CONTENT:
Section 1. Fractures and luxations of permanent teeth
Section 2. Avulsion of permanent teeth
Section 3. Traumatic injuries to primary teeth

Disclaimer: These guidelines are intended to provide information for health care providers caring for patients with dental injuries. They represent the current best evidence based on literature research and professional opinion. As is true for all guidelines, the health care provider must apply clinical judgment dictated by the conditions present in the given traumatic situation. The IADT does not guarantee favorable outcomes from following the Guidelines, but using the recommended procedures can maximize the chances of success.

These Guidelines have been endorsed by the following professional organizations: (We will add organizations as they provide their endorsements)
INTRODUCTION

Traumatic dental injuries (TDIs) occur with great frequency in preschool, school age children and young adults comprising 5% of all injuries for which people seek treatment. A twelve year review of the literature reports that 25% of all school children experience dental trauma and 33% of adults have experienced trauma to the permanent dentition with the majority of injuries occurring before age 19. Luxation injuries are the most common TDIs in the primary dentition, whereas crown fractures are more commonly reported for the permanent dentition. TDIs present a challenge to clinicians worldwide. Consequently, proper diagnosis treatment planning and followup are critical to assure a favorable outcome.

Guidelines, among other things, should assist dentists, other health care professionals and patients in decision making. Also, they should be credible, readily understandable and practical with the aim of delivering appropriate care as effectively and efficiently as possible.

The following guidelines by the International Association of Dental Traumatology (IADT) represent an updated set of guidelines based on the original guidelines published in 2007. The update was accomplished by doing a review of the current dental literature using EMBASE, MEDLINE, and PUBMED searches from 1996-2011 as well as a search of the journal of Dental Traumatology from 2000 to 2011. Search words included tooth fractures, root fractures, tooth luxation, lateral luxation and permanent teeth, intruded permanent teeth, and luxated permanent teeth.

The primary goal of these guidelines is to delineate an approach for the immediate or urgent care of TDIs. It is understood that subsequent treatment may require secondary and tertiary interventions involving specialist consultations, services and/or materials/methods not always available to the primary treating clinician.

The IADT published its first set of guidelines in 2001 and updated them in 2007. As with the previous guidelines, the working group included experienced investigators and clinicians from various dental specialties and general practice. This revision represents the best evidence based on the available literature and expert professional judgment. In cases where the data did not appear conclusive, recommendations are based on the consensus opinion of the working group followed by review by the members of the IADT Board of Directors. It is understood that guidelines are to be applied with evaluation of the specific clinical circumstances, clinicians’ judgement and patients’ characteristics, including but not limited to compliance, finances and understanding of the immediate and long-term outcomes of treatment alternatives versus non-treatment. The IADT cannot and does not guarantee favorable outcomes from strict adherence to the Guidelines, but believe that their application can maximize the chances of a favorable outcome.

Guidelines undergo periodic updates. These 2012 Guidelines will appear in three parts:

Part I: Fractures and luxations of permanent teeth
Part II: Avulsion of permanent teeth
Part III: Injuries in the primary dentition

Guidelines offer recommendations for diagnosis and treatment of specific TDIs; however, they do not provide the comprehensive nor detailed information found in textbooks, the scientific literature and most recently the Dental Trauma Guide (DTG) which can be accessed on http://www.dentaltraumaguide.org. Additionally, the DTG, also available on the IADT’s web page http://www.iadt-dentaltrauma.org provides a visual and animated documentation of treatment procedures as well as estimations of prognosis for the various TDIs.

GENERAL RECOMMENDATIONS

Clinical Examination
Detailed description of protocols, methods and documentation for clinical assessment of TDIs can be found in current textbooks.\textsuperscript{1,14,15}

**Radiographic Examination**

Several projections and angulations are routinely recommended but the clinician should decide which radiographs are required for the individual. The following are suggested:

- Periapical radiograph with a 90° horizontal angle with central beam through the tooth in question.
- Occlusal view.
- Periapical radiograph with lateral angulations from the mesial or distal aspect of the tooth in question.

Emerging imaging modalities such as cone beam computerized tomography (CBCT) provide enhanced visualization of TDIs, particularly root fractures and lateral luxations, monitoring of healing and complications. Availability is limited and its use not currently considered routine, however, specific information is available in the scientific literature.\textsuperscript{16,17}

**Splinting: Type and Duration**

Current evidence supports short-term, non-rigid splints for splinting of luxated, avulsed and root-fractured teeth. While neither the specific type of splint nor the duration of splinting are significantly related to healing outcomes (except for avulsion where the time may be of importance), it is considered best practice in order to maintain the repositioned tooth in correct position, provide patient comfort and improved function.\textsuperscript{18-23}

**Use of Antibiotics**

There is limited evidence for use of systemic antibiotics in the management of luxation injuries and no evidence that antibiotic coverage improves outcomes for root fractured teeth. Antibiotic use remains at the discretion of the clinician as TDI’s are often accompanied by soft tissue and other associated injuries, which may require other surgical intervention. In addition, the patient’s medical status may warrant antibiotic coverage.\textsuperscript{23,24}

**Sensibility Tests**

Sensibility testing refers to tests (cold test and/or electric pulp test) attempting to determine the condition of the pulp. At the time of injury sensibility tests frequently give no response indicating a transient lack of pulpal response. Therefore, at least two signs and symptoms are necessary to make the diagnosis of necrotic pulp. Regular followup controls are required to make a pulpal diagnosis.
Immature versus Mature Permanent Teeth

Every effort should be made to preserve pulpal vitality in the immature permanent tooth in order to ensure continuous root development. The vast majority of TDIs occur in children and teenagers where loss of a tooth has lifetime consequences. The immature permanent tooth has considerable capacity for healing after traumatic pulp exposure, luxation injury and root fractures. Pulp exposures secondary to TDIs are amenable to proven conservative pulp therapies that maintain vital pulp tissue and allow for continued root development.25-29 In addition, emerging therapies have demonstrated the ability to revascularize/regenerate vital tissue in canals of immature permanent teeth with necrotic pulps.30-35 Teeth frequently sustain a combination of several injuries. Studies have demonstrated that crown fractured teeth with or without pulp exposure and associated luxation injury experience a greater frequency of pulp necrosis.36 The mature permanent tooth that sustains a severe TDI after which pulp necrosis is anticipated is amenable to preventive pulpectomy as root development is substantially completed.

Pulp Canal Obliteration

Pulp canal obliteration (PCO) occurs more frequently in teeth with open apices which have suffered a severe luxation injury. It usually indicates ongoing pulpal vitality. Extrusion, intrusion and lateral luxation injuries have high rates of PCO.37,38 Subluxated and crown fractured teeth also may exhibit PCO although with less frequency.39 Additionally PCO is a common occurrence following root fractures.40,41

Patient Instructions

Patient compliance with follow-up visits and home care contributes to better healing following a TDI. Both patients and parents of young patients should be advised regarding care of the injured tooth/teeth for optimal healing, prevention of further injury by avoidance of participation in contact sports, meticulous oral hygiene and rinsing with an antibacterial such as chlorhexidine gluconate 0.1% alcohol free for 1-2 weeks.

Additional Resources

Besides the general recommendations above, clinicians are encouraged to access the DTG, the journal Dental Traumatology, and other journals for information pertaining to treatment delay,42 intrusive luxations,43-52 root fractures,24,33-37 pulpal management of fractured and luxated teeth,58-70 splinting,18-22,71 and antibiotics.72

References


47. Andreasen JO, Bakland LK, Andreasen FM. Traumatic intrusion of permanent teeth. Part 2. A clinical study of the effect of preinjury and injury factors such as sex, age, stage of root development, tooth location and extent of injury including number of intruded teeth on 140 intruded permanent teeth. Dent Traumatol 2006; 22(2):90-8.


PERMANENT TEETH

1. Treatment guidelines for fractures of teeth and alveolar bone

### INFRACTION

<table>
<thead>
<tr>
<th>Clinical findings</th>
<th>Radiographic findings</th>
<th>Treatment</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>An incomplete fracture (crack) of the enamel without loss of tooth structure. Not tender.</td>
<td>No radiographic abnormalities. Radiographs recommended: a periapical view. Additional radiographs are indicated if other signs or symptoms are present.</td>
<td>In case of marked infractions, etching and sealing with resin to prevent discoloration of the infraction lines. Otherwise, no treatment is necessary.</td>
<td>No follow-up is generally needed for infraction injuries unless they are associated with a luxation injury or other fracture types.</td>
</tr>
</tbody>
</table>

#### Favorable Outcome
- Asymptomatic
- Positive response to pulp testing.
- Continuing root development in immature teeth.

#### Unfavorable Outcome
- Symptomatic
- Negative response to pulp testing.
- Signs of apical periodontitis.
- No continuing root development in immature teeth.
- Endodontic therapy appropriate for stage of root development is indicated.

### ENAMEL FRACTURE

<table>
<thead>
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<th>Clinical findings</th>
<th>Radiographic findings</th>
<th>Treatment</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>A complete fracture of the enamel. Loss of enamel. No visible sign of exposed dentin. Not tender. If tenderness is observed evaluate the tooth for a possible luxation or root fracture injury. Normal mobility. Sensibility pulp test usually positive.</td>
<td>Enamel loss is visible. Radiographs recommended: periapical, occlusal and eccentric exposures. These are recommended in order to rule out the possible presence of a root fracture or a luxation injury. Radiograph of lip or cheek to search for tooth fragments or foreign materials.</td>
<td>If the tooth fragment is available, it can be bonded to the tooth. Contouring or restoration with composite resin depending on the extent and location of the fracture.</td>
<td>6-8 weeks C++ 1 year C++</td>
</tr>
</tbody>
</table>

#### Favorable Outcome
- Asymptomatic
- Positive response to pulp testing.
- Continuing root development in immature teeth.
- Continue to next evaluation.

#### Unfavorable Outcome
- Symptomatic
- Negative response to pulp testing.
- Signs of apical periodontitis
- No continuing root development in immature teeth.
- Endodontic therapy appropriate for stage of root development is indicated.

* = for crown fractured teeth with concomitant luxation injury, use the luxation followup schedule.
C++ = clinical and radiographic examination.
<table>
<thead>
<tr>
<th>ENAMEL-DENTIN-FRACTURE</th>
<th>Clinical findings</th>
<th>Radiographic findings</th>
<th>Treatment</th>
<th>Follow-Up</th>
<th>Favorable Outcome</th>
<th>Unfavorable Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>● A fracture confined to enamel and dentin with loss of tooth structure, but not exposing the pulp. ● Percussion test: not tender. If tenderness is observed, evaluate the tooth for possible luxation or root fracture injury. ● Normal mobility. ● Sensibility pulp test usually positive.</td>
<td>● Enamel-dentin loss is visible. ● Radiographs recommended: periapical, occlusal and eccentric exposure to rule out tooth displacement or possible presence of root fracture. ● Radiograph of lip or cheek lacerations to search for tooth fragments or foreign materials.</td>
<td>● If a tooth fragment is available, it can be bonded to the tooth. Otherwise perform a provisional treatment by covering the exposed dentin with glass-ironomer or a more permanent restoration using a bonding agent and composite resin, or other accepted dental restorative materials. ● If the exposed dentin is within 0.5mm of the pulp (pink, no bleeding) place calcium hydroxide base and cover with a material such as a glass ionomer.</td>
<td>6-8 weeks C’’ 1 year C’’</td>
<td>● Asymptomatic ● Positive response to pulp testing. ● Continuing root development in immature teeth ● Continue to next evaluation</td>
<td>● Symptomatic ● Negative response to pulp testing. ● Signs of apical periodontitis. ● No continuing root development in immature teeth. ● Endodontic therapy appropriate for stage of root development is indicated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENAMEL-DENTIN-PULP FRACTURE</th>
<th>Clinical findings</th>
<th>Radiographic findings</th>
<th>Treatment</th>
<th>Follow-Up</th>
<th>Favorable Outcome</th>
<th>Unfavorable Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>● A fracture involving enamel and dentin with loss of tooth structure and exposure of the pulp. ● Normal mobility ● Percussion test: not tender. If tenderness is observed, evaluate for possible luxation or root fracture injury. ● Exposed pulp sensitive to stimuli.</td>
<td>● Enamel – dentin loss visible. ● Radiographs recommended: periapical, occlusal and eccentric exposures, to rule out tooth displacement or possible presence of root fracture. ● Radiograph of lip or cheek lacerations to search for tooth fragments or foreign materials.</td>
<td>● In young patients with immature, still developing teeth, it is advantageous to preserve pulp vitality by pulp capping or partial pulpotomy. Also, this treatment is the choice in young patients with completely formed teeth. ● Calcium hydroxide is a suitable material to be placed on the pulp wound in such procedures. ● In patients with mature apical development, root canal treatment is usually the treatment of choice, although pulp capping or partial pulpotomy also may be selected. ● If tooth fragment is available, it can be bonded to the tooth. ● Future treatment for the fractured crown may be restoration with other accepted dental restorative materials.</td>
<td>6-8 weeks C’’ 1 year C’’</td>
<td>● Asymptomatic. ● Positive response to pulp testing. ● Continuing root development in immature teeth. ● Continue to next evaluation.</td>
<td>● Symptomatic. ● Negative response to pulp testing. ● Signs of apical periodontitis. ● No continuing root development in immature teeth. ● Endodontic therapy appropriate for stage of root development is indicated.</td>
</tr>
</tbody>
</table>

* = for crown fractured teeth with concomitant luxation injury, use the luxation followup schedule  
C’’ = clinical and radiographic examination.
<table>
<thead>
<tr>
<th>Clinical findings</th>
<th>Radiographic findings</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>● A fracture involving enamel, dentin and cementum with loss of tooth structure, but not exposing the pulp.</td>
<td>● Apical extension of fracture usually not visible.</td>
<td>Emergency treatment</td>
</tr>
<tr>
<td>● Crown fracture extending below gingival margin.</td>
<td>● Radiographs recommended: periapical, occlusal and eccentric exposures. They are recommended in order to detect fracture lines in the root.</td>
<td>● As an emergency treatment a temporary stabilization of the loose segment to adjacent teeth can be performed until a definitive treatment plan is made.</td>
</tr>
<tr>
<td>● Percussion test: Tender.</td>
<td>● coronal fragment mobile.</td>
<td>Non-Emergency Treatment Alternatives</td>
</tr>
<tr>
<td>● Sensibility pulp test usually positive for apical fragment.</td>
<td></td>
<td>● Removal of the coronal crown-root fragment and subsequent restoration of the apical fragment exposed above the gingival level.</td>
</tr>
</tbody>
</table>

**Follow-Up**

- 6-8 weeks C**
- 1 year C**

**Favorable Outcome**

- Asymptomatic
- Positive response to pulp testing.
- Continuing root development in immature teeth
- Continue to next evaluation

**Unfavorable Outcome**

- Symptomatic
- Negative response to pulp testing.
- Signs of apical periodontitis.
- No continuing root development in immature teeth.
- Endodontic therapy appropriate for stage of root development is indicated.

---

+=for crown fractured teeth with concomitant luxation injury, use the luxation followup schedule.

C++ =clinical and radiographic examination
### CROWN-ROOT FRACTURE WITH PULP EXPOSURE

<table>
<thead>
<tr>
<th>Clinical findings</th>
<th>Radiographic findings</th>
<th>Treatment</th>
<th>Follow-Up</th>
<th>Favorable Outcome</th>
<th>Unfavorable Outcome</th>
</tr>
</thead>
</table>
| ● A fracture involving enamel, dentin, and cementum and exposing the pulp. | ● Apical extension of fracture usually not visible. | **Emergency treatment**  
● As an emergency treatment a temporary stabilization of the loose segment to adjacent teeth.  
● In patients with open apices, it is advantageous to preserve pulp vitality by a partial pulpotomy. This treatment is also the choice in young patients with completely formed teeth. Calcium hydroxide compounds are suitable pulp capping materials. In patients with mature apical development, root canal treatment can be the treatment of choice. | 6-8 weeks C  
1 year C** | ● Asymptomatic  
● Positive response to pulp testing.  
● Continuing root development in immature teeth  
● Continue to next evaluation | ● Symptomatic  
● Negative response to pulp testing.  
● Signs of apical periodontitis.  
● No continuing root development in immature teeth.  
● Endodontic therapy appropriate for stage of root development is indicated. |
| ● Percussion test: tender. | ● Radiographs recommended: periapical and occlusal exposure. | **Non-Emergency Treatment Alternatives**  
● Fragment removal and gingivectomy (sometimes ostectomy)  
Removal of the coronal fragment with subsequent endodontic treatment and restoration with a post-retained crown. This procedure should be preceded by a gingivectomy and sometimes ostectomy with osteoplasty. This treatment option is only indicated in crown-root fractures with palatal subgingival extension.  
● Orthodontic extrusion of apical fragment  
Removal of the coronal segment with subsequent endodontic treatment and orthodontic extrusion of the remaining root with sufficient length after extrusion to support a post-retained crown.  
● Surgical extrusion  
Removal of the mobile fractured fragment with subsequent surgical repositioning of the root in a more coronal position.  
● Root submergence  
If an implant solution is planned, the root fragment may be left in situ.  
● Extraction  
Extraction with immediate or delayed implant-retained crown restoration or a conventional bridge. Extraction is inevitable in very deep crown-root fractures, the extreme being a vertical fracture | | |
| ● Coronal fragment mobile. | | | | | |

*C** = clinical and radiographic examination;  
C++ = clinical and radiographic examination;  
* = for crown fractured teeth with concomitant luxation injury, use the luxation followup schedule.
## Follow-Up Procedures for Fractures of Teeth and Alveolar Bone

<table>
<thead>
<tr>
<th>Root Fracture</th>
<th>Clinical Findings</th>
<th>Radiographic Findings</th>
<th>Treatment</th>
<th>Follow-Up</th>
<th>Favorable Outcome</th>
<th>Unfavorable Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>● The coronal segment may be mobile and may be displaced.</td>
<td>● The fracture involves the root of the tooth and is in a horizontal or oblique plane.</td>
<td>● Reposition, if displaced, the coronal segment of the tooth as soon as possible.</td>
<td>4 Weeks S+, C++</td>
<td>● Positive response to pulp testing (false negative possible up to 3 months).</td>
<td>● Symptomatic</td>
</tr>
<tr>
<td></td>
<td>● The tooth may be tender to percussion.</td>
<td>● Fractures that are in the horizontal plane can usually be detected in the regular periapical 90° angle film with the central beam through the tooth. This is usually the case with fractures in the cervical third of the root.</td>
<td>● Check position radiographically.</td>
<td>6-8 Weeks C**</td>
<td>● Negative response to pulp testing (false negative possible up to 3 months).</td>
<td>● Extrusion of the coronal segment.</td>
</tr>
<tr>
<td></td>
<td>● Bleeding from the gingival sulcus may be noted.</td>
<td>● If the plane of fracture is more oblique which is common with apical third fractures, an occlusal view or radiographs with varying horizontal angles are more likely to demonstrate the fracture including those located in the middle third.</td>
<td>● Stabilize the tooth with a flexible splint for 4 weeks.</td>
<td>4 Months S**, C**</td>
<td>● Signs of repair between fractured segments.</td>
<td>● Radiolucency at the fracture line.</td>
</tr>
<tr>
<td></td>
<td>● Sensitivity testing may give negative results initially, indicating transient or permanent neural damage.</td>
<td>● Fractures that are in the horizontal plane can usually be detected in the regular periapical 90° angle film with the central beam through the tooth. This is usually the case with fractures in the cervical third of the root.</td>
<td>● It is advisable to monitor healing for at least one year to determine pulp status.</td>
<td>6 Months C**</td>
<td>● Continue to next evaluation.</td>
<td>● Clinical signs of periodontitis or abscess associated with the fracture line.</td>
</tr>
<tr>
<td></td>
<td>● Monitoring the status of the pulp is recommended.</td>
<td>● If the plane of fracture is more oblique which is common with apical third fractures, an occlusal view or radiographs with varying horizontal angles are more likely to demonstrate the fracture including those located in the middle third.</td>
<td>● If pulp necrosis develops, root canal treatment of the coronal tooth segment to the fracture line is indicated to preserve the tooth.</td>
<td>1 Year C**</td>
<td>● Endodontic therapy appropriate for stage of root development is indicated.</td>
<td>● Endodontic therapy appropriate for stage of root development is indicated.</td>
</tr>
<tr>
<td></td>
<td>● Transient crown discoloration (red or grey) may occur.</td>
<td>● Fracture lines may be located at any level, from the marginal bone to the root apex.</td>
<td></td>
<td>5 Years C**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Root Fracture

- 4 Weeks S+, C++
- 6-8 Weeks C**
- 4 Months S**, C**
- 6 Months C**
- 1 Year C**
- 5 Years C**

### Alveolar Fracture

- 4 Weeks S+, C**
- 6-8 Weeks C**
- 4 Months C**
- 6 Months C**
- 1 Year C**
- 5 Years C**

### Favorable Outcome

- Positive response to pulp testing (false negative possible up to 3 months).
- Signs of repair between fractured segments.
- Continue to next evaluation.

### Unfavorable Outcome

- Symptomatic
- Negative response to pulp testing (false negative possible up to 3 months).
- Extrusion of the coronal segment.
- Radiolucency at the fracture line.
- Clinical signs of periodontitis or abscess associated with the fracture line.
- Endodontic therapy appropriate for stage of root development is indicated.

**S** = splint removal; **S** = splint removal in cervical third fractures.

**C** = clinical and radiographic examination.

**++** = Whenever there is evidence of external inflammatory root resorption, root canal therapy should be initiated immediately, with the use of calcium hydroxide as an intra-canal medication.
## Treatment Guidelines for Luxation Injuries

### Follow-Up Procedures for luxated permanent teeth

**Favorable and Unfavorable outcomes include some, but not necessarily all, of the following:**

<table>
<thead>
<tr>
<th>CONCUSSION</th>
<th>Clinical Findings</th>
<th>Radiographic Findings</th>
<th>Treatment</th>
<th>Follow-Up</th>
<th>Favorable Outcome</th>
<th>Unfavorable Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>● The tooth is tender to touch or tapping; it has not been displaced and does not have increased mobility.</td>
<td>● No radiographic abnormalities</td>
<td>● No treatment is needed.</td>
<td>4 Weeks C++</td>
<td>Asymptomatic</td>
<td>● Symptomatic</td>
<td></td>
</tr>
<tr>
<td>● Sensitivity tests are likely to give positive results.</td>
<td></td>
<td>● Monitor pulpal condition for at least one year.</td>
<td>6-8 Weeks C++</td>
<td>Positive response to pulp testing</td>
<td>● Negative response to pulp testing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 Year C++</td>
<td>False negative possible up to 3 months</td>
<td>● False negative possible up to 3 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuing root development in immature teeth</td>
<td>● No continuing root development in immature teeth, signs of apical periodontitis.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intact lamina dura</td>
<td>● Endodontic therapy appropriate for stage of root development is indicated.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUBLUXATION</th>
<th>Clinical Findings</th>
<th>Radiographic Findings</th>
<th>Treatment</th>
<th>Follow-Up</th>
<th>Favorable Outcome</th>
<th>Unfavorable Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>● The tooth is tender to touch or tapping and has increased mobility; it has not been displaced.</td>
<td>● Radiographic abnormalities are usually not found.</td>
<td>● Norm ally no treatment is needed, however a flexible splint to stabilize the tooth for patient comfort can be used for up to 2 weeks.</td>
<td>2 Weeks S, C++</td>
<td>Asymptomatic</td>
<td>● Symptomatic</td>
<td></td>
</tr>
<tr>
<td>● Bleeding from gingival crevice may be noted.</td>
<td></td>
<td></td>
<td>4 Weeks C++</td>
<td>Positive response to pulp testing</td>
<td>● Negative response to pulp testing</td>
<td></td>
</tr>
<tr>
<td>● Sensitivity testing may be negative initially indicating transient pulpal damage.</td>
<td></td>
<td></td>
<td>6-8 Weeks C++</td>
<td>False negative possible up to 3 months</td>
<td>● False negative possible up to 3 months</td>
<td></td>
</tr>
<tr>
<td>● Monitor pulpal response until a definitive pulpal diagnosis can be made.</td>
<td></td>
<td></td>
<td>6 Months C++</td>
<td>Continuing root development in immature teeth</td>
<td>● No continuing root development in immature teeth, signs of apical periodontitis.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 Year C++</td>
<td>Intact lamina dura</td>
<td>● Endodontic therapy appropriate for stage of root development is indicated.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXTRUSIVE LUXATION</th>
<th>Clinical Findings</th>
<th>Radiographic Findings</th>
<th>Treatment</th>
<th>Follow-Up</th>
<th>Favorable Outcome</th>
<th>Unfavorable Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>● The tooth appears elongated and is excessively mobile.</td>
<td>● Increased periodontal ligament space apically.</td>
<td>● Reposition the tooth by gently re-inserting it into the tooth socket.</td>
<td>2 Weeks S, C++</td>
<td>Asymptomatic</td>
<td>● Symptomatic</td>
<td></td>
</tr>
<tr>
<td>● Sensitivity tests will likely give negative results.</td>
<td></td>
<td>● Stabilize the tooth for 2 weeks using a flexible splint.</td>
<td>4 Weeks C++</td>
<td>Clinical and radiographic signs of normal or healed periodontium.</td>
<td>● Negative response to pulp testing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● In mature teeth where pulp necrosis is anticipated or if several signs and symptoms indicate that the pulp of mature or immature teeth became necrotic, root canal treatment is indicated.</td>
<td>6-8 Weeks C++</td>
<td>Positive response to pulp testing</td>
<td>false negative possible up to 3 months.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 Months C++</td>
<td>● False negative possible up to 3 months.</td>
<td>● If breakdown of marginal bone, splint for an additional 3-4 weeks.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 Year C++</td>
<td>● Continuing root development in immature teeth.</td>
<td>● External inflammatory root resorption.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yearly 5 years C++</td>
<td></td>
<td>● Endodontic therapy appropriate for stage of root development is indicated.</td>
<td></td>
</tr>
</tbody>
</table>

S = splint removal; C++ = clinical and radiographic examination.
**+++**Whenever there is evidence of external inflammatory root resorption, root canal therapy should be initiated immediately, with the use of calcium hydroxide as an intra-canal medication.
### Lateral Luxation

<table>
<thead>
<tr>
<th>Clinical Findings</th>
<th>Radiographic Findings</th>
<th>Treatment</th>
<th>Favorable Outcome</th>
<th>Unfavorable Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>The tooth is displaced, usually in a palatal/lingual or labial direction.</td>
<td>The widened periodontal ligament space is best seen on eccentric or occlusal exposures.</td>
<td>Reposition the tooth digitally or with forceps to disengage it from its bony lock and gently reposition it into its original location.</td>
<td>2 Weeks S**, C** 4 Weeks C** 6-8 Weeks C** 6 Months C** 1 Year C** Yearly for 5 years C**</td>
<td>Asymptomatic  Clinical and radiographic signs of normal or healed periodontium.  Positive response to pulp testing (false negative possible up to 3 months).  Marginal bone height corresponds to that seen radiographically after repositioning.  Continuing root development in immature teeth</td>
</tr>
<tr>
<td>It will be immobile and percussion usually gives a high, metallic (ankylosis) sound.</td>
<td></td>
<td>Stabilize the tooth for 4 weeks using a flexible splint.</td>
<td></td>
<td>Symptoms and radiographic signs consistent with apical periodontitis.  Negative response to pulp testing (false negative possible up to 3 months).  If breakdown of marginal bone, splint for an additional 3-4 weeks.  External inflammatory root resorption or replacement resorption  Endodontic therapy appropriate for stage of root development is indicated.</td>
</tr>
<tr>
<td>Fracture of the alveolar process present.</td>
<td></td>
<td>If the pulp becomes necrotic, root canal treatment is indicated to prevent root resorption.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensibility tests will likely give negative results</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Intrusive Luxation

<table>
<thead>
<tr>
<th>Clinical Findings</th>
<th>Radiographic Findings</th>
<th>Treatment</th>
<th>Favorable Outcome</th>
<th>Unfavorable Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>The tooth is displaced axially into the alveolar bone.</td>
<td>The periodontal ligament space may be absent from all or part of the root.</td>
<td>Teeth with incomplete root formation: Allow eruption without intervention. If no movement within few weeks, initiate orthodontic repositioning. If tooth is intruded more than 7mm, reposition surgically or orthodontically before ankylosis can develop. If tooth is intruded beyond 7mm, reposition surgically. The pulp will likely become necrotic in teeth with complete root formation root canal therapy using a temporary filling with calcium hydroxide is recommended and treatment should begin 2-3 weeks after surgery. Once an intruded tooth has been repositioned surgically or orthodontically, stabilize with a flexible splint for 4-8 weeks.</td>
<td>2 Weeks S**, C** 4 Weeks C** 6-8 Weeks C** 6 Months C** 1 Year C** Yearly for 5 years C**</td>
<td>Tooth in place or erupting. Intact lamina dura No signs of resorption. Continuing root development in immature teeth.</td>
</tr>
<tr>
<td>It is immobile and percussion may give a high, metallic (ankylosis) sound.</td>
<td>The cemento-enamel junction is located more apically in the intruded tooth than in adjacent non-injured teeth, at times even apical to the marginal bone level.</td>
<td></td>
<td></td>
<td>Tooth locked in place/ankylosic tone to percussion. Radiographic signs of apical periodontitis External inflammatory root resorption or replacement resorption. Endodontic therapy appropriate for stage of root development is indicated.</td>
</tr>
<tr>
<td>Sensibility tests will likely give negative results.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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S** = splint removal; C** = clinical and radiographic examination.

**++=Whenever there is evidence of external inflammatory root resorption, root canal therapy should be initiated immediately, with the use of calcium hydroxide as an intra-canal medication.
TASK FORCES

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