

## Complete Summary

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### **GUIDELINE TITLE**

Clinical guideline on management of acute dental trauma.

### **BIBLIOGRAPHIC SOURCE(S)**

American Academy of Pediatric Dentistry (AAPD). Guideline on management of acute dental trauma. Chicago (IL): American Academy of Pediatric Dentistry (AAPD); 2007. 14 p. [81 references]

### **GUIDELINE STATUS**

This is the current release of the guideline.

It updates a previously published version: American Academy of Pediatric Dentistry. Clinical guideline on management of acute dental trauma. Chicago (IL): American Academy of Pediatric Dentistry; 2004. 8 p.

## COMPLETE SUMMARY CONTENT

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## SCOPE

### **DISEASE/CONDITION(S)**

Acute traumatic dental injuries including:

- Infraction
- Crown fracture (uncomplicated or complicated)
- Crown/root fracture
- Root fracture
- Concussion
- Subluxation

- Lateral luxation
- Intrusion
- Extrusion
- Avulsion

## **GUIDELINE CATEGORY**

Diagnosis  
Management  
Treatment

## **CLINICAL SPECIALTY**

Dentistry  
Emergency Medicine  
Pediatrics

## **INTENDED USERS**

Dentists  
Emergency Medical Technicians/Paramedics  
Health Care Providers  
Health Plans  
Managed Care Organizations  
Physicians  
Public Health Departments

## **GUIDELINE OBJECTIVE(S)**

To define, describe appearances, and set forth objectives for general management of acute traumatic dental injuries

## **TARGET POPULATION**

Children with acute traumatic dental injuries

## **INTERVENTIONS AND PRACTICES CONSIDERED**

### **Diagnosis**

1. Radiographic assessment
2. Clinical assessment

### **Management/Treatment**

1. Flexible splinting
2. Maintaining pulp vitality with continued monitoring, endodontic treatment, and reattachment of the crown fragment
3. Restoring normal esthetics and function with fixed or removable appliances
4. Examining injured lips, tongue, and gingiva for tooth fragments
5. For small fractures, smoothing rough margins and edges

6. Pulpal treatment alternatives for primary teeth:
  - Pulpotomy
  - Pulpectomy
  - Extraction
7. Pulpal treatment alternatives for permanent teeth:
  - Direct pulp capping
  - Partial pulpotomy
  - Pulpectomy (start of root canal therapy)
8. Tooth removal
9. Coronal fragment removal followed by supragingival restoration or necessary gingivectomy; osteotomy; or surgical or orthodontic extrusion to prepare for restoration
10. Repositioning of displaced tooth (passive, active, and/or surgical)
11. Tooth replantation
12. Tetanus prophylaxis
13. Antibiotic coverage
14. Antiresorptive-regenerative therapies

## **MAJOR OUTCOMES CONSIDERED**

- Pulp vitality
- Esthetics and function

## **METHODOLOGY**

### **METHODS USED TO COLLECT/SELECT EVIDENCE**

Hand-searches of Published Literature (Primary Sources)  
 Searches of Electronic Databases

### **DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE**

A MEDLINE search was conducted using the terms "teeth," "trauma," "permanent teeth," and "primary teeth." Also, a review of the journal *Dental Traumatology* was conducted for the years 2000-2006.

### **NUMBER OF SOURCE DOCUMENTS**

Not stated

### **METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE**

Subjective Review

### **RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE**

Not applicable

### **METHODS USED TO ANALYZE THE EVIDENCE**

Review

## **DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE**

This guideline is based on a review of the current dental and medical literature related to dental trauma.

## **METHODS USED TO FORMULATE THE RECOMMENDATIONS**

Expert Consensus

## **DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS**

The clinical guidelines of the American Academy of Pediatric Dentistry (AAPD) are developed under the direction of the Board of Trustees, utilizing the resources and expertise of its membership operating through the Council on Clinical Affairs (CCA).

Proposals to develop or modify guidelines may originate from 4 sources:

1. The officers or trustees acting at any meeting of the Board of Trustees
2. A council, committee, or task force in its report to the Board of Trustees
3. Any member of the AAPD acting through the Reference Committee hearing of the General Assembly at the Annual Session
4. Officers, trustees, council and committee chairs, or other participants at the AAPD's Annual Strategic Planning Session

Regardless of the source, proposals are considered carefully, and those deemed sufficiently meritorious by a majority vote of the Board of Trustees are referred to the CCA for development or review/revision.

Once a charge (directive from the Board of Trustees) for development or review/revision of a clinical guideline is sent to the CCA, it is assigned to 1 or more members of the CCA for completion. CCA members are instructed to follow the specified format for a guideline. All clinical guidelines are based on 2 sources of evidence: (1) the scientific literature; and (2) experts in the field. CCA, in collaboration with the Council on Scientific Affairs, performs a comprehensive review of current scientific literature for each document. In cases where scientific data does not appear conclusive, experts may be consulted.

The CCA meets on an interim basis (midwinter) to discuss proposed clinical guidelines. Each new or reviewed/revised guideline is reviewed, discussed, and confirmed by the entire council.

## **RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS**

Not applicable

## **COST ANALYSIS**

A formal cost analysis was not performed and published cost analyses were not reviewed.

## **METHOD OF GUIDELINE VALIDATION**

Comparison with Guidelines from Other Groups  
Peer Review

## **DESCRIPTION OF METHOD OF GUIDELINE VALIDATION**

Once developed by the Council on Clinical Affairs (CCA), the proposed guideline is submitted for the consideration of the Board of Trustees. While the board may request revision, in which case it is returned to the council for modification, once accepted by majority vote of the board, it is referred for Reference Committee hearing at the upcoming Annual Session. At the Reference Committee hearing, the membership may provide comment or suggestion for alteration of the document before presentation to the General Assembly. The final document then is presented for ratification by a majority vote of the membership present and voting at the General Assembly. If accepted by the General Assembly, either as proposed or as amended by that body, the document then becomes the official American Academy of Pediatric Dentistry (AAPD) clinical guideline for publication in the AAPD's Reference Manual and on the AAPD's Web site.

## **RECOMMENDATIONS**

### **MAJOR RECOMMENDATIONS**

#### **Infraction**

**Definition:** Incomplete fracture (crack) of the enamel without loss of tooth structure

**Diagnosis:** Normal gross anatomic and radiographic appearance; craze lines apparent, especially with transillumination

**Treatment Objectives:** To maintain structural integrity and pulp viability (Andreasen & Andreasen, 1994; Robertson, 1998; Ravn, "Follow-up study of permanent incisors with enamel cracks," 1981)

**General Prognosis:** Complications are unusual (Olsburgh, Jacoby & Krejci, 2002).

#### **Crown Fracture - Uncomplicated**

**Definition:** An enamel fracture or an enamel-dentin fracture that does not involve the pulp

**Diagnosis:** Clinical and/or radiographic findings reveal a loss of tooth structure confined to the enamel or to both the enamel and dentin (Flores et al., "Guidelines, part 1," 2001; Flores et al., "Guidelines, part 3," 2001; Flores, 2002;

Andreasen & Andreasen, 2000; Holen & McTigue, 2005; Borum & Andreasen, 1998.; Fried & Erickson, 1995; McTigue, 2005; Robertson, 1998; Ravn, "Follow-up study of permanent incisors with enamel fractures," 1981; Ravn, "Follow-up study of permanent incisors with enamel-dentin fractures," 1981).

**Treatment Objectives:** To maintain pulp vitality and restore normal esthetics and function. Injured lips, tongue, and gingiva should be examined for tooth fragments. For small fractures, rough margins and edges can be smoothed. For larger fractures, the lost tooth structure can be restored (Flores et al., "Guidelines, part 1," 2001; Flores et al., "Guidelines, part 3," 2001; Flores, 2002; Andreasen & Andreasen, 2000; Holan & McTigue, 2005; Borum & Andreasen, 1998.; Fried & Erickson, 1995; American Academy of Pediatric Dentistry [AAPD], 2002; McTigue, 2005; Robertson, 1998; Olsburgh, Jacoby, & Krejci, 2002; Ravn, "Follow-up study of permanent incisors with enamel fractures," 1981; Ravn, "Follow-up study of permanent incisors with enamel-dentin fractures," 1981).

**General Prognosis:** The prognosis of uncomplicated crown fractures depends primarily upon the concomitant injury to the periodontal ligament and secondarily upon the extent of dentin exposed (Andreasen & Andreasen, 2000). Optimal treatment results follow timely assessment and care.

### **Crown Fracture - Complicated**

**Definition:** An enamel-dentin fracture with pulp exposure

**Diagnosis:** Clinical and radiographic findings reveal a loss of tooth structure with pulp exposure (Flores et al., "Guidelines, part 1," 2001; Flores et al., "Guidelines, part 3," 2001; Flores, 2002; Andreasen & Andreasen, 2000).

**Treatment Objectives:** To maintain pulp vitality and restore normal esthetics and function (AAPD, 2002). Injured lips, tongue, and gingiva should be examined for tooth fragments.

- *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 (Flores et al., "Guidelines, part 1," 2001; Flores et al, 2002; Holan & McTigue, 2005; Borum & Andreasen, 1998; Fried & Erickson, 1995).
- *Permanent Teeth:* Pulpal treatment alternatives are direct pulp capping, partial pulpotomy, and pulpectomy (start of root canal therapy) (Flores et al., "Guidelines, part 3," 2001; Andreasen & Andreasen, 2000; Olsburgh, Jacoby, & Krejci, 2002; Cvek, 1978).

**General Prognosis:** The prognosis of crown fractures appears to depend primarily upon a concomitant injury to the periodontal ligament (Andreasen & Andreasen, 2000). The age of the pulp exposure, extent of dentin exposed, and stage of root development at the time of injury secondarily affect the tooth's prognosis (Andreasen & Andreasen, 2000). Optimal treatment results follow timely assessment and care.

### **Crown/Root Fracture**

**Definition:** An enamel, dentin, and cementum fracture with or without pulp exposure

**Diagnosis:** Clinical findings usually reveal a mobile coronal fragment attached to the gingiva with or without a pulp exposure. Radiographic findings may reveal a radiolucent oblique line that comprises crown and root in a vertical direction in primary teeth and in a direction usually perpendicular to the central radiographic beam in permanent teeth. While radiographic demonstration often is difficult, root fractures can only be diagnosed radiographically (Flores et al., "Guidelines, part 1," 2001; Flores et al., "Guidelines, part 3," 2001; Flores, 2002; Andreasen & Andreasen, 2000; Andreasen & Andreasen, 1994).

**Treatment Objectives:** To maintain pulp vitality and restore normal esthetics and function (Tapias et al., 2003)

- *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 (Flores et al., "Guidelines, part 1," 2001; Flores et al., 2002).
- *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 surgical or orthodontic extrusion to prepare for restoration. If the pulp is exposed, pulpal treatment alternatives are pulp capping, pulpotomy, and root canal treatment (Flores et al., "Guidelines, part 3," 2001; Andreasen & Andreasen, 2000; Olsburgh, Jacoby, & Krejci, 2002).

**General Prognosis:** Although the treatment of crown-root fractures can be complex and laborious, most fractured permanent teeth can be saved (Andreasen & Andreasen, 2000). Fractures extending significantly below the gingival margin may not be restorable.

## **Root Fracture**

**Definition:** A dentin and cementum fracture involving the pulp

**Diagnosis:** Clinical findings reveal a mobile coronal fragment attached to the gingiva that may be displaced. Radiographic findings may reveal 1 or more radiolucent lines that separate the tooth fragments in horizontal fractures. Multiple radiographic exposures at different angulations may be required for diagnosis. A root fracture in a primary tooth may be obscured by a succedaneous tooth (Flores et al., "Guidelines, part 1," 2001; Flores et al., "Guidelines, part 3," 2001; Flores, 2002; Andreasen & Andreasen, 2000).

**Treatment Objectives:** To reposition as soon as possible and then to stabilize the coronal fragment in its anatomically correct position to optimize healing of the periodontal ligament and neurovascular supply, while maintaining esthetic and functional integrity (Andreasen & Andreasen, 1994).

- *Primary Teeth*: Treatment alternatives include extraction of coronal fragment without insisting on removing apical fragment or observation (Flores et al., "Guidelines, part 1," 2001; Flores, 2002; Holan & McTigue, 2005).
- *Permanent Teeth*: Reposition and stabilize the coronal fragment (Flores et al., "Guidelines, part 3," 2001; Andreasen & Andreasen, 2000).

**General Prognosis:** Pulp necrosis in root-fractured teeth is attributed to displacement of the coronal fragment and mature root development (Andreasen & Andreasen, 2000; Freely, Mackie, & Macfarlane, 2003). In permanent teeth, the location of the root fracture has not been shown to affect pulp survival after injury (Andreasen & Andreasen, 2000; Andreasen et al., "Healing of 400 intra-alveolar root fractures. 1. Effects of pre-injury", 2004). Therefore, preservation of teeth with root fractures occurring in the tooth's cervical third should be attempted (Andreasen & Andreasen, 2000; Andreasen et al., 2004). Young age, immature root formation, positive pulp sensitivity at time of injury, and approximating the dislocation within 1 millimeter (mm) have been found to be advantageous to both pulpal healing and hard tissue repair of the fracture (Cvek, Andreasen, & Borum, 2001; Andreasen et al., "Healing of 400 intra-alveolar root fractures. 1. Effects of pre-injury", 2004; Andreasen et al., "Healing of 400 intra-alveolar root fractures. 2. Effects of treatment", 2004).

## Concussion

**Definition:** Injury to the tooth-supporting structures without abnormal loosening or displacement of the tooth

**Diagnosis:** Because the periodontal ligament absorbs the injury and is inflamed, clinical findings reveal a tooth tender to pressure and percussion without mobility, displacement, or sulcular bleeding. Radiographic abnormalities are not expected (Flores et al., "Guidelines, part 2," 2001; Flores et al., "Guidelines, part 4," 2001; Flores, 2002; Andreasen & Andreasen, 2000; Holan & McTigue, 2005; McTigue, 2005).

**Treatment Objectives:** To optimize healing of the periodontal ligament and maintain pulp vitality (Flores et al., "Guidelines, part 2," 2001; Flores et al., "Guidelines, part 4," 2001; Flores, 2002; Andreasen & Andreasen, 2000; Holan & McTigue, 2005; Andreasen & Andreasen, 1994; McTigue, 2005; Crona-Larson, Bjarnason, & Noren, 1991)

**General Prognosis:** For primary teeth, unless associated infection exists, no pulpal therapy is indicated (Flores, 2002). Although there is a minimal risk for pulp necrosis, mature permanent teeth with closed apices may undergo pulpal necrosis due to associated injuries to the blood vessels at the apex and, therefore, must be followed carefully (Andreasen & Andreasen, 2000).

## Subluxation

**Definition:** Injury to tooth-supporting structures with abnormal loosening but without tooth displacement



**Diagnosis:** Because the periodontal ligament attempts to absorb the injury, clinical findings reveal a mobile tooth without displacement that may or may not have sulcular bleeding. Radiographic abnormalities are not expected (Flores et al., "Guidelines, part 2," 2001; Flores et al., "Guidelines, part 4," 2001; Flores, 2002; Andreasen & Andreasen, 2000).

**Treatment Objectives:** To optimize healing of the periodontal ligament and neurovascular supply (Flores et al., "Guidelines, part 2," 2001; Flores et al., "Guidelines, part 4," 2001; Flores, 2002; Andreasen & Andreasen, 2000; Holan & McTigue, 2005; Borum & Andreasen, 1998; Fried & Erickson, 1995; Soporowski, Allred, & Needleman, 1994; Ravn, 1968; Andreasen & Andreasen, 1994; McTigue, 2005; Crona-Larson, Bjarnason, & Noren, 1991)

- *Primary Teeth:* The tooth should be followed for pathology.
- *Permanent Teeth:* Stabilize the tooth and relieve any occlusal interferences. For comfort, a flexible splint can be used. Splint for no more than 2 weeks.

**General Prognosis:** Prognosis is usually favorable (Holan & McTigue, 2005; McTigue, 2005). The primary tooth should return to normal within 2 weeks (Flores, 2002). Mature permanent teeth with closed apices may undergo pulpal necrosis due to associated injuries to the blood vessels at the apex and, therefore, must be followed carefully (Andreasen & Andreasen, 2000).

## **Lateral Luxation**

**Definition:** 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 (Holan & McTigue, 2005; McTigue, 2005; Nikoui, Kenny, & Barrett, 2003).

**Diagnosis:** Clinical findings reveal that a tooth is displaced laterally with the crown usually in a palatal or lingual direction and may be locked firmly into this new position. The tooth usually is not mobile or tender to touch. Radiographic findings reveal an increase in periodontal ligament space and displacement of apex toward or through the labial bone plate (Flores et al., "Guidelines, part 2," 2001; Flores et al., "Guidelines, part 4," 2001; Flores, 2002; Andreasen & Andreasen, 2000; Nikoui, Kenny, & Barrett, 2003).

## **Treatment Objectives**

- *Primary Teeth:* To allow passive repositioning or actively reposition and splint for 1 to 2 weeks as indicated to allow for healing, except when the injury is severe or the tooth is nearing exfoliation (Flores et al., "Guidelines, part 2," 2001; Flores, 2002; Borum & Andreasen, 1998; Fried & Erickson, 1995; Soporowski, Allred, & Needleman, 1994; Ravn, 1968; Andreasen & Andreasen, 1994)
- *Permanent Teeth:* To reposition as soon as possible and then to 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. The tooth may need to be extruded to free apical lock in the cortical bone plate. Splinting an additional 2 to 4 weeks may be needed with

breakdown of marginal bone (Flores et al., "Guidelines, part 4," 2001; Andreasen & Andreasen, 2000; Andreasen & Andreasen, 1994; Crona-Larson, Bjarnason, & Noren, 1991; Nikoui, Kenny, & Barrett, 2003).

**General Prognosis:** Primary teeth requiring repositioning have an increased risk of developing pulp necrosis compared to teeth that are left to spontaneously reposition (Flores, 2002). In mature permanent teeth with closed apices, pulp necrosis and pulp canal obliteration are common healing complications while progressive root resorption is less likely to occur (Nikoui, Kenny, & Barrett, 2003).

## **Intrusion**

**Definition:** 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 (Holan & McTigue, 2005; McTigue, 2005; Humphrey, Kenny, & Barrett, 2003).

**Diagnosis:** Clinical findings reveal that the tooth appears to be shortened or, in severe cases, it may appear missing. The tooth's apex usually is displaced labially toward or through the labial bone plate in primary teeth and driven into the alveolar process in permanent teeth. The tooth is not mobile or tender to touch. Radiographic findings reveal that the tooth appears displaced apically and the periodontal ligament space is not continuous. Determination of the relationship of an intruded primary tooth with the follicle of the succedaneous tooth is mandatory. If the apex is displaced labially, the apical tip can be seen radiographically with the tooth appearing shorter than its contralateral. If the apex is displaced palatally towards the permanent tooth germ, the apical tip cannot be seen radiographically and the tooth appears elongated. An extraoral lateral radiograph also can be used to detect displacement of the apex toward or through the labial bone plate. An intruded young permanent tooth may mimic an erupting tooth (Flores et al., "Guidelines, part 2," 2001; Flores et al., "Guidelines, part 4," 2001; Flores, 2002; Andreasen & Andreasen, 2000; Humphrey, Kenny, & Barrett, 2003).

## **Treatment Objectives**

- *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 (Flores et al., "Guidelines, part 2," 2001; Flores, 2002; Borum & Andreasen, 1998; Fried & Erickson, 1995; Soporowski, Allred, & Needleman, 1994; Ravn, 1968; Andreasen & Andreasen, 1994).
- *Permanent Teeth:* To reposition passively (allowing re-eruption to its preinjury position), or actively (repositioning with traction), or surgically and to stabilize the tooth in its anatomically correct position to optimize healing of the periodontal ligament and neurovascular supply while maintaining esthetic and functional integrity. In teeth with immature root formation, the objective is to allow for spontaneous eruption. In mature teeth, the goal is to reposition the tooth with orthodontic or surgical extrusion and initiate endodontic treatment within the first 3 weeks of the traumatic incidence (Flores et al., "Guidelines, part 4," 2001; Andreasen & Andreasen, 2000; Andreasen & Andreasen, 1994; Crona-Larson, Bjarnason, & Noren, 1991; Humphrey, Kenny, & Barrett, 2003).

**General Prognosis:** In primary teeth, 90% of intruded teeth will re-erupt spontaneously (either partially or completely) in 2 to 6 months (Holan & McTigue, 2005; Gondim & Moreira Neto, 2005). Even in cases of complete intrusion and displacement of primary teeth through the labial bone plate, a retrospective study showed the re-eruption and survival of most teeth for more than 36 months (Holan & Ram, 1999). Ankylosis may occur, however, if the periodontal ligament of the affected tooth was severely damaged, thereby delaying or altering the eruption of the permanent successor (Flores, 2002). In permanent, mature teeth with closed apices, there is considerable risk for pulp necrosis, pulp canal obliteration, and progressive root resorption (Humphrey, Kenny, & Barrett, 2003). Immature permanent teeth that are allowed to reposition spontaneously demonstrate the lowest risk for healing complications (Andreasen, Bakland, & Andreasen, "Traumatic intrusion of permanent teeth. Part 2", 2006; Andreasen, Bakland, & Andreasen, "Traumatic intrusion of permanent teeth. Part 3", 2006). Extent of intrusion (7 mm or greater) and adjacent intruded teeth have a negative influence on healing (Andreasen, Bakland, & Andreasen, "Traumatic intrusion of permanent teeth. Part 2", 2006).

## **Extrusion**

**Definition:** Partial displacement of the tooth axially from the socket; partial avulsion. The periodontal ligament usually is torn (Holan & McTigue, 2005; McTigue, 2005; Lee, Barrett, & Kenny, 2003).

**Diagnosis:** Clinical findings reveal that the tooth appears elongated and is mobile. Radiographic findings reveal an increased periodontal ligament space apically (Flores et al., "Guidelines, part 2," 2001; Flores et al., "Guidelines, part 4," 2001; Flores, 2002; Andreasen & Andreasen, 2000; Lee, Barrett, & Kenny, 2003).

## **Treatment Objectives**

- *Primary Teeth:* To reposition and allow for healing, except when there are indications for an extraction (i.e., the injury is severe or the tooth is nearing exfoliation). If the treatment decision is to reposition and stabilize, splint for 1 to 2 weeks (Flores et al., "Guidelines, part 2," 2001; Flores, 2002; Holan & McTigue, 2005; Borum & Andreasen, 1998; Fried & Erickson, 1995; Soporowski, Allred, & Needleman, 1994; Ravn, 1968; Andreasen & Andreasen, 1994).
- *Permanent Teeth:* To reposition as soon as possible and then to 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 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 3 weeks (Flores et al., "Guidelines, part 4," 2001; Andreasen & Andreasen, 2000; Andreasen & Andreasen, 1994; Crona-Larson, Bjarnason, & Noren, 1991; Lee, Barrett, & Kenny, 2003).

**General Prognosis:** There is a lack of clinical studies evaluating repositioning of extruded primary teeth (Flores, 2002). In permanent mature teeth with closed apices, there is considerable risk for pulp necrosis and pulp canal obliteration

(Lee, Barrett, & Kenny, 2003). These teeth must be followed carefully (Flores et al., "Guidelines, part 4," 2001; Andreasen & Andreasen, 2000).

## **Avulsion**

**Definition:** Complete displacement of tooth out of socket. The periodontal ligament is severed and fracture of the alveolus may occur (Holan & McTigue, 2005; McTigue, 2005).

**Diagnosis:** Clinical and radiographic findings reveal that the tooth is not present in the socket or the tooth already has been replanted. Radiographic assessment will verify that the tooth is not intruded when the tooth was not found (Flores et al., "Guidelines, part 2," 2001; Flores, 2002; Andreasen & Andreasen, 2000; Holan & McTigue, 2005; McTigue, 2005).

## **Treatment Objectives**

- *Primary Teeth:* To prevent further injury to the developing successor. Avulsed primary teeth should not be replanted because of the potential for subsequent damage to developing permanent tooth germs. (Flores et al., "Guidelines, part 2," 2001; Flores, 2002; Andreasen & Andreasen, 2000; Holan & McTigue, 2005; Ravn, 1968; Andreasen & Andreasen, 1994).
- *Permanent Teeth:* To replant as soon as possible and then to stabilize the replanted tooth in its anatomically correct location to optimize healing of the periodontal ligament and neurovascular supply while maintaining esthetic and functional integrity except when replanting is contraindicated by:
  1. The child's stage of dental development (risk for ankylosis where considerable alveolar growth has to take place)
  2. Compromising medical condition
  3. Compromised integrity of the avulsed tooth or supporting tissues

Flexible splinting for 1 week is indicated (Flores et al., "Guidelines, part 5," 2001). Tetanus prophylaxis and antibiotic coverage should be considered (Flores et al., "Guidelines, part 5," 2001; Andreasen & Andreasen, 2000; Andreasen & Andreasen, 1994; "Treatment of the avulsed," 1995; Andreasen et al., "Replantation, 1," 1995; Andreasen et al., "Replantation, 2," 1995; Andreasen et al., "Replantation, 3," 1995; Andreasen et al., "Replantation, 4," 1995; Barrett & Kenny, "Survival," 1997; Barrett & Kenny, "Avulsed," 1997).

Treatment strategies are directed at avoiding inflammation that may occur as a result of the tooth's attachment damage and/or pulpal infection (Trope, 2002; AAPD, 2007).

**General Prognosis:** Prognosis in the permanent dentition is primarily dependent upon formation of root development and extraoral dry time (Flores et al., "Guidelines, part 5," 2001; Andreasen & Andreasen, 2000). The tooth has the best prognosis if replanted immediately (Andreasen & Andreasen, 1994; Trope, 2002). If the tooth cannot be replanted within 5 minutes, it should be stored in a medium that will help maintain vitality of the periodontal ligament fibers (AAPD, 2002; Sigalas et al., 2004). Transportation media for avulsed teeth include (in order of preference): Viaspan; Hank's Balanced Salt Solution (tissue culture medium); cold milk; saliva (buccal vestibule); physiologic saline; or water

("Treatment of the avulsed," 1995; Andreasen et al., "Replantation, 4," 1995; Barrett & Kenny, "Survival," 1997; Barrett & Kenny, "Avulsed," 1997; Hiltz & Trope, 1991). Limited tooth storage in a cell-compatible medium prior to replantation has produced similar healing results as compared with immediately replanted teeth (Pohl, Filippi, & Kirschner, 2005). The risk of ankylosis increases significantly with an extraoral dry time of 15 minutes (AAPD, 2002; Chappuis & von Arx, 2005). An extra-oral dry time of 60 minutes is considered the point where survival of the root periodontal cells is unlikely (Trope, 2002). In permanent avulsed teeth, there is considerable risk for pulp necrosis, root resorption, ankylosis, and subsequent infraocclusion during adolescent growth (Andreasen et al., "Replantation, 4" 1995; Barrett et al., 2005; Malmgren & Malmgren, 2002).

**Additional Considerations:** There are possible contraindications to tooth replantation. Examples are immunocompromise, severe congenital cardiac anomalies, severe uncontrolled seizure disorder, severe mental disability, severe uncontrolled diabetes, and lack of alveolar integrity.

**Current Research:** Antiresorptive-regenerative therapies may have potential for enhancing the prognosis of avulsed teeth (Pohl, Filippi, & Kirschner, 2005). Treatment strategies are directed at avoiding or minimizing inflammation, increasing revascularization, and producing hard barriers in teeth with open apices (Flores et al., "Guidelines, part 5," 2001; Trope, 2002; 2003; Trope, 2003; Filippi, Pohl, & von Arx, 2001; Finucane & Kinirons, 2003; Schjott & Andreasen, 2005; Cvek et al., 1990; Maroto et al., 2003; Villa & Fernandez, 2005; Rafter, 2005; Khin & Sae-Lim, 2003; Bryson et al., 2003). Dental practitioners should follow current literature and consider carefully evidenced-based recommendations that may enhance periodontal healing and revascularization of avulsed permanent teeth.

## CLINICAL ALGORITHM(S)

None provided

## EVIDENCE SUPPORTING THE RECOMMENDATIONS

## REFERENCES SUPPORTING THE RECOMMENDATIONS

[References open in a new window](#)

## TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

All oral health guidelines are based on 2 sources of evidence: (1) the scientific literature; and (2) experts in the field.

## BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

## POTENTIAL BENEFITS

- Improved functional and esthetic outcome for children who experience dental trauma
- Improved psychological outlook for such children

## **POTENTIAL HARMS**

The risk of ankylosis increases significantly with an extraoral dry time of 15 minutes.

## **CONTRAINDICATIONS**

### **CONTRAINDICATIONS**

- There are possible contraindications to tooth replantation. Examples are immunocompromise, severe congenital cardiac anomalies, severe uncontrolled seizure disorder, severe mental disability, severe uncontrolled diabetes, and lack of alveolar integrity.
- Replanting is contraindicated by:
  - The child's stage of dental development (risk for ankylosis where considerable alveolar growth has to take place)
  - Compromising medical condition
  - Compromised integrity of the avulsed tooth or supporting tissues

## **QUALIFYING STATEMENTS**

### **QUALIFYING STATEMENTS**

Appendix I of the original guideline document is a sample document for recording assessment of acute traumatic injuries. This sample form, developed by the American Academy of Pediatric Dentists (AAPD), is provided as a practice tool for pediatric dentists and other dentists treating children. It was developed by pediatric dentistry experts and offered to facilitate excellence in practice. This form, however, does not establish or evidence a standard of care. In issuing this form, the American Academy of Pediatric Dentists is not engaged in rendering legal or other professional advice. If such services are required, competent legal or other professional counsel should be sought. Well-designed follow-up procedures are essential to diagnose complications.

## **IMPLEMENTATION OF THE GUIDELINE**

### **DESCRIPTION OF IMPLEMENTATION STRATEGY**

An implementation strategy was not provided.

### **IMPLEMENTATION TOOLS**

Chart Documentation/Checklists/Forms  
Resources

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

## **INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES**

### **IOM CARE NEED**

Getting Better

### **IOM DOMAIN**

Effectiveness  
Safety

## **IDENTIFYING INFORMATION AND AVAILABILITY**

### **BIBLIOGRAPHIC SOURCE(S)**

American Academy of Pediatric Dentistry (AAPD). Guideline on management of acute dental trauma. Chicago (IL): American Academy of Pediatric Dentistry (AAPD); 2007. 14 p. [81 references]

### **ADAPTATION**

Not applicable: The guideline was not adapted from another source.

### **DATE RELEASED**

1991 (revised 2007 May)

### **GUIDELINE DEVELOPER(S)**

American Academy of Pediatric Dentistry - Professional Association

### **SOURCE(S) OF FUNDING**

American Academy of Pediatric Dentistry

### **GUIDELINE COMMITTEE**

Council on Clinical Affairs

### **COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE**

The Council on Clinical Affairs and Council on Scientific Affairs are comprised of pediatric dentists representing the six geographical districts of the American Academy of Pediatric Dentistry (AAPD) along with additional consultants confirmed by the Board of Trustees.

## **FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST**

Council members and consultants were asked to disclose potential conflicts of interest. None was identified.

## **GUIDELINE STATUS**

This is the current release of the guideline.

It updates a previously published version: American Academy of Pediatric Dentistry. Clinical guideline on management of acute dental trauma. Chicago (IL): American Academy of Pediatric Dentistry; 2004. 8 p.

## **GUIDELINE AVAILABILITY**

Electronic copies: Available from the [American Academy of Pediatric Dentistry Web site](#).

Print copies: Available from the American Academy of Pediatric Dentistry, 211 East Chicago Avenue, Suite 700, Chicago, Illinois 60611.

## **AVAILABILITY OF COMPANION DOCUMENTS**

Information about the American Academy of Pediatric Dentistry (AAPD) mission and guideline development process is available on the [AAPD Web site](#).

The following implementation tool is available for download from the AAPD Web site:

- [Dental growth and development chart](#)

Additionally, a sample implementation tool for recording assessment of acute traumatic injuries is included in Appendix I in the [original guideline document](#).

## **PATIENT RESOURCES**

None available

## **NGC STATUS**

This NGC summary was completed by ECRI on March 16, 2005. The information was verified by the guideline developer on April 18, 2005. This summary was updated by ECRI Institute on April 3, 2008. The updated information was verified by the guideline developer on April 30, 2008.

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