


# NOT ANOTHER DENTAL EMERGENCY???

The Ten Most Common Pediatric Dental Emergencies (and then some)

David L. Rothman, D.D.S.  
drdavid@davidrothmandds.com


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## Disclosure

I do not have any financial affiliations or conflicts of interests to disclose.



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## Romper Room and Miss Francis




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## Online Resources


- American Academy of Pediatric Dentistry Guidelines
  - [www.aapd.org/policies](http://www.aapd.org/policies)
- American Academy of Pediatrics
  - Management of Dental Trauma in a Primary Care Setting/ M.A. Keels DDS
  - <http://Pediatrics.aappublications.org/content/early/2014/01/22/peds.2013-3792>
- American Dental Association
  - [www.mouthhealthy.org](http://www.mouthhealthy.org)
- AdCouncil
  - [www.2min2x.org](http://www.2min2x.org)
- NIH/NIDCR
  - Oral Health in America: A report of the Surgeon General

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## AAP Section on Oral Health




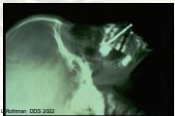
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## What is an Emergency?

- Expected or Unexpected
  - Immediate risk to health or life
  - Demands immediate intervention
    - Recognition
    - Time to treat
    - Stabilization
    - Definitive care

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## Emergencies in Pediatric Dentistry

- Anesthesia related medical emergencies
  - Usually airway problems
    - Allergic reactions to drug or procedures
    - Drug/dose related problems
    - Local anesthesia overdose
    - Laryngospasm
- Pediatric emergencies in the office
  - Occur concurrently but not caused by sedation
    - Airway obstruction/ foreign body
    - Seizures
    - Allergic reactions to drugs or procedures
    - Asthma
    - Hypoglycemia
- Pediatric dental emergencies anywhere
  - Anything the parent thinks is important



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## The Rule of Four

- Swelling and Purulence
- Bleeding
  - Overt or covert
- Fractured Tooth
- Fractured Bone



- Stop what you're doing and get prepared
  - You're coming in for these!



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## SimMan Bobsled Team



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## Frequent Fliers Club



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## Cardio"pup"monary Resuscitation



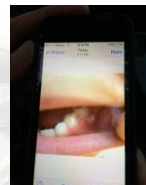
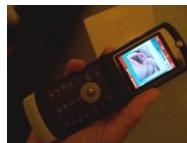
Flossy  
Courtesy of Alan Gaddan, DDS

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## Triaging the Dental Emergency

- Be Available for Calls and Emergencies 24/7
  - You don't always have to be in the office
  - Gen X-ers and Millennials love e-mail, texting and cell phones



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## Triaging the Dental Emergency

- Phone Call/Email
- Send photo
- Call parent back (unless secure email)
- Office set-up
  - Preparing for the onslaught
  - Least invasive in a busy schedule
- SOP and Checklist
- Practice/practice/practice



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## Triaging the Dental Emergency

- Email
  - HIPPA compliant?
    - Secure email
    - Gmail compliant software
      - Docs in google cloud
      - Need BAA (business associate agreement)
  - Epocrates
- Email in/Call out



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## Pain in Children

- The response to the sensation of pain is often confused for disruptive behaviors
- May be socialized but is real
- Must be recognized as an important entity
- Changes in physiologic parameters
- Difficult to assess in children under 6
  - Use observation
- Self reporting in children over 6
  - Pain scales



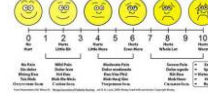
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## Pain Scales

- Visual vs Verbal

Wong-Baker FACES Pain Rating Scale



LEGO PAIN ASSESSMENT TOOL



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## Use topical and make it red

- Hides the color of blood
- Numbs mucosa but not much deeper
- Still requires distraction and clenching
- Optimum time 1-3 minutes
- Don't use too much
  - Risk of methemoglobinemia



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## Don't waste your money on expensive anesthetics

- 2% Lidocaine with 1:100000
  - Wide margin of safety
  - Full mouth with two carpules
  - Lasts too long?
  - Amide anesthetic
    - Metabolized in the liver
  - High pKa therefore slower dissociation to free base
    - Infection has lower pH: limits free base



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## Don't block children under 8 or use a full carpule

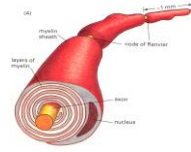
- Porous bone
- Teeth clenched
- Move needle along alveolar bone
- Interdental
- Never do a "long buccal"
- 1 hour anesthesia time
- Controlled by volume



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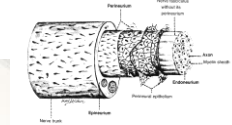
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## Peripheral Sensory Nerve Conduction



Anesthetic solution must cover 3 nodes ( $\approx 3$  mm) to block nerve impulse.

Protein bound section active here blocking  $\text{Na}^{++}$  channels.



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## Commonly Used Local Anesthetic Agents - Dose Recommendations from AAP/AAPD

Drug	Maximum dose with epinephrine (mg/kg)	
	Medical Use	Dental Use
Lidocaine	7.0	4.4
Mepivacaine	7.0	4.4
Articaine	7.0	7.0

■ Determined by relative vascularity of injection area  
 Guideline for Monitoring and Managing Pediatric Patients During and After Sedation for Diagnostic and Therapeutic Procedures. AAPD Reference Manual 2016  
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## Moore's Rule of 25

- One carpule/25 lbs. body weight
  - Actually per 4.4 mg/kg= one carpule/22 lbs.
- Any marketed local anesthetic used in dentistry
- Establishes a conservative dose
- Examples:
  - 50 lbs. 2 carpules
  - 75 lbs. 3 carpules
  - 100 lbs. 4 carpules
- May be too conservative in preschool child
- mg/kg calculation provides greater accuracy

■ Moore P. Manual of Local Anesthesia, 4th ed. Eastman-Kodak Co., Rochester, NY, 1996

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## Factors Contributing to Increased Risk of Local Anesthetic Overdose

- Failure to calculate LA dose by weight
- Treating multiple quadrants at one appointment
- Failure to use LA with vasopressor
- LA administered in all quadrants at one time
- Concomitant use of sedation, especially opioids
- LA administered as standard volume per injection
- Selecting a high-concentration solution

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## Local Anesthetic Volume Administered

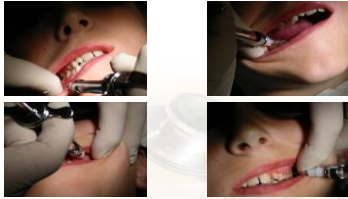
*"For children under 10 years of age, it is rarely necessary to administer more than one-half cartridge (20 mg), even for mandibular blocks."*

Astra Pharmaceuticals Package Insert, 1997

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## Infiltration Technique



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## Anesthesia Techniques in Children

- Short needle
- Smaller amount
  - Diffuses over a larger *relative* area
  - Less myelination



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## Influence of pH

- Most LAs are weak bases
  - $pK_a$  7.5-9.5
- Only the base form can diffuse rapidly into nerve
- A high  $pK_a$  means slower dissociation to free base
- Clinical result in onset of anesthesia?
- Tissue acidity lowers pH locally
  - Limits formation of free base
  - Leads to ionic entrapment in extracellular space

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## Buffering Local Anesthetics Problems

- Pain from the pH incompatibility of local anesthetic and vasopressor with local tissue pH
  - LA: pH 5-9
  - Vasopressor: pH 3.5
- Tissue injury
- Latent uptake until pH "normalizes"
  - At acidic pH LA exists in non lipid soluble ionized form therefore unavailable to cross to nerve
- Infection lowers tissue pH

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## Buffering Local Anesthetics Benefits

- Increases amount of lipid soluble active non ionized form
  - From pH 3.5 to buffered 7.4 there is a 6000 fold increase in lipid soluble form
- Patient comfort
- More rapid onset
- Decreased injury to tissue
- $CO_2$  release from HCl interaction with  $NaHCO_3$  may potentiate action of LA and have its own anesthetic effect

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## Buffering Local Anesthesia Armamentarium

- 8.4%  $NaHCO_3$  available as 4.2g/50ml  $H_2O$
- Tuberculin Syringe
- Alcohol wipes
- L.A. carpule: 1.7ml with epi 1:100000 or 1:200000
- Dose is 1.1-1.8ml/10ml therefore .2ml/1.7ml
- Lasts about 2 weeks when stored at 32-40° F

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## Buffering Local Anesthetics Technique



From: youtube.com

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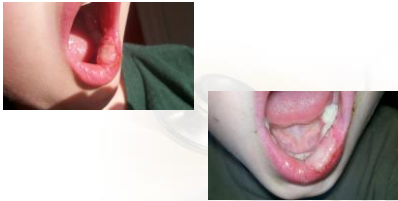
## And the Complications...



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## A Few Days Later



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## Oral Analgesics for Kids

Drug	Dose	Comments
Acetaminophen	10-15 mg/kg/dose q4-6h	No more than 5 doses/24 hrs
Ibuprofen	4-10 mg/kg/dose q4-6h	No more than 5 doses/24 hrs
Naproxen	5-7 mg/kg/dose q8-12h	>2yo
Acetaminophen/Ibuprofen	Staggered q2-3h	For severe pain



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## Analgesics for Kids

- No Aspirin
  - Reyes syndrome
  - Autoimmune
- No acetaminophen
  - Asthma?!
  - 6-7 yo
  - 1/yr: 70+
  - 1/mo: 540+
  - Gonzalez-Barcala FJ, Pertega S, Castro TP. Exposure to paracetamol and asthma symptoms. Euro J Pub Health 2013;23:706-710
- Liver destruction
- NSAIDs
  - Bleeding and clotting issues
- Narcotics
  - Respiratory and cardiac depression
  - Abuse
- Combined therapy
  - NSAID/Acetaminophen/NSAID/Acetaminophen



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## Topical Analgesics for Kids

- Benzocaine
  - Methemoglobinemia
  - Available as a commercially available combined topical with
  - Avoid "compounded" topicals
- Benadryl
  - Topical application may also lead to drowsiness
- Lidocaine
  - Can reach toxic dose quickly in mouthrinses
- Triple Mouthwash/Philadelphia Mouthwash/Magic Mouthwash
  - No clinical evidence of efficacy of one over another
  - A mucosal coating agent
  - A topical anesthetic
- Chlorhexidine
  - Conflicting results
- Saline/ Sodium bicarbonate/ Glycerine
- Mucosal coating agents
  - Sucralfate (Carafate)
  - Kapectate
  - Zilactin



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## Antibiotics for Kids

Drug	Form supplied	Dosage
Amoxicillin	Suspension, chewable tabs, tabs, capsules	3mo-40kg: 20-40mg/kg/day TID >40kg: 250-500 mg TID
Augmentin (Amoxicillin + clavulanate potassium)	Suspension, chewable tablet, tablet	3mo-40kg: 25-45mg/kg/day BID >40kg: 500-875 mg BID
Azithromycin (Z-pak)	Suspension, tablet, capsule, injectable	6mo-16yr: 12 mg/kg/day (OD) X 5days
Cephalexin	Suspension, tablet, capsule	25-100mg/kg/day QID
Clindamycin	Suspension, capsule	8-20mg/kg/day TID/QID

Children: 12 years of age and younger

\*macrolides (bacteriostatic mycins) increase risk of gastric disturbance"

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## The Antibiotic Conundrum

- Cost vs. efficacy
- GRAS
  - OTC vs Rx
- Proprietary vs. Generic
  - Cost of development
  - Payoff
  - "X" no. of years exclusive rights
- What happens if older drugs that are cheaper are effective but new drugs much more expensive, and significantly (but slightly) more effective in research?
  - Does it make the original drug less effective or less desirable?
  - Uniqueness
- Azithromycin (Z-pac) v Amoxicillin
- Lidocaine v Articaine



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## Give an antibiotic?

- Sensitivity
  - Of bacteria
  - Of patient
- Drainage
- Swelling and airway obstruction
- Systemic effect
- Can the problem be treated by other methods?
  - Anti-inflammatories
  - Pain meds



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## When Not to Give an Antibiotic



1. Pain (analgesics/antiinflammatory drugs are indicated)
2. Edema (antiinflammatory drugs indicated)
3. Redness/heat (antiinflammatory drugs indicated)
4. Purulence (resolved by drainage of pus/debridement)
5. Abscess localized (e.g. abscess abscess, periodontal abscess) (Resolves by incision and drainage)
6. Draining sinus tract. (Removal of foci of infection resolves drainage and sinus tract may heal on its own or may have to be surgically excised.)

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## Topical Antibiotics for Kids

- Chlorhexidine gluconate
  - Antibacterial and antifungal activity
  - 0.12% with/without alcohol
  - Pericoronitis
  - Aphthae
  - Gingivitis
  - Not caries control!



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## Antibiotic Prophylaxis for Kids

- Prevention of bacterial endocarditis
- May be given up to 1 hour after treatment or injury
  - Usually 1 hour before
- Significant risk of bleeding or tissue damage



Drug	Pediatric Dose	Adult Dose
Amoxicillin	50 mg/kg	2 g
Clindamycin	20 mg/kg	600 mg
Cephalexin	50 mg/kg	2 g
Azithromycin	15 mg/kg	500 mg
Clarithromycin	15 mg/kg	500 mg

Pediatric dose should not exceed adult dose

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## Antifungals for Kids

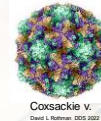
Drug	Dose	Comments
Nystatin #1 for local treatment of oral infections	Oral suspension: 100,000 units per ml <1yr: 1 ml in corners of mouth 4-5 times/day for 14 days >1yr: 200,000-300,000 units per side 4-5 times/day for 14 days	High sucrose content
Nystatin/triamcinolone ointment #1 for topical use	Tablets: 100,000 units/tablet dissolved slowly TID for 14 days 100000 units nystatin with 0.1% triamcinolone QID for 14 days	Hard to find
Clotrimazole	10 mg troche dissolved slowly 5 times per day for 14 days	High sucrose content
Ketoconazole	3.3-6.6 mg/kg/day OD	Use until infection resolves
Fluconazole #1 for systemic treatment	6-12 mg/kg/day OD 1 <sup>st</sup> dose 3-12 mg/kg/day OD 2 <sup>nd</sup> dose 14 days	
Clotrimedine Gluconate 0.12%	Swish and spit 15ml TID	Has shown antifungal activity against candida

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## Antivirals for Kids

Drug	Dose	Comments
Acyclovir	Topical cream 5%	Thin layer 5X/day 4 days Herpes labialis
Acyclovir with hydrocortisone	Topical cream 5% A with 1%H	Thin layer 5X/day for 4 days Herpes labialis
Acyclovir	Suspension 200 mg/5 ml Tablets 400/800 mg	≤12 yo: 15 mg/kg 5 X/day X 7 days >12 yo: 400 mg 3-5X/Day X 7-10 days NOT FDA approved for primary herpetic gingivostomatitis



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## Steroids and Coating Agents for Kids

Drug	Dose	Comments
Triamcinolone topical paste (medium potency)	Thin layer TID for 7 days applied to ulcers	≥13 y.o.
Orabase B Coat and numb	Thin layer TID for up to 7 days applied to ulcers	Avoid excessive use because of risk of methemoglobinemia
Zilactin B Coat and numb	Thin layer TID for up to 7 days applied to ulcers	Avoid excessive use because of risk of methemoglobinemia
Sucralfate (Carafate) Coat only		
Benadryl and Kaopectate	Benadryl 12.5 mg/5 cc + Kaopectate 1:1 ratio	Avoid compounding with Lidocaine due to toxicity Swish and spit or apply with cotton swab
Prednisone 5 mg tablets	40-60 mg 1 <sup>st</sup> day, 20-30 mg 2 <sup>nd</sup> day, 10-15 mg 3 <sup>rd</sup> day, 5-7.5 mg 4 <sup>th</sup> and 5 <sup>th</sup> days	For adolescents and adults only.

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## Vaccinations

- When and how often?
- Up to date?
- Tetanus
  - TDAP
- Hep B
- Hep C
- HPV



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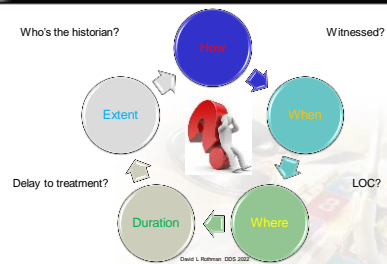
## Vaccinations for Kids

- Tetanus Toxoid
  - Clostridium tetani in soil
  - Head and neck exposed and susceptible
  - As part of Tdap, DTap, DT and Td
    - Tetanus
    - Diphtheria
    - Pertussis
  - In general 5 doses before 5yo
  - Booster recommended q10y
    - Recommended if injury occurs >5y from last booster



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## History

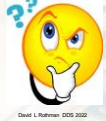


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*Name an adult disease that affects infants, children, adolescents, adults and the elderly?*



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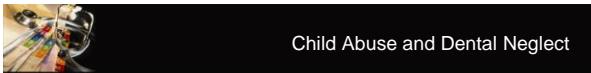


### Child Abuse and Dental Neglect

- 3 million reports of child abuse are made involving 6 million children (HHS 2013)
- Every day 4-5 children are killed by child abuse or neglect (HHS 2013)
- Head and neck area is involved between 54 and 65% of reported child abuse (Katner JADA 2012, O'Neill JTrauma 1979)
  - Bruises and injury to upper lip and frenum
    - Followed by oral mucosa, teeth, gingivae and tongue
  - Delay in seeking treatment
  - Parent /child interaction
    - Quiet child
    - Parent refuses to allow child to be alone with hc provider

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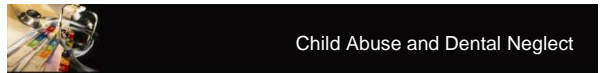
### Child Abuse and Dental Neglect

- Injuries and story inconsistent with history and accident



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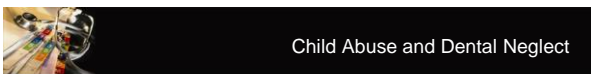
### Child Abuse and Dental Neglect

- Child Abuse
  - Parent or caretaker emotionally, physically or sexually neglects, abuses or abandons a child
  - Causing bodily injury by action or inaction
    - Striking child to cause injury
  - Fabricating an illness or symptoms
    - Munchhausen's by proxy
  - Causing mental injury by action or inaction
  - Causing sexual abuse or exploitation by action or inaction



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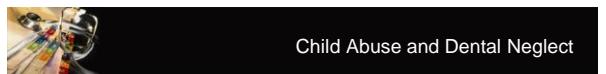
### Child Abuse and Dental Neglect

- Physical Neglect
  - Failure to provide a child with adequate essentials of life
    - Food
    - Clothing
    - Shelter
    - Medical care
  - Psychological nurturing and support
  - May lead to psychological and mental injury including
    - Anxiety, agitation, depression, socially withdrawn, psychotic
    - Inability to accomplish age appropriate tasks



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### Child Abuse and Dental Neglect

- Definitions:
  - Dental Neglect
    - Failure of parent or caretaker to follow through with treatment necessary
    - Provide adequate function
    - Freedom from pain and infection
  - Can affect
    - Learning
    - Communication
    - Nutrition
    - Growth and development



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## Child Abuse and Dental Neglect

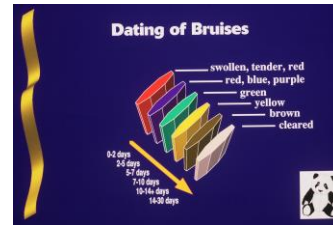
- Diagnosis
  - Physical signs
    - Multiple injuries at different states of healing
    - Burns
    - Broken teeth
    - Perioral injuries
    - Gingival, frenum and alveolar mucosa
    - Bite marks
    - Intraoral petechiae at junction of hard and soft palate
      - Towards back of mouth
    - HPV infections



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## Child Abuse and Dental Neglect



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## Child Abuse and Dental Neglect

- What to do if you suspect?
  - Call for help for the family not punitive
    - Family or caregivers may have trouble understanding needs
    - Lack of finances
    - Lack of transportation
    - Lack of providers
    - May be cultural
- Mandated reporters
  - Any licensed healthcare provider
  - Must follow state law
  - Anonymous
- Permissive reporter
  - Not licensed and is concerned
  - Anonymous



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## Child Abuse and Dental Neglect

- If immediate danger to child's welfare
  - Stall/Detain in office and make 911 call
  - Follow up with written report within 48 hours (state dependent)
- If not immediate danger
  - On-line or phone report immediately
  - Written report within 48 hours (state dependent)
- Anonymous report
  - Usually protected by state if report made in unbiased manner based on reasonable evidence
  - Parent can "assume" and file civil suit



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## Medical and Dental History

- CC is now "Area of Concern"
- Full and complete history of incident or problem
  - Witnesses?
  - Screening questions
- Full and complete medical history
  - Medications
  - Food and Drug allergies
    - Only 0.44% have celiac disease
    - Has to have an IgE component otherwise just a rxn or sensitivity
      - RAST (radioallergosorbent test) v skin test
  - Immunizations
  - Diseases of Childhood
  - Anesthesia and Surgeries
  - Complications



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## Medical and Dental History

- Dental History Screening questions
  - Last exam
  - Age and dental age
  - Tooth eruption
  - Habits
  - Treatment needed and performed
  - Occlusion



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## Clinical Exam

- Extraoral:
  - General look and responsiveness
    - "What did your child look like before? Do you have a picture?"
  - Symmetry
    - Swelling
    - Lumps and bumps
  - Soft tissues and condition
    - Scars, bruises, injuries
  - Bones
    - Steps, misalignments
    - Ecchymosis
  - Lips
    - symmetrical



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## Clinical Exam

- Intraoral
  - Frenae
    - Lacerations
    - Pulls and deviations
  - Buccal Mucosa
  - Floor of mouth
    - Lesions
    - Symmetry
  - Hard and soft palates
    - Lesions
    - Mobility
  - Tongue
    - Range of motion
    - Coating
    - Papillation
    - Crentations



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## Symmetry

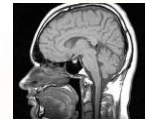


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## Rapid Neurological Assessment

- Evaluate for mentation, responsiveness, neuro damage
  - Glasgow Coma Scale
  - AVPU
  - Cranial Nerve Evaluation



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## Rapid Neurological Assessment

### Glasgow Coma Scale

Glasgow Coma Scale for Assessment of Coma in Infants and Children		INFANT AND YOUNG CHILD CRITERIA	OLDER CHILD AND ADULT CRITERIA
Eye opening	4	Spontaneous opening	Spontaneous
	3	To loud noise	To verbal stimuli
	2	To pain	To pain
Verbal response	5	Spontaneous, coos, cries to appropriate stimuli	Oriented to time, place, and persons; uses appropriate words and phrases
	4	Irritable cries	Confused
	3	Inappropriate crying	Incomprehensible words or verbal response
	2	Cries, moans	No response
Motor response	6	Spontaneous movement	Obeys commands
	5	Withdraws to touch	Localizes pain
	4	Withdraws to pain	Withdraws to pain
	3	Abnormal flexion (decorticate)	Flexion to pain (decorticate)
	2	Abnormal extension (decerebrate)	Extension to pain (decerebrate)
1	No response	No response	

\*Add the score from each category to get the total. The maximum score is 15, indicating the best level of neurologic functioning. The minimum is 3, indicating severe neurologic unresponsiveness.

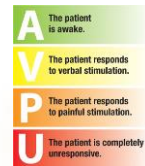
From Teasdale, G., & Jennett, B. (1974). Assessment of coma and impaired consciousness. *Lancet*, 2, 81-86. Jones, H. F. (1986). Neurologic evaluation and support in the child with acute brain injury. *Pediatric Annals*, 15(1), 14.

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## Rapid Neurological Assessment

- AVPU
  - Alert
  - Verbal
  - Pain
  - Unresponsive



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## Rapid Neurological Assessment

### • Cranial Nerves

CN	Motor	Sensory	Special Sensory	Function	Exam	Lesion
II			Special Sensory: Sight		Sensory	Assess vision in each eye. Snellen chart/ Rosenbaum chart
III	Eye muscles		Special Sensory: Sight		Sensory	Assess vision in each eye. Snellen chart/ Rosenbaum chart
IV	Eye muscles		Special Sensory: Sight		Sensory	Assess vision in each eye. Snellen chart/ Rosenbaum chart
V	Trachea		Special Sensory: Superior Colicula		Motor	Check jaw coordination. Wile movement
VI	Tongue		Special Sensory: Taste		Motor	Assess patient's ability to move downward and inward
VII	Assess		Special Sensory: Taste (Anterior 2/3), Touch (Anterior 2/3)		Both	Motor: Ask patient to stick out tongue Sensory: Ask patient to identify taste
VIII	Assess		Special Sensory: Hearing		Motor	Assess hearing of each ear
IX	Assess		Special Sensory: Taste (Posterior 1/3), Touch (Posterior 1/3)		Both	Motor: Ask patient to stick out tongue Sensory: Ask patient to identify taste
X	Assess		Special Sensory: Taste (Posterior 1/3), Touch (Posterior 1/3)		Both	Motor: Ask patient to stick out tongue Sensory: Ask patient to identify taste
XI	Assess		Special Sensory: Taste (Posterior 1/3), Touch (Posterior 1/3)		Both	Motor: Ask patient to stick out tongue Sensory: Ask patient to identify taste
XII	Assess		Special Sensory: Taste (Posterior 1/3), Touch (Posterior 1/3)		Both	Motor: Ask patient to stick out tongue Sensory: Ask patient to identify taste

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## Rapid Neurological Testing

**10 The Cranial Nerves**

1. Olfactory
2. Optic
3. Oculomotor
4. Trochlear
5. Trigeminal
6. Abducens
7. Facial
8. Vestibulocochlear
9. Vagus
10. Sacral

from pinterest

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## Concussion and Mild Traumatic Brain Injury

- Confusion
  - confused or blank expression or blunted affect
- Delayed responses and emotional changes
  - simple questioning responses delay
  - emotional lability
    - \* may become more evident as the athlete attempts to cope with his or her confusion
- Pain/dizziness
  - headache and dizziness
    - \* increased intracranial pressure
- Visual disturbances
  - seeing stars, blurry vision, or double vision
- Amnesia
  - Pretraumatic (retrograde) is brief
  - Posttraumatic (anterograde)
    - \* more variable (lasting seconds to minutes)
- Signs of increased intracranial pressure
  - persistent vomiting may suggest a significant brain injury with associated elevated intracranial pressure, other signs of increased intracranial pressure include worsening headache, increasing disorientation, and a changing level of consciousness
- **If no vomiting, may watch for 30 minutes**



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## Concussion and Mild Traumatic Brain injuries

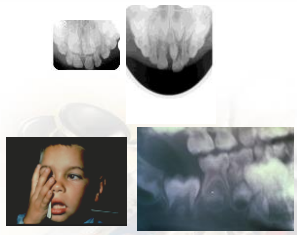
- Post concussion syndrome
  - Headaches
  - Dizziness
  - Fatigue
  - Irritability
  - Anxiety
  - Insomnia
  - Loss of concentration and memory
  - Noise and light sensitivity



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## Radiographic Exam

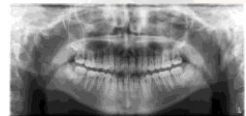
- PAs
  - 3 views
- BWX
  - #0,1,2
- Occlusal
  - #2 v #4
- Extraoral
  - #4
  - Double time
  - Distal shot
- Panorex



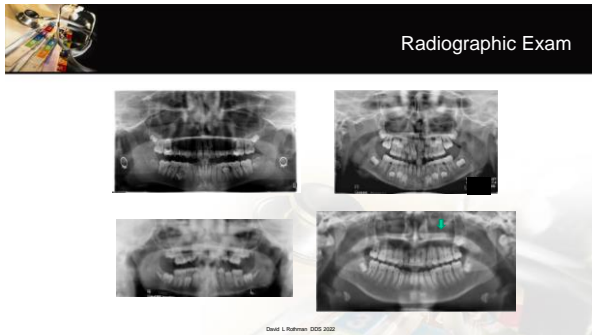
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## Radiographic Exam

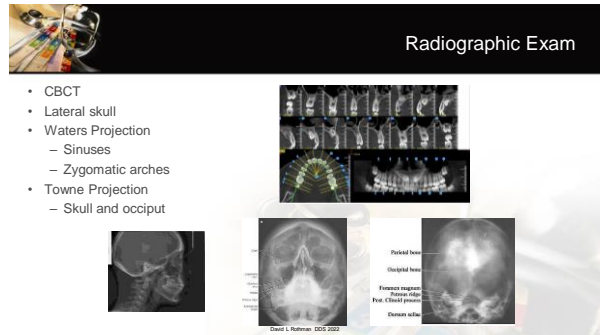
- Bitewing
  - Caries
- Periapical
  - Periodontal support
  - Root angulation
  - Anomalies
- Panorex
  - Bone maturity
  - Impactions
  - Development
  - Sinuses
  - Anomalies



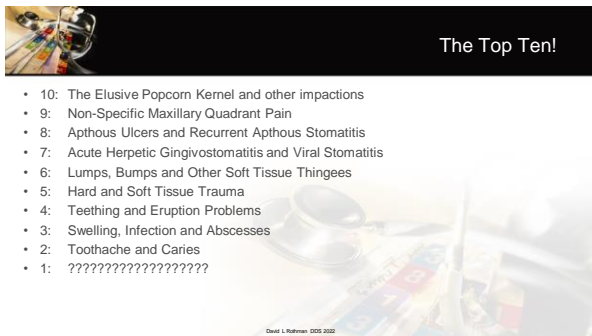
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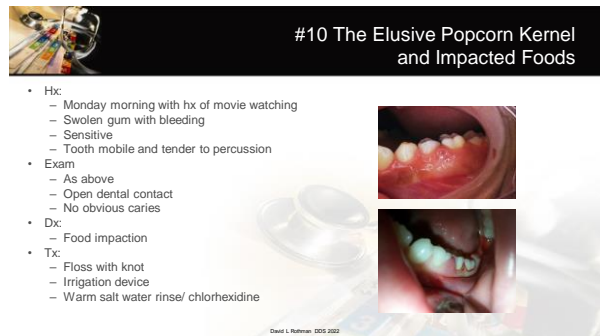
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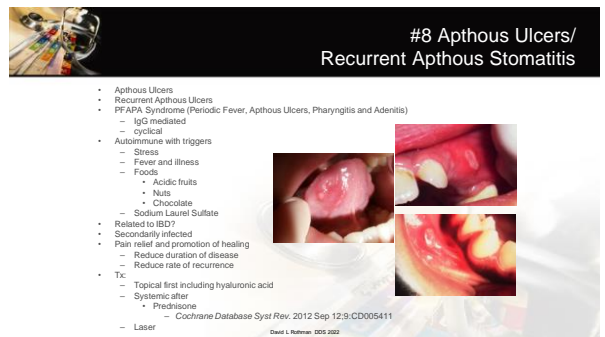
75



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### #7 Viral Stomatitis Primary Herpetic Gingivostomatitis

- Hx:
  - Prodromal signs
  - URI/flu symptoms
  - Irritability and loss of appetite
- Exam:
  - Generalized swollen and bleeding gums
  - Low grade fever <101
  - Sunken cloudy eyes (SLK)
- Dx:
  - Viral Stomatitis
    - Echo, rhino, herpes, coxsackie viruses
    - Covid gingivitis
    - Erosive lesions-atypical
- Tx:
  - Antivirals if early enough
  - Palliative topicals/systemics
  - Fluids
    - Dehydration is major complication
  - Time limited
    - Heals in 10 days with meds; 1% weeks without
    - Is this "teething"?




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### #6 Lumps, Bumps and Other Soft Tissue Things

- Geographic Tongue
- Hemangioma
- Riga Fede
- Habit problems
- Stenson's Duct
- Thrush
- Lip and cheek bite after anesthesia
- Mucocele




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### #6 Lumps, Bumps and Other Soft Tissue Things

- Hx:
  - Painless swelling anywhere in mouth
  - Enlarging or stable
  - Doesn't interfere with eating
  - Overlying mucosa may be irritated
  - Rarely "just happened"
  - Bleeds profusely if irritated
- Exam:
  - Raised round red lesion
  - Fluctuant
- Dx:
  - Hemangioma/Angioma
- Tx:
  - Surgical excision
  - Cautery
  - Specialist!!!!

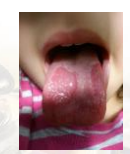


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### #6 Lumps, Bumps and Other Soft Tissue Things

- Geographic tongue (Benign Migratory Glossitis)
  - Benign depapillation of tongue that migrates over the dorsal and ventral surfaces
    - 3% population
    - No loss of taste
  - Allergic?
    - Related to IBD?
    - Common in psoriasis
    - Human Leukocyte Antigen (HLA)
  - Polygenic
    - Chronic Granulomatous Disease
  - No treatment
    - Some recommend no:
      - SLS
      - Citrus fruits

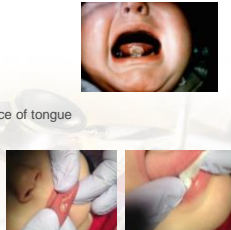


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### #6 Lumps, Bumps and Other Soft Tissue Things

- Hx:
  - New teeth have erupted
  - Showed up immediately after
  - No interruption in eating
  - No pain
- Exam:
  - White raised lesions on ventral surface of tongue
  - Directly over newly erupted teeth
- Dx:
  - Riga Fede Syndrome
- Tx:
  - None!




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### #6 Lumps, Bumps and Other Soft Tissue Things

- Hx:
  - No or low grade fever
  - Asymptomatic
  - White coat that can be scraped off tongue
  - Alternative:
    - Red inflamed mouth
  - +/- antibiotics
    - +/- newborn with mother with + hx
    - + Birth canal and nipple
- Exam:
  - White, caseous, raised plaques
  - Bright red, inflamed mucosa
- Dx:
  - Candidiasis (thrush)
- Tx:
  - +/- Topical antifungals
  - Treat mom!
  - Wipe mouth




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### #6 Lumps, Bumps and Other Soft Tissue Things

- Hx:
  - Difficulty latching on and feeding
  - Blanching of area lingual to lower incisors
  - ROM exist in closed mouth (colic/regurgitation)
- Dx:
  - Normal findings v tongue tie v short frenum v anxious parent
  - Careful evaluation for surgical intervention
- Tx:
  - There are **no** studies that conclusively show intervention improves outcome other than observational. There are **no** control studies.
  - Lingual frenuloplasty
    - no benefit of frenuloplasty in the newborn except to alleviate nipple pain
    - No difference in weight gain with or without tx
      - Cochrane database
    - Less anxious parenting
    - If the number of children who are dx'd as needing lingual frenectomy for feeding issues were really in need and didn't have intervention the population would have died off




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### #6 Lumps, Bumps and Other Soft Tissue Things

- Stenson's Duct
  - From parotid gland
  - Normally appears like bump with dot in the middle
  - Can get irritated from braces or biting
  - Can get infected or have retrograde infection
    - Requires antibiotics
    - After decongestant use
    - Vaping and cigarettes
- TX:
  - Treat by stopping cause/irritant and increasing saliva flow

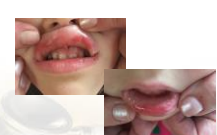


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### #6 Lumps, Bumps and Other Soft Tissue Things

- Hx:
  - Immediate, rapid onset and swelling
  - Localized to lips
  - New lipstick or lipgloss
  - Citrus fruit, shellfish
- Exam:
  - Edematous firm lips
  - No other tissue involved
- Dx:
  - Angioedema
    - Localized allergic response
    - Affects dermis, submucosal and subcutaneous tissues
- Tx:
  - Benadryl 12.5-25 (50) mg q4h
  - Watch for progression to ANAPHYLAXIS and epinephrine/O<sub>2</sub>
    - 0.15mg pediatric 1<sup>st</sup> dose/0.3mg adult q5min



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### #6 Lumps, Bumps and Other Soft Tissue Things

- Post anesthesia injuries
  - Localized lip swelling
  - Localized lip swelling
  - Localized lip swelling



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### #5 Hard and Soft Tissue Trauma



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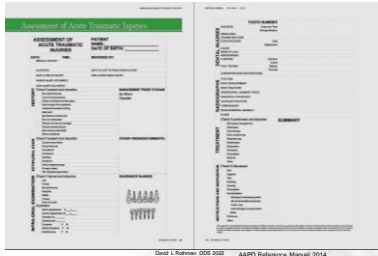
### #5 Hard and Soft Tissue Trauma



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## #5 Hard and Soft Tissue Trauma



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## Soft Tissue Trauma

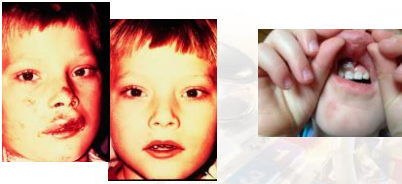
- Contusion/bruise
  - Raised
  - Caused by blood vessels rupturing in skin from blow
- Ecchymosis
  - Flat
  - Caused by bleeding in the underlying tissues leaking outwards
  - Not necessarily trauma
- Abrasion
  - Scratches not through skin
- Laceration
  - Cut through skin
- Avulsion
  - Skin torn off the underlying bone or tissues
- Puncture



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## Soft Tissue Trauma

- Kids heal quickly and relatively scar free
  - Vit E oil
  - Sunblock



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## Soft Tissue Trauma

- Puncture wounds
  - Suture only if open during function
  - Check for underlying damage
    - Salivary glands
    - Blood vessels
  - Spontaneous healing with minimal intervention



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## Hard Tissue Injuries

- Exam
  - Always check ROM
    - » Unequal condylar head movement
  - Check occlusion
  - Asymmetry
  - Palpate
    - » Tenderness to palpation
    - » Stepping/displaced/nondisplaced
  - Take appropriate radiographs



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## Hard Tissue Injuries

- Bones and Fractures
  - Younger children rarely fracture fully
    - Usually greenstick fracture
    - Covered with fatty tissue for shock absorption
  - Common sites are condylar necks
    - Contralateral fracture
    - Chin/ bilateral
  - Damage to condylar head and growth site
  - Limited treatment if occlusion OK
    - Diet, exercise
    - Remodels quickly






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### Hard Tissue Injuries

- Bones and fractures
  - Other common site is mandible
  - Through tooth socket
    - Weak spot
    - Favorable
      - » Doesn't separate during function
      - » No splinting/diet/ROM
    - Unfavorable
      - » Separates during function
      - » Splinting
    - Damage to developing teeth







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### Hard Tissue Injuries

- Tx of mandibular fractures
  - Guarantee patency of airway
  - Closed/open reduction
  - Splinting
  - Plates
  - Ortho buttons on teeth with interarch elastics
  - No tx!
    - If favorable
    - Diet
    - Range of motion
    - Exercise
    - Remodeling






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### Hard Tissue Injuries

- Bones and Fractures
  - Orbital Injuries
    - Ecchymosis of circumorbital area
    - Eye points down
    - Possible nerve impingement
    - Immediate referral

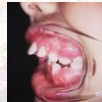



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### Alveolar Bone and Tooth Trauma

- Dental Trauma
  - Preschool children 6.1-62.1%
  - School age children 5.3-21%
  - Male:female 2:1
    - Approaching 1:1 in future
  - Maxillary central incisors most frequently affected
    - Primary and permanent
    - CI II<CI I
  - Causes
    - Sports
    - Violence
    - Auto accidents





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### Alveolar Bone and Tooth Trauma: All Bone is not the Same!

- Skeletal or basal bone
  - Intramembranous or Endochondral
  - Thick cortical plate
  - Vascular with marrow spaces
  - Unyielding
- Alveolar bone
  - Develops embryologically with cementum
  - Exists only for the teeth
  - Porous
  - Allows orthodontic movement





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### Alveolar Bone and Tooth Trauma

- Alveolar bone
  - Plastic/pliable
  - Supports teeth and develops with them
  - Larger marrow spaces and weak trabeculation
  - Single or multiple teeth
  - Tx:
    - Reduce fracture
    - Stabilize as needed
    - Monitor tooth vitality



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## Tooth Trauma

- Dental Trauma Guide
  - Jens Ove Andreason
  - [www.dentaltraumaguide.org](http://www.dentaltraumaguide.org)
    - Non profit
    - Interactive
- International Association of Dental Traumatology (IADT)
- AAPD Clinical Guidelines 2014



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## Tooth Trauma

- Dental Trauma Guide
  - Trauma Pathfinder



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## Dental Trauma Portable Emergency Kit

- Emergency Kit
  - Mirror
  - Syringe
  - Hank's Basic Salt solution
  - 100 mg doxycycline in 20ml saline
  - Sterile saline
  - Chlorhexidine oral rinse 0.12%
  - 50 # monofilament fishing line
  - .016 ortho wire
  - Wire cutter
  - Flowable composite/glass ionomer/etchant
    - Light if needed
  - Local anesthetic (buffered)
  - xrays



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## Tooth Trauma

- Exam
  - Count the teeth
    - Determine dental development
  - Check the arch form
  - Examine the soft tissues
    - Where are the parts?
  - Palpate
  - Percuss
  - Transilluminate
  - Pulp test
  - Radiograph
    - 3 views!
  - Record!



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## Tooth Trauma

- Pulp testing
  - Unreliable in
    - Primary teeth
    - Open apices
    - Recently traumatized teeth
  - Types
    - Electric
    - Cold
  - Best use
    - After 2-4 weeks to assess but with same limitations



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## Tooth Trauma

- Infraction (crazing)
  - 10.5-12.5 %
  - No loss of tooth structure
  - Allows pathway for bacteria to invade pulp
  - Weakens tooth to further trauma
  - Pulp necrosis in 3.5% of cases
  - Tx:
    - Resin bonding over surface to seal tooth



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## Tooth Trauma

- Enamel Fractures
  - Loss of enamel only
  - 82% of crown fx in primary dentition
  - 2<sup>nd</sup> most common in permanent dentition
  - Rare pulp necrosis
    - 1.7%
  - Tooth color change
    - Benign?
  - Tx:
    - None
    - Smooth
    - Restore
    - Radiograph to r/o root fracture



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## Discolored Anterior Teeth

- Do not require intervention unless other signs and symptoms appear
  - Mobility
  - Spontaneous or elicited pain
  - Fistula formation
  - Radiographic changes



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## Tooth Trauma

- Enamel-Dentin Fractures
  - Loss of enamel and dentin not involving pulp
  - Palliative Repair
    - Glass ionomer
    - Flowable composite
    - Cosmetic repair
  - Reattach segment



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## Tooth Trauma



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## Tooth Trauma

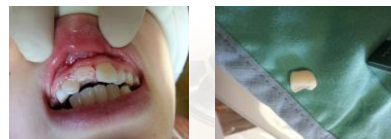
- Enamel-Dentin-Pulp fractures
  - “Complicated”
  - Treatment of pulp
    - Cvek technique
    - MTA/Biodentine
    - Glass ionomer
  - Palliative repair
  - Cosmetic repair
  - Attach segment



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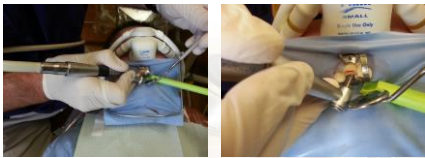
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## Tooth Trauma



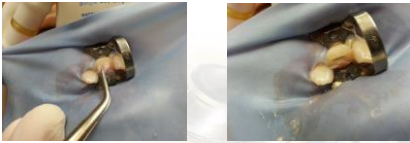
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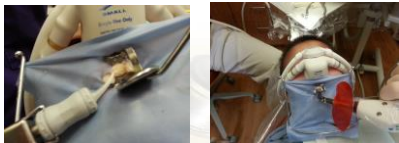
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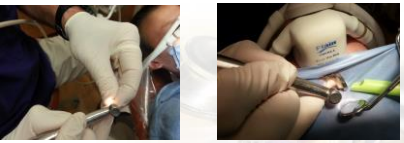
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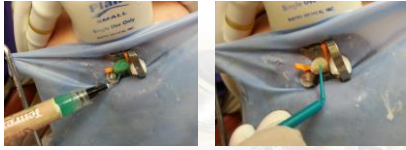
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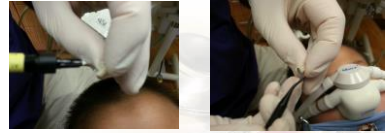
Tooth Trauma



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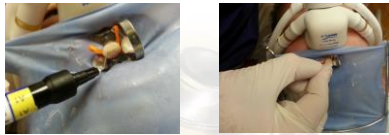
Tooth Trauma



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Tooth Trauma



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Tooth Trauma



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Tooth Trauma

- Crown-Root fractures
  - primary teeth
    - Extract if subosseous
  - Permanent teeth
    - Conservative
    - Remove loose segment
    - Direct pulp cap or extirpate pulp
    - Orthodontic extrusion
    - Extraction and implant

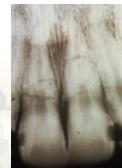


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Tooth Trauma

- Root Fractures
  - Primary teeth
    - Coronal 1/3 extract
    - Middle 1/3 watch
    - Distal 1/3 OK
  - Permanent teeth
    - Conservative management
    - Coronal 1/3 remove mobile section
      - RCT and extrusion
    - Middle 1/3 watch without mobility
    - Distal 1/3 watch
  - Healing can occur across fractures

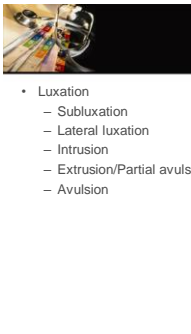
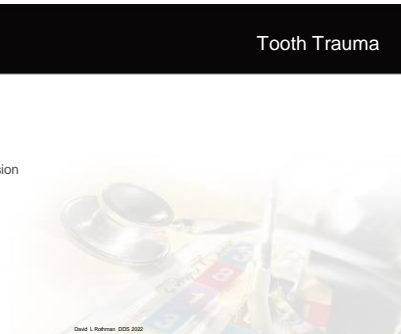


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### Tooth Trauma

- Luxation
  - Subluxation
  - Lateral luxation
  - Intrusion
  - Extrusion/Partial avulsion
  - Avulsion

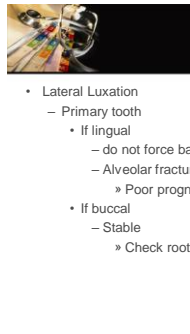
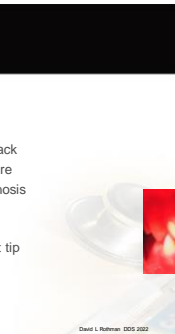
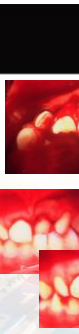




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### Tooth Trauma

- Lateral Luxation
  - Primary tooth
    - If lingual
      - do not force back
      - Alveolar fracture
        - » Poor prognosis
    - If buccal
      - Stable
        - » Check root tip

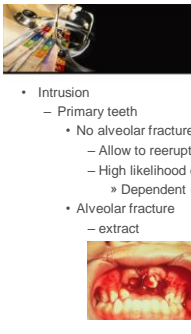
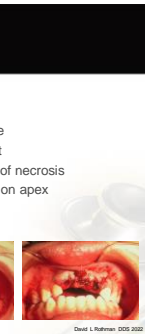
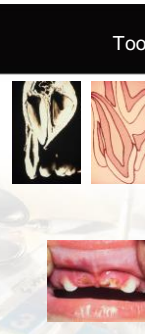






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### Tooth Trauma

- Intrusion
  - Primary teeth
    - No alveolar fracture
      - Allow to reerupt
      - High likelihood of necrosis
        - » Dependent on apex
  - Alveolar fracture
    - extract

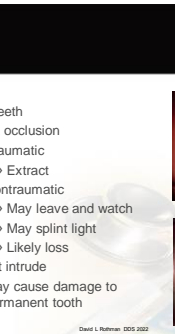





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### Tooth Trauma

- Extrusion
  - Primary teeth
    - Check occlusion
      - Traumatic
        - » Extract
      - Nontraumatic
        - » May leave and watch
        - » May splint light
        - » Likely loss
    - Do not intrude
      - May cause damage to permanent tooth

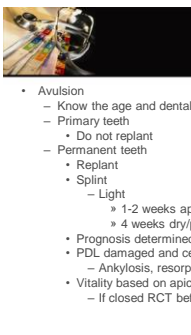

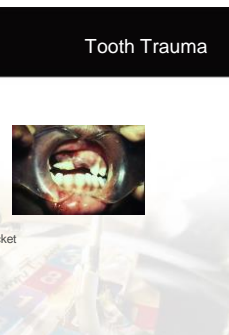




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### Tooth Trauma

- Avulsion
  - Know the age and dental development
  - Primary teeth
    - Do not replant
  - Permanent teeth
    - Replant
    - Splint
      - Light
        - » 1-2 weeks appropriate media
        - » 4 weeks dry/poorly stored
    - Prognosis determined by storage and time out of socket
      - » PDL damaged and cementum in contact with bone
      - Ankylosis, resorption and infection
    - Vitality based on apical closure
      - If closed RCT before splint comes off

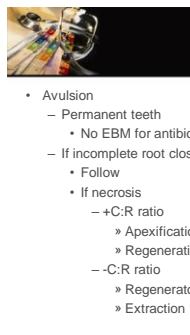
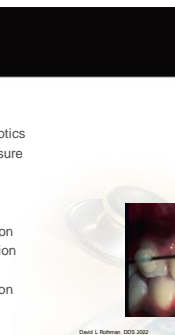
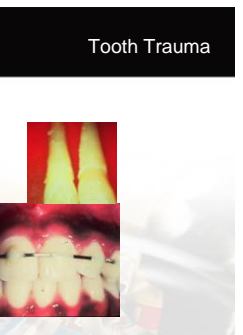




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### Tooth Trauma

- Avulsion
  - Permanent teeth
    - No EBM for antibiotics
  - If incomplete root closure
    - Follow
      - If necrosis
        - +C:R ratio
          - » Apexification
          - » Regeneration
        - -C:R ratio
          - » Regeneration
          - » Extraction

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## Tooth Trauma

- Follow up
  - Office visit with radiographs
    - 4 weeks
    - 3 months
    - 6 months
    - 1 year
    - Yearly after
  - Looking for
    - Pulpal changes
    - Vitality changes
    - Tooth color changes (?)
    - Periodontal support



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## #4 Teething and Eruption Problems

- There is no such thing as "teething"*
  - Why does it only occur in primary teeth?
- Associative not causative/ occurs temporally related
  - Pain
  - Hands in mouth
  - Fever
  - Irritability
  - GI distress
  - Salivation
- NO STUDY EVER HAS PROVEN ITS EXISTENCE!!!**
- R/O viral and bacterial infection, behavioral changes, diet changes
- Cochrane database-inconclusive evidence



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## Mythology: What to expect...



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## Mythology: What to expect...

- Your baby's teeth will make their grand, grumpy entrance between 3 and 12 months old or later. Here are some common signs your little one is teething, along with remedies that will ease baby's discomfort.
- When your baby's first tooth shows up, you might be taken by surprise ("Oh! What just got a tooth?"), or you might just finally understand what all those strange symptoms were about. Look out for these common signs your baby is teething:
- Teething Symptoms
  - Swelling
  - Swelling and/or gum redness
  - Irritability
  - Crying
  - Excessive drooling
  - Refusing to eat
  - Not sleeping
  - Ear pulling and cheek rubbing
- Every baby experiences the start of teething differently. Some have virtually no symptoms, while others suffer through teething pain and fussiness for months. But if you know the signs to look out for, the timing of baby teething, and home remedies you can use to alleviate teething discomfort, it can make it easier for your baby (and you) to get through this particular milestone.
- When Do Babies Start Teething?
- Teething symptoms can precede the actual appearance of a tooth by as much as two or three months. Most babies get their first tooth around 6 months old, though when those first tiny pearly whites make their appearance can vary quite a bit from baby to baby. Some infants' first teeth erupt as early as three months old, while others don't get theirs until after the first birthday. In other words, there's a wide range of normal in terms of when teething in babies starts.
- <http://www.whattoexpect.com/first-year/teething/>



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## How Do Teeth Erupt?

- Passive growth from deposition at Hertwig's epithelial root sheath
- Apoptosis (programmed cell death) at the incisal edge/cusp tips
  - Blood supply cut off by hormonal transmitter
- May lead to pain as tooth comes in contact with thin overlying mucosa from trauma
- Tooth erupts and gingiva evaginates with collar of non keratinized tissue
  - Food may get stuck in gingival pocket
- May get bleeding in between the tooth sac and the mucosa
  - Eruption hematoma
    - benign



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## And This Also...

- Fever from allergic or bacterial response
  - <102 viral
  - >102-104.5 bacterial
  - Dehydration
  - Allergic also increases temperature slightly
- Hand in Mouth
  - Itching burning gums
  - Viral infections
    - Herpes simplex and Herpes stomatitis/Primary Herpetic Gingivostomatitis
    - Echo, Rhino are others



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## Remedies –Careful with:

- Orajel – Contains Benzocaine 10% and FD&C Red 40, Flavor, Glycerin, Polyethylene Glycols, Water Purified, Sodium Saccharin, Sorbic Acid, Sorbitol ; rare cases of benzocaine toxicity with overuse.
- Teething biscuits – may contain unnecessary sugar – dentists warn against caries promotion
- Frozen miw-bagel halves – popular, but same caveat as above.
- Hyland's Homeopathic Teething Tablets
  - Off the market? YES!!!
  - Contains:
    - Calcarea Phosphorica (Calcium Phosphate), 3X
    - HFUS Chamomilla (Chamomile) 3X HFUS Coffea Cruda (Coffeine) 3X HFUS Belladonna 3X HFUS (Atropine) 0.0003%
    - Almost imperceptible amounts of these toxins, but drugs are regulated; potential toxicity with overdose from the belladonna alkaloid
    - In common use – ask if being used – many parents swear by them!



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## #4 Teething and Eruption Problems

- Mesiodens
  - What beautiful teeth you have!



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## #4 Teething and Eruption Problems

- Natal tooth
  - Present at birth
  - 1:1000-3000
- Neonatal tooth
  - Present in 1<sup>st</sup> month
- Are not mesiodens or supernumeraries
- Cap of enamel
  - If removed pulp stump remains and dentin covered tooth will develop
  - Misshapen and sensitive
- May interfere with feeding
- No EBD for extraction
  - No case reports for aspiration



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## #4 Teething and Eruption Problems

- Mesiodens
  - Dental lamina breaks into extra tooth bud(s)
  - In midline of maxillary arch
  - Conical or tooth shaped
  - May be single or multiple
  - Pointing up or down
  - Remove if impacting eruption of permanent teeth
    - May opt to watch with q2y radiographs
    - Correct time to remove is if erupted or if 1/2-2/3 root formation of surrounding permanent teeth



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## #4 Teething and Eruption Problems

- Ectopic eruption
  - Due to overretained primary teeth
  - Not a problem unless permanent tooth erupts into crossbite
  - May also occur to widen arch and compensate for different functional envelope



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## #4 Teething and Eruption Problems

- Bonus question:
  - "Shouldn't you just take out those extra baby teeth?"
  - or: my child looks like a shark

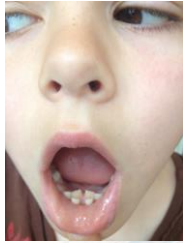


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## #4 Teething and Eruption Problems



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## #4 Teething and Eruption Problems

- Though it may appear necessary and may look uncomfortable, it is not necessary
- The teeth will exfoliate
- During normal swallowing the tongue pushes the teeth forwards
- Does **not** mean the child is predisposed to crowding
- Always a caveat!
  - Maxillary anterior teeth erupting into crossbite
  - Maxillary anterior teeth erupting into unattached gingiva



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## #4 Teething and Eruption Problems

- Eruption Hematoma
  - Benign blood filled sac above an erupting tooth as developmental sac thins out and trauma may cause bleeding
  - No treatment is needed!!!



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## #4 Teething and Eruption Problems

- Gemination
  - A primary or permanent tooth splits and becomes 2 teeth
  - Dentition: 1 + normal#
- Fusion
  - 2 teeth fuse at the cementum or enamel
  - Dentition: normal # -1



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## #4 Teething and Eruption Problems

- Pericoronitis
  - Flap of gingiva overlying erupting tooth
  - Food and bacteria
  - Can become infected and inflamed
    - Swells and becomes traumatized
    - Rx chlorhexidine, warm salt water rinses, irrigation
    - Rx amoxicillin pm



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## #4 Teething and Eruption Problems

- Sequestrum
  - Spicule of bone that has had blood supply cut off while tooth erupts
  - Benign and requires no treatment



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### #4 Teething and Eruption Problems

- What do you think this is?



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### #4 Teething and Eruption Problems

- Teratoma or Ectopic Eruption of tooth?



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### #3 Swelling, Infection and Abscesses

- Hx:
  - When, where, fever, location, changes in size and shape
  - +/- pain
  - +/- heat/warmth
- Exam:
  - Location
  - Indurated or fluctuant
  - Pointing or diffuse
  - Associated pathosis



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### #3 Swelling, Infection and Abscesses

- Infections in Children Spread More Rapidly
- Wide marrow spaces
- Shorter distances to especially susceptible structures
  - Cavernous sinus
  - Growth centers
    - TMJ
  - Tooth buds
    - Turner teeth
    - Dysplastic teeth



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### #3 Swelling, Infection and Abscesses

- Mucocele
  - Mucous retention cyst
  - Trauma to salivary gland duct
  - Swell/burst/swell
  - Full excision or marsupialization



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### #3 Swelling, Infection and Abscesses

- Ranula
  - Mucous retention cyst in Wharton's duct
  - May be due to antihistamines or other agents that dry the mouth
  - Marsupialization or probing
  - Lemon drops
    - Increase salivation
  - Rule out sublingual infection
    - Ludwig's Angina
      - Life threatening
        - » Airway compromise



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### #3 Swelling, Infection and Abscesses

- Dental Infections
  - Intraoral
    - Path of least resistance
      - Generally to buccal
      - To lingual or palatal
        - More virulent
    - Antibiotic coverage prior to treatment
      - Infections are acidic
      - Difficult to anesthetize
  - Drain?
    - Usually through the sulcus
    - Fistulous tract



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### #3 Swelling, Infection and Abscesses

- Dental Infections/Odontogenic Infections
  - Extraoral
    - Hospitalization and IV antibiotics
    - Drainage to avoid Ludwig's Angina
    - Does warm water intraorally help?

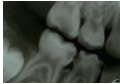


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### #2 Toothache and Caries

- Friday afternoon at 4PM
  - History of being in pain for a week but didn't want to take the child out of school/soccer/music lessons
    - Generalized pain relieved by NSAIDs or Tylenol
  - Frequency
  - Severity
  - Location
  - Swelling/drainage
  - Hx of
    - Trauma
    - Restorations
    - Decay /untreated



Pulp polyp

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### #2 Toothache and Caries

- Treatment
  - Palliative treatment
    - IRM
    - GI/RMGI
    - Indirect pulp treatment
  - Possible ab's
  - Return for full diagnosis and definitive treatment
    - Restoration
    - Exfoliation
    - Extraction



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### #1 The Bill

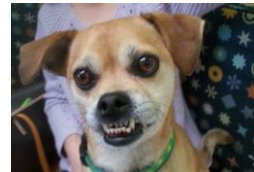
Item	Quantity	Unit Price	Total Price
Exam	1	\$150.00	\$150.00
Periapical Radiograph	1	\$100.00	\$100.00
Emergency Treatment	1	\$200.00	\$200.00
Material	1	\$50.00	\$50.00
Office Fee	1	\$100.00	\$100.00
Insurance	1	\$150.00	\$150.00
Tax	1	\$25.00	\$25.00
Total			\$775.00

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### Bonus Emergency

- Treat or Not To Treat?



Orthodontic emergency: Time to treat before nature can self correct

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It is less important how you define a child than how you treat a child: with respect and understanding



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Enjoy yourself!



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Thank You for Listening

- Any questions?



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