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CASE REPORT

Avulsed Anterior Permanent Tooth Replaced by Fixed Functional Interim Prosthesis with Natural Crown: A Case Report

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ABSTRACT

Trauma to the anterior teeth is common in children, who become susceptible to such injury from the very moment they attempt to walk erect independently. Dental avulsion refers to the complete displacement of the tooth from its socket due to trauma. Various treatment modalities are available to treat such case. The tooth can be replanted back or replaced by a prosthesis depending on the extraoral drytime and the stage of development of root of the avulsed tooth. **Objective:** To describes a case of avulsed permanent maxillary central incisor managed by fixed functional prosthesis. **Case report:** A 12-year-old boy came with an avulsed permanent maxillary central incisor. The tooth was replaced esthetically and satisfactorily after 1 month of avulsion by means of a biologically fixed functional prosthesis, that is, a modified “Hollywood Bridge.” In this modality, the crown of the avulsed tooth was used as a pontic, and stainless steel wires and bands were used to fix the prosthesis in the mouth as an interim treatment option.

Key words: avulsion, fixed-functional prosthesis, modified hollywood bridge

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INTRODUCTION

Trauma to the anterior teeth is relatively common in children.¹ Dental injuries are highly prevalent between 7 and 12 years of age wherein males are the most commonly affected. Avulsion is one of the most serious dental injuries, considering that it is the complete detachment of a tooth from its socket.² According to a previous report, 10% of the population has experienced some kind of dental trauma, of which 0.5-16% accounts to avulsion of permanent teeth.³⁻⁷ The etiology of tooth avulsion in permanent dentition includes falls, fights, sport injuries, automobile accidents, and child abuse.⁸

The maxillary incisors are the most commonly affected in cases of increased overjet and incompetent lips, which are the potential etiological factors of avulsion.⁸ Treatment planning depends on the extraoral drytime and the stage of development of root of the avulsed tooth.¹ The treatment of choice for an avulsed tooth

is immediate reimplantation, although it is not always possible to perform this treatment.⁹ If reimplantation cannot be performed, prosthetic management is advised.¹ Prosthetic management includes treatment options such as fabrication of a fixed partial denture (e.g., Maryland bridge or a fiber-reinforced resin-composite bridge) or a removable partial denture to replace the missing permanent tooth.^{2,5,6}

Moreover, fixed functional prosthesis, which is also known as “Hollywood Bridge” can be an alternative choice of treatment to replace a missing tooth. It comprises the artificial tooth (pontic) being attached to stainless steel wires that are soldered to bands adapted around the molars.³ The current case report elaborates a way of replacing a missing permanent central incisor by means of a modified “Hollywood Bridge.” In such approach, the crown of the avulsed tooth was separated from its root and then attached to stainless steel wires to serve as an interim treatment option.



Figure 1. (A) Preoperative frontal; (B) occlusal clinical photograph and (C) the avulsed 21.



Figure 2. A radiolucent bony socket of the concerned avulsed tooth was observed during radiological investigation



Figure 3. Dental impression of both arches.

CASE REPORT

A 12-year-old boy reported to the Department of Pedodontics and Preventive Dentistry in Guru Nanak Institute of Dental Sciences and Research, Kolkata, with a chief complaint of missing tooth in the upper front tooth region. As stated by the parent, the child lost his tooth because he fell to the ground a month before. Since the incident, the parent kept the tooth in a piece of paper and wished that the tooth be placed back in its usual place. Intraoral examination revealed the absence of the maxillary left permanent central incisor (21) and completely healed socket and soft tissue (Figure 1). Furthermore, a radiolucent bony socket of the concerned avulsed tooth was observed during radiological investigation (IOPAR) (Figure 2). The patient had a moderate oral hygiene status. Medical history was noncontributory. A fixed functional prosthesis (modified biological “Hollywood bridge”) was decided to be fabricated with the decoronated crown of the avulsed tooth serving as the pontic for

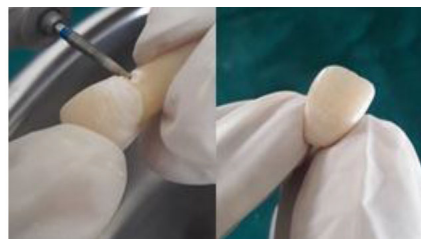


Figure 4. Decoronation of the avulsed tooth maintaining the cemento enamel junction.



Figure 5. The decoronated crown was placed on the maxillary cast and adjustment in its dimension was done.



Figure 6. Creation of a groove on the middle third

the replacement of the missing tooth, thereby fulfilling the esthetic and psychological needs of the patient. The treatment plan was explained to the patient, and an informed consent was obtained subsequently.

After proper oral prophylaxis was applied, impressions of both arches were acquired to create the diagnostic cast (Figure 3). Orthodontic bands (0.005-inch thickness and 0.180-inch width) were adapted on teeth 16 and 26, and then an alginate impression of the upper arch was obtained and poured with dental stones to create the working cast. Before the avulsed tooth was decoronated, the tooth was properly cleaned, stored, and sterilized by immersing in 0.9 N of sodium hydroxide for 2 hours and then autoclaving at 121°C for 15 minutes.¹⁰ Then, a tapered fissure diamond bur was selected for a complete decoronation⁵ of the avulsed tooth using an air rotor handpiece. The crown was completely separated from the root. Throughout the entire process, the normal contour of the cemento enamel junction was maintained (Figure



Figure 7. A 19 gage stainless steel wire Orthodontic bands were adapted on teeth 16 and 26, an alginate impression was obtained to make the working cast, and the crown of the avulsed tooth was placed on the working cast.



Figure 8. Immediate postoperative occlusal view (A) and frontal view (B) after cementation of the molar band to the tooth structure with glass ionomer cement.



Figure 9. The condition of the appliance at 1 year of follow-up, showing good condition.

4). The decoronated crown was now placed on the maxillary cast in its missing place to check if any adjustments in its dimensions were further needed (Figure 5). A groove was created on the middle third of the palatal surface of the crown with the tapered fissure bur to retain the wire (to be used to reinforce the appliance) on to the crown (Figure 6). A 19 gage stainless steel wire was then molded and adapted to the shape of the maxillary arch. Thereafter, the crown was placed in its desired place, and the created palatal groove was made to contact the anterior portion of the wire, ensuring good adaptation between the tooth and the wire. The free ends of the wire were soldered to the corresponding molar bands. The palatal surface was etched with 37% phosphoric acid and applied with a bonding agent (Figure 7). Furthermore, a light-cure composite resin (Ivoclar Vivadent) was added in an increasing amount between the palatal groove and the contacted portion of the wire as well as on top of it and then light-cured for 30 seconds. The appliance was then removed from the cast for trimming, finishing, and polishing. Afterward, the appliance was fitted in the patient's mouth and finally cemented in place by using Type 1 glass ionomer cement (Figure 8). The

placement was checked for any presence of occlusion and adjusted as necessary. The final outcome was a well-adapted prosthesis with excellent esthetics. The patient was consistently followed up at 3 months interval and advised to wear the appliance until 18 years of age. Thereafter, removal of the appliance followed by anterior maxillary implant placement in place of the missing upper left permanent central incisor, was advised. The appliance was in good condition after 1 year of follow-up (Figure 9).

DISCUSSION

Replacement of an avulsed tooth in a growing child is challenging for the clinicians. The primary goal in treating an avulsed tooth is its timely reimplantation. In the present case, the patient sought for consultation after 1 month of avulsion when the soft tissue was already completely healed. Hence, the avulsed tooth could no longer be reimplanted.

If reimplantation cannot be performed, prosthetic management is advised.¹ Various treatment options are available for prosthetic replacement. Removable partial dentures are often the first line of treatment in a growing pediatric patient until the dimensions of the alveolar bone have become stable and the eruption of permanent teeth has completed; however, child's compliance to wear the prosthesis is questionable.² Another option is the Maryland bridge, which consists of an artificial crown attached to the adjacent teeth with the aid of wing-like porous metal retainers; however, the metal framework can sometimes pose an unesthetic appearance and also reportedly lowers bond strength between the enamel and the metal, making it a less favorable option.² Cantilever-fixed partial dentures are also undesirable candidates for replacing missing avulsed permanent anterior teeth because they compromise the support aside from applying additional torsion on the abutment.² Fiber-reinforced resin-composite bridges can result in excellent esthetics in terms of replacing missing teeth, but their inability to withstand heavy masticatory load and problems in maintaining oral hygiene can downgrade their status as a treatment option.²

Fixed functional prosthesis can be an alternative choice of treatment for tooth replacement. Also known as "Hollywood Bridge," it comprises the artificial tooth (pontic) being attached to stainless steel wires that are soldered to bands adapted around the molars. In the present case, "Hollywood Bridge" was modified by using the crown of the decoronated avulsed tooth as a pontic instead of any artificial tooth. Advantages of this prosthesis involve no compromise of healthy tooth structure of any adjacent or opposite teeth, given that no tooth preparation is needed. It has also adequate strength to withstand mastication forces and other associated functional movements. It serves both functional and esthetic purposes. Patient compliance

is nil, considering that the appliance is fixed in its type. It is a simple, noninvasive, and also economical treatment procedure. The only disadvantage is that the incorporation of bands on the permanent first molars may hamper the transverse maxillary growth.¹¹ It is a favorable interim option for replacing lost anterior teeth in a growing child wherein ossification of midpalatine suture has not occurred,¹² thereby minimally affecting the maxillary transverse growth. If this procedure is performed at the right time, that is, before the ossification of the midpalatine suture,^{11,12} the labiopalatal alveolar dimensions can be preserved for years while at the same time allowing for extra vertical growth, making restoration possible later with an implant.

CONCLUSION

Our case suggests a temporary treatment option for the functional and esthetic replacement of a missing anterior tooth in children. The modified biological “Hollywood Bridge” prosthesis can be fabricated easily, repaired, and removed from the mouth without any damage to the sound tooth structure. Aside from being economical, it can maintain the place for future implant or any permanent prosthesis.

CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest related to this case report.

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