

Fifth stage

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Management of traumatic injuries to the teeth and supporting tissues of children

One of the most common dental problems in children is an injury to both the primary and permanent teeth and the supporting structures which vary in its severity from a simple condition like mild chipping of the enamel to severe cases like in maxillofacial injury that demand specific dental treatment. Complications, like malformation, degeneration, necrosis, abscess formation and even tooth loss from the arch, will result if the condition is left untreated. The likelihood of success often depends on the rapidity with which the tooth is treated after the injury, regardless of whether the procedure involves protecting a large area of exposed dentin or treating a vital pulp exposure.

The diagnosis of the extent of the injury after a blow to a tooth, regardless of loss of tooth structure, is difficult and often inconclusive. Trauma to a tooth is invariably followed by pulpal hyperemia, the extent of which cannot always be determined by available diagnostic methods. Congestion and alteration in the blood flow in the pulp may be sufficient to initiate irreversible degenerative changes which, over time, can cause pulpal necrosis. In addition, the apical vessels may have been severed or damaged enough to interfere with the normal reparative process. Treatment of injuries causing pulp exposure or tooth displacement is particularly challenging because the prognosis of the involved tooth is often uncertain.

The International Association of Dental Traumatology reports that one of every two children sustains a dental injury, most often between the ages of 8 and 12 years. They suggest that, in most cases of dental trauma, a

rapid and appropriate treatment can lessen its impact from both an oral and an aesthetic standpoint.

History And Examination Of The Injury

• Medical history

Accurate medical history should be taken with record information involving nausea, vomiting, drowsiness, or possible cerebral spinal fluid leakage from the nose and ears, which would indicate a skull fracture. In addition, the patient should be evaluated for lacerations and facial bone fractures. Obtaining a baseline temperature, pulse, blood pressure, and respiratory rate should be considered as information to be gathered before addressing the dental needs of the patient. A quick cranial nerve evaluation involving the following four areas:

1. Extraocular muscles are intact and functioning appropriately; that is, the patient can track a finger moving vertically and horizontally through the visual field with the eyes remaining in tandem.
2. Pupils are equal, round, and reactive to light with accommodation.
3. Sensory function is normal as measured through light touch to various areas of the face.
4. Symmetry of motor function is present, as assessed by having the patient frown, smile, move the tongue, and perform several voluntary muscular movements.

• Dental history

Accurate dental history should be taken with record information involving:

1. Cause of trauma.
2. Time of trauma. The time interval between injury and treatment significantly influences the prognosis of an injured tooth. Furthermore, the prognosis of the injured teeth maintaining pulp vitality diminished when treatment was delayed. The loss of vitality of some injured teeth

occurred as early as 3 months and as late as 24 months after the injury, which justifies a long follow-up period after injury.

There are three major categories of treatment timing:

- acute treatment (i.e., within a few hours),
- subacute treatment (i.e., within the first 24 hours),
- and delayed treatment (i.e., after the first 24 hours).

3. The place; where did the injury occur, may indicate the need for tetanus prophylaxis.

4. Pain is important in determining the extent of the injury. The patient's complaints and experiences after the injury are often valuable in determining the extent of the injury and in estimating the ability of the injured pulp and supporting tissues to overcome the effects of the injury.

1. Pain caused by thermal change is indicative of significant pulpal inflammation.
2. Pain occurring when the teeth are brought into normal occlusion may indicate that the tooth has been displaced. Such pain could likewise indicate an injury to the periodontal and supporting tissues.

• **Clinical examination**

1. Visual examination:

A. Any leakage of straw colored fluid from the nose, bruising, hemorrhage or laceration of the soft tissues or swelling.

B. Type of fracture: Classification of crown fractures depends on describing the extent of damage to the crown of the tooth

-- Crown fracture—uncomplicated: an enamel fracture or an enamel-dentin fracture that does not involve the pulp.

-- Crown fracture—complicated: an enamel-dentin fracture with pulp exposure

- C. Discoloration of the tooth. The color of the injured tooth should be carefully compared with that of adjacent uninjured teeth (pink or reddish mean hyperemia, gray mean non vital with pulp necrosis).
- D. Oral hygiene.
- E. Occlusion.
- F. Deviation in the path of mandible during mouth opening.

The clinical examination should be conducted after the teeth in the area of injury have been carefully cleaned of debris. A piece of cotton moistened with saline or hydrogen peroxide can be used to clean the teeth and surrounded area .When the injury has resulted in a fracture of the crown, the dentist should observe the amount of tooth structure that has been lost and should look for evidence of pulp exposure. With the aid of a good light, the dentist should carefully examine the clinical crown for cracks and craze lines, the presence of which could influence the type of permanent restoration used for the tooth.

2. A Digital examination

- a. Tenderness of the tooth to gentle percussion.
- b. Mobility of the tooth.
- c. Vitality test of the injured tooth by thermal or electrical pulptester.

Immediately after trauma, it does not give response to vitality test because the tooth is in state of shock ,re-examine the tooth after 6 weeks and if the child does not give response, this is an indicator that the tooth is non vital. The injured tooth should be performed, and the teeth in the immediate area, as well as those in the opposing arch, should be tested. When the electric pulp tester is used, the dentist should first determine the normal reading by testing an uninjured tooth on the opposite side of the mouth and recording the lowest number at which the tooth responds. If the injured tooth requires more current than does a normal tooth, the pulp may be undergoing degenerative change, whereas if it required less current, pulpal inflammation is usually indicated. Pulp testing following traumatic injuries is a controversial issue. These procedures require cooperation and

a relaxed patient, in order to avoid false reaction. However, this is often not possible during initial treatment of injured patients, especially children. Furthermore, the electric pulp test is frequently unreliable, even on normal teeth when apices are incompletely formed.

The thermal test is probably more reliable than the electric pulp test in testing primary incisors in young children. Failure of a tooth to respond to heat indicates pulpal necrosis. The response of a tooth to a lower degree of heat than is necessary to elicit a response in adjacent teeth is an indication of inflammation. Pain occurring when ice is applied to a normal tooth will subside when the ice is removed. A more painful and often lingering reaction to cold indicates a pathologic change within the pulp, the nature of which can be determined when the reaction is correlated with other clinical observations. Failure of a recently traumatized tooth to respond to the pulp test is not uncommon and may indicate a previous injury with a resulting necrotic pulp. However, the traumatized tooth may be in a state of shock and as a result may fail to respond to the accepted methods of determining pulp vitality. The failure of a pulp to respond immediately after an accident is not an indication for endodontic therapy. Instead, emergency treatment should be completed, and the tooth should be retested at the next follow-up visit.

3.Radiographical Examination

The examination of traumatized teeth cannot be considered complete without a radiograph of the injured tooth, the adjacent teeth, and sometimes the teeth in the opposing arch. In search of a fractured tooth fragment, it may be necessary to obtain a radiograph of the soft tissue surrounding the injury site.

Radiographs are taken for:

- 1) Baseline evaluation.
- 2) Medicolegal records.
- 3) Follow up evaluation (comparison with the records in future).

Frequent, periodic radiographs reveal evidence of continued pulp vitality or adverse changes that take place within the pulp or the supporting tissues. In young teeth in which the pulp recovers from the initial trauma, the pulp chamber and canal decrease in size coincident with the normal formation of secondary dentin. After a period of time an inconsistency in the true size or contour of the pulp chamber or canal compared with that of adjacent teeth may indicate a developing pathologic condition.

4) To assess the size of pulp chamber and proximity to the fracture line. The relative sizes of the pulp chamber and canal should be carefully examined. Irregularities or an inconsistency in the size of the chamber or canal compared with that of adjacent teeth may be evidence of a previous injury. This observation is important in determining the immediate course of treatment.

5) Determine the stage of root development (the stage of apical development often indicates the type of treatment).

6) Presence of root fracture or alveolar bone fracture. A root fracture as a result of the injury or one previously sustained can be detected by a careful examination of the radiograph. However, the presence of a root fracture may not influence the course of treatment, particularly if the fracture line is in the region of the apical third. Teeth with root fractures in this area rarely need stabilization, and a fibrous or calcified union usually results.

7) To ascertain the position of traumatized tooth and its relationship to the unerupted teeth in the area (dislocation of the tooth). If teeth have been discernibly dislocated, with or without root fracture, two or three radiographs of the area at different angles may be needed to clearly define the defect and aid the dentist in deciding on a course of treatment.

8) Periodontal ligament condition.

9) Pre-existing pathological condition.

10) Extraoral radiographs help in diagnosis of jaw fractures, complex injuries (to identify the extent and location of all injuries e.g. panoramic,

oblique lateral jaw radiograph are useful in addition to the diagnostic process.

The aim of treatment of any injured tooth is to:

- 1) Maintain vitality
- 2) Allow normal development and growth of the jaws and alveolar bone

Emergency treatment of soft tissue injury

Injury to the teeth of children is often accompanied by:

- 1) Open wounds of the oral tissues,
- 2) Abrasion of the facial tissues,
- 3) Puncture wounds.

The dentist must recognize the possibility of the development of tetanus after the injury and must carry out adequate first-aid measures. Primary immunization is usually a part of medical care during the first 2 years of life. However, primary immunization cannot be assumed—it must be confirmed by examination of the child's medical record.

When the child who has had primary immunization receives an injury from an object that is likely to have been contaminated, the antibody forming mechanism may be activated with a booster injection of toxoid. An unimmunized child can be protected through passive immunization or serotherapy with tetanus antitoxin (tetanus immune globulin, or TIG).

The dentist examining the child after an injury should determine the child's immunization status, carry out adequate debridement of the wound, and, when indicated, refer the child to the family physician. Tetanus is often fatal, and preventive measures must be taken if there is a possibility that an injured child is not adequately immunized.

Debridement, suturing, and/or hemorrhage control of open soft-tissue wounds should be carried out as indicated. Working with an oral and maxillofacial surgeon or a plastic surgeon may also be indicated. In extensive injury the child should be hospitalized.

