

TRAUMA to the PRIMARY DENTITION

DIAGNOSIS

CHILDREN'S DENTISTRY, P.C. NEWSLETTER

PRACTICAL CLINICAL TIPS: KEEPING YOUR PEDIATRIC SKILLS CURRENT

Background Information

Approximately thirty percent of children experience traumatic injury to the primary dentition, the most common injuries being avulsion and luxation. The diagnosis of injuries in the primary dentition is straightforward; the decision of whether to treat or observe is often the dilemma. This is complicated by the fact that young children present behavior management challenges. Our goal is to ensure the healthy development of the underlying succedaneous tooth. Should you observe an injured tooth or extract it? What about endodontics, or sutures, or the use of a splint, or an antibiotic? When are these interventions appropriate in a toddler?

Since the extent of the injury is often not immediately apparent the trauma requires both immediate intervention and long term follow-up. In this issue, we will give you our clinical experience in evaluating and treating injuries in young children and provide guidelines to help you manage the injury.

A thorough clinical and radiographic examination is necessary to determine the extent of oral traumatic injuries. In general, the child should be evaluated as soon as possible following the injury to ensure the best prognosis.

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Assessment of Dental Trauma

Radiographs

- ◆ Size 2 periapical and/or occlusal films are best to determine the extent of pulpal and osseous injury. (We use a double film packet to take radiographs of traumatized teeth and send the duplicate film to the insurance company.)
- ◆ A panorex is taken if damage to the supporting structures is suspected.

Subluxation
which must
be extracted.



INJURY CLASSIFICATION

- ◆ Crown infraction: Incomplete fracture (crack) of the enamel without loss of tooth substance.
- ◆ Concussion: Injury to the tooth's supporting structures without abnormal loosening or displacement of the tooth.
- ◆ Subluxation: Injury to the tooth's supporting structures with abnormal loosening but without displacement of the tooth.
- ◆ Intrusive luxation: Displacement of the tooth into alveolar bone.
- ◆ Extrusive luxation: Partial displacement of the tooth out of the socket.
- ◆ Lateral luxation: Displacement of the tooth in a direction other than axially.
- ◆ Avulsion: Complete displacement of the tooth out of its socket.

Fractures:

- ◆ Class I: Simple enamel fracture.
- ◆ Class II: Fracture of enamel and dentin.
- ◆ Class III: Fracture of enamel and dentin with a pulp exposure..

<u>INJURY</u>	<u>TREATMENT</u>	<u>FOLLOW-UP</u>
Concussion	None immediately	1,2,6, and 12 mos.
Subluxation	None immediately	1, 2,6, and 12 mos.
Lateral luxation :		
a.. Minor (2-3mm)	None immediately	1,2,6 and 12 mos.
b. Moderate (3-4mm)	Reposition	1,2,6 and 12 mos.
c. Severe (+4mm)	Extract	
Intrusion	Periapical x-ray Extraoral x-ray- if crown is not visible clinically	
	Extract if: <ul style="list-style-type: none"> ◆ Tooth has been driven into the developing permanent bud. This can be determined by observing the angle of the intruded tooth at the incisal edge and by palpating the labial plate ◆ Labial plate is perforated ◆ Area becomes infected 	
	Allow to re-erupt if : <ul style="list-style-type: none"> ◆ Child is < 48 mos. ◆ Intrusion is along the long axis 	Monthly to monitor re-eruption
Extrusion	Extract	prn
Avulsion	Do not replant	prn
Infraction	None immediately	prn
Class I Fracture	Smooth sharp edges	1,2,6, and 12 months
Class II Fracture	Restore with composite or crown	1,2,6, and 12 months
Class III Fracture	Pulpectomy, if restorable Extract, if non-restorable	As dictated by treatment
Root Fracture:	Periapical radiograph	
	Observe if: Good alignment/mobility	1,2,6, and 12 mos.
	Extract if: Separated or mobile	prn

INTRUSIONS

Primary incisors will intrude easily because of the small conical root and the "give" of the surrounding cancellous bone.



The right central has been intruded and later re-erupted.

Points on Allowing Re-eruptions

- ◆ Takes 4-6 months (usually 1 mm/month).
- ◆ Place the child on amoxicillin for 7 days because of microalveolar fractures.
- ◆ If the tooth subsequently ankyloses, it is usually not necessary to extract it unless it is a cosmetic concern or if it is not in the path of the permanent successor.
- ◆ Is more predictable the younger the child (age 30 months or younger).
- ◆ Allow re-eruption if the tooth has been displaced no more than 8mm and the long axis of the root is in the same plane as the pre-injury position
- ◆ Usually the tooth will not re-erupt in the original arch position



Extra oral radiograph to evaluate an intruded tooth. Double the exposure time for this radiograph.

SOFT TISSUE INJURIES

- ◆ Gingival abrasion: These will heal without treatment. Any recession which results will resolve as the secondary teeth erupt, bringing new gingival growth.
- ◆ Injuries requiring sutures: Lip lacerations, frenum tears and denudation of the alveolus are best sutured with resorbable 4-0 gut. Resorbable sutures are best for young children.
- ◆ Tongue lacerations require sutures only if the laceration is deep and bleeding cannot be controlled.

FOREIGN BODIES

Any foreign body such as gravel, dirt or a tooth fragment in the lip must be removed and the area cleansed thoroughly. Radiographs of the lip to check for any foreign bodies can be taken at 25% less than the normal exposure time.

USE OF ANTIBIOTICS

We prescribe oral amoxicillin for injuries only when there has been an alveolar fracture. This occurs when multiple teeth have been avulsed or if one tooth has been avulsed with a shearing force, tearing the gingiva and the socket. Amoxicillin should be given in an oral dose of 20-50 mg/kg in 3 divided doses per day for children. Give it one hour before or two hours after a meal. Amoxicillin is the drug of choice for intraoral injuries because it is a broad spectrum antibiotic that is well absorbed, has a high blood level and a long half life. If the child is allergic to amoxicillin, clindamycin is the antibiotic of choice. Clindamycin should be given in an oral dose of 10-30 mg/kg/day in 3 divided doses for children.

SPLINTS

We rarely splint primary teeth but if the traumatized tooth or teeth are excessively mobile, use a wire with composite, or simply composite, to stabilize for 7 days.

PULP THERAPY FOR PRIMARY INCISORS

Purpose: The goal of pulpal therapy is to prolong the retention of the primary anterior tooth in order to preserve the normal function and esthetic quality of the child's early dentition without compromising the health of the permanent tooth.

Rationale: Pulpectomies are an elective procedure on maxillary and mandibular primary centrals since extraction of these particular teeth will not result in speech or functional problems. The permanent central will erupt within the normal arch alignment whether the primary tooth is present or not. Cosmetics is the only reason to retain centrals. However, in a very young child, cosmetics is important. The permanent maxillary central usually erupts at age 7 1/2. Extraction of the primary tooth will accelerate that eruption time an average of 6 months. We will save primary centrals at the request of the parent at any age as long as there is no physiologic, external or internal root resorption.

Lateral incisors serve as a guide plane for the erupting permanent centrals and their presence results in better alignment of the incisors. We will encourage parents to consider pulp therapy for primary laterals for this reason. However, if a primary lateral is lost prematurely, space maintenance is not necessary.

Indications: Teeth with restorable crowns and with the following signs and symptoms are candidates for pulpectomies:

- ◆ Pain
- ◆ Class I or Class II mobility that does not resolve within 2 weeks
- ◆ Presence of a pathologic sinus or parulis
- ◆ Apical radiolucency
- ◆ Dark discoloration in addition to one other symptom.
- ◆ Reddish blue discoloration that persists for 3 months.
- ◆ Traumatic or carious pulp exposure.

- ◆ If the tooth is undergoing internal, external or physiologic root resorption, the tooth should be extracted.



The right central exhibits a red discoloration and assuming there is not root resorption, should receive a pulpectomy.

TECHNIQUE:

- ◆ Anesthetize the tooth
- ◆ Isolate with rubber dam
- ◆ Access the pulpal tissue from the labial midcrown
- ◆ Amputate the coronal pulp tissue with a round bur and establish good access
- ◆ Remove the radicular pulpal tissue with a broach or file.
- ◆ Take care to stay within the confines of the canal. Working length radiographs are not necessary. Keep in mind that primary incisors have a foramen that is positioned about 1-2mm from the end of the root on the lingual side. Therefore, keep your estimated working length about 2mm from the apex of the root.



Labial access

INSTRUMENTATION

We use rotary files from Tulsa Dental Products: The Profile .04 Taper Series. Hand files are also effective. Most incisors will be instrumented to a size 45 file.

During instrumentation do not cut the dentin, but use the files to clean the pulpal tissue from the canal walls. Rotary instruments have a counter clockwise rotation and do a nice job of pulling this tissue out. Broaches are also effective.

IRRIGATION

We irrigate with either full strength sodium hypochlorite or chlorhexidine. Since we will fill the space with zinc oxide/eugenol, a bactericidal agent, we are not concerned about complete sterilization of the canal as we would be with a permanent tooth. **TAKE GREAT CARE** with sodium hypochlorite to prevent any solution from getting in the child's mouth or out the end of the apex. This is done by slowly inserting the solution and constantly oscillating the syringe.

Fill: Fill the canal with a very stiff paste of USP zinc oxide and eugenol. Do not use formocresol. Use USP ZO and eugenol without a catalyst so that the paste will resorb with the root during exfoliation. We use hand files to advance the paste to working length. A stiff paste assures that an overfill will be unlikely. Always stay 2mm short of the apex. Overfills are to be avoided! Zinc oxide/eugenol is tissue toxic and will cause an acute inflammatory response.

Restoration: Fill the canal to the CEJ. We use a thin layer of thick zinc phosphate cement over the ZOE before we place the final composite restoration. Now fill the access with a light shade of composite and veneer the entire labial surface with composite to match the adjacent teeth. You must cover the entire labial surface with composite, because if the tooth was not dark originally it will darken subsequent to treatment. The labial approach allows easier access and facilitates placement of a composite veneer for an esthetic final restoration. If the crown is intact, we use this technique. If the crown is fractured, we restore it with an open face stainless steel crown.

Radiograph: Always take a final radiograph to confirm your fill. If the fill is a little short or not dense, the technique will usually be successful because of the filling medicament. If you have an overfill that is less than 1mm, observe the tooth periodically. If the overfill is more than 1mm, curette the excess paste through the labial alveolar plate. Take another radiograph to verify that the excess ZOE has been removed.

Statistics: We conducted a retrospective study in our practice. This study was published in 1989. We found that the long term success of the anterior pulpectomy technique was 86.3%.

Monitor: Continue to monitor the pulpectomized tooth until exfoliation. Deflection of the permanent bud may prevent normal exfoliation and the primary incisor may need to be extracted. We find that this seldom occurs. The incidence of ectopic eruption of the permanent bud is the same for traumatized primary incisors with or without a pulpectomy, so the cause of the deflection is not the procedure, but the traumatic episode.



The right central received a pulpectomy and composite veneer.



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FOLLOW UP

Discolored Teeth Any injured tooth may discolor several days to several months after an injury. Although histologic studies have shown that every discolored tooth has an inflamed pulp, we will observe discolored teeth unless a pulpectomy is necessary and the following signs of irreversible pulpitis/necrosis are present:

- ◆ Pain
- ◆ Swelling /parulis
- ◆ Mobility and a widened PDL
- ◆ Periapical pathology
- ◆ A red/gray discoloration that does not resolve.

Many times after an injury, the primary incisor will discolor and then lighten. The most favorable prognosis is a tooth that turns YELLOW/BROWN. These teeth will usually undergo calcific metamorphosis. Pulpal obliteration does not need to be treated. However, it must be monitored with radiographs beginning at age 5 1/2 to 6 years of age to ensure that the root is resorbing as the succedaneous tooth erupts.

Teeth that turn RED/GRAY have a poor prognosis. The color is a result of pulpal hemorrhage which will subsequently result in pulpal necrosis. These teeth should be monitored carefully and receive a pulpectomy if the discoloration does not lighten within 3 months.

Radiographic Signs After Injury

- ◆ Pulpal obliteration: No treatment is necessary.
- ◆ Internal or external root resorption: This irreversible inflammatory response cannot be treated except by extraction.

Ankylosis: Primary teeth which have been intruded have a high probability of ankylosing. Extraction is usually not necessary unless:

- ◆ A periodontal abscess occurs.
- ◆ It has poor aesthetics.
- ◆ The underlying permanent tooth is being deflected from its normal path of eruption.

Primary incisors which sustain a "shattered" crown fracture, in which there are three or more fractured pieces, are ankylosed.

When extracting an ankylosed primary incisor, if the apical segment breaks, it is not necessary or desirable to remove the apex if there is a high chance of damage to the permanent bud. The apex will dissolve spontaneously within four weeks.

Infections: Intraoral infections after an injury are rare. Amoxicillin is the drug of choice. As with any infection, caution the parent to keep the child WELL HYDRATED.



This permanent central incisors was damaged from a traumatic injury to the mandibular anterior primary teeth at approximately 12 months of age.

DAMAGE TO THE PERMANENT TOOTH

The parent should be advised that damage to the developing tooth germ is possible when the primary tooth has been displaced, intruded or avulsed. The most common sequela is an enamel brown/yellow or white scar, on the permanent tooth. After the tooth is fully erupted the deformation can be restored or bleached depending on its manifestation.

Instructions to parents:

- ◆ Brush any injured teeth with a soft toothbrush
- ◆ Swab injured areas with hydrogen peroxide diluted 4 parts water/1 part hydrogen peroxide
- ◆ soft diet prn

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