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Traumatic Injuries of Teeth: A Review

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Abstract--Dental trauma is a significant public health problem because of its frequency, impact on economic productivity and quality of life. It is not a disease and no individual is ever at zero risk of sustaining these potentially life-changing injuries. The aim of this article was to review the literature on the prevalence, incidence, a etiology, prognosis and outcomes of dental trauma. The importance of standardized reporting, oral health policy, adjunctive research methods, prevention and education will also be discussed. Approximately one-third of children and toddlers (primary teeth) and one-fifth of adolescents and adults (permanent teeth) sustained a traumatic dental injury. The majority involved the maxillary central incisors, mainly from falls in toddlers at home and contact sport in adolescents.

Keywords---dental trauma, epidemiology, outcomes, prevalence.

Introduction

Dental trauma (traumatic dental injury) is an impact injury to the teeth and/or other hard and soft tissues within and around the vicinity of the mouth and oral cavity. It is usually sudden, circumstantial, unexpected, accidental and often requires emergency attention. It is not a disease but a consequence of several unavoidable risk factors in life. Although these injuries are more common in certain groups, no individual is ever at zero risk through their activities of daily living. These injuries may render an individual with meticulous oral hygiene and a life experience of only the standard check-up and clean with life-changing dentistry. Costs to the injured person and the community throughout the world

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have been substantial.¹Trauma of the oral and maxillofacial region occurs frequently and comprises 5 percent of all injuries for which people seek treatment. Accidental trauma to the dentition of an individual is one of the most distressing incidents to befall during his lifetime.¹Every dentist must be well prepared to meet these emergencies.it is incumbent upon the dentist to preserve the vitality of injured teeth whenever possible and to restore them skillfully to their original appearance.¹ Advances in dental researches have greatly improved the ability of dentist to ensure long term retention of traumatized teeth in children.¹

Classification by Ellis (1970)

It is simplified classification. Broad term such as simple or extensive or extensive fractures are used.

- Class I - simple crown fracture with little or no dentin affected
- Class II – extensive crown fracture with considerable loss of dentin, but pulp is not affected.
- Class III – Extensive crown fracture with considerable loss of dentin and pulp exposure
- Class IV – A tooth devitalized by trauma with or without loss of tooth structure.
- Class V – Teeth lost as a result of trauma.
- Class VI – Root fracture with or without the loss of crown structure.
- Class VII – Displacement of the tooth with neither root nor crown fracture.
- Class VIII – Complete crown fracture and its replacement.
- Class IX – Traumatic injuries of primary teeth.²

Content

Patients with dental injuries should be examined as soon after the traumatic incident has taken place. The examination process of trauma patients is similar to the regular examination of all endodontic patient² The various clinical and radiographic examination are carried out together necessary information about the type and extent of injury and to detect foreign bodies and supporting structures respectively.³As dental trauma is unpredictable; it is difficult to accurately determine the prognosis of injuries. Patients with dental trauma need to be aware that certain injures require multiple appointments and/or subsequent reviews over time. Success rates can be as varied as the nature and circumstances causing trauma. This has obvious cost and quality of life implications and forms an important part of management and informed consent. This underscores the pivotal role of epidemiological studies as large datasets can predict the likely scenario of consequences following trauma.³

Types of injuries

Uncomplicated crown fractures in the permanent dentition are the most common type of injury. This has ramifications for epidemiological studies as many of these injuries are not perceived as requiring treatment. As such, the prevalence of

dental trauma is likely to be underestimated. Subluxation injuries, when reported, were also common, especially in the primary dentition. In most studies, displacement (luxation injuries) of teeth occurred more frequently in the primary dentition where some authors have suggested the resilient nature of the supporting structures favour dislocation rather than fracture. The prevalence of luxation may also be underestimated given that the majority of studies were retrospective and some studies did not consider these injuries. Avulsion injuries were uncommon but were more prevalent in studies focusing on certain subpopulations.

An 'after hours' study by Warren et al. indicated a higher incidence of these injuries. Similarly, Adekoya acknowledged fights were common in their subpopulation where one-fifth of injuries were avulsions. Only a few studies considered the recording of soft tissue injuries. The majority of dental trauma in both the primary and permanent dentition involved the anterior teeth. The maxillary central and lateral incisors were the most common teeth injured. In most cases, trauma affected a single tooth but certain events (sports, violence and traffic accidents) reported a greater probability of injuring multiple teeth.³

Uncomplicated crown fractures

Crown fracture is a type of traumatic injury in which a portion of tooth enamel is lost following a perpendicular or obliquely directed impact force to the incisal edge of the tooth. Crown fracture may involve enamel only, enamel and dentin or enamel, dentin and pulp.⁴ Clinical examination of the fractured teeth should be done after a thorough cleaning to assess the extent of the fracture and detect the possibility of minute pulp exposures. Crown fractures are usually sensitive to thermal changes because of dentin exposure after crown fracture. In these cases, care should be taken not to expose the pulp with the probe while checking for pulp exposure.⁴

Complicated crown fractures

A complicated crown fracture involves the enamel, dentin and pulp. The exposure of pulp in complicated crown fractures makes the treatment more difficult.⁵

A crown fracture involves the pulp, if left untreated will always result in pulp necrosis. Bacterial contamination of the pulp precludes healing and repair unless the exposure can be covered to prevent further contamination.⁵

Root fracture

Root fracture are defined as fracture involving dentin, cementum and pulp. They are relatively uncommon among dental traumas. They comprise 0.5-7% of the injuries affecting the permanent dentition and 2-4% in the primary dentition. A fractured root is an endodontic emergency if the tooth is painful and especially if the incisal fragment is mobile.⁵⁻⁶

Crown root fractures

A crown-root fracture is a fracture involving enamel, dentin and cementum. According to pulpal involvement they may be grouped into complicated and uncomplicated. The most common etiologic factors are injuries caused by falls , bicycles and automobile accidents and foreign bodies striking the teeth.⁶

Luxation and subluxation injuries

Luxation injuries include impact trauma that ranges from minor crushing of the periodontal ligament and the neurovascular supply to the pulp to more major trauma such as a forceful and sometimes total displacement of teeth.⁶ Displacement of teeth in luxation injuries has the potential to disrupt the neurovascular supply to the pulp. Crushing of the periodontal fibers and restriction/compression of supply channels (apical canal, lateral canal, fins, transverse anastomoses and loops) to the pulp causes ischemia which may lead to necrosis. Besides root maturity, the degree and direction of displacement has a significant influence on the onset of ischemic necrosis. This highlights the rationale in repositioning and splinting teeth following injury.⁶ Studies have demonstrated the following order (increasing order of risk) for developing pulp necrosis: concussion; subluxation; extrusion; lateral luxation and intrusion. Intrusion is the most severe form of luxation where necrosis is inevitable in permanent teeth with developed roots. This can be related to complete restriction of the main blood supply (apical foramen) to the pulp as the tooth is crushed into the underlying bone. Displacement of teeth in luxation injuries has the potential to disrupt the neurovascular supply to the pulp. Crushing of the periodontal fibers and restriction/ compression of supply channels (apical canal, lateral canal, fins, transverse anastomoses and loops) to pulp causes ischemia which may lead to necrosis. Besides root maturity, the degree and direction of displacement has a significant influence on the onset of ischemic necrosis. This highlights the rationale in repositioning and splinting teeth following injury. Studies have demonstrated the following order (increasing order of risk) for developing pulp necrosis: concussion; subluxation; extrusion; lateral luxation and intrusion. Intrusion is the most severe form of luxation where necrosis is inevitable in permanent teeth with developed roots. This can be related to complete restriction of the main blood supply (apical foramen) to the pulp as the tooth is crushed into the underlying bone.⁷

Avulsions

Tooth avulsion implies the total displacement of the tooth out of the socket. It is characterized along with the damage to the periodontal ligament, cementum, alveolar bone , as well as gingival and pulpal tissue.⁷ Avulsion is the most serious form of dental trauma where early and correct management is pivotal. All permanent and mature avulsed teeth undergo pulp necrosis. Revascularization may be possible in immature teeth with incompletely developed roots but success rates have been reported to be less.⁷

Management

Various storage mediums

- Hank's balanced salt solution
- Milk
- viaSpan
- Propolis
- Tender coconut water⁸

Treatment guidelines

The tooth should be left in place. The area should be cleaned with water spray, saline, or chlorhexidine. A gingival lacerations should be sutured if present. A flexible splint for up to 2 weeks is applied and systemic antibiotics are administered.⁸ Various physiologic storage media include tissue culture medium and cell transport media. Examples of osmolality balanced media are HBSS, saline , and milk and saliva can also be used.⁸

Management of injuries

The ultimate goal of management is the recovery of the pulp and periarticular tissues through repair or regeneration. This outcome is dependent on the pulp maintaining its integrity in the presence of reduced vascular supply (ischemia), loss of substance from the tooth (breakdown of natural barriers) and the presence of bacteria. This triad of factors may limit recovery and result in a range of complications. pulp, these complications include necrosis, canal calcification, infection of the root canal system or internal resorption. Similarly, the periarticular tissues may undergo apical periodontitis, external resorption (inflammatory or replacement), disturbances in root development, loss of periodontal ligament (ankylosis), transient apical breakdown, soft tissue recession and/or fibrous healing. Other complications include malalignment and discoloration of teeth, difficulty with eating, compromised aesthetics and discomfort. The prognosis of certain injuries is dependent on early and correct management. Regardless of the injury, management objectives should always be focused on minimizing the impact of the aforementioned triad of factors. Other factors aside, a healthy pulp has a better prognosis than a pulp without blood supply. Healthy pulps are more resistant to bacterial invasion through the dentinal tubules and the resistance afforded by the host defense mechanisms through the neurovascular supply. This underscores the importance of conservative pulp therapies and restorative dentistry aimed at limiting the ingress of bacterial invasion.⁸⁻⁹

Conclusion

*HEALING TAKES COURAGE AND WE ALL HAVE COURAG
EVEN IF WE HAVE TO DIG A LITTLE TO FIND IT*

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Dental trauma is not a disease but rather an unfortunate impact injury to the teeth and mouth that can arise from any activity of daily living. Its prevalence remains high and studies have indicated that its impact may exceed caries and periodontal disease in certain populations. Although there is a need to standardize reporting and research, epidemiological studies have indicated that approximately one-third of toddlers and one-quarter of adolescents and adults have experienced dental trauma. Most of these injuries involve the upper central incisors from falls at home or sustained while playing sport. Predicting the prognosis of teeth is difficult due to methodological, behavioural, cultural and environmental factors. This further suggests the need to establish a reliable evidence base. The prognosis for some dental injuries (e.g., avulsion injuries) depends on early and correct treatment. For this reason, it is important that a dental emergency service be organized in each geographic region. Ideally, such a service would be provided on a 24-hour basis. During office hours, dental clinics can provide emergency service. However, because the majority of dental injuries occur outside office hours other solutions also must be provided. A well-functioning emergency service outside office hours can be provided via a central dental emergency clinic or hospital.⁹

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