



CODEN [USA]: IAJ PBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF  
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.2388895>Available online at: <http://www.iajps.com>

Research Article

**DENTAL INJURIES IN PRIMARY DENTITION**

Ashwaq Hussain ALHakami<sup>1</sup> Futun abdulrahman alqahtani<sup>1</sup>, Ohoud nader khalawi<sup>2</sup>, Akram kamal banah<sup>2</sup>, Dareen Arshad A Menkabo<sup>2</sup>, Rahaf Hamed Alhazmi<sup>2</sup>, , Ebtehal Yannallah AlGhamdi<sup>3</sup>, Mufidh abduladym Al abdulaal<sup>3</sup>, Zohoor M.Y Salama<sup>4</sup>, Tala Falah Alotaibi<sup>5</sup>

<sup>1</sup>Ministry of health, <sup>2</sup>Ibn sina national college, <sup>3</sup>Al farabi college, <sup>4</sup>October 6th university, <sup>5</sup> Riyadh Elm University

**Abstract**

**Background:** Tooth-related trauma to preschool children can be difficult to manage because of the child's and parents' anxiety and the probability of injury to the developing permanent tooth buds. Causes for these injuries may differ in different countries and various age brackets. Organization of emergency dental care, prevention of dental trauma, reduce cost, and to create awareness are important factors needed to change epidemiologic data toward more promising figures in the future.

**The aim of work:** This study aims to understand the incidence, the prevalence of dental trauma, the sequelae, treatment guidelines, and prevention of same.

**Materials and methods:** we conducted this review using a comprehensive search of MEDLINE, PubMed and EMBASE from January 1985 to March 2017. The following search terms were used: dental trauma, crown fractures, treatment guideline, dental trauma sequelae, prevention

**Results:** Dental injuries are common among preschool children, ranging from 30-40%, both in boys and girls. Much minor trauma goes unrecorded in that age, thereby underestimating the actual occurrence. The most commonly affected teeth are the central incisors. The various factors that lead to the high occurrence of trauma in the young age are increased overjet which leads to incomplete lip closure thus exposing the teeth to the more traumatic atmosphere. Falls in toddlers as soon as they start walking is another common factor that leads to dental injuries.

**Keywords:** Dental Trauma, Crown Fractures, Treatment Guideline, Dental Trauma Sequelae.

**Corresponding author:**

Ashwaq Hussain ALHakami,

Email: [Dr\\_Ashwagi@hotmail.com](mailto:Dr_Ashwagi@hotmail.com) ,

Mobail: +966 535337773.

QR code



Please cite this article in press Ashwaq Hussain ALHakami et al., *Dental Injuries In Primary Dentition* ., Indo Am. J. P. Sci, 2018; 05(12).

## INTRODUCTION:

Dental injuries are common among preschool children, ranging from 30-40%, both in boys and girls. By the age of 14, 30% of children already face a dental injury mostly to the primary dentition. By the age of 14, 30% of children have encountered some form of dental injury [1,2]. Much minor trauma goes unrecorded in that age, thereby underestimating the actual occurrence. The most commonly affected teeth are the central incisors [2,3]. The various factors that lead to the high occurrence of trauma in the young age are increased overjet which leads to incomplete lip closure thus exposing the teeth to the more traumatic atmosphere. Falls in toddlers as soon as they start walking is another common factor that leads to dental injuries [3]. Child abuse is a very disturbing cause that leads to dental injuries in primary dentition. The head and neck and region is the most commonly injured area in the victims of child abuse, ranging from 75 to 80% [4,5]. The various signs of abuse can be a frenal tear in the labial mucosa, and injuries which do not match the history that the caregiver or the child provides. Multiple injuries that are in different healing stages is another common sign [6]. Marks of pinching or hand marks in the head and neck region and trauma to soft tissues of the cheek and neck is also a sign that can lead to suspicion of child abuse [7].

## METHODOLOGY:

### •Data Sources and Search terms

We conducted this review using a comprehensive search of MEDLINE, PubMed and EMBASE, from January 1985 to March 2017. The following search terms were used: dental trauma, crown fractures, treatment guideline, dental trauma sequelae, prevention

### •Data Extraction

Two reviewers have independently reviewed the studies, abstracted data and disagreements were resolved by consensus. Studies were evaluated for quality and a review protocol was followed throughout.

This study was done after approval of ethical board of King Abdulaziz University.

## DENTAL TRAUMA ASSESSMENT:

### CLINICAL EXAMINATION:

A methodical approach should be followed for the examination of dental trauma. History taking, which includes both medical and dental is the first and foremost step in providing immediate care. Several leading questions should be asked including the time and cause of the injury to determine the need for

medical attention like a tetanus injection or a head injury [8]. While taking the history, it is important for the dentists or the physician to ask questions related to whether the child lost consciousness or was there any history of a headache, dizziness and nausea or vomiting. Since the dentition is very close to the skull, it is very important to do a neurological examination of the child. If any concussion and loss of consciousness have occurred in the child, medical intervention is must at first [9]. The occlusion of the patient should be examined because any change in the occlusion suggests fracture of the mandible, maxilla and alveolar fracture or displacement. A dental surgeon should be referred immediately if the child gives any complaint of sensitivity or pain while any thermal tests. The child should be made to clean his face and mouth with saline or betadine solution following a thorough examination of the lip, buccal mucosa, tongue, and other soft tissue. The various signs that have to check in the patient who is suspected of dental trauma are the fracture of the facial skeleton, any abnormality in the original position of a particular tooth and the mobility of the tooth. The management strategy completely changes depending on whether the tooth is primary or permanent and hence that should be checked during the clinical examination [8,9].

## RADIOGRAPHIC EXAMINATION:

Radiographs give a better picture of the extent of the dental trauma and hence once the emergency treatment has been delivered, the most suitable radiographic assessment should be done of the suspected region. If the traumatic injury has been localized to one particular tooth, instead of computed tomography (CT) scan, and intraoral periapical radiograph gives a better judgment of the extent of trauma. Another advantage of using an IOPA is the reduced amount of radiation the child is exposed to. To assess the amount of tooth displacement in the socket and the presence of tooth or root fracture, one must take radiographs from different angulations. [9,10]. The presence of any foreign body in the soft tissue may lead to various systemic problems, and hence if any lip abrasion or deep laceration is noticed, a radiograph is immediately indicated to check for any foreign bodies. In cases of dental trauma, it is important to refer the patient to a dental set up because a general hospital's emergency or radiology department is not equipped with dental radiography and a dentist's opinion is important in such cases. In case the patient comes with a displaced jaw or any other facial bone, a fracture of the skeletal bone is suspected and, in such cases a Cone Beam Computed Tomography, or a CT is necessary [11].

## DENTAL TRAUMA CLASSIFICATION: LUXATION INJURIES:

The most common injury in the primary teeth is luxation, and that causes injury to the periodontal ligament. Young children have very limber supporting structures and hence instead of fracturing, the teeth tend to move [12].

### 1. Concussion

A concussion injury transmits the force of the hit to the PDL but causes no movement of the tooth. The only clinical sign will be pain to percussion. In such cases, intervention is not required, but the tooth can be removed from occlusion for children who are very sensitive to pain [13].

### 2. Subluxation

In cases of subluxation the tooth does not move out from the socket but the mobility increases. Bleeding from the sulcus is generally present. The child is instructed to not put the tooth under load for 14-15 days. Subluxation has a very good prognosis if the child is monitored closely and appropriate precautions are taken [13].

### 3. Lateral luxation

It is a more severe trauma with the tooth displaced from its normal position, generally in a lingual direction. Radiographs should be taken, and any fracture of the root should be ruled out [12]. If the tooth is causing any problem in the occlusion, it should be repositioned by the dentists and splinting should be done for 3-4 weeks [13]. If a tooth is completely displaced from the original position, it is generally indicated for extraction since it may hamper the development of the successor tooth [14,15].

### 4. Intrusion

Injury leading to intrusion can cause damage to the existing tooth bud of the permanent tooth, and the patient's parents should be informed about the consequences [16]. Extraction is generally avoided in such cases or is done in a very conservative manner because of the successor tooth bud being at high risk of damage [17]. Radiograph should be taken in every angulation, and a lateral anterior radiograph is mandatory to assess the position of the tooth and extent of displacement about the permanent tooth bud. If the tooth is intruded in a more buccal direction and is away from the permanent tooth bud, the prognosis is good and in such cases eruption of the intruded tooth without any complications takes place [18]. If the permanent tooth bud is impinged by the tooth that is intruded, then careful extraction

should be done avoiding any trauma to the tooth bud [14]. It takes almost 4-5 months for a completely or partially intruded tooth [18,19].

### 5. Extrusion

In extrusion, the tooth is displaced from the centre of its socket and has high mobility. The treatment plan in extrusion depends on various factors such as the extent of extrusion, the cooperation between the child and his parents. The extent of the extrusion can be visualized clinically and radiographically. Repositioning can be done in minor extrusion cases, but an extreme case of extrusion has to go for extraction [14].

### 6. Avulsion

Replantation of the avulsed tooth is not indicated due to the damage that can be caused to the permanent tooth bud [20,21]. more than the functional loss, avulsion of anterior teeth is traumatic to the parents since the aesthetics of the child is compromised. Hence the parents should be counselled and advised against replantation if that can cause any damage. Loss of the primary incisors at an early age can lead to a loss of space thus causing drifting of teeth or crowding in the permanent successors. The eruption of the canine reduces the chances of this. Since esthetics is a major concern in anterior teeth, a removable or fixed partial denture can be immediately placed [22].

## CROWN FRACTURES:

Fracture of the tooth causes the fracture of the crown which is displeasing especially in case of anterior teeth, in the case of posterior teeth it causes a loss of function and malalignment of teeth. The crown fractures should be restored immediately. The various crown fractures and management is described below [23].

### 1. Uncomplicated crown fractures

These fractures include fractures that involve only the enamel and dentin without the exposure of pulp. An IOPA is a must to show the extent of the fracture and if the pulp is involved in the line of fracture. IOPA also examines possibilities of root resorption and other trauma. Finishing stone burs and sandpaper discs can be used to refine the sharp edges if the fracture is not extensive and there is the presence of rough edges. Fractures that include the incisal angle or cusps of the tooth requires restoration with composite resin or pre-contoured stainless-steel crown [23].

### 2. Complicated crown fractures

Complicated crown fractures are those that involve the fracture of enamel and dentin followed by the

exposure of pulp. The treatment of such a case depends on the age of the patient, development of the tooth and the child's cooperation. Pulpotomy is the choice of treatment in young patients (less than 3 years) in which the root is not completely formed [24]. In a completely developed root, pulpectomy is performed with a resorbable paste like zinc oxide eugenol. Treatment of complicated crown fractures should be completed as soon as practicable after the injury, usually within 1 or 2 days. The cooperation between the child and his parents is a very important factor in the management of complicated fractures [24].

### 3. Crown/Root Fractures

Extraction is the treatment option for Primary teeth with fractures that extend through the crown to the root. An IOPA gives the extent of the damage. If the fractured root fragment is very close to the developing tooth bud, its advised to leave that fragment to resorb because extraction can cause damage to developing tooth bud [14].

### 4. Root Fractures

If the coronal portion of the root is displaced, then it should go for extraction and the apical portion left to resorb naturally. When primary roots fracture in the apical third, the coronal fragment may not be displaced and may have adequate stability to allow its retention in the mouth [14].

**Table 1: Summary of treatment guidelines for fractures of teeth and alveolar bone in children [28]**

<u>Injury Type</u>	<u>Clinical findings</u>	<u>Radiographic findings</u>	<u>Treatment</u>	<u>Follow-up</u>
ENAMEL FRACTURE	Fracture involves enamel.	No radiographic abnormalities	Smoothen sharp edges	
ENAMEL DENTIN FRACTURE	Fracture involves enamel and dentin; the pulp is not exposed.	No radiographic abnormalities	If possible, seal completely the involved dentin with glass ionomer to prevent microleakage. If large restore with composite.	3-4 weeks C
CROWN FRACTURE WITH EXPOSED PULP	Fracture involves enamel and dentin and the pulp is exposed.	The stage of root development can be determined from one exposure.	If possible preserve pulp vitality by partial pulpotomy. Extraction is also an option.	1 week C 6-8 weeks C+R 1 year C+R
CROWN-ROOT FRACTURE	Crown as mentioned above + loose, but still attached, fragments of the tooth.	In laterally positioned fractures, the extent in relation to the gingival margin can be seen	Fragment removal only if small otherwise extraction.	In cases of fragment removal only: 1 week C 6-8 weeks C+R 1 year C(*)
ROOT FRACTURE	The coronal fragment may be mobile or displaced.	The fracture is usually located mid-root or in the apical third.	• If the coronal fragment is not displaced no treatment is required. If displaced, extract only that fragment. The apical fragment should be left to be resorbed	No displacement: 1 week C, 6-8 weeks C, 1 year C+R and C(*) each subsequent year until exfoliation. Extraction 1 year C+R and C(*)each subsequent year until exfoliation.

ALVEOLAR FRACTURE	Segment mobility and dislocation are common findings. Occlusal interference is often noted.	A lateral radiograph may also give information about the relation between the two dentitions and if the segment is displaced in labial direction	Reposition any displaced segment and then splint for 4 weeks	1 week C 3-4 weeks S+C+R 6-8 weeks C+R 1 year C+R and C(*) each subsequent year until exfoliation
CONCUSSION	The tooth is tender to touch. It has normal mobility and no sulcular bleeding.	No abnormality	Observation	1 week C 6-8 weeks C
SUBLUXATION	The tooth has increased mobility but has not been displaced. Bleeding from gingival crevice may be noted.	Radiographic abnormalities are usually not found	Observation. Use chlorhexidine 0.12% alcohol-free topically.	1 week C 6-8 weeks C Crown discoloration might occur. No treatment is needed unless a fistula develops. Dark discolored teeth should be followed carefully to detect sign of infection as soon as possible
EXTRUSIVE LUXATION	The tooth appears elongated and can be excessively mobile.	Increased periodontal ligament space apically.	For minor extrusion (< 3mm), careful repositioning and spontaneous alignment might occur. Extraction for severe cases.	1 week C 6-8 weeks C+R 6 months C+R 1 year C+R Discoloration might occur. Dark discolored teeth should be followed carefully to detect sign of infection as soon as possible.
LATERAL LUXATION	The tooth is displaced, usually in a palatal/lingual or labial direction, but immobile	Increased periodontal ligament space apically is best seen on the occlusal exposure	Minor displacements with occlusal discrepancy, selective grinding and repositioning. Severe cases are extracted	1 week C 2-3 weeks C 6-8 weeks C+R 1 year C+R
INTRUSIVE LUXATION	The tooth is usually displaced through the labial bone plate,	When the apex is displaced toward or through the labial bone plate, the apical tip can be visualized and appears shorter than its contra lateral. When the apex is displaced towards the permanent tooth germ, the apical tip cannot be visualized and the tooth appears elongated	If the apex is displaced toward or through the labial bone plate, the tooth is left for spontaneous repositioning. If displaced towards permanent dentition, extract	1 week C 3-4 weeks C + R 6-8 weeks C 6 months C+R  1 year C+R and (C*)

AVULSION	The tooth is completely out of the socket	A radiographic examination is essential to ensure that the missing tooth is not intruded.	It is not recommended to replant avulsed primary teeth.	1 week C 6 months C + R  1 year C + R and (C*)
----------	---	---	---	--

**Table 1:** Pediatric dental injury types, manifestation, imaging, treatment and follow-up

KEY: C=Clinical examination; R=Radiographic examination; (C\*) = Clinical and radiographic monitoring until eruption of the permanent successor S=Splint removal.

### SEQUELAE FROM DENTAL TRAUMA IN THE PRIMARY DENTITION:

The parents should always be informed about prevention of trauma and good oral hygiene. Maintaining good oral hygiene helps faster healing after dental trauma. The child should be given only soft food and liquid diet and sucking on a pacifier should be stopped for 10 days following the trauma. The routine use of systemic antibiotics in the postoperative care of primary tooth trauma is not indicated [26]. Systemic antibiotics are required if needed for the child's medical condition. Discoloration of a crown, non-vitality of pulp, calcification of the pulp chamber, are the possible consequences and hence parents should be informed prior. A child cannot assess symptoms of a necrotic tooth and hence the parents should be given prior instructions to observe the tooth for development of the symptoms of pulpal necrosis which can be gingival swelling, increased mobility, and gum boil. Whenever such signs appear, parents/caregiver must follow it up with the pediatric dentist to determine the need of already injured tooth [26].

### DENTAL TRAUMA PREVENTION:

Prevention is better than cure, and hence pediatricians can advise for dental injury-preventive measures as they provide other injury-prevention messages during well-child visits. Active participation of the parents in the child's sports activities allowing him to participate in sports appropriate for his age, general household safety measures such as stairway gates and removal of trip hazards that could lead to dental trauma reduces the chances of injury. Although these preventive measures may not prevent all dental injuries, they can lessen their incidence and severity. Mouth guards have been recently started being used as part of a preparticipation in sports or other physical activities. There are four sports namely football, field/ice hockey and lacrosse that require mouth guards by the US National Collegiate Athletic Association Currently [27]. The American Dental Association recommends the use of mouth guards in 29 sports/exercise activities. Sports mouth guards are

available in various materials and are available over the counter in sports-related shops; they can also be made in a dental clinic by measuring the patient's mouth. Purchased mouth guards can be placed in boiling water to soften the material and then biting into it to create an impression of the upper teeth, which helps create a customized mouth-guard. Impact studies have shown that wearing any mouthguard reduces the risk of tooth injury compared with not wearing a mouth guard [27].

### CONCLUSION:

Dental injury of a primary tooth is complicated by various factors like the age and cooperation of the patient and the parents, development of the tooth and involvement of the successor tooth bud. The first measure should be to avoid dental trauma by taking preventive measures, but if the trauma occurs, the management largely depends on a proper diagnosis, pain management, treatment planning, cooperation of the patient and prevention of injury to the developing permanent tooth bud. Once the treatment is done, the child should be kept under follow up until complete healing has occurred and the permanent teeth have erupted successfully.

### REFERENCES:

1. **Andreasen JO, Andreasen FM and Andersson L (2007):** Textbook and Color Atlas of Traumatic Injuries to the Teeth. 4th ed. Copenhagen, Denmark: Munksgaard, pp: 224-225
2. **Glendor U (2008):** Epidemiology of traumatic dental injuries – a 12-year review of the literature. Dent Traumatol., 24(6):603-11.
3. **Glendor U, Halling A Andersson L et al (1998):** Type of treatment and estimation of time spent on dental trauma. A longitudinal and retrospective study. Swed Dent J., 22:47-60.
4. **da Fonseca M, Feigal R and ten Bensele R (1992):** Dental aspects of 1248 cases of child maltreatment on file at a major county hospital. Pediatr Dent., 14:152-7.
5. **Maguire S, Junter B and Hunter L et al (2007):** Diagnosing abuse: a systematic review

- of torn frenum and other intraoral injuries. Arch Dis Child, 92(12):1113-7.
6. **American Academy of Pediatrics, American Academy of Pediatric Dentistry (1999):** Oral and dental aspects of child abuse and neglect. Pediatrics, 104:348-50.
  7. **Welbury RR, Murphy JM (1998):** The dental practitioner's role in protecting children from abuse. The orofacial signs of abuse. Braz Dent J., 184(2):61-5.
  8. **Halstead ME, Walter KD (2010):** Council on Sports Medicine and Fitness. American Academy of Pediatrics. Clinical report—sport-related concussion in children and adolescents. Pediatrics, 126(3):597-615.
  9. **Andreasen FM, Andreasen JO (1985):** Diagnosis of luxation injuries: the importance of standardized clinical, radiographic and photographic techniques in clinical investigations. Endod Dent Traumatol., 1(5):160-169
  10. **Andreasen FM, Andreasen JO (1988):** Resorption and mineralization processes following root fracture of permanent incisors. Endod Dent Traumatol., 4(5):202-214
  11. **Siegel J A, and Stabin M G (2012):** Radar commentary: use of linear no-threshold hypothesis in radiation protection regulation in the United States. Health Physics, 102:90-99.
  12. **Borum MK, Andreasen JO (1998):** Sequelae of trauma to primary maxillary incisors. Part I. Complications in the primary dentition. Endod Dent Traumatol., 14:31-44.
  13. **Flores MT (2002):** Traumatic injuries in the primary dentition. Dent Traumatol., 18: 287-98.
  14. **Flores MT, Malmgren B, Andersson L et al (2007):** Guidelines for the management of traumatic dental injuries. III. Primary teeth. Dent Traumatol., 23(4):196-202.
  15. **Soporowski NJ, Allred EN and Needleman HL (1994):** Luxation injuries of primary anterior teeth – prognosis and related correlates. Pediatr Dent., 16:96-101
  16. **Assunc, a~o LR, Ferelle A, Iwakura ML et al (2009):** Effects on permanent teeth after luxation injuries to the primary predecessors: a study in children assisted at an emergency service. Dent Traumatol., 25:165-70.
  17. **Flores MT, Holan G, Borum M et al (2007):** Injuries to the primary dentition. In: Andreasen JO, Andreasen FM, Andersson L, editors. Textbook and color atlas of traumatic injuries to the teeth. 4th edition. Oxford (UK): Blackwell Munksgaard, p. 516-41.
  18. **Holan G, Ram D (1999):** Sequelae and prognosis of intruded primary incisors: a retrospective study. Pediatr Dent., 21:242-7
  19. **Gondim JO, Moreira Neto JS (2005):** Evaluation of intruded primary incisors. Dent Traumatol., 21:131-3.
  20. **Andreasen JO, Ravn JJ (1971):** The effect of traumatic injuries to primary teeth on their permanent successors. II. A clinical and radiographic follow-up study of 213 injured teeth. Scand J Dent Res., 79:284-94
  21. **Zamon EL, Kenny DJ (2001):** Replantation of avulsed primary incisors: a risk-benefit assessment. J Can Dent Assoc., 67:386-9.
  22. **Rock WP (2002):** Extraction of primary teeth – balance and compensation. In UK National clinical guidelines in pediatric dentistry. Int J Paediatr Dent., 12:151-3.
  23. **Waggoner WF (2005):** Restorative dentistry for the primary dentition. In: Pinkham J, Casamassimo P, Fields H, editors. Pediatric dentistry; infancy through adolescence. 4th edition. St. Louis (MO): Elsevier Saunders, p. 368-9.
  24. **Fuks AB (2005):** Pulp therapy for the primary dentition. In: Pinkham J, Casamassimo P, Fields H, et al., editors. Pediatric dentistry: infancy through adolescence. 4th edition. St. Louis (MO): Elsevier Saunders, p. 384-6
  25. **American Academy of Pediatric Dentistry (2008):** Guideline for monitoring and management of pediatric patients during and after sedation for diagnostic and therapeutic procedures. Pediatr Dent., 30:143-59.
  26. **Malmgren B, Andreasen JO, Flores MT et al (2012):** International Association of Dental Traumatology. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 3. Injuries in the primary dentition. Dent Traumatol., 28(3):174-182
  27. **Knapik JJ, Marshall SW, Lee RB et al (2007):** Mouthguards in sports activities: history, physical properties, and injury prevention effectiveness. Sports Med., 37(2):117-144
  28. **Malmgren B, Andreasen JO, Flores MT, Robertson A, DiAngelis AJ, Andersson L, Cavalleri G, Cohenca N, Day P, Hicks ML and Malmgren O (2012):** International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 3. Injuries in the primary dentition. Dental Traumatology, 28: 174-82.