PERIODONTAL DISEASE AND DENTAL CARIES

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History of etiologic agent:

**Dental Caries:**

In 1924 *streptococcus mutans* and *lactobacillus* were isolated from human caries lesions but was not studied until the 1960s when it was then re-identified as the etiological agent.

- Koch’s postulates were fulfilled in infectivity in animal models
- Difficult to prove it was a pathogen in humans due to *streptococcus mutans* appearing as normal flora on teeth.

Dental decay has not been a prevalent problem until the overconsumption of sucrose.

- Predominant organism of sucrose emerges as *streptococcus mutans* that cause dental caries.

**Factoid:**

- Dental decay was one of the main reasons for rejection from military service in WWI, WWII, and Koran war.
- Separate dental care facilities were created due to the high amount of dental abnormalities in the 19th century

**Periodontal Disease:**

In the past it was indicated that almost every one would experience advanced stages of periodontal disease.

New findings have shown that periodontal disease involves very specific infections.

- Bacteria in plaque doesn't directly cause periodontal disease
- The bacteria in the plaque that touches the tissue causes compound to penetrate the gums and cause inflammatory response.

**Factoid:**

- Periodontitis is identified according to the amount of tissue loss and how many teeth are involved.
Example of a case of the disease:

- Name: Earl E. Bird
- Gender: Male
- Height: 5'8
- Weight: 284 lbs
- Allergies: Penicillin and latex
- Conditions: Coronary artery disease
- Difficult time getting around and breathing
- Smokes cigarettes (pack a day) and consumes beer daily (1-2)
- Has not been to dentist in over 10 yrs.
- Complaint: Tooth sensitivity, mobility, needs cleaning and x-rays.

Summary:
- X-rays show patient has signs of moderate to severe periodontitis due to:
  - Severe bone loss in anterior of mouth
  - Moderate in posterior of mouth
  - Teeth 8, 9, 23, 24, and 25 show mobility
  - Gums are receding about 1-3 mm
  - Pockets that are 4 mm deep
  - Teeth that show mobility have less than one mm of gingiva attached
  - Slight bleeding while probing
  - Enlargement
  - Redness
  - Rough texture in posterior mandibular

Treatment:
- Individual hygiene oral instructions
  - Techniques in brushing/flossing
    - Perio-aid
    - Tongue scraper
- Nutritional counseling
- Tobacco counseling
- X-rays
- Study models
- Quadrants definitive debridement
- Selective polish
- Local anesthesia
- Fluoride – professional application
- Referred to periodontist
- 3-month check-up

- Between first and last treatment patients plaque index decreased by 73% (Beginning plaque index: 85%, ending plaque index: 12%)
Description of the etiologic agent and description of specific virulence factors:

**Type of pathogen:**
- The etiologic agents are bacterium

**Characteristics:**
- The shape of streptococcus mutans is cocci shaped (round) and are in strips.
- Gram positive
- Size from 0.5 to 0.75 micrometers
- Non-motile
- Grow best in 18-40 degrees Celsius
- Mesophilic (grow best in a moderate temperature; not too hot or too cold)

**Virulence factors:**
- Acid tolerant due to sugar binding with the bacterium
- Dependent on synthesis with water-soluble sugars and proteins (consumption of food and beverages)
- Produces lactic acid to break down dietary sugars
Description of the disease, the patients outwards symptoms and the incubation time of the disease:

**Dental caries:**

During dental caries the enamel of the tooth is being broken down due to the pathogen *Staphylococcus mutans* binding with sugars that are consumed creating acidity that breaks down the enamel and causes demineralization of the tooth.

- Symptoms include plaque build up, pain and discomfort while chewing, and sensitivity
- There is no specific incubation time for dental caries

**Periodontal disease:**

Inflammatory response to the gingiva and connective tissue to the bacteria and plaque build up in the mouth. Two general groupings of periodontal disease are:

- **Gingivitis:** bleeding of gum tissue with no bone loss or deep periodontal pockets
- **Periodontitis:** Inflammatory response due to plaque build up which results in loss of attachments between tooth and bone, loss of bone, and deep periodontal pockets

  - Symptoms are mobility of teeth, gum inflammation, and redness
  - Incubation time can vary due to degree of patients symptoms and differing treatment plans
Mode of transmission:

- Part of normal flora
- Streptococcus mutans can be passed person to person by horizontal or vertical transmission
- Colonizes self among human hosts
Diagnostic process:

**Dental caries:**
- Regular check-ups at dentist
- Test each tooth to test for soft enamel for signs of potential cavities
- X-rays to see bacteria in teeth

**Periodontal:**
- Periodontal Screening and Recording
  - Dentist uses a probe (pointy instrument) to detect the depths of tooth pockets. If it is more than 3mm deep that indicates disease.
  - Helps regulate connective tissue, gingival overgrowth/recession.
- Testing Tooth Movement: pushing each tooth and observing any movement (usually indicates bone loss)
- X-Rays: shows any bone structure changes in the mouth.
Methods of prevention and treatment:

**Prevention:**
- Brush teeth twice a day
- Floss regularly
- Visit dentist routinely for check-up and routine cleaning
- Don’t smoke

**Treatment:**
- Treatment varies depending on the extent of disease
- All treatment requires each patient to keep good individual oral health care
- Doctor may suggest changing habitual behaviors that effect oral health
- Deep cleaning
  - Scaling and root planning
- Medications
- Surgical treatments
Number of cases in US each year including Salem, OR:

**Periodontal disease:**
- Adults (20-64): 8.52%
- Seniors (65 or older): 17.20%

**Salem, OR:**
- Adults 35 and older lose more teeth from gum disease than they do from cavities
- Common in children from poor dental hygiene habits

**Dental Caries: US**
- Children (2-11): 42%
- Adolescent (12-19): 59%
- Adults (20-64): 92%
- Seniors (65 or older): 93%

Salem, OR: Adults 35 and older lose more teeth from gum disease than they do from cavities.

Common in children from poor dental hygiene habits.

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![Graph showing enamel fluorosis and dental caries association.]
Why is this an important disease to study?

**Importance:**
- Prevent dental caries which lead to periodontal disease
- Understanding the effect of what we consume on our mouth and teeth
- Teaching good oral healthcare while preventing preventable diseases
- Understanding what to recognize
- Discovering how the pathogens in our mouth work with the food we consume
- Bacteria the cause dental caries and disease live in the normal flora of our mouth
References: