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# Direct bonded prosthesis using avulsed tooth: A novel technique for esthetic rehabilitation in growing children

**Dr Aiswarya Ann Babu**
Sr. Lecturer, Al Azhar dental college, Perumpillichira P.O, Thodupuzha, Kerala-685605, India

***Corresponding author**
Dr Aiswarya Ann Babu
Email: annaiswarya@yahoo.in

**Abstract:** Avulsion and luxation account for up to 16% of all traumatic injuries in the permanent dentition and 7.2% of injuries in the primary dentition. A range of treatment options exist to bridge the space created, depending on the condition of the surrounding dentition and the character of the patient. They include both removable and fixed appliances. Following the traumatic loss of an anterior tooth it is important that an immediate replacement is provided in order to avoid esthetic, masticatory and phonetic difficulties and to maintain the edentulous space to avoid arch length discrepancy. The loss of an anterior tooth in a child or young adolescent may present a difficult prosthetic problem. This problem can be managed in several ways. This article reports utilization of the avulsed tooth as part of a direct bonded transitional prosthesis in a growing child.
**Keywords:** Avulsion, trauma, injuries, anterior tooth, esthetic, direct bonded prosthesis, growing child.

## INTRODUCTION

Avulsion and luxation are complex injuries that affect multiple tissues, accounting up to 16% of all traumatic injuries in the permanent dentition and 7.2% of injuries in the primary dentition[1]. When a child loses a maxillary permanent central incisor as a result of a traumatic injury—causing cervical fracture or avulsion without the possibility of reimplantation—or decoronation, a number of options exist to bridge the space created, depending on the condition of the surrounding dentition and the character of the patient. They include both removable and fixed appliances[2]. When situation do not allow the use of these methods—e.g., if the patient refuses a removable appliance or if a fixed appliance cannot be used in a growing child, as the teeth are not fully erupted we are challenged to provide a solution.

Here I present a case of a 8 year old child whose central incisor was avulsed due to trauma and the patients natural tooth was used as a pontic in a simple appliance fabricated chair side.

## CASE REPORT

An 8 years old girl reported to the Department of Pedodontics and Preventive Dentistry, with a chief complain of dislodged upper front teeth. The patient reported that maxillary permanent central incisors was avulsed two days back (Fig. 1). The trauma took place when the patient fell down from the staircase hitting her face against a sewing machine. The child remained conscious and there was no history of vomiting, or bleeding from the nose or ears after the injury. The child was taken to a physician immediately after trauma, her lip lacerations were sutured and antibiotics were prescribed by the physician. The parents failed to report to the dental clinic for 2 days after the injury. They had however stored a central incisor tooth which they got from the spot in water in a plastic jar. The parents reported that they could not find the other tooth. Extraoral swelling and lip lacerations were seen.(Fig 1) Intraoral examination revealed soft tissue injury which was already sutured. The alveolar socket of the avulsed maxillary permanent right central incisor appeared intact, however a part of the maxillary left central incisor was visible as a small white line on the distal aspect.(fig 2) Intraoral periapical radiograph of the area showed no remaining tooth particles or debris in relation to 11, but 21 was completely intruded with Ellis class I fracture. On examination of the avulsed tooth the crown and root appeared intact with no visible signs of damage. Root completion of the tooth had not taken place. As the tooth was intact and the patient and the parent wanted the tooth to be replaced we decided to reimplant the tooth after explaining the poor prognosis of the tooth to the parent. 21 was kept under observation to facilitate its eruption into its original position. 11 was reimplanted and splinted (fig 3). After 2 months of follow up we could see the root of 11 had completely resorbed due to inflammatory resorption and 21 was erupting into its position. We extracted 11 and preserved it in hydrogen peroxide solution. Because both the patient and his parents were concerned with aesthetics, the possibility of using the clinical crown as part of a fixed appliance was proposed. Upon approval of the patient and parents treatment was initiated after 21 had completely erupted into its position. Composite

restoration was done for the fractured tooth 21 after it was fully erupted.( fig 4)

The crown of 11 was shortened to fit the incisogingival dimension without touching the gingiva to prevent irritation to the gingiva and to allow easy cleaning[3]. The pulp chamber was replaced with composite resin (Z100, 3M ESPE, St. Paul, MN).

A 0.0175-inch (0.4445-mm) twist-flex wire (3M Unitek, Monrovia, CA), which is widely used for splinting after orthodontic treatment, was bent to form a loop and to attach the pontic to the adjacent tooth (fig 5)[4] . To keep the pontic from touching the mandibular incisors after bonding, 0.3 mm of the enamel was removed from the palatal aspect crown[5,6]. The loop was then bonded to the pontic using composite resin (Z100, 3M ESPE, St. Paul, MN). The ends of the U loop was bend at $90^{o}$ and was inserted into the pulp chamber of 11 before curing the composite placed in the pulp chamber (fig 6). The free ends of the loop was inserted into the pulp chamber to facilitate retention of the pontic. Then curing was done. The pontic was held in place, adjusted to the arch and the loop were bonded to the adjacent central incisor, tooth 21, with composite resin after removal of 0.3 mm of enamel from the palatal aspect (Fig 7).

The patient was seen at follow-up appointments after 1 week, then at 3-months and 6 months. During this whole period, the patient reported no eating problems, normal functioning and full satisfaction with the prosthesis. Continuous eruption of tooth 12 and 22 was observed.

**Fig 1: Extra oral picture pre op**

**Fig 2: Intra oral picture pre op**

**Fig 3: After reimplantation and splinting**

**Fig 4: 21 erupted into its position and was restored with composite**

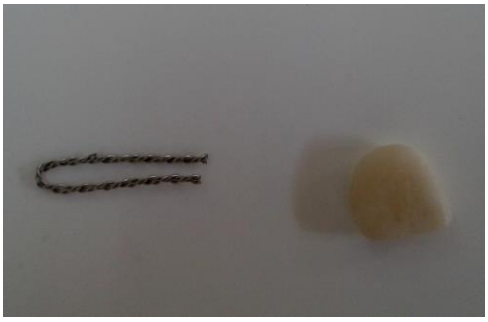

**Fig 5: U loop and pontic reduced to incisogingival dimension**

**Fig 6: ends of U loop bend at 90$^{o}$ and inserted into the pulp chamber**

**Fig 7: post op picture**

**Fig 8: 6 months follow up**

**DISCUSSION:**

The loss of an anterior tooth in a child or young adolescent may present a difficult prosthetic problem. This problem can be managed in several ways, including (1) a provisional removable partial denture replacing the missing tooth (teeth); (2) a provisional fixed acrylic bridge utilizing the adjacent teeth as full crown abutments; or (3) a bonded bridge using either a denture tooth, or a chairside fabricated composite resin tooth as the tooth replacement[7]. These techniques have their advantages and disadvantages when fabricating an aesthetically acceptable result. The disadvantage of a removable partial denture is that the acrylic denture base is bulky and must cover the soft tissue. In many cases adjusting to this restoration is difficult for the young patient. In the case of a conventional full-coverage crown retained fixed partial denture, a major disadvantage of the procedure is that it may involve the preparation of healthy abutment teeth for crowns. When it involves a young child, the anatomic considerations of size of the pulp, continuing soft tissue changes as the teeth continue to erupt, and other growth and development that will occur preclude the use of crown preparations. The technique described in this article has several advantages over other methods for the immediate replacement of an anterior tooth that has been avulsed[8]. These are as follows:

- The material needed for the procedure are easily available in all dental clinics.
- Psychological comfort for the patient since the patient's own tooth is used as pontic
- Can be fabricated chair side.
- Better colour matching and aesthetics with the adjacent teeth.
- Minimal preparation of the abutment teeth.
- Post-traumatic ridge resorption can be managed by the addition of further composite resin or glass ionomer cement to the fitting surface of the tooth.
- Less time consuming.

Implants are the treatment of choice and should be considered when general and local conditions are favorable. Their use is generally not intended before the end of the growth period and around the age of 18 years. Because of their high cost, poor financial condition could also limit their use. More economically acceptable treatments should therefore be investigated for the replacement of a missing tooth, as a main treatment or as a long-term provisional treatment before implant therapy[9].

**CONCLUSION:**

The procedure described in this article suggests a new treatment option for the replacement of a missing anterior tooth in children. This technique restores aesthetics and function. It is more comfortable for the young patient than a removable appliance. It does not require elaborate laboratory procedures and

can be easily modified or repaired by simple chair-side procedures, until the time a more definitive restoration can be placed. The noninvasive and modifiable nature of this technique made it superior to all other options.

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