Oral Hygiene and Dental Care for the Laryngectomee

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Texas Laryngectomee Association

IAL

Parkland

JPS

Texas Health Presbyterian Hospital DALLAS

UT Southwestern Medical Center

Outline

- Why does it matter?
- Osteoradionecrosis
- Radiation
- Limited Opening
- Acid reflux
- Saliva
- Prevention & Treatment

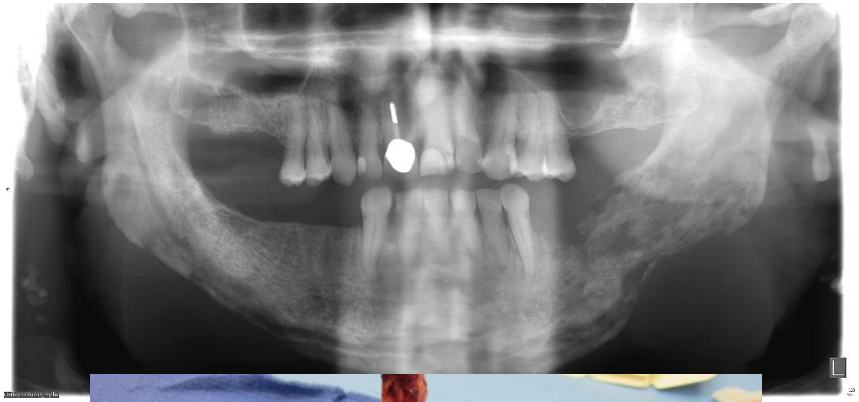
Why does it matter?

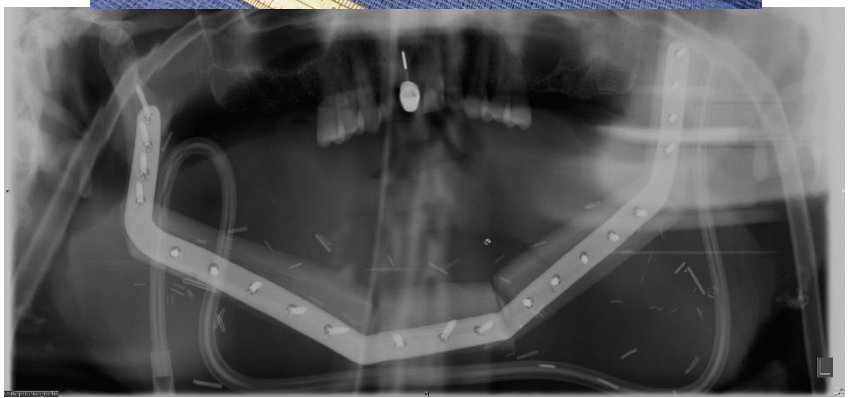
- Evidence support
  - Teeth is better than no teeth
    - Function, self-esteem, comfort, cosmetics
  - Pain
  - Infection
  - Cost!
    - Prevention versus treatment
    - $104-$122 Cleaning
      - $50 supplies q3 months
    - $1,500-$5,000 Denture
      - Replacement, relining necessary (4-6 years)
      - 48% dissatisfied, 5% completely satisfied
    - $1,362-$1,570 crown
    - $120 emergency exam
    - $200 extraction
    - $175-$450 filling
  - Osteoradionecrosis...

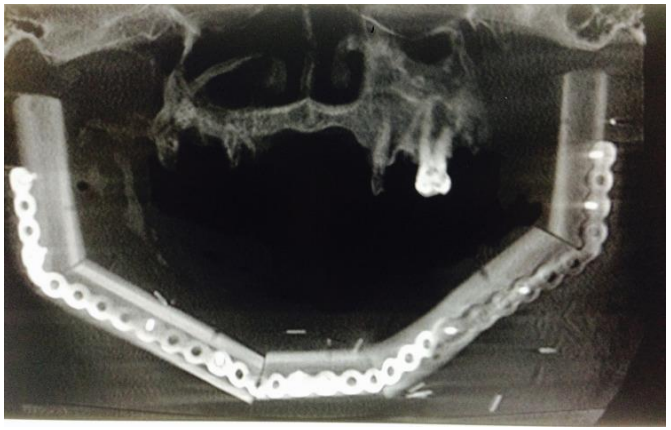
Why does it matter?

- Osteoradionecrosis
  - 60% of H&N cancer patients receive radiation
  - Incidence of 5-15% for ORN
  - Incidence of 65,000 H&N cancers/ year
  - 3,250 ORN cases/yr
  - Risk is lifelong
    - Mean 3 years after treatment
  - Can be severely debilitating

Morbidity







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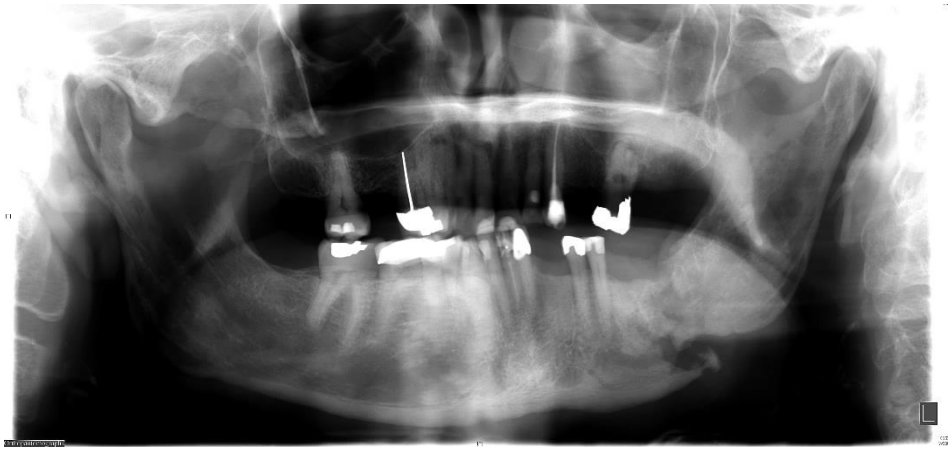

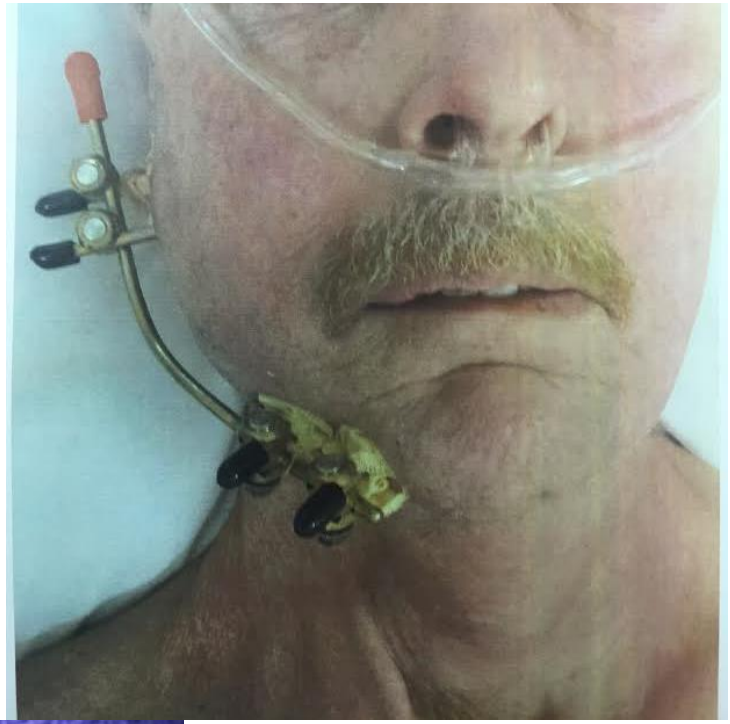

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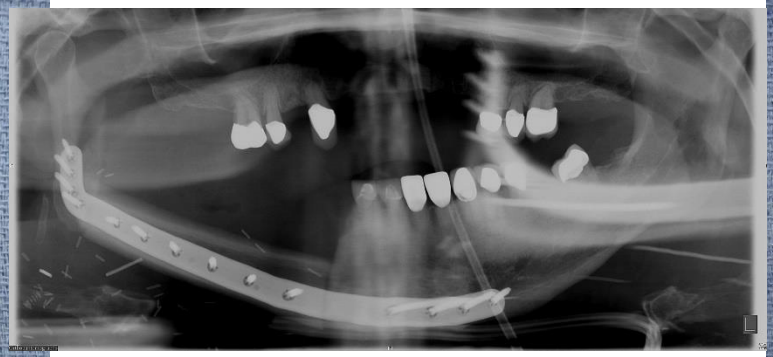


Osteoradionecrosis Signs/Symptoms

- Symptoms
  - Pain
  - Paresthesia
  - Dysesthesia
  - Trismus

- Signs
  - Ulceration of mucosa
  - Exposed bone
  - Malodor
  - Fracture
  - Fistula
  - Ulceration of skin

Osteoradionecrosis- Defined

- Regaud 1922
  - Radiation Osteitis
- Marx 1983
  - An area >1cm of exposed bone in field of XRT that fails to heal in 6 months
- Epstein
  - Ulceration or necrosis of mucous membrane with exposure of bone >3 mo
- Marx, Johnson 1987
  - Non-viable exposed bone which fails to heal without intervention

- Definition
  - Exposed, devitalized bone
  - Radiation field
  - Failure to heal
    - 3-6 months (chronicity)
  - No evidence of tumor!
    - Dx of exclusion
  - Can be superficial or deep
  - Active progression versus stable

Osteoradionecrosis

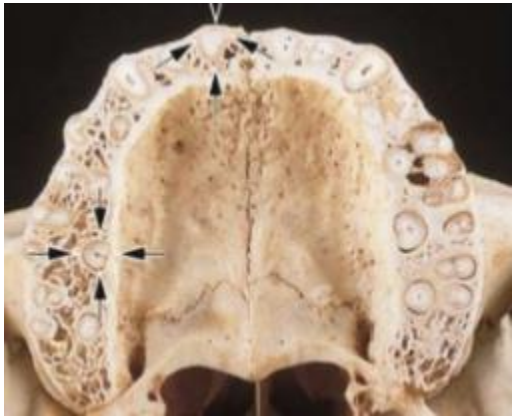
- Epidemiology
  - Incidence varies
    - Depends on definition
    - 2-15%
      - Pre 1960 17-37%
        - Orthovoltage-Megavoltage
    - Mandible to maxilla 24:1
  - Total radiation dose
    - >50Gy, >60Gy, >70Gy
    - Increases with Chemo/XRT
    - Decreases with IMRT

- Other sites
  - Skull
  - Chest wall
    - Breast Ca
    - Rib, sternum
  - Pelvis
  - Vertebra

Osteoradionecrosis and Radiation Dose to the Mandible in Patients With Oropharyngeal Cancer

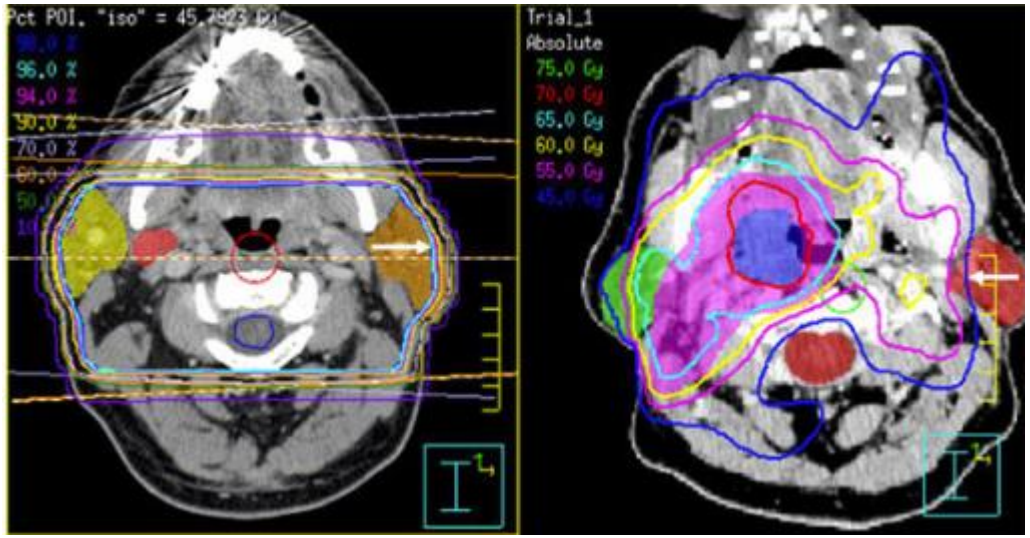
Osteoradionecrosis

- Mandible
  - Poorly vascularized
    - Inferior alveolar- teeth
    - Endosteal to Subperiosteal plexus of vessels
  - High Density
    - More dense structures absorb higher dose XRT
  - Most tumors are peri-mandibular
    - Tongue, FOM, Tonsil, Larynx



Osteoradionecrosis

- Radiation
  - Higher total dose increases risk
    - >60Gy
    - Tumor close to bone
    - Brachytherapy
  - IMRT decreases risk
    - Reduced total volume to bone
    - 60Gy- permanent hair loss



Osteoradionecrosis

- Risk factors
  - Poor oral hygiene
  - Dental extractions
  - Tobacco/Alcohol
  - Denture pressure sores
  - Comorbidity

Patient and treatment-related risk factors for osteoradionecrosis of the jaw in patients with head and neck cancer

Jan-Dirk Raguse, MD, DMD,[a] Jaber Hossamo, MD,[a] Ingeborg Tinhofer, PhD,[b] Bodo Hoffmeister, MD, DMD, PhD,[a] Volker Budach, MD, PhD,[b] Basil Jamil, MD,[b,c] Korinna Jöhrens, MD,[d] Nadine Thieme, MD,[e] Christian Doll, MD, DMD,[a] Susanne Nahles, DMD, PhD,[a] Stefan T. Hartwig, MD, DMD,[a] and Carmen Stromberger, MD[b]

Management of ORN

- HBO
  - Hyperbaric Oxygen
- PENTOCLO
  - Pentoxifylline, Vitamin E
- SURGERY

- Cochrane Database Review 2016
  - Only included RCT's
    - HBO vs No HBO
  - 14 trials, N=753

- Statistically significant improvement in mucosal coverage, decrease in wound breakdown, increased chance of cure/improvement following surgery (flaps, resection), and improved probability of healing irradiated tooth sockets following dental extractions.

Cochrane Library

Trusted evidence.
Informed decisions.
Better health.

Hyperbaric Oxygen Therapy

Oral Effects of Radiation

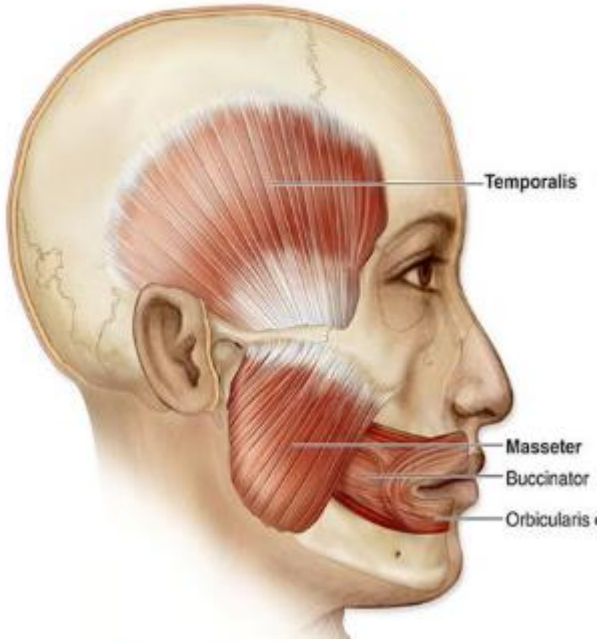
- Radiation
  - Dose dependent, site dependent
  - Reduces blood supply
    - Poor tissue healing, osteoradionecrosis
  - Does not affect teeth
    - Adult teeth are radiation resistant
  - Taste
    - Taste buds die
      - 120 days
      - 25tsp of sugar in 1 cup

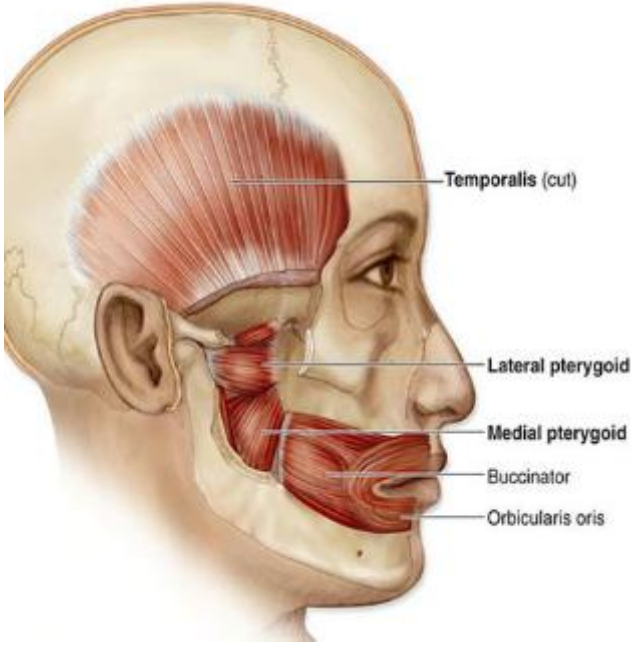
- Irreversible damage to salivary glands
  - Single dose of 1Gy can cause damage
  - 24Gy Parotid
  - 39Gy Submandibular
  - Glands exquisitely sensitive
  - Poor regenerative capacity

- Xerostomia
  - “Dry Mouth”

Effects of Radiation

- Limited opening
  - Trismus
  - Radiation induced fibrosis
    - Muscles involved in oral function
  - Progressive
  - Prevention is key
    - “Sets up like Cement”





Effects of Radiation

Acid Reflux

- Laryngectomy
  - Removes UES
    - Cricopharyngeus muscle
    - Always open
    - Reflux of stomach contents
    - LES
      - ¾ of people over 70
  - **Acid erosion**
    - Decreased saliva to buffer
    - Weakens enamel

- Antacids
- PPI
- Avoid lying down flat
  - After eating
    - Upright 60 min
    - 3 hours before laying down
- Smaller meals
  - Avoid coffee, chocolate, alcohol, peppermint, large fatty meals
- Weight loss
- Smoking cessation
- Relaxation
- Elevate bed
  - 6-8 inches
  - 45 degree
- Bend at the knees

Acid Reflux

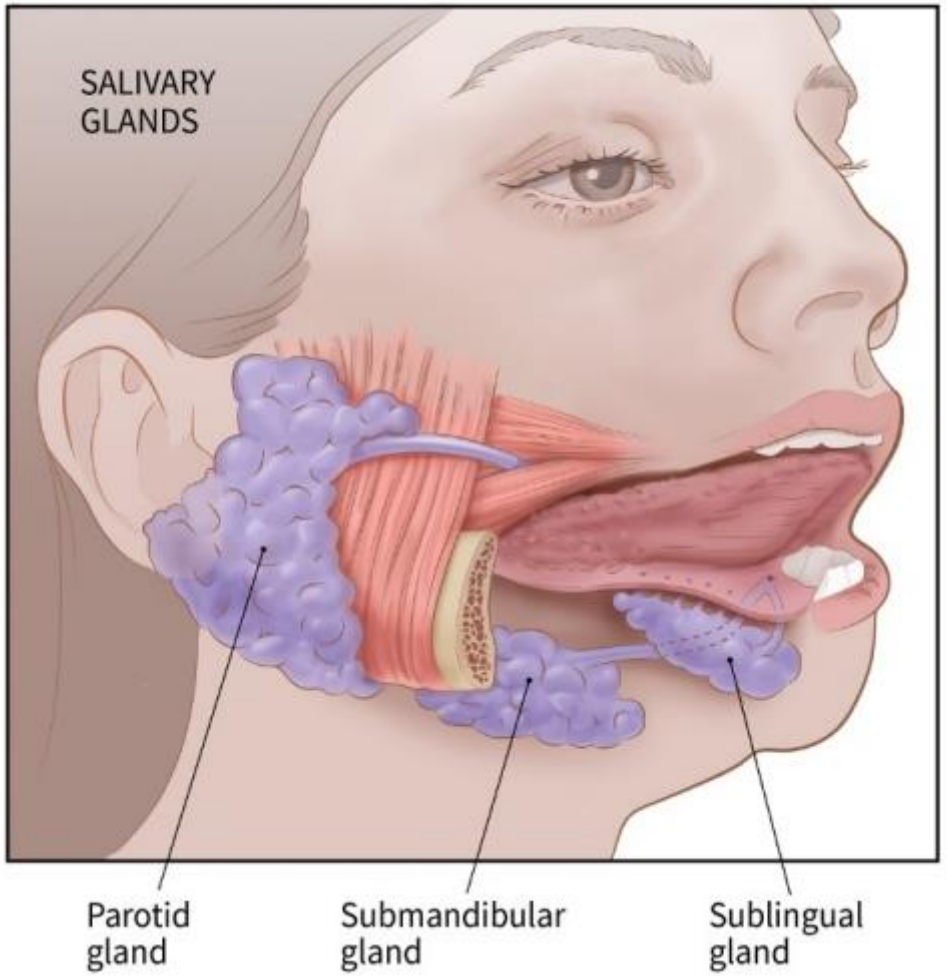
SALIVA

SALIVA

Radiation

Saliva

- Saliva
  - 1000-1500mL per day
    - 34oz, 3 cans of Coke
  - Parotid
    - 25%
  - Submandibular
    - 70%
  - Sublingual
    - 4%
  - Minor
    - 1%



Saliva

- Saliva
  - Serous
    - Stimulated, Sensitive
    - Watery
  - Mucous
    - Resting, Resistant
    - Thick, Viscous, Ropy, Sticky
    - Too much saliva sensation

Lubrication and fluid coating	Mucins, proline-rich proteins and H2O components of saliva provide physical protection against mechanical, thermal, chemical irritation. Aids in speech and swallowing.
Cleansing	The H2O component facilitates clearance of food and swallowing.
Antimicrobial actions	Specific (sIgA) and non-specific (lactoferrin, lysozyme, lactoperoxidase) antimicrobial mechanisms help control the oral microflora.
Remineralisation	Supersaturation of calcium and phosphate due to the presence of the salivary protein statherin, facilitates remineralisation of the teeth. Anionic proline-rich proteins bind calcium and phosphate and bring them to the apatite surface.
Buffering	Bicarbonate and, to a lesser extent, phosphate and macromolecules help neutralise plaque pH after meals, thereby reducing time available for demineralisation.
Mucosal integrity	This is maintained by a hydrated surface film composed of H2O, electrolytes and salivary mucins.
Digestion and taste	Mucins aid in bolus formation. Digestive enzymes found in saliva include amylase, protease, lipase and nuclease. For a substance to be tasted, it must be in aqueous solution. Water of saliva functions as a solvent to facilitate taste.

Saliva

- Saliva
  - Water, electrolytes, protein, carbohydrates, immune function
  - Immune
    - IgA, Histatins, Immunoglobulins
    - Antibacterial, antifungal
    - 37% of H/N XRT Candidiasis
- Lubrication
  - Swallowing
  - Food
  - Protection
- pH buffering
  - Bicarbonate
  - Promotes remineralization

- Saliva
  - Taste
    - Need water, salivary enzymes
    - Also need smell for taste!
  - Cleaning effect
    - Washes away food debris

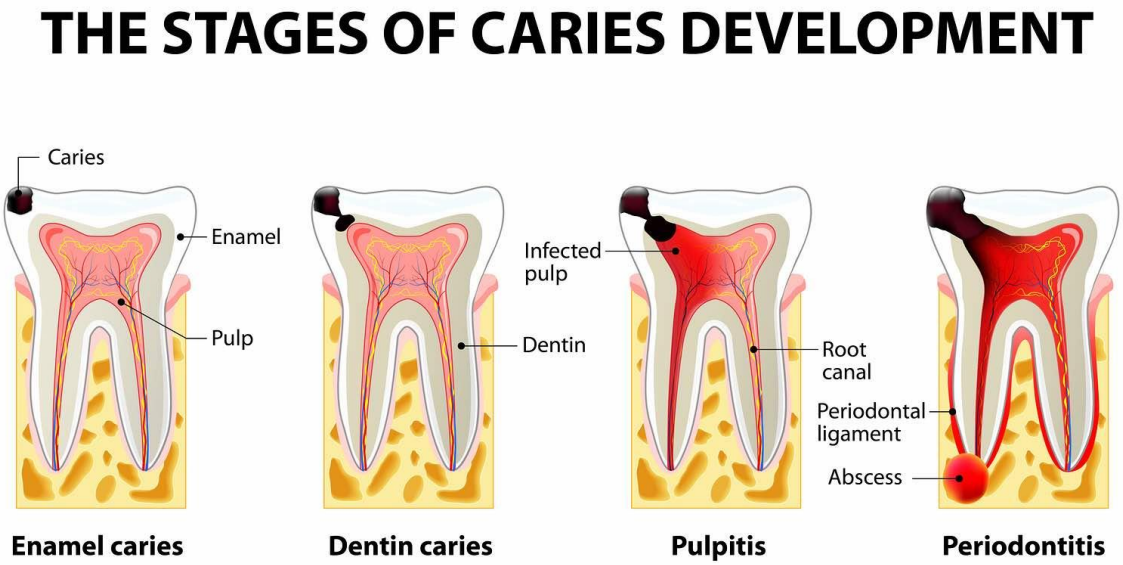
Saliva

- Volume
  - Prone to injury
    - Infections- candida
  - Decreased buffering capacity >45%
    - Acid environment
    - Decreased “healing”
      - Remineralization
- Composition
  - Decreased pH
    - More acidic
    - Less bicarbonate
  - Acidogenic bacteria
    - Strep Mutans
    - Lactobacilli
    - MD Anderson Study
    - Fewer “good” bacteria

#1 Reason for tooth decay

Prevention

- What is a Cavity?
  - It is not caused by sugar
  - It IS caused by bacteria
    - That LOVE sugar
    - That LOVE acid
  - Caries
- Demineralization
  - Acid
  - Erodes the enamel
  - Creates a “cavity”



Prevention

- Diet Modification
  - Sugar
    - Encourages cariogenic bacteria
      - ACID
    - Yeast colonization
    - 20-30 minutes to recover
    - Sip all day, get Decay
    - Replace with xylitol
      - Or other sugar substitutes

Prevention

- Diet Modification
  - Sugar
  - Sucrose, fructose
  - High fructose corn syrup
  - Agave nectar/syrup
  - Galactose
  - Barley malt
  - Brown rice syrup
  - Dextrin
  - Dextrose
  - Diastatic malt
  - Ethyl maltol
  - Glucose
  - Lactose
  - Malt syrup
  - Maltodextrin
  - Maltose
  - Rice syrup
  - Beet sugar
  - Blackstrap molasses
  - Brown sugar
  - Buttered syrup
  - Cane juice
  - Cane sugar
  - Caramel
  - Carob syrup
  - Castor sugar
  - Coconut sugar
  - Confectioner's sugar
  - Date sugar
  - Demerara sugar
  - Evaporated cane juice
  - Florida crystals
  - Fruit juice/concentrate
  - Golden sugar
  - Grape sugar
  - Honey
  - Icing sugar
  - Invert sugar
  - Maple syrup
  - Molasses
  - Muscovado sugar
  - Panela sugar
  - Raw sugar
  - Refiner's sugar
  - Sorghum syrup
  - Sucanat
  - Treacke sugar
  - Turbinado sugar
  - Yellow sugar

Prevention

- Remineralization
  - **Fluoride**
  - Saliva
    - Chewing gum, lozenges
      - Sugar free, xylitol
    - Fibrous vegetables and fruits
    - Hard cheese
      - Calcium, Phosphate, pH
  - Substitutes
    - Tricalcium phosphate
      - Prevident 5000 Booster Plus
    - MI Paste
      - Recaldent
      - Milk allergy

Prevention

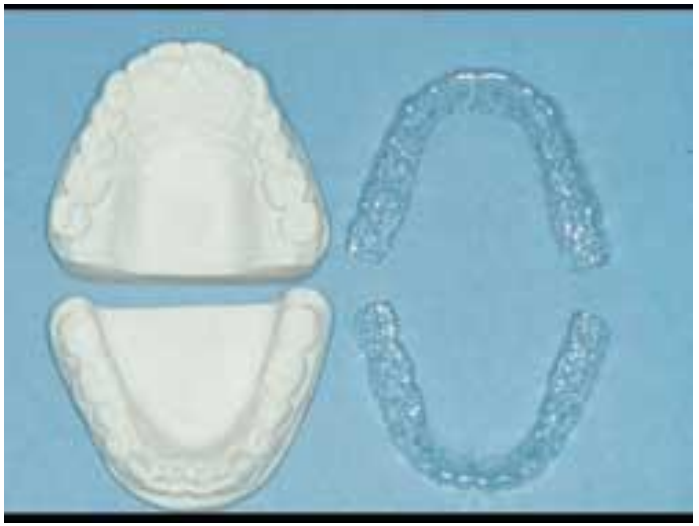
- Acid
  - We need a buffer
  - Salt/Soda rinse
    - Baking soda 1 tsp
    - Salt ½ tsp
    - 12oz warm water
  - Baking Soda Paste
  - Chewing gum
    - Xylitol (candies, gum)
    - 2 weeks
      - Increased saliva
      - Increased pH
  - Water bottle
    - Evidence benefit

- Decontamination
  - Brushing
    - Twice daily minimum
    - After meals
    - 2-3 min
    - Soft brush
    - Every surface and tongue
  - Flossing
  - Waterpik
  - Frequent dental visits
    - Pre, 3 weeks, 6 weeks, 3 months, 6 months then 3-6 months intervals lifelong

Prevention

- Pre Treatment
  - Might be the most important visit
  - Sets expectations
  - Treat existing disease
    - Mod-severe periodontal disease = extract
  - Assess dental IQ
  - Begin prevention
  - Evidence supports
    - Retain teeth

- Make custom tray
  - Fluoride
    - 1.1% neutral sodium fluoride gel or 0.4% stannous fluoride gel
  - Chlorhexidine gel



Prevention

- Fluoride
  - Stannous fluoride 0.4%
    - Adv: Cariostatic, antimicrobial, works against root surface decay, arrest of incipient decay
    - DisAdv: Metallic taste, can cause staining and sensitivity, low pH
    - Apply in tray for 5 minutes
    - Do not rinse for 30-45 min
    - Meticulous hygiene alone was insufficient. Fluoride made the difference. Dreizen et al.
    - High fluoride RX toothpaste
      - Caution flavoring and SLS
      - Prevident dry mouth
- Sodium fluoride 1% gel
  - Adv: Neutral pH, no sensitivity, pleasant taste
  - DisAdv: Not as effective as SnF for antimicrobial activity
- Acidulated phosphate gel 1%
  - Adv: Taste, no sensitivity
  - DisAdv: Requires low pH to be effective, etches the tooth, can damage restorations in teeth

Prevention

- Chlorhexidine (CHX)
  - Alcohol free version only
    - CHX and fluoride combination proven effective.
    - CHX kills bacteria, yeast, fungus
    - Don’t use with Nystatin, binds and makes both ineffective.
    - Rinses, gels.
      - Gel more effective
- Lip Care
  - Prevent drying, cracking
  - Predispose to fungal infection

Prevention

The Beneficial Effects of a Supersaturated Calcium Phosphate Rinse on the Oral Cavity in Xerostomia Patients

- Saliva substitutes
  - Water
  - Biotene
    - Lactoperoxidase, lysozyme and lactoferrin
    - Shown to relieve subjective oral symptoms in most xerostomic patient
      - No changes in microflora
  - SalivaMAX
    - Supersaturated calcium phosphate powder
    - Dissolve in water
    - RX only

Prevention

Therapy	Dose	Contraindications
Systemic sialogogue		
Pilocarpine (Salagen[a]), 5 mg	3–6 tabs daily	Asthma, glaucoma, liver dysfunction
Bethanechol (Urecholine), 25 mg	1 tab 3 times daily	Asthma, peptic ulcer, bladder inflammation
Anethole dithiolethione (Sialor),[b] 25 mg	1 tab 3 times daily	Hypersensitivity
Cevimeline (Evoxac),[c] 30 mg	1 tab 3 times daily	Asthma, glaucoma, liver dysfunction, cardiovascular disease

- Saliva substitutes
  - Water
  - Palliative medical therapy
    - Pilocarpine (Salagen) 5mg, q4-q8
    - Cevimeline (Evoxac) 30mg, q8, newer, fewer side effects
    - Side effects
      - Miosis, flushing, bradycardia, bronchospasm, increased bronchial secretions, involuntary urination and/or defecation, sweating, lacrimation, **salivation**, hypotension and seizures.

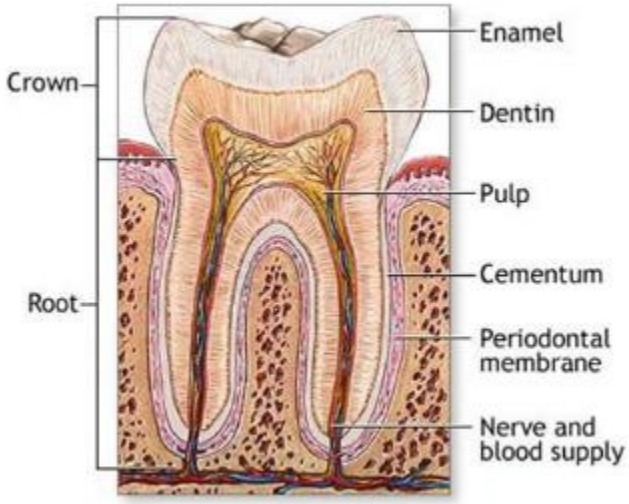
Contraindicated:
Glaucoma, asthma, liver dysfunction
Caution:
Cardiovascular disease

Treatment of Decay

- At the Dentist:
  - Fillings are better than crowns
  - Amalgam (silver) is better than composite (tooth color)
  - Light activated glass ionomer good for non-chewing surfaces (release fluoride and uptake fluoride, tooth color)
- Radiation
  - Wait 6 months to 1 year before new dentures or partials are made.
  - Dentures out during therapy most of the time.

Treatment of Decay

- Different tooth surfaces than usually expected
  - Smooth surfaces.
  - Rapid progression.
  - Circumferential caries at CEJ.
  - More similar to acid related decay.
  - Makes repair more difficult.



Replacement of Teeth

- Dental Implants
  - 92% success @ 10 years
  - Still require maintenance/cleaning
- Dental Bridge
  - 10-15 year lifespan
- Denture/Partial
  - Require reline every 5 years
  - Remake every 10-15

Replacement of Teeth

- Dental Implants

Questions?

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