IDR International Dental Research

Case Report

Temporary adhesive bridge restoration of the upper anterior teeth lost due to trauma: Three case reports

Meryem Şahin[1], İsmet Rezani Toptancı[1]

[1] Dicle University, Faculty of Dentistry, Department of Pediatric Dentistry, Diyarbakır, Turkey

Abstract

Aim: Traumatic dental injuries at the anterior region of the maxilla occur frequently in children and adults. In this case report, we aimed to describe the temporary aesthetic restoration of the upper lateral incisor with a fiber-reinforced bridge by using the original tooth crown, which had avulsed after dental trauma.

Methodology: **Case 1:** A 14-year-old girl with an avulsion in tooth #11 due to trauma visited our clinic. During the examination, it was seen that the wound had healed, and there was no luxation in teeth #21 and #12. Since the patient could not undergo prosthetic procedures, for reasons including implants, and did not want a removable prosthesis, a single crown supported by acrylic tooth fibers was constructed.

Case 2: A 17-year-old male patient was referred to our clinic because of an avulsed left lateral incisor tooth, which was traumatized 15 days before visiting the clinic. His medical history revealed that his parents had found the tooth two hours after the trauma. However, the emergency clinic that he had previously visited did reimplant that tooth and repaired it with fiber-reinforced composite.

Case 3: In the examination of a 12-year-old male patient who applied to our clinic due to trauma, it was observed that tooth #11 had an avulsion and tooth #12 had a crown fracture. Root canal treatment was performed. A crown was made for the patient by supporting the fiber inside the canals of tooth #11 and tooth #21. It was revised aesthetically with the support of the crown of the other tooth.

Conclusion: Avulsion after anterior trauma affects patients' appearance aesthetically; thus, patients want to be treated as soon as possible. Function, phonation, and aesthetics must be quickly provided for a loose anterior tooth. Fiber-reinforced adhesive bridge techniques may be considered as a temporary treatment for providing an aesthetically appealing appearance until the completion of permanent prosthetic treatment.

Keywords: avulsion, trauma, fiber, adhesive bridge, anterior tooth esthetic

Correspondence:

Dr. İsmet Rezani TOPTANCI
Dicle University, Faculty of Dentistry
Department of Pediatric Dentistry,
Diyarbakır, Turkey.
E-mail:ismettoptanci@gmail.com

Received: 6 March 2021
Accepted: 19 May 2021

Access Online

DOI:
10.5577/intdentres.2021.vol11.suppl1.42

How to cite this article: Şahin M, Toptancı İR. Temporary adhesive bridge restoration of the upper anterior teeth lost due to trauma: Three case reports. Int Dent Res 2021;11(Suppl.1):285-91. https://doi.org/10.5577/intdentres.2021.vol11.suppl1.42

Introduction

Providing aesthetic rehabilitation based on the age of a patient for anterior teeth that are missing for various reasons is a technical challenge in dentistry. Assessing aesthetics by using neighboring teeth is effective, especially before implant application. When a patient loses an anterior maxillary tooth, its immediate replacement for aesthetic reasons is a significant concern. Delayed replacement is unacceptable for cosmetic reasons (1). For young patients in particular, provisional removable dental

applications are seldom psychologically and functionally acceptable (1, 2). Dentists consider the crown preparation of sound adjacent teeth for prosthodontic applications as radical treatment (2). When improving the aesthetics of anterior teeth, the extensive preparation of adjacent teeth for a conventional fixed partial denture is currently impossible to justify (3). A single-tooth implant is an alternative for patients with adequate bone dimensions, age, and periodontal health (2, 3). Immediate interventions are essential for the psychological benefit of the patient and to protect facial aesthetics and phonetics. Preserving aesthetics for the patient, a minimum loss of material, and not impairing the integrity of the neighboring teeth are important (4, 5). When the adjacent teeth are caries-free and have good aesthetics, or if the patient is young, immediate dental replacement in the aesthetic zone of anterior tooth loss is challenging (1). Temporarily removable appliances for aesthetic applications are especially psychologically and functionally unacceptable for young adolescent patients. The crown preparation of sound adjacent teeth is considered a radical treatment for young and adolescent patients (2). Presently, fiber-reinforced composite (FRC) is more often advocated for because of a favorable elastic modulus and a better adhesion of the composite bonding agent to the skeleton than that of metals (6, 7). FRC bridges are adhesive, minimally invasive, and economical restorations that can be used for the one-time replacement of missing teeth. Studies have shown that FRC prostheses made with a direct technique are long-lasting applications (8, 9). However, many patients fear the required implant or surgical application and the treatment cost. FRC fixed prostheses are an aesthetically pleasing alternative method to traditional treatment for missing anterior teeth (10). FRC is formed from two components: fibers and a resin matrix (9). Polyethylene and glass fibers are the most useful materials for fixed partial prostheses to improve the mechanical properties of resin composites (11). Chairside tooth replacement is an easy, effective application using FRC technology (1, 12). Previous studies have attempted chairside tooth replacement involving the use of pontics derived from extracted acrylic teeth and resin composite (13, 14). A chairside FRC prosthesis offers a fast, minimally invasive application for tooth replacement that has aesthetic, functional, and durable results (1). An acrylic or a natural tooth (in the case of extraction or the avulsion of an incisor) can be used as a pontic (15). Chauhan reported 21 patients' treatments using a natural tooth pontic in a FRC fixed partial denture (16). Auplish and Darbar described the immediate replacement of a lateral incisor using FRC with the natural tooth as the pontic (17).

This article describes three clinical cases in which FRC bridges at the anterior region were fabricated using the natural tooth as a pontic for the immediate replacement of permanent incisors following trauma.

Case Reports

Case 1

A 14-year-old female patient with an avulsion of tooth #11 due to trauma was admitted to our clinic. The patient described falling while running at school 40 days ago. She stated that she had experienced an avulsion and could not find the tooth. The patient went to a dentist after the incident, who only cleaned the wound and made recommendations. After detailed radiographic and clinical examinations, a fixed-partial denture was not indicated because of the extensive tooth preparation required, the probable damage to the pulp tissue, and the patient's age and economic situation. Therefore, a fiber-reinforced composite (FRC) prosthesis with acrylic pontic was performed (Fig. 1).

Figure 1. A 14-year-old female patients' avulsion of #11pre operative view.

After selecting the acrylic pontic size and color, a CONSTRUCT (Kerr Lab, California, USA) application was performed (Fig. 2). After making small preparations, Pontic tooth was placed in the tooth space and fixed with fiber on the cingulum. Fiber material was cut and immersed into the bonding agent and flowable composite (Filtek Flow, 3M ESPE) for 15 minutes. It was protected from premature polymerization by light. The extended fiber materials were protected from polymerization with covering foils. In this way, the clinician had adequate working time to properly place and embed the Fiber onto the two adjacent teeth. After adaptation of pontic, both pontic and adjacent teeth were etched and bonded. Pontic adhered to adjacent teeth with composite resin (Fig 3, 4.5). Sixth months control, no clinical or radiological problem in the adhesive bridge or adjacent teeth was observed.

Figure 2. Used fiber resin Construct™ (Kerr Corporation, California, USA)

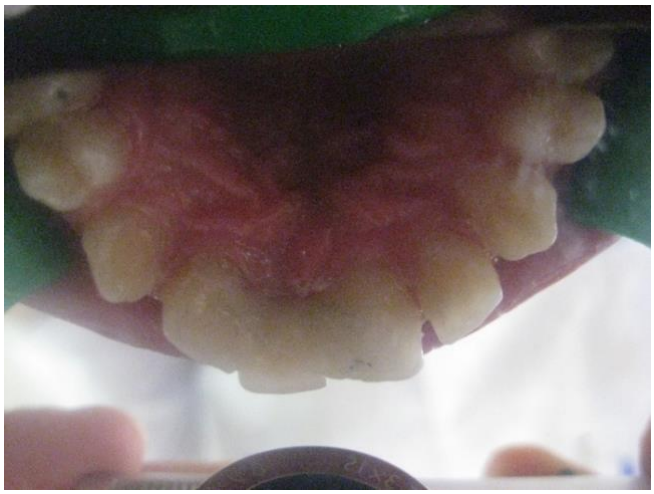

Figure 3. Palatinal view of fiber-reinforced composite restoration with acrylic pontic

Figure 4. Anterior view of fiber-reinforced composite restoration with acrylic pontic

Figure 5. After restoration

Case 2

Seventeen years old male patient with an avulsion of #22 due to trauma was admitted to our clinic. At the patient's history, he described the trauma about 15 days before. The patient found his tooth near the site of the trauma. However, the patient reached the dentist after 2 hours due to the distance, depending on the location. The dentist did not perform reimplantation due to the delayed time and lack of dental materials. However, the patient kept his teeth in tap water for 15 days. After a detailed radiographic and clinical examination, we decided to wait one month for wound healing and bone formation at the alveolar socket. One month later, after the clinic visit, precisely 45 days after the trauma, the periapical film was retaken (Fig 6,7). A fixed partial denture was not indicated because of the age and the economic situation of the patient family. Clinically there is no pain, sensitivity, or mobility at adjacent teeth. We decided to perform a Fiber-Reinforced Composite prosthesis with patients' own avulsed tooth as pontic. The patient's tooth was cleaned (Fig 8), and the coronal part was cut with a bur from the cole area and separated from the root part (Fig. 9). The pulp of the coronal part was removed, the pulp cavity was cleaned and prepared with the drill. Cleaned pulp cavity etched, bonded, and filled with flowable composite (Fig 10). CONSTRUCT (Kerr Lab, California, USA) application was performed as fiber (Fig. 2). After making small preparations, the Pontic tooth was placed in the tooth space and fixed with fiber on the cingulum (Fig. 11). Fiber material was cut and immersed into the bonding agent and flowable composite (Filtek Flow, 3M ESPE) for 15 minutes. It was protected from premature polymerization by light. The extended fiber materials were protected from polymerization with covering foils. In this way, the clinician had adequate working time to properly place and embed the Fiber onto the two adjacent teeth. After adaptation of pontic, both pontic and adjacent teeth were etched and bonded. Pontic adhered to adjacent teeth with composite resin (Fig. 12). Sixth months control, no clinical or radiological problem in the adhesive bridge or adjacent teeth was observed.

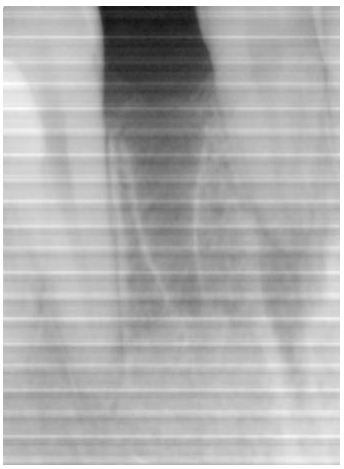

Figure 6. Seventeen years old male patient with an avulsion periapical radiography (Case 2)

Figure 7. Seventeen years old male patient with an avulsion (Case 2)

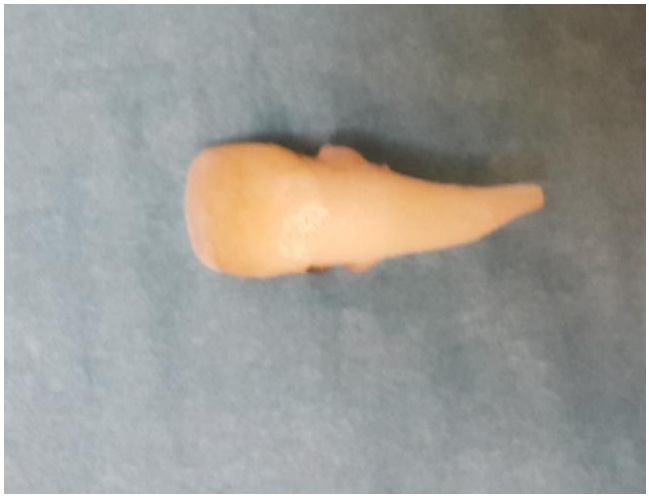

Figure 8. The patient's tooth was cleaned

Figure 9. The patient's tooth coronal part was cut with a bur from the cole area

Figure 10. Cleaned pulp cavity etched, bonded, and filled with flowable composite.

Figure 11. Pontic tooth was placed in the tooth space and fixed with fiber on the cingulum after making small preparations

Case 3

A twelve-year-old male patient was admitted to our clinic after trauma, and his #11 was avulsed, and #21 was fractured coronally. At the patient's history, he described the trauma about two months before. #11 tooth was avulsed, and #21 was coronally fractured, and the pulp was opened. The patient couldn't found his tooth at the site of the trauma. The first dentist to whom the patient went performed the root canal treatment of tooth # 21 and made recommendations for tooth #11, and called the patient to follow up. The dentist finished the root canal treatment of the patient after two sessions and suggested a crown-bridge treatment. Firstly teeth and dental arch were evaluated for mobility in our clinic. Percussion of the teeth was examined, and the trauma area was palpated from the buccal and palatinal regions to see if there was any fracture line. It was seen that tooth #21 also had a crown fracture and had a root canal treatment. The tooth #11 region of the patient was evaluated (Fig. 13). After a detailed clinical examination, a fixed-partial denture was not indicated because of the required extensive tooth preparation and age. For this reason, it was appropriate to make a fiber-reinforced composite pontics to tooth #11 space with intracoronal support from tooth # 21 (Fig. 14,15). After intra-coronal preparation of #21, CONSTRUCT (Kerr Lab, California, USA) application was performed (Fig.2). Fiber material was cut and immersed into the bonding agent and flowable composite (Filtek Flow, 3M ESPE) for 15 minutes. It was protected from premature polymerization by light, and it was placed in the intracoronal cavity using a flowable composite and set by light. The extended fiber materials were placed as a base material to the space of tooth #11 and protected from polymerization with covering foils. Then, the composite pontic is made by hand, and the restoration is completed (Fig 16). Occlusal arrangements were made. The patient was called for control in three-month periods. No problem was observed at teeth #11and #21 during the controls.

Figure 12. Finished of restoration

Figure 13. A twelve-year-old male patient after trauma, and his #11 was avulsed, and #21 was fractured coronally

Figure 14. Make a fiber-reinforced composite pontics to tooth #11 space with intracoronal support from tooth # 21

Figure 15. Make a fiber-reinforced composite pontic to tooth #11 space with intracoronal support from tooth # 21

Figure 16. Finishing of restoration

Discussion

The choice of restoration that will provide aesthetics, function, and phonation in anterior tooth loss is essential in young people. Different solutions can be used to replace a single missing tooth (1). Moreover, to provide the FPD with retention and stability, aggressive tooth preparation is necessary (18). For this reason, pulp exposure during the preparation of adjacent teeth is a high risk (19). A single-tooth implant is an alternative for patients with adequate bone dimensions, age, and periodontal health (2, 3). Two decades before, modification of the classic tooth preparation for design suitable form for resin-bonded fixed partial dentures has been advocated by lots of researchers to enhance retention and resistance (3). However, even these preparation modifications cannot prevent existing teeth from being damaged in young patients. Resin-bonded Fixed Partial Denture (FPD) is a highly effective treatment option in cases where minimum material loss is desired in anterior tooth loss (6). FRC bridges are adhesive, minimally invasive, and economical restorations (8, 9). At the same time, these materials optimize the material's mechanical properties harmoniously with filler materials (15, 20). The resin matrix work as a carrier and protector material around the fibers (20). Studies have shown that Fiber-reinforced Composites have superior physical properties over filler composites (21, 22). The development of implant-supported restorations guided a different approach to a single-tooth replacement (1). However, dentists may not apply this therapeutic option, especially young patients, either because of the age and higher cost. Resin-bonded fixed-partial dentures (FPDs) with metal frameworks are practical and cost-effective dental applications (23). But no definite study documentation of long-term success for the replacement of posterior teeth (24). The successful use of FRC restorations has been shown in other clinical reports and studies (25, 26). The primary type of failures identified was either bulk fracture at the connector or the pontic area, de-bonding of the veneering composite, or fiber exposure (1, 8). Although reinforced composite materials provide excellent esthetics, Bohlsen (2003) and Behr (2003) do not recommend composite materials for a permanent restoration (27, 28). In our study, the applications performed in all three cases are fiber-reinforced composite restorations for aesthetic purposes. While acrylic pontic was used in our first case, the patient's own tooth was used as a natural pontic in our second case. In our third case, teeth were made with composite filling so that all three materials were monitored. During the 2-year period in which all three cases were followed, no de-bonding, coloration, or any fracture was observed, and no problems were encountered in the adjacent teeth. When the patients we followed up in this study were compared with similar studies, it was the first study in terms of evaluating three different pontic materials. a few studies stated that unstable esthetics, increased wear, and liability to plaque accumulation at fiber-reinforced composite restorations (29). However, such negativities were not encountered in our study. The durability of such aesthetic applications is increasing day by day, especially with new materials. We believe that further studies will give more insight into the success and strength of such permanent restorations.

Conclusions

Although losing teeth with trauma, young and adolescent patients have the desire expressed for cosmetic and metal-free restoration. This situation has led to the increased performance and esthetic at resin composites. In this study, we described a more conservative, esthetic, and cost-effective method for replacing anterior teeth replacement with using patients' natural tooth, acrylic tooth, and composite as a pontic in a resin composite-reinforced fiber framework. This technique appears to be an effective restorative solution. However, additional studies are necessary to provide more clinical data for this technique.

Acknowledgments: This study was presented as a full-text oral presentation at the 1st International Dental Research and Health Sciences Congress held between 20-22 May 2021.

Patient Consent for Publication: Written informed consent was obtained from the patients.

Peer-review: Externally peer-reviewed.

Author Contributions: Conception – İ.R.T.; Design –M.Ş.; Supervision – İ.R.T.; Materials – M.Ş.; Data Collection and/or Processing – İ.R.T.; Analysis and/or Interpretation – M.Ş.; Literature Review – İ.R.T; Writer – M.Ş.; Critical Review – İ.R.T.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

References

1. Kermanshah H, Motevasselian F. Immediate tooth replacement using fiber-reinforced composite and natural tooth pontic. Operative dentistry. 2010;35(2):238-45. (Crossref)
2. Danan M, Degrange M, Vaïdeanu T, Brion M. Immediate replacement of a maxillary central incisor associated with severe facial bone loss: use of Bio-Oss collagen-case report. International Journal of Periodontics and Restorative Dentistry. 2003;23(5).
3. Wyatt CC. Resin-bonded fixed partial dentures: what's new? Journal of the Canadian Dental Association. 2007;73(10).
4. Khetarpal A, Talwar S, Verma M. Creating a single-visit, fibre-reinforced, composite resin bridge by using a natural tooth pontic: a viable alternative to a PFM bridge. Journal of Dlinical Diagnostic Research: JCDR. 2013;7(4):772. (Crossref)
5. Parolia A, Shenoy KM, Thomas MS, Mohan M. Use of a natural tooth crown as a pontic following cervical root fracture: a case report. Australian Endodontic Journal. 2010;36(1):35-8. (Crossref)
6. Van Heumen CC, Kreulen CM, Creugers NH. Clinical studies of fiber‐reinforced resin‐bonded fixed partial dentures: a systematic review. European Journal of Oral Sciences. 2009;117(1):1-6. (Crossref)
7. van Heumen CC, van Dijken JW, Tanner J, Pikaar R, Lassila LV, Creugers NH, et al. Five-year survival of 3-unit fiber-reinforced composite fixed partial dentures in the anterior area. Dental Materials. 2009;25(6):820-7. (Crossref)
8. Vallittu PK, Sevelius C. Resin-bonded, glass fiber-reinforced composite fixed partial dentures: a clinical study. The Journal of Prosthetic Dentistry. 2000;84(4):413-8. (Crossref)
9. Monaco C, Ferrari M, Paolo G, Scotti R. Clinical evaluation of fiber-reinforced composite inlay FPDs. International Journal of Prosthodontics. 2003;16(3).
10. Freilich MA, Karmaker AC, Burstone CJ, Goldberg AJ. Development and clinical applications of a light-polymerized fiber-reinforced composite. The Journal of Prosthetic Dentistry. 1998;80(3):311-8. (Crossref)
11. Strassler HE, Tomona N, Spitznagel Jr JK. Stabilizing periodontally compromised teeth with fiber-reinforced composite resin. Dentistry Today. 2003;22(9):102-4, 6.
12. Ibsen R. Fixed prosthetics with a natural crown pontic using an adhesive composite. Case history. Journal-Southern California Dental Association. 1973;41(2):100-2.
13. Davila J, Gwinnett A. Clinical and microscopic evaluation of a bridge using the acid-etch resin technique. ASDC Journal of Dentistry for Children. 1978;45(3):228-32.
14. Stolpa JB. An adhesive technique for small anterior fixed partial dentures. The Journal of Prosthetic Dentistry. 1975;34(5):513-9. (Crossref)
15. Martin A, Meiers J, Duncan J, Goldberg A. Fiber-reinforced composites in clinical dentistry. Quintessence Publishing Co, Inc; 2000.
16. Chauhan M. Natural tooth pontic fixed partial denture using resin composite--reinforced glass fibers. Quintessence International. 2004;35(7).
17. Auplish G, Darbar U. Immediate anterior tooth replacement using fibre-reinforced composite. Dental Update. 2000;27(6):267-70. (Crossref)
18. Kolbeck C, Rosentritt M, Behr M, Lang R, Handel G. In vitro examination of the fracture strength of 3 different fiber‐reinforced composite and 1 all‐ceramic posterior inlay fixed partial denture systems. Journal of Prosthodontics. 2002;11(4):248-53. (Crossref)
19. Goodacre CJ, Bernal G, Rungcharassaeng K, Kan JY. Clinical complications in fixed prosthodontics. The Journal of Prosthetic Dentistry. 2003;90(1):31-41. (Crossref)
20. Kumar PP, Srilatha K, Nandlal B, Dhull KS. Evaluation of the Load-bearing Capacity of Fractured Incisal Edge of Maxillary Permanent Central Incisors restored with a Glass Fiber-reinforced Nanocomposite: An in vitro Study. International Journal of Clinical Pediatric Dentistry. 2015;8(1):22. (Crossref)
21. Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Load bearing capacity of fibre-reinforced and particulate filler composite resin combination. Journal of Dentistry. 2006;34(3):179-84. (Crossref)
22. Garoushi SK, Ballo AM, Lassila LV, Vallittu PK. Fracture resistance of fragmented incisal edges restored with fiber-reinforced composite. Journal of Adhesive Dentistry. 2006;8(2). (Crossref)
23. Creugers N, De Kanter R, Van't Hof M. Long-term survival data from a clinical trial on resin-bonded bridges. Journal of Dentistry. 1997;25(3-4):239-42. (Crossref)
24. Kerschbaum T, Haastert B, Marinello CP. Risk of debonding in three-unit resin-bonded fixed partial dentures. The Journal of Prosthetic Dentistry. 1996;75(3):248-53. (Crossref)
25. Culy G, Tyas MJ. Direct resin‐bonded, fibre‐reinforced anterior bridges: A clinical report. Australian Dental Journal. 1998;43(1):1-4. (Crossref)
26. Jain P, Cobb D. Evaluation of a glass-fiber-reinforced, bonded, inlay-supported fixed partial denture--4-year results. Compendium of Continuing Education in Dentistry. 2002;23(9):779-83, 86, 88 passim; quiz 94.
27. Bohlsen F, Kern M. Clinical outcome of glass-fiber-reinforced crowns and fixed partial dentures: A three-year retrospective study. Quintessence International. 2003;34(7).
28. Behr M, Rosentritt M, Handel G. Fiber-reinforced composite crowns and FPDs: A clinical report. International Journal of Prosthodontics. 2003;16(3).
29. Behr M, Rosentritt M, Latzel D, Handel G. Fracture resistance of fiber-reinforced vs. non-fiber-reinforced composite molar crowns. Clinical Oral İnvestigations. 2003;7(3):135-9. (Crossref)