



Management of Severe Dentoalveolar Trauma in an 11-Year Old Girl: A Case Report

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Abstract

Dentoalveolar trauma is one of most commonly encountered oral emergencies in the pediatric population. Therefore, an effective emergency management and treatment plan are crucial to preserve orofacial functions, aesthetics, and to promote self esteem.

This article aims to describe, through a clinical case, the management of severe dentoalveolar trauma, in an 11-year-old-girl, involving alveolar bone comminution, avulsion of maxillary left lateral incisor (#22) and canine (#23), lateral luxation of central maxillary incisors (#11 and #21) and an uncomplicated crown fracture of the maxillary right lateral incisor (#12).

The management consisted of the extraction of tooth (#21), reduction and splinting of tooth (#11), coronary restoration of tooth (#12) and subsequent prosthetic rehabilitation for missing teeth.

No clinical or radiological complications were detected during the 12 month follow-up period.

Introduction

Traumatic Dental Injuries (TDI) are one of most commonly encountered oral emergencies of childhood. According to Antipovienė et al [1], falls were the most common cause of trauma followed by injuries during bicycle accidents.

Tooth avulsion is a complex traumatic injury that involves the complete dislocation of the tooth out of the alveolar bone socket and replantation remains arguably the optimal treatment option [2]. However, when reimplantation is not possible, the use of removable appliance is essential for restoring orofacial functions, aesthetic, and promoting self esteem.

This approach requires multidisciplinary planning, along with periodic adjustments [3].

Lateral luxation is characterized by the traumatic displacement of a tooth in any direction other than axially. The treatment includes digital repositioning of luxated teeth, and stabilizing them with a splint for 4 weeks. Due to the high risk of pulp necrosis following lateral luxation, especially in case of mature teeth and severe displacement, an immediate root canal treatment is highly recommended [4].

This article aims to illustrate, through a clinical case, the management of severe dentoalveolar trauma involving maxillary alveolar bone comminution, avulsion of teeth #22 and #23, lateral luxation of teeth #11 and #21 and an uncomplicated crown fracture of tooth #12 in an 11-year-old-girl.



No clinical or/and radiological complications were observed during the 8 months follow-up period.

Case Presentation

An 11-year-old female patient was referred to the Department of Pediatric and Preventive Dentistry at La Rabta hospital of Tunis, with the chief complaint of serious dental trauma that occurred one day ago.

The patient was accompanied by her mother, who reported that the girl had lost control of her bike, resulting in a crash into the wall. The patient's medical history showed no systemic disease, and the child's health history was non-contributory. The tetanus vaccination was current. Examination of the facial bones and the temporomandibular joint showed no pathological signs or symptoms. However, lacerations in the facial soft tissues were observed.

Intra-oral examination showed ecchymosis of the upper lip, the avulsion of left maxillary lateral incisor (#22) and the left maxillary canine (#23), lateral luxation and displacement of maxillary central incisors (#11 and #21) in palatal direction associated with an increased mobility, as well as enamel-dentin fracture without pulp exposure in the right maxillary lateral incisor (#12).

The alveolar bone fracture involved the buccal socket wall of tooth (#11) and the comminution of the alveolar bone around teeth (#22) and (#23).

During occlusal examination, anterior crossbite was observed. (Figure 1).



Figure 1: Initial intraoral view.

The radiographic examination revealed an empty alveolar socket for tooth (#23), the persistence of a coronal fragment from tooth (#22), lateral luxation and extrusion of teeth (#21) and (#11), and uncomplicated crown fracture of tooth (#12) (Figure 2).



Figure 2: Panoramic radiograph.

During the anamnesis, the mother reported that she had not searched for the missing teeth in the trauma scene.

After signing the informed consent by the child's mother, the treatment began.

Under local anesthesia, the left central maxillary incisor (#21) was extracted and the fractured crown fragment of tooth (#22) was removed.

The traumatized region was irrigated with physiological saline, followed by iodine alcohol disinfection.

The right central maxillary incisor (#11) was gently repositioned to its original position in the alveolus by digital pressure.

Then, a semi-rigid splint was applied to the labial surface of the affected tooth and the immediately adjacent teeth using composite resin (3M ESPE) and 0.6 mm orthodontic wire. It was maintained for 4 weeks. Finally, sutures were placed to hold soft tissues tightly **and to cover** the exposed **bone**. (Figure 3).



Figure 3: Extraction of tooth (#21), repositioning and splinting of tooth (#11) and sealing the alveolar socket by suturing the flap over it.

A 7-day course of Amoxicillin was prescribed, and Non-steroidal anti-inflammatory drug was recommended for five days.

Oral hygiene instructions were provided to the patient. Accordingly, he was recommended to use chlorhexidine (0.12%) mouthrinse twice a day for 2 weeks and maintain a soft food diet for up to 2 weeks.

In the one-week follow-up, Endodontic treatment was initiated to prevent root resorption by opening access cavity, then continued with root canal preparation using Rotary files (M3 Pro Gold system). 2.5% NaOCl solution was used for irrigation followed by 17% Liquid Ethylenediaminetetraacetic Acid (EDTA). The canal was dried with sterile paper points, then filled using **Premixed Calcium Hydroxide Paste with Iodoform (VioPex) as an intracanal medicament**. The access cavity was temporized with Zinc Oxide-eugenol (ZOE). The patient was scheduled for control 3 weeks later.

In the next appointment, the splint was removed and a dental impression was taken for **prosthetic** rehabilitation. Intra-canal medication was renewed every month for 3 months.

The removable partial denture was delivered to the patient to restore masticatory function, speech, and to improve aesthetics by replacing missing teeth. The **patient was satisfied** with the obtained **results**.

In the subsequent visit, the injured tooth was asymptomatic, in stable and functional position. The patient reported no subjective complaints.

Under local anesthesia, the tooth was isolated with a rubber dam. Then, the temporary restoration and calcium hydroxyde dressing were removed from the canal and the tooth was ir-

rigated with 2.5% NaOCl and dried with paper point.

Consecutively, root canal obturation was done using Gutta Percha (GP) and Bioceramicroot canal sealer (BioRoot). Then, a radiograph was taken to assess the quality of the obturation (Figure 4).



Figure 4: Periapical radiograph.

A. Rootfilling with intracanal medication (Premixed calcium hydroxide and iodoform)

B. Root canal treatment of tooth (#11)

Furthermore, Tooth (#12) was restored with direct composite.

Follow-up appointments for clinical and radiographic assessment were scheduled at 4 weeks, and then every 3 months (Figure 5).



Figure 5: A. Periapical radiograph with 1 year follow-up

B. Clinical image after 1 year follow-up

Discussion

This case report aimed to describe the management of severe dental trauma in an adolescent and the interest of prosthetic appliance in restoring the oral health in children.

Dental avulsion is one of the most serious dental injuries and is seen in 0.5-16% of all dental injuries. According to the recent International Association of Dental Traumatology IADT guidelines, immediate replantation is, in most situations, the treatment of choice [5].

Although, parental misinformation on the appropriate emergency management could result in the non-replantation of avulsed teeth by leaving them at the site of trauma [6].

In the present case, the patient did not actively search for the missing teeth as she was unaware of the possibility of their replantation.

Appropriate on site intervention can greatly improve the prognosis of a traumatized tooth, which can ultimately con-

tribute preserving a child's smile. Consequently, it is highly recommended to increase public awareness through educational campaigns and public health programs regarding first-aid treatment.

Recognizing the importance of providing onsite information about appropriate emergency measures, the IADT has developed a mobile application designed for both parents and professionals. (<https://www.iadt-dentaltrauma.org/for-patients.html>) [6].

The App provides clear instructions for patients on handling all types of dental injuries. The immediate care provided at the injury site will determine the survival of the affected tooth, there by keeping child's smile. [site IADT]

Dental luxation is a prevalent injury, representing 23.3% of reported dental injuries. It requires immediate tooth repositioning as it creates occlusal interferences and prevents correct mouth closure [4].

The splint following lateral luxation injuries is considered crucial for preserving the traumatized tooth in the correct position, facilitating the alveolar process and periodontal ligament healing [7].

In our clinical case, a splint made from orthodontic wire and resin composite was applied for 4 weeks. A systematic review conducted by Clark et al in 2019 reported pulp necrosis was the most frequent complication among mature teeth with lateral luxation injuries, occurring in 44.2% of cases [8].

In the present case, pulpal necrosis was observed in the right central maxillary incisor (#11) one week after the trauma. Subsequently, a root canal treatment was recommended to prevent root resorption.

Furthermore, removable prosthesis was placed to maintain the gap between (#11) and (#24). Indeed, prosthodontic rehabilitation is the preferred treatment for growing patients [9].

They offer a non-invasive, economical and reversible replacement of missing teeth. The application and repair are easy, although regular adjustments of the prostheses every 2-4 years are necessary in order to monitor the jaw's growth [10].

The use of a removable partial denture is necessary to restore oral functions and aesthetics, prevent lingual interposition habits, enhance overall self-esteem and alleviate the psychological impact of tooth loss [11].

Nevertheless, the compliance of the child to wear the appliance is questionable [12].

Mini-implants should be an alternative approach promoting bone stimulation and preventing resorption until the end of the growth. However, this treatment carries the risk of growth cessation, ankylosis and implant submergence [13][10].

For our patient, after her growth spurt, a multidisciplinary approach is needed to successfully choose the appropriate therapeutic modality.

Conclusion

The management of paediatric dental trauma presents clinical challenges to dental professionals. Appropriate emergency treatment and long term follow-up are necessary for the prognosis following trauma.

Promoting awareness about pediatric dental trauma among parents, educators and public education programs is crucial for improving the long-term prognosis of traumatized teeth.

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