

Pediatric Dento-alveolar trauma & infections

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Nomenclature

- Numbering Teeth

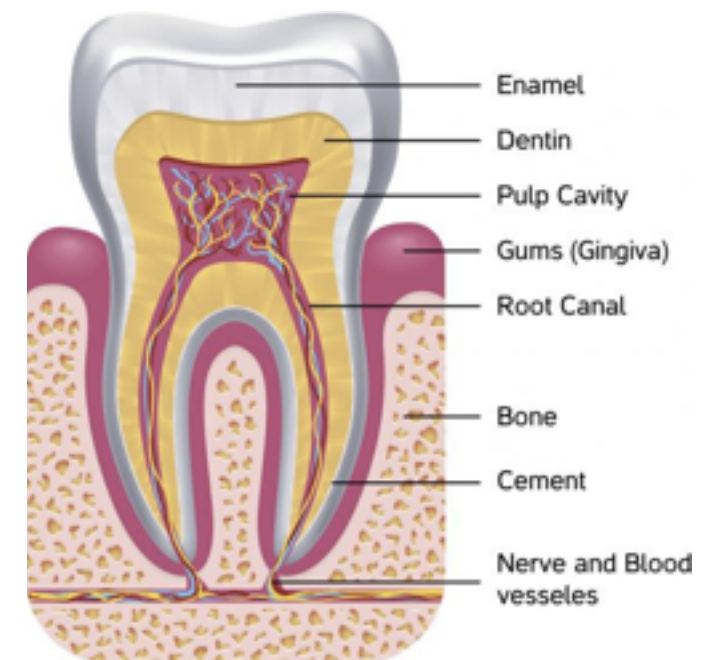
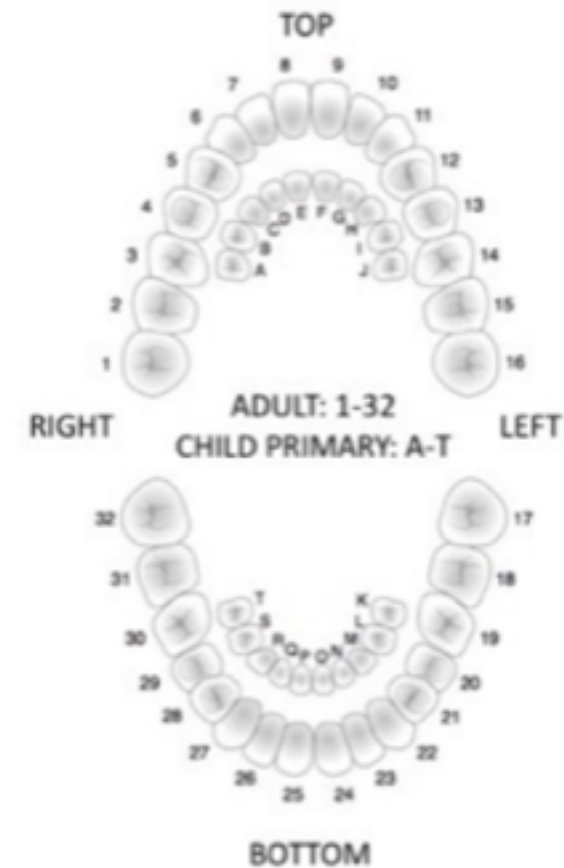
- Deciduous: A-T (20)
- Permanent (darker/larger than deciduous)
 - Top (R->L): #1-16
 - Bottom (L->R): #17-32
- By Quadrant: central incisor, lateral incisor, canine, 2 premolars (not present in primary), 3 molars (including wisdom)

- Surfaces

- Maxillary, mandibular (upper, lower);
buccal, lingual (outside, inside);
interproximal, occlusal (between/on top);
apical, coronal (root, crown)

- Layers

- Enamel > Dentin > Pulp
- Periodontal ligament > Alveolar bone



Approach to Trauma

1. ABC's
 2. If uncontrolled bleed, suction + pressure > lido+epi + suture site if needed. Bite block helpful
 3. Look for lacs, foreign bodies, aspirated teeth (CXR)
 4. Assess for mandibular, alveolar ridge or facial/maxillary fracture:
 - a) Asymmetry or bone mobility
 - b) Numbness/sensory deficit
 - *Inferior alveolar n*: mandibular teeth (*mental branch* = lower lip, chin)
 - c) Focal tenderness
 - d) *Tongue blade test*: malocclusion
 - e) CT Maxillofacial
- **Immediate OMFS:**
 - Alveolar ridge fracture
 - **DDS within 24hr:**
 - Ellis 2-3 fracture
 - Root fracture
 - Extrusion > 3mm
 - Lateral luxation with malocclusion
 - **Regional nerve blocks:**
 - Supraperiosteal
 - Inferior alveolar
 - Mental
 - Infraorbital

Lacerations

- **Gingival:**

- Repair Indication: large (>2cm, can trap food) or tissue flap falling between occlusive surfaces of teeth.
- Technique: Lido+epi +/- IN versed. May need ketamine if more extensive or patient does not tolerate. 5-0 Chromic or Vicryl rapide.
- Home: soft food x2-3d, rinse mouth after PO, avoid spicy/salty food, avoid straw (negative pressure increases bleeding). Antibiotics not needed for most.



- **Tongue:**

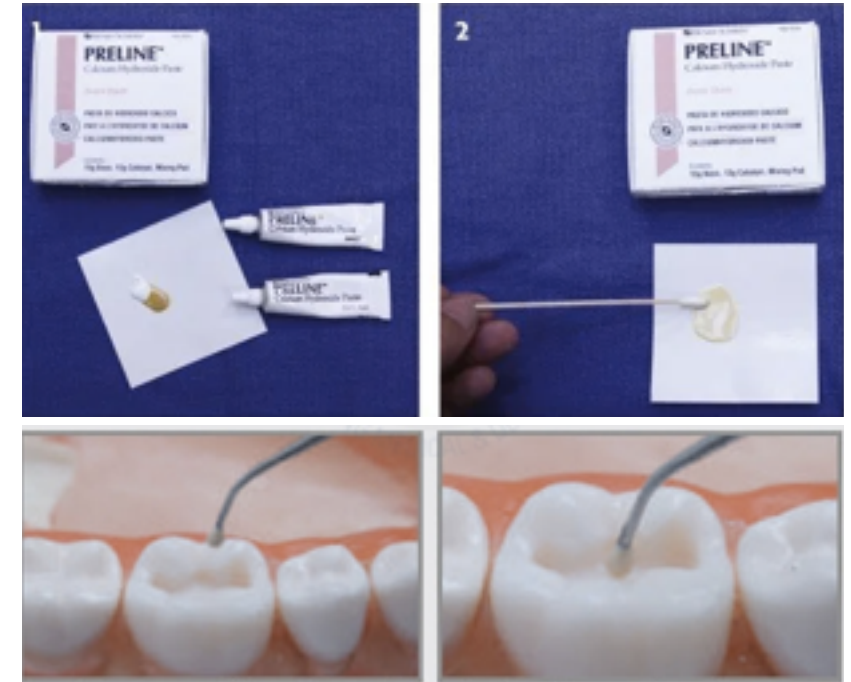
- Repair Indication: full-thickness, large gaping >1cm w/ free edge or flap, or bleeding that doesn't stop.
- Technique: Most done with ketamine sedation. Use bite block (rolls of gauze), and grasp tongue w/ Magill forceps or towel clamp (must keep dry) or nylon suture thru tip tongue (can tie to bed if no assistant). Irrigate if needed then close w/ 4-0 Chromic or Vicryl rapide using large bites.
- Home: Can choose to use chlorhexidine gluconate 0.12% mouthwash BID x7d, and if large/complex Augmentin (most don't need antibiotics).



Sealing & Splinting

- **Sealing with Ca OH paste (DyCal or Preline):**

- For dentin fractures; aids in prevention of infection and pain relief. Measure equal amounts of catalyst and base. Mix together with cotton applicator. Dry tooth surface by having patient bite on gauze. Apply to site - dries within minutes.



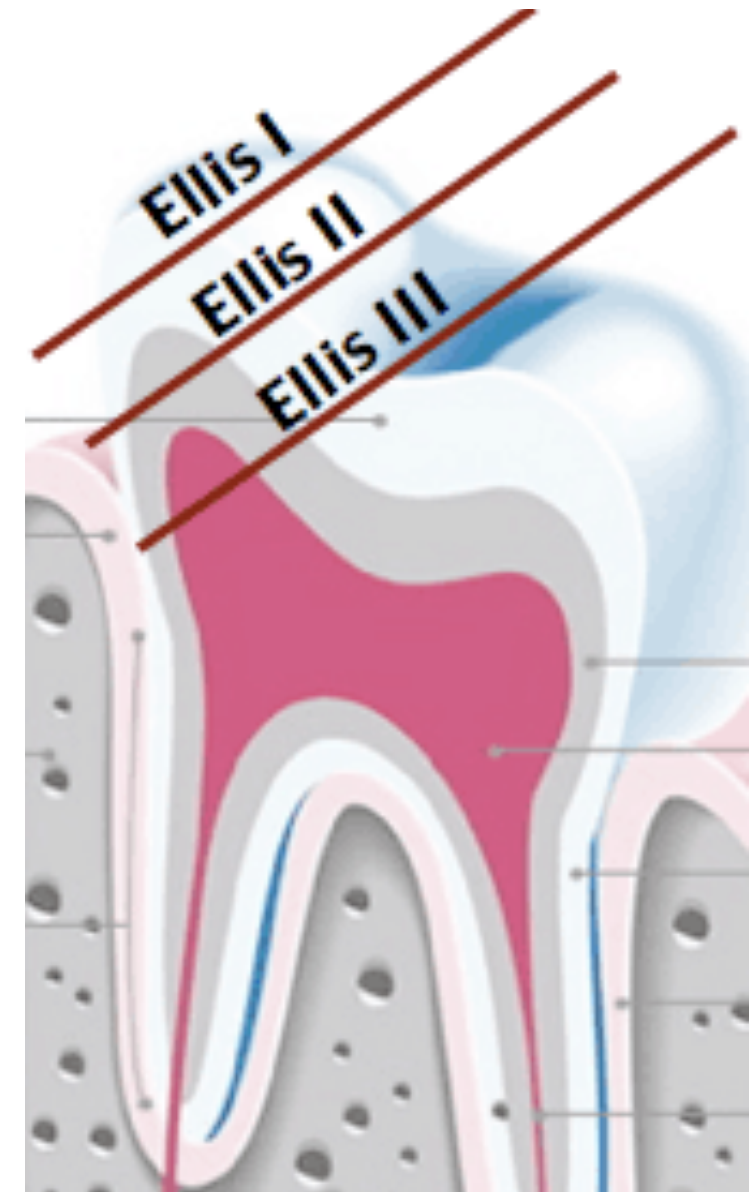
- **Splinting with Coe-Pak:**

- For reimplanted or grossly mobile teeth. Measure equal lengths of catalyst and epoxy on to paper pad (2" each). Mix together with tongue depressor. Roll into 2 logs using wet gloves. Teeth/gingiva must be dry. Apply to both medial and lateral tooth surfaces extending to 2-3 adjacent stable teeth, including gingiva. Avoid occlusal surface. Soft diet, f/u DDS 24h.
- CoePak alternative = Dermabond + Steristrips



Dental Fracture (Ellis Classification)

- ELLIS 1 (enamel)
 - File sharp edges with Emery board.
 - Non-urgent DDS referral for cosmetic reconstruction.
- ELLIS 2 (dentin = creamy yellow +pain)
 - Seal exposed dentin to prevent infection and reduce sensitivity:
 - Local block > dry tooth > smooth edges w/ file > paint with calcium hydroxide paste (*DyCal* or *Preline*) > DDS within 24h (seal lasts 2-3 days).
- ELLIS 3 (pulp = pink +pain)
 - Local block > Apply saline- or lido-moistened cotton pledget over pulp and hold until bleeding stops (2-5min) > *DyCal/Preline* seal > DDS within 24h.
 - Complication = apical periodontitis, failure of root maturation (most need root canal to prevent these).

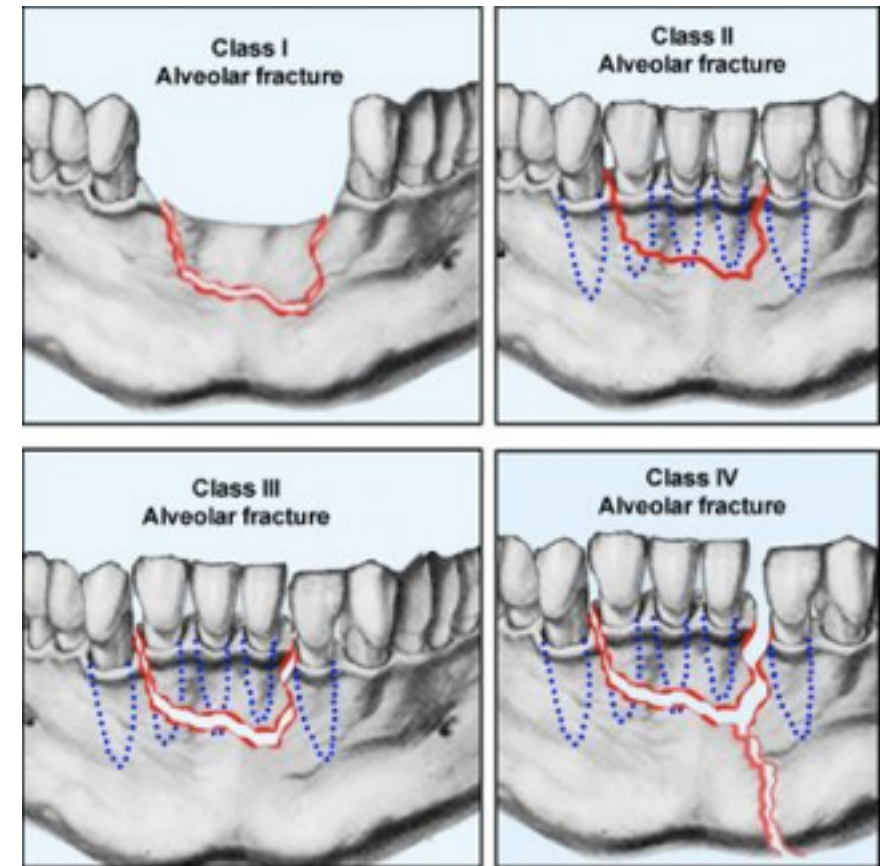


Percuss around tooth checking for dental root fracture below cementoenamel junction.
Image if unsure

Dental Fracture

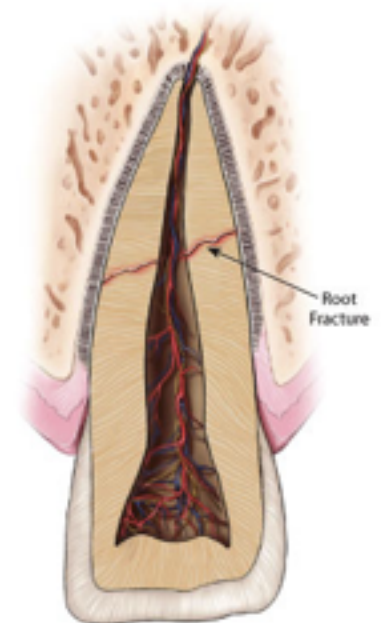
- **Alveolar Ridge Fracture:**

- Exam: Segment or multiple teeth mobile, malocclusion, and/or sensory deficit. Can extend into mandible.
- Mgmt: CT maxillofacial to determine level of fracture. Do NOT replace avulsed teeth. Immediate OMFS splinting under sedation + lac repair.



- **Root Fracture:**

- Exam: Coronal fragment mobile/displaced and bleeding from gingival sulcus + tender to percussion +/- sensory deficit.
- Mgmt: CT maxillofacial to determine level of fracture. Rinse exposed root surface > reposition and bind coronal segment with temporary splint. Refer to DDS within 24h for formal splinting and root canal (if pulp necrosis).



Avulsion

- Periodontal ligament cell viability nil after 60min without storage medium.
- Storage: EMT Toothsaver (12-24h), milk (3-8h) or even parent mouth.
- Reimplant: Should not reimplant primary tooth. If unsure primary vs permanent tooth (age 6-12yo), no harm in replacing tooth immediately long as old enough not to choke on tooth. Handle by crown only and rinse in saline. Need field block before reimplant + irrigated socket (remove clots). Once reimplanted, have patient bite on gauze. Splint + doxy 100 BID x7d or PCN VK 50mg/kg/d div QID + Td + chlorhexidine 0.1% rinse BID + soft diet + DDS within 24h. *Do not replace avulsed tooth if suspect alveolar ridge fracture.



Subluxation & Extrusion

- Subluxation
 - Loosening of tooth in alveolar socket due to damage to PDL or alveolar bone. Always consider alveolar ridge and occult root fracture especially when segment of teeth displaced.
 - Most minor subluxations will settle back in alone.
 - If extrusion with loosening in socket:
 - **PRIMARY TOOTH** (<5yo)
 - Extract severely loosened teeth if high-risk aspiration (>3mm extrusion) with local lido and dry gauze or needle holder.
 - If minor extrusion (<3mm), reposition and splint.
 - **PERMANENT TOOTH** (begins @5y, done @13y)
 - Reposition, splint with CoePak and refer DDS (24-48h).
 - If +crown fracture, use local lido and seal with *DyCal/Preline*.

Periodontal Injuries

CONCUSSION	SUBLUXATION	LATERAL LUXATION	INTRUSION	EXTRUSION	AVULSION
No displacement No mobility	Angled forward or backward +/- mobility	Angled laterally +/- mobility	Displaced into socket +/- mobility	Displaced incompletely out of socket +/- mobility	Displaced completely out of socket
Percussion sensitive	Percussion sensitive +/- Malocclusion		May not be visible (false appearance of avulsion)		Missing tooth
Non-emergent; NSAIDS Soft Diet	NSAIDS, soft diet	Realign & immobilize w/ splint asap	Rx: Extract vs spontaneous re-eruption		Re-implant avulsed permanent teeth ASAP Best if 15-30m
Dental referral Good prognosis	Dental Follow-up Dental consult for possible immobilization Monitor for pulp necrosis	Firm, gentle pressure usually will reposition tooth Dental consult or referral within 24 hours Monitor for pulp necrosis	Primary tooth: Dental F/U for imaging of the proximal tooth. Permanent tooth: Urgent follow-up. Monitor for pulp necrosis	Primary tooth: Extract if aspiration risk Permanent tooth: Emergent dental for splinting Monitor for pulp necrosis	Primary tooth: Do not replace Permanent tooth: Rinse gently replace immediately Dentist for immobilization

Intrusion: 80% re-erupt, 15% partially re-erupt, 5% remain impacted. No treatment needed in ED but should see DDS urgently because intrusion toward permanent teeth can cause disfigurement. If permanent, need DDS for repositioning/splinting, eval for fracture/pulp necrosis.

Pulpitis

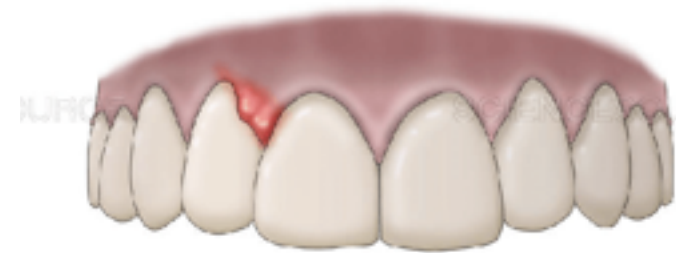
- Due to dental caries.
 - *Reversible* = inflammation causing temperature/pressure sensitivity.
 - *Irreversible* = necrosis causing constant pain.
- **Gingivitis**: inflammation of just gingiva.
- **Periodontitis**: inflammation of entire attachment apparatus (PDL+gingiva); causes loosening, bleeding. Augmentin only if severe (moderate/severe bone loss)
- **Pericoronitis**: inflammation due to food trapped between erupting tooth and gingival flap (*operculum*). Refer for excision of flap and/or tooth removal. Typically no antibiotics.



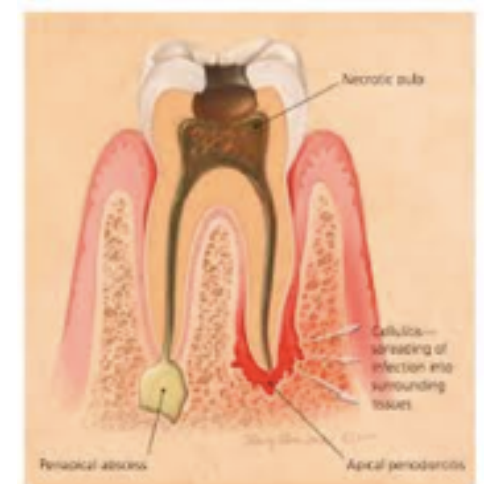
Periodontal & Periapical Abscess

- Infection in gingiva (*periodontal*) or at tooth apex (*periapical*) due to irreversible pulpitis. Tooth sensitive to percussion and heat +/- cellulitis of surrounding gingiva, buccal surface.
- **Abscess** = fever, lymphadenopathy, tooth mobility, edema of soft tissue. If concern for local extension to deep space (especially if neck swelling), get CT max/face w/ cont. Consult OMFS especially if extension to alveolar bone for I&D and penrose, otherwise can consider needle aspiration + Augmentin or Clinda x7d if 1) fever and lymphadenopathy; 2) surrounding tissue spread; or 3) immunocompromised. +DDS outpt 1-3d. Admit IV Unasyn or Clinda if deep fascial infection (pain, swelling, trismus, dysphagia) or osteomyelitis (rare, mandible > maxilla).
Potential Spaces for Abscess Extension:
 - Masticator, buccal, canine, infratemporal, submental/mandibular/lingual, lateral pharyngeal, retropharyngeal
- **Parulis** = end of a draining fistulous tract of necrotic tooth. Soft, solitary, erythematous papule. Don't need I&D, just manual pressure since already draining.

Periodontal abscess

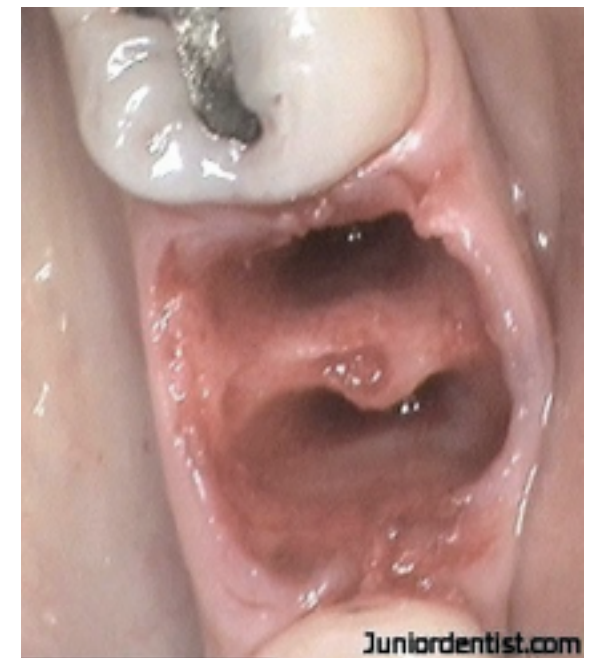


Periapical abscess



Alveolar Osteitis (“Dry Socket”)

- Post-extraction (molar) pain due to loss of healing clot.
- Inflammation and local osteomyelitis approx 3-5d after extraction.
- Mgmt: consider nerve block, gentle warm irrigation w/o debridement, pack socket w/ dry socket paste (OTC petroleum based). NO antibiotics, DDS ref in 24h.



Submandibular space infection (Ludwig Angina)

- Bilateral, 2 compartments: sublingual + submaxillary. Most arise from infected molar. Aggressive “brawny” polymicrobial cellulitis and tongue distention with possible airway obstruction. Generally no lymphadenopathy or abscess.
- **Risk Factors:** diabetes, immunodeficiency
- **Mgmt:**
 - Secure airway if dyspnea (before stridor develops) - ENT c/s for fiberoptic nasal intubation
 - Obtain Blood Cx and begin antibiotics:
 - Unasyn or Ceftx + Flagyl or Clinda + Levoflox
 - Add Vanco or Linezolid if MRSA risk or septic
 - If immunodeficient: Cefepime + Flagyl or Meropenem or Zosyn



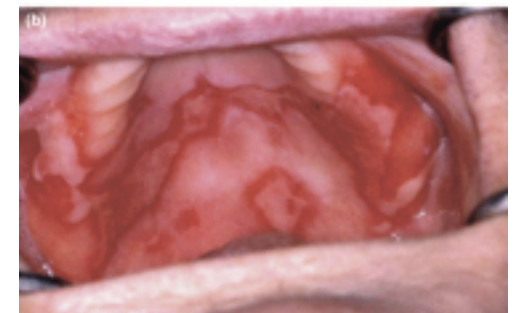
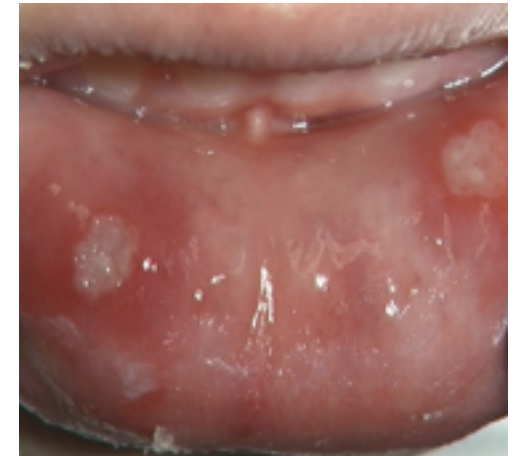
Sialoadenitis

- Inflamed salivary gland (parotid, submandibular, sublingual). Infection, obstruction or inflammatory. Viral bilateral. Bacterial (staph) unilateral +/- dehydration. RFs = DM, dehydration, Sjogrens syndrome, radiation therapy. Obtain US (CT + cont 2nd line)
- **Acute unifocal salivary gland swelling:** most commonly due to sialolithiasis obstruction and/or bacterial (fever, expression of pus).
 - **Mgmt:** Sialogogues (sour candy), local heat, oral rehydrate, massage. Improve in 1-5d. If infected, add augmentin + ENT referral
- **Acute multifocal salivary gland swelling:**
 - **Mumps:** most classic but parainfluenza and EBV may mimic. +Fever, headache, malaise/myalgia then parotid involvement w/in 48h. Starts unilateral then bilat in few days
 - Other causes: inflammatory (radio-iodine, contrast), juvenile recurrent parotitis, drug-induced.



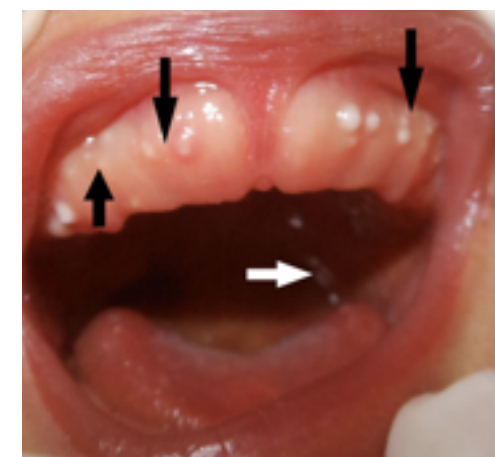
Aphthous stomatitis (canker sores)

- Round ulcers 3-5mm peripheral erythematous and yellowish exudate centrally, multiple times/year and heal in 7-14d. Complex = more numerous, painful, larger (>1cm), longer 4-6 weeks (must exclude Behcet). Immune dysregulation w/ pro-inflam process + genetic component. If +systemic sx and/or recalcitrant, consider PFAPA, SLE, IBD, cyclic neutropenia, or hyperIgD.
 - **Pain control:** 2% viscous Lido; Benadryl/Aluminum hydroxide swish/spit (Magic Mouthwash); rarely liquid Norco if severe
 - **Secondary bacterial/fungal inf (usually on immunosupp):** Chlorhexidine 0.12% swish/spit BID, Nystatin swish/swallow QID
 - **Simple:** Dexamethasone elixir (0.5mg/5cc) TID (alt = clobetasol gel/ointment) + Sucralfate suspension 1g QID
 - **Complex:** Prednisone 20-40mg QD x4-7d + topical
- **HSV gingivostomatitis:** Can be extensive, commonly over cutaneous lip and only rarely over masticatory gingiva or hard palate. Consider immunodeficient if recurrent intra-oral HSV



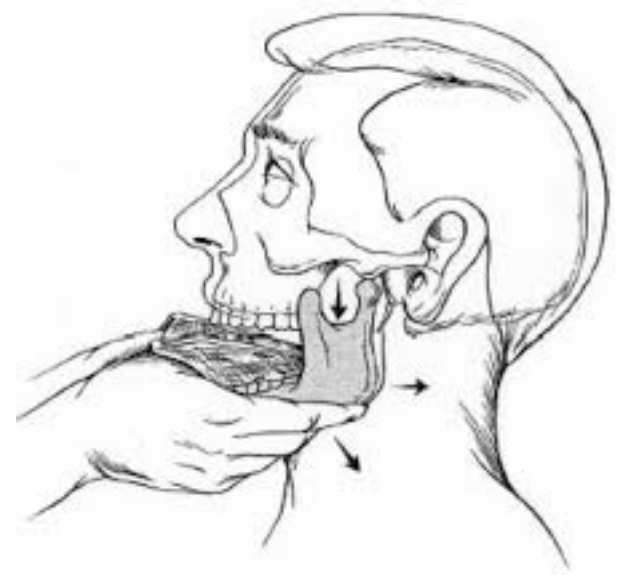
Intraoral Cysts

- Mucoccele (mucous retention cyst): obstructed salivary glands/ducts. Soft and minimally tender. Refer for excision/marsupialization. No antibiotics unless secondary infection.
 - Ranula: sublingual (can be discolored). Refer to ENT.
- Torus Palatinus: benign midline nodular overgrowth of cortical bone. Ulcerate easily.
- Bohn's cyst: baby inner lip/gingiva clustered cysts. Observe.
- Gingival cyst (Epstein's pearl): keratinized cyst 1-3mm, on alveolar ridge or midline on hard palate. Degenerate in 2wk-5mo.



Temporomandibular Joint (TMJ) Dislocation

- After extreme mouth opening (yawn, eating, laughing, seizure), most often anteriorly (posterior assoc w/ trauma). Mandibular condyles displace forward and lock anterior to articulate eminence -> cannot close mouth. Get CT max/face to exclude mandibular fracture only if preceding trauma.
- **Syringe Technique:** Ask patient to bite on an empty syringe (5 or 10ml) placed b/w posterior molars, and roll back and forth - acts as rolling fulcrum to slide mandible posteriorly. No anesthesia needed. Try for 2 minutes.
- **Traditional Technique:** Ketamine sedation and local lido to overcome pain/masticatory muscle spasm. Wrap thumbs in gauze and push down and backward on molars. If fail, can try one side at a time by placing both hands on same side of mandible.



Further Reading

- Hammel J, Fischel J. Dental Emergencies. *Emerg Med Clin N Am.* 2019. 37:81-93.
- Benko P. Acute dental emergencies in emergency medicine. *Emergency medicine practice.* 2003. 5(5).