# Pediatric Dentistry

# 5 th Year

## Lec. 7

## Management of Trauma to the Teeth and Supporting Tissues



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# Methods of 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.
c. Discoloration of the tooth.
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. With light transmitted through the teeth in the area, the color of the injured tooth should be carefully compared with that of adjacent uninjured teeth.

## 2. Digital examination:

a. Tenderness of the tooth to gentile percussion.
b. Mobility of the tooth.
c. Vitality test of the injured tooth by thermal or electrical pulp tester.

Immediately after trauma, it does not give response to vitality test (why?) reexamine 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

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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 also somewhat helpful in determining the degree of pulpal damage after trauma. Although there are difficulties with the thermal test, it 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.



***Note:*** In children the electric pulp tester is controversy because it needs cooperation and a relaxed child. When the child come from the 1st time because of anxiety the child will give false response.

## 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.

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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.
11) Soft tissue radiographs are helpful in determining displacement of tooth/teeth fragments into adjacent soft tissue.

## 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

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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.



**Note:** 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

## Types of fracture

By Ellis and Davey (1960):
Class I: Enamel fracture;
Class II: Enamel and dentin fracture;
Class III: Enamel and dentin fracture exposing dental pulp;
Class IV: The traumatized tooth that becomes non vital;
Class V: Avulsion;
Class VI: Fracture of the root;
Class VII: Displacement of tooth;
Class VIII: Fracture of crown en masse;
Class IX: Traumatic injuries of primary teeth.

Classification by McDonald (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.

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# Emergency Treatment and Temporary Restoration of Fractured Teeth without Pulp Exposure



## Crown Craze or Crack:

These are minute cracks extending throughout the labiolingual surface, usually resulting from direct trauma to a tooth. These crazed areas may involve enamel alone or both enamel and dentin.

A trauma to a tooth that causes a loss of only a small portion of enamel should be treated as carefully as one in which greater tooth structure is lost. The emergency treatment of minor injuries in which only the enamel is fractured may consist of no more than smoothing the rough, jagged tooth structure. However, without exception, a thorough examination should be conducted.

The patient should be reexamined at 2 weeks and again at 1 month after the injury. If the tooth appears to have recovered at that time, continued observation at the patient's regular recall appointments should be the rule.

Sudden injuries with a resultant extensive loss of tooth structure and exposed dentin require an immediate temporary restoration or protective covering (to avoid further damaging of the pulp from thermal or bacteria which can transmitted to the pulp through dentinal tubule), in addition to the complete diagnostic procedure. In this type of injury, initial pulpal hyperemia and the possibility of further trauma to the pulp by pressure or by thermal or chemical irritants must be reduced. Furthermore, if normal contact with the adjacent or opposing teeth had been lost, temporary restoration or protective covering can be designed to maintain the arch integrity. Because providing an adequate permanent restoration may depend on maintaining the normal alignment and position of teeth in the area, this part of the treatment is as **important as** maintaining the vitality of the teeth. Several restorations that will satisfy these requirements can easily be fabricated.

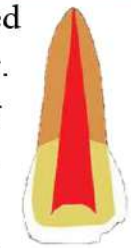
There are factors that can affect the treatment:

1) The time dentin had been exposed.
2) The thickness of the dentin covering the pulp.
3) The stage of the development of the root.



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**If thick layer of dentin cover that pulp**, a direct pulp capping is indicated to cover the dentinal tubule by Ca $(OH)_2$ and hold the medication by means of retainer. Use an orthodontic band (or one of the followings: acrylic crown (which is good for esthetic), celluloid crown, stainless steel crown, cupper ring). Then fill the gap with cement and ask the patient to come after some time to check the vitality, the mobility, and the band should stay 6-8 weeks if everything is all right then restore the teeth.



**If the patient have class II # near the pulp**:

- ✓ If the patient come immediately do pulp capping.
- ✓ If the patient come later on then we consider it as an exposure and we do root canal filling because the thin layer of dentin left is not enough to protect the pulp from infection.



## Fragment Restoration (Reattachment of Tooth Fragment)

Occasionally the dentist may have the opportunity to reattach the fragment of a fractured tooth using resin and bonding techniques. This procedure is atraumatic and seems to be the ideal method of restoring the fractured crown. Sealing the injured tooth and aesthetically restoring its natural contour and color are accomplished simply and constitute an excellent service to the patient.

The procedure provides an essentially perfect temporary restoration that may be retained a long time in some cases. It is not often that the fractured tooth fragment remains intact and is recovered after an injury, but when this happens, the dentist may consider the reattachment procedure. The tooth requires no mechanical preparation because retention is provided by enamel etching and bonding techniques. If little or no dentin is exposed, the fragment and the fractured tooth enamel are etched and reattached with bonding agents and materials.

For cases in which considerable dentin is exposed or a direct pulp cap is indicated, some controversy exists about the best treatment to enhance the likelihood of maintaining pulp vitality. Some believe that the meticulous use of bonding agents and materials to directly cap the exposed dentin and the pulp, if exposed, (i.e., the total-etch technique) is best, whereas others believe that calcium hydroxide should be applied to the exposed dentin and pulp before the bonding procedure is completed.

After the fragment was trial-seated to confirm a precise fit, the exposed dentin of the fractured tooth was covered with a thin layer of hard-setting calcium hydroxide that was allowed to remain as a sedative dressing between the tooth and restored fragment. A

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portion of the dentin in the fragment was removed to provide space for the calcium hydroxide. The fragment was then soaked in etchant, and the fractured area of the tooth was also etched well beyond the fracture site. After thorough rinsing and drying of all etched enamel, the fragment and the etched portion of the tooth were painted with a light-curing sealant material bonding agent was recommended.

The selected shade of composite resin was used to fill the prepared void in the fragment, and it was then carefully seated into its correct position and held firmly while the material was light-cured. Subsequent radiographs and vitality tests indicated that the tooth had probably responded favorably.

## Temporary Bonded Resin Restoration

The excellent marginal seal and retention derived from the application of aesthetic restorative materials to etched enamel surfaces have revolutionized the approach to the restoration of fractured anterior teeth. These bonding techniques are highly successful and versatile in many situations involving anterior trauma.

It may not be advisable to restore an extensive crown fracture with a finished aesthetic resin restoration on the day of the injury because it is usually best not to manipulate the tooth more than is absolutely necessary to make a diagnosis and provide emergency treatment. In addition, such emergencies are usually treated at unscheduled appointments, and this treatment should be carried out as efficiently as possible to prevent significant disruption of the dentist's scheduled appointments. A temporary restorative resin restoration can be placed efficiently and is often the treatment of choice.

Conventional bonding procedures are used for application of the restorative resin material as a protective covering at the fracture site. As a short-term temporary restoration, it requires little or no finishing and does not need to restore the tooth to normal contour. However, the restoration should cover the fractured surfaces and maintain any natural proximal contacts the patient may have had before the injury. After an adequate recovery period, an aesthetic resin restoration may be completed, often without removal of all the temporary resin material. However, the outer surfaces of the temporary restoration should be removed superficially before the new material is applied. The margins of the new restoration should extend beyond the margins of the temporary restoration and onto newly etched enamel.

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