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Management of Traumatic Dental Injuries in Young Patients – A Series of Case Report

Abstract:
Dental trauma is a severe traumatic injury involving alveolar bone and dental structures. Like any trauma, it can leave irreparable sequelae and even cause tooth loss. The present series of case reports highlight the management of such traumatic dental injuries that are seen in dental practice.
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Key-words: Dental trauma, Young permanent tooth, Intrusion, Luxation, Primary teeth.

Introduction:

Dental trauma is an important public health problem worldwide and may occur throughout life. Various innervations and treatment options are available, depending on the particular traumatic injury sustained, but the actual fact is that every trauma case is an exclusive case, which needs a unique diagnosis and treatment. The etiology in young children is complex which incorporates oral characteristics of the individual like excessive overjet, factors associated with human behavior like risk-taking or impulsiveness and environmental factors including socioeconomic status and/or deprivation. Within the behavioral component, the etiology can be further grouped as intentional and unintentional causes, where unintentional includes fall or collisions and intentional one is more likely to involve a violent act that is either self or other inflicted. [1]

Pediatric patients present a novel challenge to oral health care providers for a range of reasons, age, maturity, temperament, developmental status, and constant change in dentition and behavior being the primary reasons. Besides this, young children might not be able to accurately describe their symptoms or details of how an injury occurred, and it's obligatory for the healthcare provider to determine if the injury matches the outline provided or if there is a possible concern for abuse or maltreatment. Finally, caregivers may have strong opinions about the kind of treatment should be provided, and this could go against currently accepted guidelines. Hence, all these reasons are required to be considered in the treatment plan.

In the present series of case report displacement fractures including Intrusive luxation, Lateral luxation, and Impact of Trauma to Primary teeth on their permanent successor shall be discussed.

Case Report :

1. Immediate surgical repositioning following intrusive luxation of maxillary central incisor in a young patient-

Intrusive luxation is a rare type of dental injury in which the tooth is displaced further into the alveolar bone by a traumatic force. It comprises 0.3% to 1.9% of all traumatic injuries in permanent dentition[2], and is rarely seen in developing

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permanent dentition. These luxation injuries are one of the most difficult kinds of injuries to treat as there are differing opinions on what constitutes the most effective treatment. [3] The two main variables determining the choice of treatment are the stage of root development and the severity of the intrusion.[4] Treatment options include passive repositioning ,which involves allowing the tooth to re erupt, and active repositioning, which can be accomplished surgically or through the use of orthodontic appliances. Treatment planning is further complicated by the fact that these type of luxations are related to a high risk of complications during healing, including pulpal necrosis, external inflammatory resorption, replacement resorption and marginal bone loss and because of the rare occurrence of intrusive luxations, there is a scarcity of published data on the management and prognosis of this kind of injury as suggested by Tsilingaridis et al [5]

The following case report includes the management and outcome at of a severely intruded young permanent incisor in a ten-year-old patient.

A ten-year-old boy reported with the chief complaint of bleeding from his upper front tooth region and gave a history of accidental fall that occurred at school one hour earlier [Fig i(a)]. After taking IOPA, it was revealed that the left maxillary central incisor was intruded [Fig I (b)].

The tooth did not respond to the electric pulp test. The treatment plan included surgical repositioning of the intruded tooth [Fig ii(a)] followed by semi–rigid splinting [Fig ii (b),(c)] for four weeks, and the patient was instructed to consume a soft diet. After four weeks the splinting was removed vitality test was done, and a composite build-up of the tooth was done. [Fig ii(d),(e)]. Follow up was done after four months and seven months [Fig ii(f),(g)].Regular follow up was done, there was no loss of attached gingiva, pulp was vital, there was no root resorption, inflammation, periapical infection, and the marginal bone was maintained after one year of follow up.[Fig ii(h)]

Case Report :

2. Digital repositioning following lateral luxation of maxillary central incisor in a child patient reporting after one day.

Lateral Luxations account for 11% of traumatized young permanent teeth [6]. This type of injuries involves the displacement of the tooth in an exceedingly palatal or labial direction, with fracture of the alveolar bone from the displacement of the root, resulting in severance of the neurovascular supply and periodontal ligament. The diagnosis is confirmed by a clinical and radiographic inspection. The tooth is mostly not mobile but sometimes can interfere with normal occlusion. The treatment involves repositioning of the tooth either with forceps or finger pressure under local anesthesia. The tooth may have to be extruded slightly before repositioning if the apex has protruded through the buccal or palatal bone, creating a bony lock. If there is a delay in treating the patient, it may be difficult to reposition the luxated tooth. In some cases, orthodontic repositioning is carried out in combination with splinting.

The following case report includes the management and outcome at the end of nine months of a severely luxated young permanent incisor in an eight year old patient.

An eight year old boy reported with the chief complaint of a locked upper front tooth region [Fig iii (a)] with a history of an accidental fall that occurred at school one day ago. After taking IOPA [Fig iii (b)], it was revealed that the left maxillary central incisor was luxated and was displaced palatally.

Digital repositioning of the luxated tooth was done, followed by semi –rigid splinting [Fig iv (a),(b),(c)] for four weeks, and the patient was instructed to consume a soft diet. After four weeks there was slight mobility, so the splinting time period was increased for two more weeks. Follow up was done after the next two weeks and splinting was removed [Fig iv (d),(e)]. Next follow up was possible at nine months [Fig iv(f)] which revealed, no root resorption, no tenderness on percussion and no marginal bone loss. The patient is still under follow up .

Case Report:

3 .Management of non erupted maxillary central incisor and extraction of undeveloped maxillary lateral incisor due to trauma to its primary teeth in the young patient.

One doubtless severe sequela of a traumatic injury to a primary tooth is a developmental disturbance to the succedaneous tooth, as the permanent successor tooth developing is in close proximity to the apex of the primary tooth. The severity of the injury and the age of the child both play a pivotal role in determining whether or not a developmental disturbance can occur to the succedaneous tooth. The consequences of such trauma include color changes, pulp necrosis, obliteration of the pulp canal, gingival retraction, tooth displacement, pathological root resorption, alterations in the process of normal root resorption, and premature loss of the primary tooth [7]. Developmental disturbances were identified in 94.5% of permanent successor teeth when avulsion of their primary predecessors occurred in

children up to age 2 years, 80% of succedaneous teeth in children aged 2–4 years, and 18.2% after 5 years old [8] Thus, it is important to consider the potential harm to the permanent tooth while addressing a primary tooth injury, with treatment decisions focusing on minimizing the potential negative sequelae.

The following case report includes the management of an impacted maxillary central incisor and extraction of undeveloped maxillary lateral incisor due to trauma to the primary tooth in a nine-year-old patient.

A nine year old boy reported with the chief complaint of a missing tooth in his upper front tooth region since Four years [Fig v (a)]. Patient gave a history of trauma to the same region four years back. After taking IOPA and OPG [Fig v (b)], it was revealed that the left maxillary central incisor was blocked, only the coronal portion of the lateral incisor was fully developed, and the left canine was fully impacted by the undeveloped lateral incisor.

In treatment planning, surgical exposure of blocked maxillary central incisor and extraction of an undeveloped maxillary lateral incisor due to trauma to its predecessor tooth was carried out and sutures were placed [Fig vi(a),(b)]. After four months of follow up eruption of the left maxillary central incisor into the oral cavity was seen [Fig vi(c)] and after one year [Fig vi(d)] of follow up, a fully erupted left maxillary central incisor in the oral cavity was seen. In this case surgical exposure of the unerupted maxillary central incisor and extraction of the undeveloped maxillary lateral incisor was successfully carried out. Regular follow ups were done, normally erupting left maxillary central incisor was seen after ten months of follow up.

Fig i (a) Preoperative image

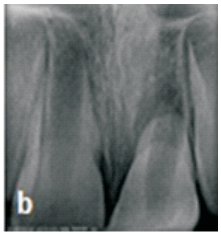

Fig ii (b) Preoperative IOPA

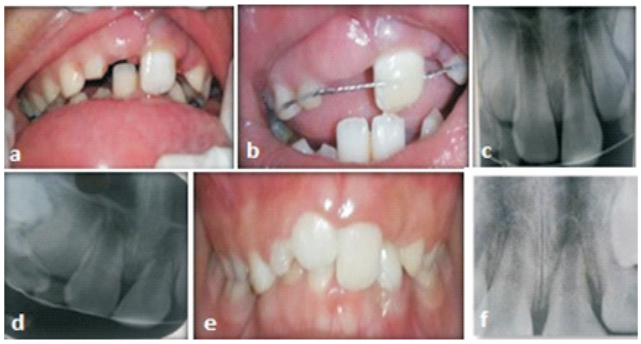

Fig ii (a) Surgical repositioning of the intruded tooth. **Fig ii (b,c)** Semi–rigid splinting done.

Fig ii (d) Follow up after four weeks. **Fig ii (e)** Semi–rigid splinting removed and composite build up done.

Fig ii (f,g) Follow up after four and seven months respectively. **Fig ii (h)** Follow up after one year.

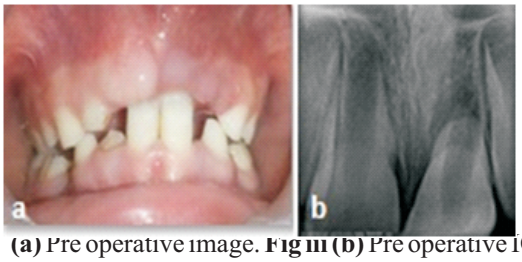

Fig iii (a) Pre operative image. **Fig iii (b)** Pre operative IOPA

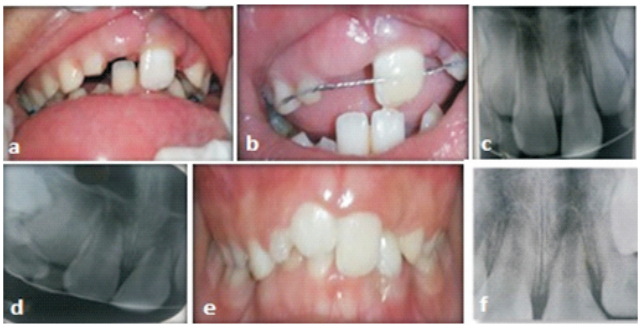

Fig iv (a),(b),(c) Digital repositioning of the luxated tooth was done, followed by semi –rigid splinting. **Fig iv (d,e)** Follow up after 6 weeks and splinting removed. **Fig iv (f)** Radiographic follow up after nine months

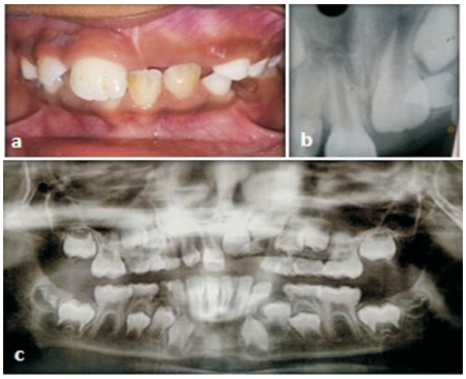

Fig v (a) Pre operative image. **Fig v (b,c)** Pre operative IOPA and OPG

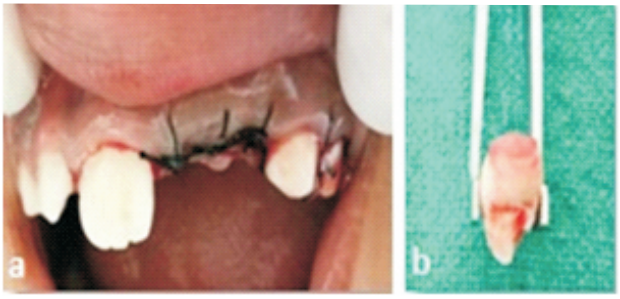

Fig vi(a),(b) Surgical procedure carried out followed by suture

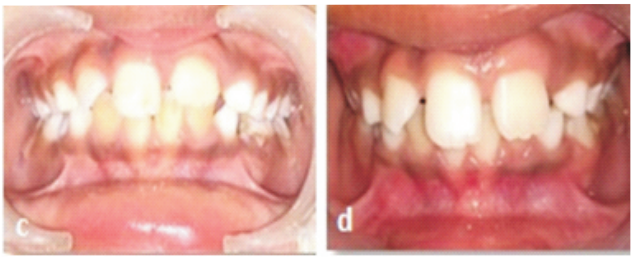

Fig vi (c) Follow up after four months **Fig vi (d)** Follow up after ten months

Discussion:

Traumatic dental injuries account for 5% of all injuries and are in the second position of call for dental care (dental caries being the first one), violence activities, road traffic accidents, and sports practice are essential reasons for such dental injuries.

In the first case of intrusive luxation, the clinical examination was based on a difference of height between the free edge of the traumatized tooth and the contralateral tooth, and a metallic tone to percussion. Radiographic examination allowed for the determination of impaction degree, root formation stage, the presence of alveolar or radicular fracture, and possible damage to the contralateral teeth. Treatment options in management are related to the aspects such as the patient's age, root development degree, and intrusion degree. For minor intrusive luxation of immature teeth (1- 3 mm), management includes waiting for spontaneous re-eruption for a few weeks (within 3 to 4 weeks), if the tooth does not reach its physiological position, orthodontic repositioning should be initiated. If the impaction degree is more than 7 mm (> 50% of the coronal), surgical or orthodontic repositioning is indicated [9]. The treatment described in the first case was relatively simple, adopting a surgical repositioning of intruded tooth followed by semi–rigid splinting for four weeks.

The second case report was a case of dental trauma in an Eight-year-old boy, who sustained luxation injury on his left immature maxillary permanent incisor. The tooth was initially repositioned and stabilized with a semi-rigid wire splint for four weeks and continuously monitored. Flexible wire-composite splints as in this case can be left in place for an extended time without any ill effects on periodontal ligament healing, since they allow for normal functional tooth movement[10]. Various investigations have measured the lateral tooth movement of teeth with this type of splint, and have demonstrated that its immobilizing effect does not exceed normal tooth firmness and that it provides a degree of tooth mobility similar to non-splinted teeth [10]. Therefore, the longer splinting time of four weeks, as opposed to the standard of two weeks for luxated immature teeth was appropriate and reasonable. However, splinting time was increased in the present case to a total of six weeks as it was an immature tooth and mobility was even present after 4 weeks of splinting. At the end of 9 months of follow up the tooth responded normally to pulp vitality test and radiograph did not show any sign of pathology.

The third case report described the management of undeveloped maxillary lateral incisor that showed the combined crown dilaceration with partial arrest of root formation which hindered the eruption of permanent maxillary central incisor and maxillary canine; only 3% of injuries to primary teeth result in crown dilacerations; however partial arresting of root formation is seen in 2% of injuries in primary teeth affecting permanent teeth [11].Most commonly injuries to primary teeth at two years of age (time at which half of the crown has been formed) causing deviation of tooth germ within the socket; however study supports avulsion to the primary incisor the as major cause of the arrest of root formation[12]. In this present case the injury must have occurred directly to hertwigs epithelial root sheath, compromising the normal root development. Extraction of the lateral incisor was done, sutures were placed and the patient was kept on regular follow up. At the end of ten months of follow up the erupting central incisor was seen and there was no sign of periapical pathology.

Conclusion :

Dental trauma in young children is a serious dental public health problem that should not be overlooked by parents. It is not possible to eliminate traumatic injuries as children are learning to walk and participating in sports activity. Considering the importance of dental trauma, treatment choices require rigor to avoid iatrogenic management with careful and continual assessment to determine the progress and prognosis of traumatic injury to young permanent teeth. The present series of case report highlights the management of commonly occurring dental trauma occurring in young permanent teeth.

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