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Management of dento-alveolar fracture in non-compliant and esthetically conscious adolescent: A case report

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ABSTRACT

Dento-alveolar trauma with avulsion is common in anterior maxillary region and these injuries are very challenging to manage in young adolescent because of dynamic state of the alveolar and dental development, occlusion and facial growth. The present case report reveals management of dento-alveolar trauma along with missing avulsed tooth and complicated crown fractures of adjacent teeth in esthetically conscious young adolescent with implant supported restoration. Patient was non-compliant and had parafunction which subjected the removable partial denture and resin bonded bridge to repeated failures. However, because of non-compliance, patient's occlusion and high esthetic demands, implant was considered as treatment option at early age which produced not only a functional and esthetic outcome but a satisfied patient as well.

1. Introduction

Dento-alveolar trauma with avulsion accounts for large number of injuries in pediatric maxillofacial trauma. These injuries are very challenging to manage in young adolescent because of dynamic state of the alveolar and dental development, occlusion and facial growth. The incidence of dental avulsion ranges from 0.5 to 16% of all traumatic injuries to the permanent teeth and from 7 to 13% of injuries in the primary dentition [1]. Various causes of avulsion consist of falls, fights, sport injuries, automobile accidents, and child abuse [2,3]. Loss of teeth in young age not only cause unpleasant esthetics but it also leads to loss of function, reduced normal alveolar growth and also affects psychosocial development [4].

The standard protocol for management for the avulsed tooth is replantation within 20–30min after injury or placing it in a protective transport medium (Hank's solution, milk, saline or saliva) until the patient is consulted by the dentist for replantation [5]. However, replantation is not always possible because of lost avulsed tooth or in cases of cortical plate fracture. If replantation is futile, or an avulsed tooth is lost prematurely, numerous treatment modalities exist [6,7], which include auto-transplantation of a developing premolar or another suitable donor tooth, a single-tooth implant supported prosthesis, orthodontic space closure, combination of auto-transplantation and orthodontic space closure or a conventional fixed partial denture.

The use of dental implants for rehabilitation of anterior missing

tooth is nowadays a common and preferred treatment modality [7]. Implants not only preserve the alveolar bone but they also offer good esthetics, function and reinstates the patient confidence and social acceptability [7,8] Clinical success is dependent on achieving osseointegration and harmonious blend of crown in the dental arch [8]. However, dental implants in young adolescents have distinct considerations because of the skeletal growth, which must be taken into account before beginning with the treatment plan [9].

This case report delineates the management of dento-alveolar fracture with avulsion in a young adolescent patient who was non-compliant and had high esthetic demands.

1.1. Case presentation

A fourteen year old healthy female patient was referred to our dental clinic 10 days after trauma for the management of dento-alveolar fracture of upper anterior region. Clinical examination revealed avulsed upper left maxillary central incisor and complicated crown fracture of adjacent teeth on both sides as well as laceration of the maxillary labial mucosa and buccal gingiva. Patient had history of RTA in Nawabshah (school bus vs truck) and she was initially brought by her parents to the emergency Unit of the Aga Khan University Hospital about 10 hours after the accident where symptomatic management was provided, patient was primarily seen there by maxillofacial team. They managed fracture of alveolar segment and repaired lacerations of extra-oral

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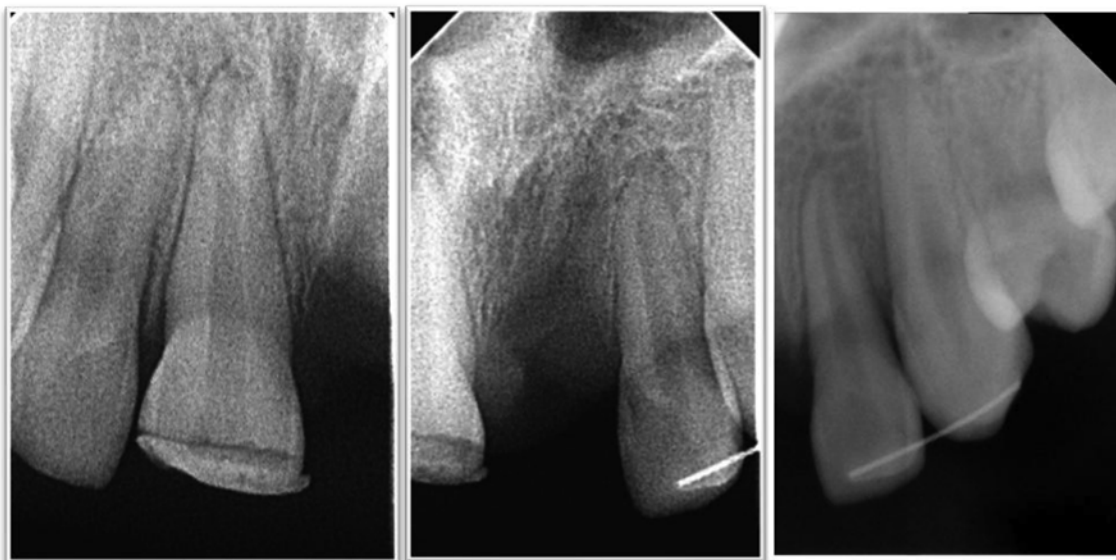


Fig. 1. Pre-op periapical radiographs.

tissues. She also had upper limb fracture which was managed by orthopedic team. Her medical history was insignificant. A signed, written informed consent form was obtained from the parents for treatment and further publication of the case.

Periapical radiographic examination revealed missing tooth #21 and crown fractures #11, 22 with no concomitant root fractures (Fig. 1). Base-line pulp vitality testing showed negative response on tooth #11 and 22 with electric pulp tester (Sybron Endo[®]). Thus diagnosis was Dento-alveolar fracture with avulsion of tooth #21 and Necrotic teeth with complicated crown fractures of tooth # 11 and 22 with mild extrusive luxation.

Since patient came with dental trauma, initially emergency management was done which comprised of non-rigid splinting of luxated tooth # 22 with co-axial wire and composite for four weeks. On the basis of investigations, endodontic treatment was initiated and canal preparation was done with Nickel Titanium (NiTi) rotary instruments (ProTaper Universal Dentsply). Irrigation was done with 2.5% sodium hypochlorite and lubrication with RC prep (RC-Prep[®]). At the end of the preparation, intra canal medication (Metapex MetaBiomed) was placed. On follow up visit after 1 week, obturation was performed with gutta percha (Obtura Sybron Endo) after irrigation and cavity was restored with a composite restoration (Fig. 2a and b). As patient was also concerned about esthetics, so we provided her simple acrylic denture temporarily for her missing tooth but due to lack of compliance and

dissatisfaction, we decided to replace #21 temporarily with the Maryland bridge (Fig. 2c) The patient wore this adhesive prosthesis for at least a year but due to parafunction and frequent debonding issues, patient was displeased and she desired fixed, permanent and esthetic treatment option.

In 2015, implant supported prosthesis and bone grafting was proposed as a definitive treatment option for replacement of missing tooth along with individual all ceramic crowns on tooth # 11 and 22. Under local anesthesia, full thickness three cornered flap was raised from right to left molar to molar region, with relieving incision at midline frenum. A non-submerged surgical protocol was followed and Bio-horizon implant (4.1 mm × 11.5 mm) was placed with primary stability. Bone grafting material i.e. decalcified freeze-dried bone allograft (Rocky Mountain cancellous bone) was packed and resorbable membrane (BioMend) placed over the defect which was later closed with 3/0 Vicryl (Coated Vicryl Plus Ethicon) sutures. Patient was discharged after sandblasting and recementing the old temporary maryland bridge along with the prescription of analgesics and antibiotics after taking a post-operative radiograph.

Following the healing phase after 3 months of implant placement, the patient was called in for her definitive prosthetic phase. At this visit, crown preparations were performed and temporary crowns were fabricated on prepared teeth as well as on implant with the help of temporary abutment, which not only served purpose of esthetics but also



Fig. 2. Peri-apical radiographs. (a, b) During treatment (c) Maryland bridge.



Fig. 3. Interim treatment phase.

allowed development of the gingival contours before final rehabilitation (Fig. 3).

On subsequent visit after 2 weeks, individual all ceramic crowns were placed on tooth #11 and 22 and cement retained implant supported crown was placed on tooth #21 (Fig. 4a,b,c).

Patient was recalled in clinic for a follow up after 1 year and on this follow up clinical photographs was taken which revealed acceptable and functional esthetic outcome (Fig. 4d).

2. Discussion

Treatment of dento-alveolar fracture with avulsed tooth in anterior maxillary region is usually challenging and problematic but unfortunately, trauma to this region is very common in young age [1,10]. Therefore, appropriate treatment planning is required in order to improve the success and prognosis of these injuries.

The primary challenges in this case were that the affected teeth were located in the aesthetic zone and high aesthetic demands of the patient. Other challenges that were complicating the case were parafunctional habit, dissatisfaction with temporary prosthesis because of frequent dislodgement and most importantly the decision of best treatment option, i.e. the definitive replacement of maxillary incisor that was lost as a result of trauma. Patient had no financial constraints as her whole treatment cost was insured.

The definitive treatment plan that was considered in this case was dental implant placement for tooth #21 and individual crowns on tooth #11 and #22. The rationale behind consideration of early implant placement in this case seeking was that patient was non-compliant, esthetically conscious and had parafunction which subjected the prostheses to repeated dislodgement. Conventional fixed partial denture was not considered in this case because of possible detrimental impact on periodontal health and the need for long term maintenance and care.

There are numerous case reports and reviews that favor placement of dental implant for prosthetic rehabilitation of missing avulsed tooth in young patient but literature also suggests that implant acts as an ankylosed tooth and thus, never follows the eruption of the adjacent teeth which leads to infra-occlusion, poor implant to crown ratio, variation in the occlusal plane and a serious esthetic impairment of the implant-supported crown. Therefore implants must only be placed after post pubertal period and growth completion [5,6,11,12].

Puberty is a period of development which is characterized by appearance of secondary sex characteristics and acceleration in skeletal growth followed by subsequent deceleration [13]. Oesterle et al. [14] suggested that implant placement during the pubertal period have a good prognosis but still lesser than the post-pubertal period. Similarly Cronin et al. [15] reported that placement of implants after the age 15 for girls and 18 for boys have the most predictable outcome.

In this case, patient was fortunately 15 years old when she came for



Fig. 4. Post-operative record after treatment: (a, b, c) immediate (d) follow up after 1 year.

permanent replacement and according to her chronological and dental age we speculated that her growth spurt and vertical growth pattern was almost completed so implant was safely placed. One aesthetic limitation in this case was gingival contours were asymmetric on both sides, Ideally pink porcelain must have been added to form the gingival contour on tooth #22 or crown lengthening surgery of tooth #12. Fortunately patient had low smile line so patient was satisfied with the final appearance and was not concerned about it. Another concern in this case was esthetic impairment because of soft tissue maturation and passive eruption that might cause exposed margins of implant crown and esthetic failure. Fortunately after 1 year follow up there were no post-operative complications of infra occlusion, soft tissue maturation or passive eruption.

3. Conclusion

Dental implant placement can be considered a potential mode of rehabilitation in young adolescents as a definitive replacement for an avulsed missing tooth. It not only restores function and aesthetics but also preserves the alveolar bone and reinstates the child's confidence and social acceptability. Appropriate treatment planning can lead to desired esthetics and increase the chances of successful implant placement in children.

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Conflict of interest

None declared.

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