Review Article

Management of Pediatric Traumatic Injuries – A Review

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Abstract:
Traumatic injuries in the childhood are the part of children's routine activities. They cannot avoid them; only measures can be taken to reduce them. Dental injuries could have improved outcomes if the public were aware of first-aid measures and the need to seek immediate treatment. This paper discusses the frequently occurring paediatric injuries and the required treatment.
Keywords: Infraction; Paediatric injuries; Concussion; Tooth fracture

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Introduction

A traumatic dentofacial accident can compromise the integrity of a previously healthy dentition and result in an unsightly appearance, affecting the child's self esteem. Most injuries in children are caused by falls and play accidents. Peak incidences in the primary dentition are found at two to three years of age, when the child is developing motor coordination. In the permanent dentition, peak incidences are found at nine to ten years of age, when vigorous playing and sport activities become more frequent. High velocity or sharp injuries cause fractures and luxations of teeth while blunt trauma causes greater damage to soft tissues. Another major cause of dental injuries in young children is automobile and school bus accidents. Unrestrained children may hit the dashboard, windshield, or the seat in front of them during a sudden stop.[1]

Dental injuries could have improved outcomes if the public were aware of first-aid measures and the need to seek immediate treatment.[2] Because optimal treatment results follow immediate assessment and care,[3] dentists have an ethical obligation to ensure that reasonable arrangements for emergency dental care are available.[4] The history, circumstances of the injury, pattern of trauma, and behavior of the child and/or caregiver are important in distinguishing non-abusive injuries from abuse.[5]

Thirty percent of children suffer trauma to the primary dentition and twenty two percent of children suffer trauma to the permanent dentition by age fourteen years. Injuries occur in males in a 2:1 margin over girls. The anterior teeth are the most commonly involved. Injuries usually involve a single tooth, except with sporting injuries and motor vehicle accidents. The predominant predisposing

factor is a Class II division 1 occlusion. As the overjet increases the frequency proportionately increases. The frequency of trauma to anterior teeth in a child with an overjet of 3-6 mm is double that of a child with an overjet of 0-3 mm. Children with an overjet greater than 6mm have a threefold frequency rate.[6]

To efficiently determine the extent of injury and correctly diagnose injuries to the teeth, periodontium, and associated structures, a systematic approach to the traumatized child is es-sential.[7] Assessment includes a thorough medical and dental history, clinical and radiographic examination, and additional tests such as palpation, percussion, sensitivity, and mobility evaluation. Intraoral radiography is useful for the evaluation of dentoalveolar trauma. If the area of concern extends beyond the dentoalveolar complex, extraoral imaging may be indicated. Treatment planning takes into consideration the patient's health status and developmental status, as well as extent of injuries.[5]

Clinical examination and diagnosis

When the patient presents for treatment of acute oral trauma the facial and oral areas are heavily contaminated, therefore, the first step in the examination process is to wash the patient's face with a mild detergent**.** The assessment of the injury begins by asking questions that aid in diagnosis and treatment planning of the injuries. Tetanus prophylaxis status, especially if the child suffered a dirty wound. If the injured child has not received tetanus toxoid within the last five years a booster is indicated. The patient should be assessed for nausea, vomiting drowsiness or possible cerebrospinal fluid leakage from the nose which would be indicative of a skull fracture.

The dentist should conduct a cranial nerve evaluation. The medical and injury history is followed by the clinical examination. The most convenient position to examine the young child, especially with limited cooperative ability is the knee to knee position. The dentist and parent are seated opposite each other with their knees touching. The parent lowers the child's head into the dentist's lap, while holding the child's hands and restraining the legs against his/her body. The dentist stabilizes the head and conducts the clinical examination. The dentist may also conduct the examination with the child in the parent's lap. The parent restrains the child's lower body by with their legs and the child's upper body with their arms. Positioning the child in the parent's lap may comfort the child to the extent that they will cooperate for clinical and radiographic examination.[8]

The dentist may also conduct the examination with the child in the parent's lap.[1] Clinical examination begins with an extraoral examination to rule out injuries to the facial bones. The temporomandibular joints are palpated, mandibular function during excursive movements is checked. Stiffness or pain in the patient's neck requires immediate referral to a physician to rule out cervical spine injury.

The intraoral examination follows with examination of the soft tissues. Lacerations of the lips and cheeks are checked. All teeth in the mouth are examined for mobility, displacement and crown fracture.

Conclusion

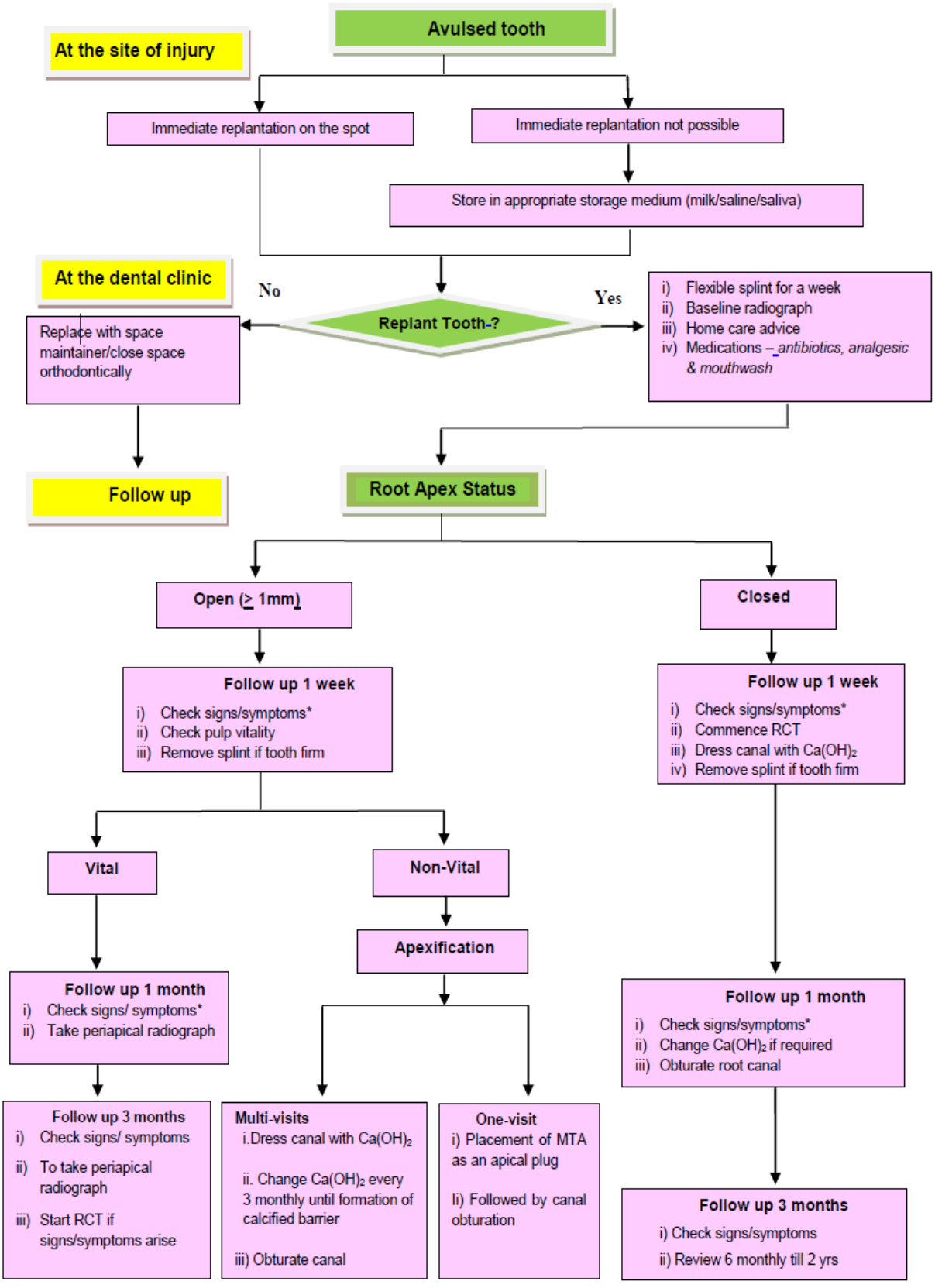
As the children cannot learn to walk without falling, difficult to escape injuries during playtime. In many cases the result is an injury to the mouth. However, there are preventive measures that can be taken to reduce the severity and frequency of injury. The use of car safety seats for infants and young children and mouthguards and helmets for older children engaged in sports can reduce the incidence of dentofacial injuries and its consequences. It is the utmost duty of dentists and auxiliaries to educate patients and parents to the available options.

Table 1: Injuries and treatment

Injuries	Treatment
Infraction is incomplete fracture or crack of the enamel without loss of tooth structure.[9]	The treatment objective is to maintain the structural integrity of the tooth and pulp vitality. Treatment ranges from observation to application of bonding agent and/sealant to the fractured enamel structure. [9]
Concussion is as defined injury to the tooth-supporting structures without abnormal loosening or displacement of the tooth.[10]	Treatment objectives are to optimize healing of the periodontal ligament and maintain pulp vitality. This is accomplished by relieving the tooth from occlusion. Splinting is usually not indicated unless the patient complains of tooth mobility. The patient should be placed on a soft diet for two weeks. [1]
Subluxation is injury to tooth-supporting structures with abnormal loosening but without tooth displacement. [11]	Treatment objectives are to optimize healing of the periodontal ligament and maintain pulp vitality. This is accomplished by relieving the tooth from occlusion. Splinting is usually not indicated unless the patient complains of tooth mobility. The patient should be placed on a soft diet for two weeks. [1]
Lateral luxation is displacement of the tooth in a direction other than axially. The periodontal ligament is torn and contusion or fracture of the supporting alveolar bone occurs.[5]	Primary teeth: Allow passive or spontaneous repositiong if there is no occlusal interference. When there is occlusal interference, the tooth can be gently repositioned or slightly reduced if the interference is minor. When the injury is severe or the tooth is about to exfoliate, extraction is the treatment of choice.[1] Permanent teeth: Reposition as soon as possible and then stabilize the tooth in its anatomically correct position to optimize healing of the periodontal ligament and neurovascular supply while maintaining esthetic and functional integrity. Repositioning of the tooth is done with digital pressure and little force. A displaced tooth may need to be extruded to free itself from the apical lock in the cortical bone plate. Splinting an additional 2 to 4 weeks may be needed with breakdown of marginal bone.[1]
Crown fracture–uncomplicated is defined as an enamel fracture or an enamel-dentin fracture that does not involve the pulp.[12]	To maintain pulp vitality and restore normal esthetics and function. Injured lips, tongue, and gingiva should be examined for tooth fragments. When looking for fragments in soft tissue lacerations, radiographs are recommended. For small fractures, rough margins and edges can be smoothed. For larger fractures, the lost tooth structure can be restored.[10]
Crown fracture–complicated is defined as an enamel/dentin fracture with pulp exposure.[1]	Primary teeth: Decisions often are based on life expectancy of the traumatized primary tooth and vitality of the pulpal tissue. Pulpal treatment alternatives are pulpotomy, pulpectomy, and extraction. Permanent teeth: Pulpal treatment alternatives are direct pulp capping, partial pulpotomy, full pulpotomy, and pulpectomy.[10]

Crown/root fracture is defined as an enamel, dentin, and cementum fracture with or without pulp exposure. [1]	Primary teeth: When the primary tooth cannot or should not be restored, the entire tooth should be removed unless retrieval of apical fragments may result in damage to the succedaneous tooth.[11] Permanent teeth: The emergency treatment objective is to stabilize the coronal fragment. Definitive treatment alternatives are: to remove the coronal fragment followed by a supragingival restoration or necessary gingivectomy, osteotomy, or extrusion (surgical or orthodontic) to prepare for restoration. If the pulp is exposed, pulpal treatment alternatives are pulp capping, pulpotomy, and root canal treatment.[10]
Root fracture is a dentin and cementum fracture involving the pulp.[5]	Primary teeth: Treatment alternatives include extraction of coronal fragment without insisting on removing apical fragment or observation. Permanent teeth: Reposition and stabilize the coronal fragment in its anatomically correct position as soon as possible to optimize healing of the periodontal ligament and neurovascular supply while maintaining esthetic and functional integrity.[5]
Intrusion is an apical displacement of tooth into the alveolar bone. The tooth is driven into the socket, compressing the periodontal ligament and commonly causes a crushing fracture of the alveolar socket. [5]	Primary teeth: to allow spontaneous re-eruption except when displaced into the developing successor. Extraction is indicated when the apex is displaced toward the permanent tooth germ. Permanent teeth: to reposition passively (allowing re-eruption to its preinjury position), actively (repositioning with traction), or surgically and then to stabilize the tooth with a splint for up to 4 weeks in its anatomically correct position to optimize healing of the periodontal ligament and neurovascular supply while maintaining esthetic and functional integrity.[1]
Extrusion is the partial displacement of the tooth axially from the socket; partial avulsion. The periodontal ligament usually is torn.[13]	Primary teeth: Allow tooth to reposition spontaneously or reposition and allow for healing for minor extrusion (<3 mm) in an immature developing tooth. Indications for an extraction include severe extrusion or mobility, the tooth is nearing exfoliation, the child's inability to cope with the emergency situation, or the tooth is fully formed. Permanent teeth: Reposition as soon as possible and then to stabilize the tooth in its anatomically correct position to optimize healing of the periodontal ligament and neuro-vascular supply while maintaining esthetic and functional integrity. Repositioning may be accomplished with slow and steady apical pressure to gradually displace coagulum formed between root apex and floor of the socket. Splint for up to 2 weeks.[14]

Table 2: Algorithm for management of avulsed permanent anterior teeth in children [15]



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