



AN OVERVIEW OF CLASSIFICATION OF TRAUMATIC INJURIES TO TOOTH AND ITS SUPPORTING STRUCTURE

Dr. Bharti Sharma

MDS Conservative dentistry and endodontics Astd. Proff at GDC Shimla

Dr. Aradhna Kaushal*

MDS Conservative dentistry and endodontics Himachal dental college

*Corresponding Author

ABSTRACT

A systematic review of the literature was undertaken to evaluate the criteria used for the diagnostic classification of traumatic dental injuries from an epidemiological standpoint. In the 1950, Pediatric dentist G.E. Ellis was the first person to promote a universal classification of dental injuries. Dental injuries have been classified according to a variety of factors, such as etiology, anatomy, pathology or therapeutic considerations. The most frequent type of injury was a simple crown fracture of the maxillary central incisors in the permanent dentition while injuries to the periodontal tissues were more common in the primary dentition. Paper describes the various categories of tooth injuries.

KEYWORDS : crown injuries, root injuries, supporting tooth injuries

INTRODUCTION:

There are various types of dental injuries related to the tooth and various tissues surrounding it. Minor falls, accidents in sports or childish pranks may produce greatest number of teeth fractures and teeth displacements in children. From these accidents, child's facial appearance becomes so altered as to make an attractive child appear unattractive. Dental injuries are considered emergency situation that require immediate care. The purpose of this article is aimed to overview the classification of the traumatized teeth.

I. BENNETT'S CLASSIFICATION (1963)¹

Bennett's classification is according to injuries to periodontium and alveolus considering the anatomy and morphology of the teeth which can be applied partially for primary and permanent teeth. This classification is based on location of fracture.

Table No.1: Bennett's Classification

Class I	Traumatized tooth
• Ia	Tooth is firm in alveolus
• Ib	Tooth is subluxed in alveolus
Class II	Coronal fracture
• IIa	Fracture of enamel
• IIb	Fracture of enamel and dentin
Class III	Coronal fracture with pulp exposure
Class IV	Root fracture
• IVa	Without coronal fracture
• IVb	With coronal fracture
Class V	Avulsion of tooth

II. Classification Of Injuries To Anterior Teeth By Ellis And Davey (1970)²

It is a simplified classification, which groups many injuries and allows for subjective interpretation by including broad terms such as simple or extensive fractures.

Table No.2: Classification of Injuries to Anterior Teeth by Ellis and Davey

Class I	Simple fracture of crown involving only enamel with little or no dentin
Class II	Extensive fracture of crown involving considerable dentin but not exposing dental pulp
Class III	Extensive fracture of crown involving considerable dentin and exposing dental pulp
Class IV	The traumatized tooth that becomes non vital with or without loss of crown structure
Class V	Total tooth loss – avulsion
Class IX	Traumatic injuries of primary teeth

Class VI	Fracture of the root with or without loss of crown structure
Class VII	Displacement of tooth with neither crown nor root fracture
Class VIII	Fracture of crown en masse and its displacement

III. Classification Of Traumatic Injuries By Johnson (1981)³

a. Injuries of Teeth

- **Crown craze or crack-** It should be noted whether the injury is a crack or an incomplete fracture of the enamel without loss of tooth structure and whether it is horizontal, vertical or oblique.
- **Crown fracture-** The area in which the fracture occurs should be specified as confined to enamel; to enamel and dentin; or enamel, dentin and pulp. It should be described as horizontal, vertical or oblique (involving mesio-incisal or disto-incisal line angle).
- **Crown- root fracture-** This type of fracture should be evaluated to determine the presence of possible pulp exposure. The extent of the fracture below the gingival margin should be recorded.
- **Root fracture-** It should be determined whether the apical third, middle third or the cervical third is involved and whether the fracture is horizontal or vertical.

b. Injuries of Teeth and Supporting Structures

- **Tooth displacement-** The type of displacement should be specified; **intrusion** is displacement of the tooth into the socket, **extrusion** is partial displacement of the tooth out of the socket.
- **Labial displacement-** Is displacement towards the lips; **lingual displacement** is displacement towards the palate; **lateral displacement** is displacement of the tooth towards the mesial or distal aspect, usually into a missing tooth space.
- **Evisulsion-** (Avulsion, Exarticulation, Knock-out, Lost) is complete displacement of the tooth from the socket. Evisulsion means "tearing out" and avulsion is tearing away of a part of structure.

c. Injuries of Tooth Supporting Structures

The following injuries must be differentiated; sensitivity (concussion), mobility (looseness or Subluxation), compression fracture of the alveolar socket (a crushing injury of the alveolar socket bone found in intrusion), alveolar socket wall fracture (labial or lingual), alveolar process fracture, maxillary fracture or mandibular fracture.

IV. Classification By Garcia- Godoy (1981)⁴

It is a numerically descriptive classification that holds good for

the primary and permanent teeth. It is based on **Andreasen's** modification of **WHO's** classification.

Table No.3: Classification By Garcia- Godoy

Class 0	Enamel crack
Class 1	Enamel fracture
Class 2	Enamel – dentin fracture without pulp exposure
Class 3	Enamel – dentin fracture with pulp exposure
Class 4	Enamel dentin – cementum fracture without pulp exposure
Class 5	Enamel dentin cementum fracture with pulp exposure
Class 6	Root fracture
Class 7	Concussion
Class 8	Luxation
Class 9	Lateral displacement
Class 10	Intrusion
Class 11	Extrusion
Class 12	Avulsion

V. Classification By Who (1994)⁽⁵⁾

Table No.4: Classification By Who

873.60	Enamel fracture
873.61	Enamel and dentin fracture without pulp exposure
873.62	Enamel and dentin fracture with pulp exposure
873.63	Root fracture
873.64	Crown-root fracture
873.66	Concussion, luxation
873.67	Intrusion, extrusion
873.68	Avulsion
873.69	Soft tissue injuries

V. Classification Based Upon A System Adopted By The W.h.o. In Its "application Of International Classification Of Diseases To Dentistry And Stomatology" [1992]⁽⁶⁾

A. Injuries To The Hard Dental Tissues And The Pulp

(I) Enamel Infarction (n502. 50)

An incomplete fracture (crack) of enamel without loss of tooth substance. (Fig. 1)

(ii) Enamel fracture (uncomplicated crown fracture) (N 502. 50)

A fracture with loss of tooth substance confined to enamel. (Fig. 2)

(iii) Enamel dentin fracture (N 502. 51)

A fracture with loss of tooth substance confined to enamel and dentin but not involving the pulp.

(iv) Complicated crown fracture (N 502. 52)

A fracture involving enamel and dentin and exposing the pulp. (Fig.3)

(v) Complicated crown- root fracture (N502. 54)

A fracture involving enamel, dentin and cementum and exposing the pulp.

(vi) Root fracture (N 502. 53) A fracture involving dentin, cementum and the pulp. Root fracture can be further classified according to displacement of the coronal fragment.



Fig. No. 1: Enamel infarction



Fig. No. 2: Enamel fracture



Fig.No. 3: Crown fracture without pulpal involvement

b. Injuries to the Periodontal Tissues

(I) Concussion (N503. 20)

An injury to the tooth displacement of the tooth, but with marked reaction to percussion. (Fig. 4)

(ii) Subluxation (loosening) (N503. 20)

An injury to the tooth without displacement of the tooth. (Fig. 5)

(iii) Extrusive luxation (peripheral dislocation, partial avulsion) (N503. 20)

Partial displacement of the tooth out of its socket. (Fig. 6)

- **Lateral luxation (N503.21):** Displacement of the tooth in a direction other than axially. This is accompanied by communication or fracture of the alveolar socket. (Fig. 7)
- **Intrusive luxation (N503. 21):** Displacement of the tooth into the alveolar bone. This injury is accompanied by communication or fracture of the alveolar socket. (Fig. 8)
- **Avulsion (exarticulation) (N503. 22):** Complete displacement of the tooth out of its socket. (Fig. 9)



Fig. No. 4: Concussion



Fig. No. 5: Subluxation



Fig. No. 6: Extrusive luxation



Fig. No. 7: Lateral luxation



Fig. No. 8: Intrusive luxation



Fig. No. 9: Avulsion

c. Injuries of the Supporting Bone

(I) Communication of the mandibular or maxillary (N502. 40) alveolar socket

Crushing and compression of the alveolar socket. This condition is found concomitantly with intrusive and lateral luxations.

(ii) Fracture of the mandibular (N502. 60) or maxillary (N502. 40) alveolar socket wall

A fracture of the facial or oral socket wall.

(iii) Fracture of the mandibular (N502. 60) or maxillary (N502. 40) alveolar process

A fracture of the alveolar process, which may or may not involve the alveolar socket.

(iv) Fracture of the mandible (N502. 61) or the maxilla (N502. 42)

A fracture involving the base of the maxilla or mandible and often the alveolar process (jaw fracture). The fracture may or may not involve the alveolar socket.

d. Injuries to the Gingiva or Oral Mucosa

(I) Laceration of gingiva or oral mucosa (S01. 50)

A shallow or deep wound in the mucosa resulting from a tear, and usually produced by a sharp object. They may involve deep structures and are followed by break in mucosa.

(ii) Contusion of gingiva or oral mucosa (S00. 50)

A bruise usually produced by impact with a blunt object and

not accompanied by a break in the mucosa, usually causing sub mucosal hemorrhage.

(iii) Abrasion of gingiva or oral mucosa (S00. 50)

A superficial wound produced by rubbing or scraping of the mucosa, leaving a raw or bleeding surface. These are superficial wounds and do not involve the deep structures.

Table No.5: Classification according to the International Classification of Diseases (1992)

Injuries to the hard dental tissues and pulp enamel infraction	N 502.50	An incomplete fracture (crack) of the enamel without loss of tooth substance
Enamel fracture (uncomplicated crown Fracture)	N 502.50	A fracture with loss of tooth substance confined to the enamel
Enamel – dentin fracture (uncomplicated, crown fracture)	EN 502.51	A fracture with loss of tooth substance confined to enamel and dentin but not involving the pulp
Complicated crown Fracture	N 502.52	A fracture involving enamel and dentin and exposing the pulp
Complicated crown root Fracture	N 502.54	A fracture involving enamel – dentin and cementum and exposing the pulp
Root fracture	N 503.53	A fracture involving dentin, cementum and the pulp
Injuries to the periodontal tissues concussion	N 503.20	An injury to the tooth –supporting structures without abnormal loosening or displacement of the tooth, but with marked reaction to percussion
Subluxation	N 503.20	An injury to the tooth supporting structures with abnormal loosening, but without displacement of the tooth.
Extrusive luxation (Peripheral dislocation, partial avulsion)	N 503.20	Partial displacement of the tooth out of its sockets
Lateral luxation	N 503.20	Displacement of the tooth in a direction other than axiallary. This is accompanied by communication or fracture of the alveolar socket.
Intrusive luxation (Central Dislocation)	N 503.21	Displacement of the tooth into the alveolar bone. This injury is accompanied by comminuting for fracture of the alveolarsocket.
Avulsion (Exarticulation)	N 503.22	Complete displacement of the tooth out of its socket
Fracture of the mandibular or maxillary alveolar socket wall	N 502.40 N 502.60	A fracture confined to the facial or oral socket wall.

Fracture of the mandible or maxilla	N 502.61 N (502.42)	A fracture involving the base of mandible or maxilla and often the alveolar process (jaw fracture). The fracture may or may not involve the alveolar socket.
Laceration of gingival or oral mucosa	S 01.50	A shallow or deep wound in the mucosa resulting from a tear, and usually produced by a sharp object
Contusion of gingival or oral mucosa	S 00.50	A bruise usually produced by impact with a blunt object and not accompanied by a break in the mucosa, usually causing sub mucosal hemorrhage.
Abrasion of gingival or oral mucosa	S 00.50	A superficial wound produced by rubbing or scraping of the mucosa leaving a raw, bleeding surface.

VI. CLASSIFICATION BY HAMILTON, ET AL.⁽⁶⁾ (1997)

- Fracture confined to enamel
- Fracture involving dentin
- Fracture with pulp exposed
- Intrinsic discoloration
- Abnormal mobility
- nfracclusion

VII. CLASSIFICATION BY MCDONALD⁽⁷⁾ (2004)

- **Class 1** - Simple fracture of the crown involving little or no dentin.
- **Class 2** - Extensive fracture of the crown involving considerable dentin but not the dental pulp.
- **Class 3** - Extensive fracture of the crown with an exposure of the dental pulp.
- **Class 4** - Loss of the entire crown.

Hence, all the classification systems include Avulsion as their essential component and define it as the complete separation of a tooth from its alveolus by traumatic injuries, most commonly used in reference to dental injuries resulting from acute trauma.

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