



CASE REPORT

Replacement of Avulsed Tooth in the Esthetic Zone Using Chair-side Fabricated Resin Composite Pontic: A Case Report

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Abstract

Avulsion of permanent teeth is a complex traumatic dental injury (TDI) where a tooth is completely displaced out of its socket without fracturing. The resultant esthetic and functional compromises are distressing for the patient and require immediate attention. The emergency management of an avulsed permanent tooth is to replant it in its socket or preserve it in suitable storage media (saliva, milk, Hanks' Balanced Salt Solution) within 60 minutes of injury. However, if the tooth is lost or is not replanted within 60 minutes, alternative methods to address the patient's esthetic concerns must be sought. This case report describes the replacement of a lost avulsed permanent tooth with a chairside fabricated resin composite pontic and a 6-month follow-up period.

Keywords: Artificial tooth; Immediate partial denture; Resin-bonded fixed partial denture; Temporary dental restoration; Fibre-reinforced bridge

Introduction

Traumatic dental injuries (TDIs) are a common occurrence in children and adolescents, accounting for 5% of all injuries.¹ An avulsion is a severe TDI in which a whole tooth is knocked out of its socket. It constitutes 0.5-16% of all TDIs in permanent teeth, making it less common than crown fractures.² While all sorts of TDIs can cause significant distress for the patient and parents, the avulsion of permanent teeth is considered one of the most serious dental injuries that requires immediate attention.² Evidence-based guidelines are present to guide the clinician and the public in delivering first aid for avulsed teeth at

the site of the accident and in prompt management at the dental office.^{1,2} Several studies have shown that the prognosis of reimplanted teeth is improved by appropriate emergency care.^{2,3} However, in certain individual clinical situations, replantation may not be possible (e.g., extensive caries or periodontal disease, severe cardiac conditions, immunosuppression, or when the avulsed tooth is lost).² Therefore, alternative methods must be used to replace the avulsed tooth in the esthetic zone to prevent the patient from being embarrassed socially and professionally.

Traditionally, immediate dentures, resin-bonded bridges, acrylic pontics, or natural tooth crowns bonded to adjacent teeth are advocated for the immediate replacement of lost anterior teeth.⁴ Despite successful outcomes with the treatment mentioned above, they may still require multiple appointments, proper planning, and dental laboratory assistance.⁵ Likewise, complex TDIs involving the periodontium and alveolus may limit immediate dental implants until the initial healing phase is completed.⁶ On the other hand, the same author recently described a simple and cost-effective method for the immediate replacement of an anterior tooth that was lost due to caries or periodontal disease.⁵ In this technique, a resin-composite pontic, fabricated chairside, was successfully utilized to replace the maxillary lateral incisor immediately post-extraction. This case report illustrates a similar procedure for the immediate replacement of an avulsed maxillary central incisor that was lost following TDI and caused the patient a great deal of psychological distress.

Case report

A-Chief complaint and history

An 18-year-old medically healthy male patient presented to the Dental Emergency Clinic of Bahrain Defense Force (BDF) Hospital in February 2023 with a complaint of missing and fractured teeth in the maxillary arch. During a routine military exercise, the patient became dizzy, fell on his face, and knocked out one of his maxillary front teeth. Although he remained unconscious for 2-3 minutes, there were no reports of vomiting, headaches, or seizures. Initially, he was treated in the accident and emergency department of BDF by the maxillofacial team, and his lower lip laceration was sutured. Once medically stable, he was immediately transferred to the dental clinic to manage his avulsed tooth.

Upon further inquiry, the patient mentioned that he was rushed to the hospital by the attendants and that the avulsed tooth was not retrieved. On presentation, he was highly anxious and distressed due to the loss of his front tooth and wanted an immediate replacement to avoid bullying. He is an irregular dental attendee who brushes his teeth

twice with fluoride-containing toothpaste without additional interdental cleaning aids. The patient is a non-smoker and has denied any clenching habits. Dietary analysis revealed a significant consumption of cariogenic foods, such as chocolates and cold drinks.

B-Examination and Investigations

Extraoral examination revealed a sutured lower lip with mild swelling. No abnormality was detected related to the temporomandibular joint and their musculature. Intraoral examination showed missing 21 and fractured 11 with enamel/dentine chipping involving the middle and cervical area of the labial surface (Figure 1).



Figure 1: Oral examination showing sutured lower lip with mild swelling, fractured tooth 11 and missing 21.

Moderate crowding of the upper and lower arches was evident in addition to carious 15,37, 46, 47 teeth. Sensibility testing of teeth 13, 12, 22, and 23 using Endo-Frost (Roeko, Langenau, Germany) showed a positive response to cold, whereas tooth 11 did not elicit any response. All the teeth were non-tender to percussion except 11, which was slightly painful on gentle finger pressure. No mobility was detected on any of the teeth that were examined except tooth 11, which showed abnormal mobility. A periapical radiograph (Figure 2) of 11, 12, and 21 showed an empty socket of 21 and mild periodontal ligament widening related to 11 apically. No evidence of root fractures was present on any of the teeth radiographed.

C-Diagnoses

Based on the clinical and radiographic evaluation, the following diagnoses were made:

- Avulsed tooth 21.
- Enamel-dentine fracture of tooth 11 with subluxation.
- Tooth 15 distal-occlusal caries (ICDAS code 06), 37,46,47 occlusal caries (ICDAS code 02).
- Class I Malocclusion.

D- Management

The treatment strategy was designed to address the patient's main complaint, which was to replace and restore his traumatized teeth in the short and long term. Furthermore, the necessity of proper oral hygiene, avoiding cariogenic meals, and receiving preventive dental treatment were emphasized to the patient. After a detailed discussion of treatment options with the patient, it was decided to restore tooth 11 with resin composite restoration and replace 21 with the fiber-reinforced bridge constructed chairside using resin composite pontic.



Figure 2: Periapical radiograph of teeth 11 and 21 showing missing 21 and fractured 11.

Local anesthesia (LA) was administered using 2% lidocaine with 1:100000 epinephrine (labial infiltration) to anesthetize tooth 11 and soft tissues related to tooth 21. A single body shade A2 of Filtek Z350 XT universal nanohybrid resin composite

(3M, St. Paul, USA) was selected, and tooth 11 was minimally (0.5 mm) prepared labially. A Vococid 35% orthophosphoric acid (VOCO GmbH, Cuxhaven, Germany) was used to etch enamel and dentine for 30 and 15 seconds (total-etch), respectively. Isolation was achieved using cotton rolls, and multiple layers of Adper Single Bond Universal Adhesive (3M) were applied to complete the adhesive procedure. After drying the adhesive for 5 seconds, tooth 11 was incrementally built freehand using the selected resin composite shade to the desired shape. A similar shade A2 of Filtek Z350 XT universal nanohybrid composite (3M) was then chosen to fabricate a chairside pontic using a tooth mold from the Essentia composite kit (GC, America) (Figure 3).

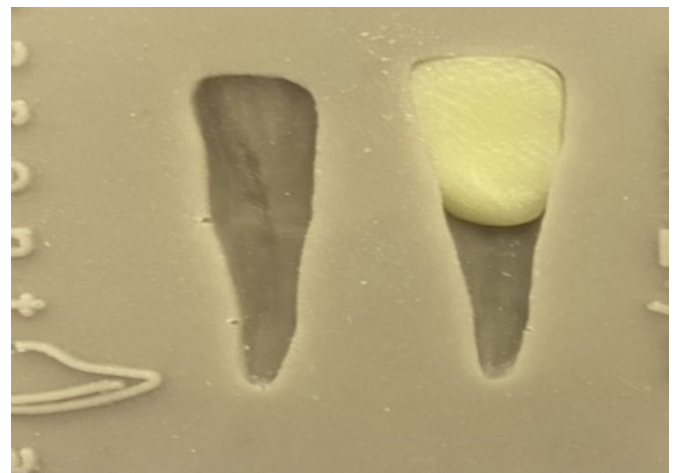


Figure 3: Fabrication of chair-side resin composite pontic.

The tissue surface of the pontic was trimmed and adjusted to fit the empty socket of tooth 21 to prevent the interdental papilla from collapsing. The approximal surfaces of the pontic and teeth 11 and 22 were etched for 30 seconds using Vococid 35% orthophosphoric acid (VOCO GmbH), and the pontic 21 was bonded with RelyXTM Unicem 2 (3M) self-adhesive resin cement to the adjacent teeth. The pontic was further reinforced using a glass fiber tape called SUPER-SPLINT (Hager & Werken GmbH & Co., Duisburg, Germany) bonded on the palatal side.

The final finishing and polishing of the restoration of tooth 11 and the fiber-reinforced bridge was carried out using fine diamond burs and the Enhance PoGo (Dentsply Sirona, Charlotte, USA)

finishing and polishing system. Final restorations (Figure 4) resulted in esthetically pleasing results and satisfied the patient's esthetic and functional demands. Oral hygiene instructions were reinforced, emphasizing cleaning under the pontic area using Oral-B super floss (Procter & Gamble, Cincinnati, USA). The patient was kept on continuous follow-up to continue monitoring the endodontic status of tooth 11 and to plan the referral for the definitive replacement of tooth 21 with dental implants.



Figure 4: Final restoration of teeth 11 and 22. Note that incisal edges were kept slightly shorter to avoid occlusal trauma to the traumatized teeth.

Discussion

TDIs present unique therapeutic challenges due to their variable clinical presentations. 'Avulsion', due to its severity and questionable prognosis, requires a multidisciplinary approach to its management. Although dentists and emergency physicians are at the forefront of dealing with dental trauma, the public can play a significant role in providing first aid, particularly for an avulsed permanent tooth.² A typical presentation of dental trauma in younger individuals necessitates that teachers, trainers, and parents are well informed about providing primary care at the site of injury. A survival rate of 50% after 5 years is reported if an avulsed permanent tooth is properly replanted within 30-60 minutes, further highlighting the importance of educating the non-dental community.⁷ Despite the presence of comprehensive guidelines for the first aid of avulsed permanent teeth, there is a lack of awareness among the non-dentist community about its appropriate

management.⁸ It appears that this is the reason why no attempt was made to retrieve the tooth at the site of injury in this case. On the other hand, dentists seem to be well-informed about the timely management of knocked-out teeth.⁸ Although delayed replantation of an avulsed permanent tooth has a poor long-term prognosis, it might help to restore its esthetics and function in the short term.² Furthermore, a natural tooth crown may be utilized later as a pontic for fabricating a temporary fiber-reinforced bridge until a definitive replacement is sought.⁴

Replacing missing teeth in the anterior maxilla can be challenging for the clinician. The rising trend of implant dentistry warrants the immediate replacement of a lost avulsed permanent tooth with an implant-retained restoration. However, factors such as the potential for jaw growth, traumatic dental injury, and financial constraints precluded the use of immediate implant restoration in this case.⁶ Moreover, there seems to be inconclusive evidence about the success of dental implants placed immediately in fresh extraction sockets. Esposito et al., in their Cochrane review, concluded that immediate implants may be at higher risk of failure and complications.⁹ Laboratory-fabricated prostheses such as immediate dentures with socket-fit designs and resin-bonded bridges were considered; however, the patient requested an urgent solution to his aesthetic concerns. Therefore, it was decided to fabricate a chairside fiber-reinforced bridge using a resin composite pontic, as described previously in the literature.⁵ Some of the advantages of this technique include immediate restoration of esthetic and functional integrity, preservation of the interdental papilla, no surgical intervention, and no laboratory support required. On the other hand, the technique has some pitfalls, including extended chairside time, requirement for a tooth mould, short-medium-term nature of the treatment, regular maintenance, and risk of debonding.

Fiber-reinforced bridges' simple and time-efficient nature makes them an attractive option for patients. When properly fabricated, fiber-reinforced bridges can provide optimal esthetic results in the short to medium term.¹⁰ It seems a suitable treatment option for younger individuals until jaw growth is

halted and the patient is mature enough to resort to definitive replacement with dental implants. After the restorations, satisfactory esthetic results were achieved, and review visits showed no complications. The importance of good oral hygiene cannot be overemphasized for the success of any dental prosthesis. Thus, tailored oral hygiene instructions were given to the patient, with particular emphasis on cleaning under the pontic area using a superfloss.

The complex nature of avulsion dental injuries means that the clinician must be prepared for a range of treatment options to restore aesthetics and function on an urgent basis. Every effort should be made to retrieve the avulsed tooth, and if not available, should resort to the least invasive treatment method. The immediate treatment choice depends on multiple factors, such as the patient's wishes, medical history, reason for tooth loss, oral health, growth status, and the cost of the treatment. Fiber-reinforced bridges, being minimally invasive, cost-effective, and easy to fabricate chair-side, appear to be an attractive short- to medium-term option.

Conflict of Interest

Nil

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