treatment is in ideal level. In the follow ups 2 years after the treatment, no problems occurred and follow-up procedure is continuing.

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