Oral Infections

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Lecture Outline

• Common Oral Infections
  – Herpes Simplex Infections
  – Aphthous Ulcers
  – Candida Infections
  – Periapical Abscesses
  – Gingivitis
• Bacterial Endocarditis Prevention in Dentistry

Objectives

• Identify the most common pathogen(s) involved in each of the infections discussed
• Identify 3 key differences in the clinical features of oral herpes and aphthous ulcers that would enable you to distinguish between them
• Identify the clinical findings and contributing factors associated with thrush and denture stomatitis
• Identify the clinical features of acute and chronic periapical abscesses and understand the role of the dental pulp in their development
• Identify the first choice antimicrobial regimen prescribed by dental professionals for the treatment of each infection
Case #1

- 21 y/o female enters the pharmacy and begins looking around. When asked if you can help her find something, she says that she has a sore in her mouth that really hurts when she eats. She wants to know if you could recommend something for her to use that would make eating more comfortable.

Primary Herpetic Gingivostomatitis

- Pathogenesis
  - Transmitted by physical contact with an infected individual
  - Uncommon; usually affects children under 5 years old
Primary Herpetic Gingivostomatitis (Continued)

• Clinical Findings
  – Multiple, painful ulcers preceded by vesicles
    • Intraoral, perioral soft tissues, and skin
  – Fever, malaise, arthralgia, headache, cervical lymphadenopathy, and gingivitis
  – Primary infection is often subclinical

Primary Herpetic Gingivostomatitis (Continued)

• Etiology
  – Most common pathogen is herpes simplex virus type I (HSV-I)
  – Occasionally caused by herpes simplex virus type II (HSV-II)

Primary Herpetic Gingivostomatitis (Continued)

• Treatment
  – Acyclovir 200-400mg, PO 5 times daily x 5d generally shortens the duration of pain, viral shedding, and systemic symptoms
  – Self-limiting; lesions heal within 2 weeks without scar
  – Virus migrates to trigeminal ganglion to reside in a latent form
Secondary/Recurrent HSV Infections

• Pathogenesis
  – Reactivation of the virus, not reinfection
  – Precipitated by stress, sunlight, cold temperature, immunodeficiency
  – Lesions infectious during vesicle stage and patients should be cautioned against autoinoculation
  – Adults and young adults

Secondary/Recurrent HSV Infections (Continued)

• Clinical Findings
  – Multiple, small ulcers preceded by vesicles
    • Recurrent herpes labialis - lesions on lip (very common)
    • Recurrent herpes stomatitis - lesions on hard palate and attached gingiva (less common)
  – Prodromal symptoms
    • Tingling, burning, or pain

Secondary/Recurrent HSV Infections (Continued)

• Etiology
  – Same as primary infection
  – Most commonly HSV-I, occasionally HSV-II
Secondary/Recurrent HSV Infections (Continued)

• Treatment
  – If initiated within 48 hours of onset, may shorten course of disease:
    • Penciclovir 10mg/g topical cream applied q2h x 4d
    • Docosanol topical applied 5 times daily for up to 10d
    • Acyclovir PO
  – Self-limiting; 1-2 weeks

Aphthous Ulcers

• Pathogenesis
  – Precipitated by stress, trauma, hormonal changes, diet (gluten), and immunologic alterations
  – Any age

Aphthous Ulcers (Continued)

• Clinical Findings
  – Recurrent, painful ulcers found anywhere in oral cavity except hard palate, attached gingiva, and lips
  – Ulcers are not preceded by vesicles
  – Light-yellow center surrounded by a erythematous halo
  – Usually round or oval, solitary, and less than 1cm in diameter
Aphthous Ulcers (Continued)

- **Etiology**
  - Unknown
  - Not viral
  - Possibly an immune defect

Aphthous Ulcers (Continued)

- **Treatment**
  - Symptomatic
  - Topical anesthetic
    - Benzocaine
  - Topical corticosteroid
  - Gluten-free diet?
  - Self-limiting
    - Heal within 2 weeks without scar

Case #1

- 21 y/o female enters the pharmacy and begins looking around. When asked if you can help her find something, she says that she has a sore in her mouth that really hurts when she eats. She wants to know if you could recommend something for her to use that would make eating more comfortable.
Case #1

- What information would be helpful in recommending treatment?
  - Do you know what kind of sore it is - what caused it? “I'm not sure.”
  - Where is the sore located? “The roof of my mouth.”
  - How long has the sore been there? “A couple of days.”
  - Have you ever had a sore like this before - same place? “I don’t remember any.”
  - Do you remember any trauma to the area? “I did eat some pizza last weekend after having about 15 gin and tonics at Sally’s. I guess I could have burned my mouth.”

Case #2

- 78 y/o male comes to the pharmacy to pick up the 29 prescription medications he is taking. After telling you that he doesn’t appreciate paying more for his pills than he does on his mortgage, he asks you if you know which denture adhesive works the best. When you inquire about his denture problems, he explains that his upper denture doesn’t seem to fit as well as it used to and he thinks its instability is making his gums sore.

Candidiasis

- Pathogenesis
  - Acute pseudomembranous form (thrush)
    - Cancer chemotherapy and radiation, debilitated elderly, immunologic immaturity in infancy
  - Chronic atrophic form (denture stomatitis)
    - Poor oral hygiene, ill-fitting denture
    - Leaving denture in 24 hours a day
  - Other predisposing factors
    - Systemic antibiotic use, endocrine disturbances, various types of immunosuppression
Candidiasis (Continued)

• Clinical Findings
  – Acute pseudomembranous form (thrush)
    • Elevated white plaques
    • When wiped away, leave an erythematous, eroded, or ulcerated surface
    • Tenderness, burning, and dysphagia

Candidiasis (Continued)

• Clinical Findings
  – Chronic atrophic form (denture stomatitis)
    • Palate is generally bright red (hyperemic) and has a velvety to pebbly surface with little keratinization
    • Usually painful
    • Angular cheilitis

Candidiasis (Continued)

• Etiology
  – Opportunistic infection of Candida species, most commonly *Candida albicans*
Candidiasis (Continued)

- **Treatment**
  - Most forms including thrush
    - Improved oral hygiene
    - Topical nystatin, suspension containing 100,000 units/mL, 2 min rinse with 4-5mL and swallow, qid x 10-14d

Candidiasis (Continued)

- **Treatment**
  - Chronic atrophic form (denture stomatitis)
    - Improved oral/denture hygiene
    - Fabrication of a new denture
    - Topical nystatin, ointment containing 100,000 units/g, applied q6h to tissue side of denture

Case #2

- 78 y/o male comes to the pharmacy to pick up the 29 prescription medications he is taking. After telling you that he doesn’t appreciate paying more for his pills than he does on his mortgage, he asks you if you know which denture adhesive works the best. When you inquire about his denture problems, he explains that his upper denture doesn’t seem to fit as well as it used to and he thinks its instability is making his gums sore.
Case #2
• What questions could you asked?
  – How long have you had the dentures?  "A long time. Probably 20 years or so."
  – Have you been to see your dentist to see if there is anything he can do to make them fit better?  "I stopped going to the dentist a few years after I got my dentures. Why should I go to the dentist and pay him to check teeth that I don’t even have? I’m pretty sure I don’t have any cavities."
  – How often do you take your dentures out?  "I only take them out about twice a week to rinse them off. I used to take them out at night, but I seem to sleep better with them in."

Periapical Abscess
• Pathogenesis
  – Tooth with a necrotic pulp - inflammation that began within the pulp spreads to periapical tissues (PDL and bone)

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Periapical Abscess (Continued)
• Clinical Findings
  – Acute periapical abscess
    • Tooth is non-vital
    • Swelling and severe pain
    • Surrounding tissue sensitive to palpation
    • Offending tooth very sensitive to percussion
    • Mobility or extrusion of the tooth
    • Trismus
Periapical Abscess (Continued)

• Clinical Findings
  – Chronic periapical abscess
    • Tooth is non-vital
    • Sinus tract present
      – Small “bump” often adjacent to offending tooth
      – Occasional tenderness and bad taste
    • No significant swelling or pain

Periapical Abscess (Continued)

• Etiology
  – Necrotic pulp tissue debris, inflammatory cells, and bacteria all serve to stimulate and sustain the periapical inflammatory process
  – Pathogenic bacteria
    • Various gram-positive aerobes and an array of gram-positive and gram-negative anaerobes

Periapical Abscess (Continued)

• Bacteroides* (Prevotella* and Porphyromonas* species)
• alpha-hemolytic streptococci*
• peptococci*
• peptostreptococci*
• Fusobacterium*

* Susceptible to Penicillin
Periapical Abscess (Continued)

• Treatment of acute periapical abscess
  – Attempt to establish drainage
    • Through tooth by initiating root canal treatment
    • Through incision
  – Systemic antibiotics

Periapical Abscess (Continued)

• Treatment of acute periapical abscess
  – Systemic antibiotic dosing
    • Penicillin VK 500mg, tid x 7-10d
    • Augmentin 500/125, bid x 10d
    • Clindamycin 150mg, qid x 7-10d
    • Alternatives include macrolides and cephalosporins

Periapical Abscess (Continued)

• Why use penicillin?
  – Study of 50 odontogenic infections
    • 14 of the 42 species of isolated microorganisms demonstrated resistance to penicillin
    • Clinical resolution of the infection occurred in all 50 cases using penicillin
      – Good incision and drainage
      – Disruption of bacterial synergy
      – Some other reason
Periapical Abscess (Continued)

- Treatment
  - In both acute and chronic periapical abscesses, the source of infection (necrotic pulp tissue) must be eliminated
    - Root Canal Treatment
    - Extraction

Periapical Abscess Flow Chart

- Infected Tooth
  - Necrotic Pulp
- Acute Abscess
  - Swelling and Pain
    - Incision/Drainage
    - Antibiotics
  - Chronic Abscess
    - Sinus Tract
    - Extraction or RCT

Case #3

- 34 y/o female comes to the pharmacy to pick up her husband's jock itch cream and some cough drops. On her way out, she stops to look at mouthwashes. She looks a little confused, so you rush over to offer your assistance. She asks you if Listerine fights the gum disease gingivitis like the commercials say it does. Despite relatively few dental problems in the past, she has noticed recently that her gums are puffy and red. Sometimes they are sore and tend to bleed when she brushes or flosses. A friend told her that she had gum disease, and if she didn't do something about it soon, all of her teeth would become loose and fall out.
Periodontal Diseases
Bacterial Plaque and Calculus

Gingivitis
Inflammation of the gingiva

Periodontitis or Refractory Periodontitis
Inflammation of tooth-supporting structures (PDL and bone)

Gingivitis (Continued)

• Pathogenesis
  – Poor oral hygiene
  – Lack of professional dental care
  – Tobacco smoking
  – Hormonal changes
    • Puberty, pregnancy, and menopause

Gingivitis (Continued)

• Clinical Findings
  – Gingival bleeding
  – Changes in gingival appearance
    • Color, consistency, surface texture, and contour
  – Discomfort
Gingivitis (Continued)

- **Etiology**
  - Presence of bacterial plaque and calculus (tarter)
    - *Actinomyces* species (early)
    - *Veillonella* and *Fusobacterium* (later)

Gingivitis (Continued)

- **Treatment**
  - Improved oral hygiene
  - Regular dental prophylaxis (cleanings)
  - Chlorhexidine gluconate 0.12% mouthrinse
    - Rinse with 15mL bid and expectorate

Case #3

- 34 y/o female comes to the pharmacy to pick up her husbands jock itch cream and some cough drops. On her way out, she stops to look at mouthwashes. She looks a little confused, so you rush over to offer your assistance. She asks you if Listerine fights the gum disease gingivitis like the commercials say it does. Despite relatively few dental problems in the past, she has noticed recently that her gums are puffy and red. Sometimes they are sore and tend to bleed when she brushes or flosses. A friend told her that she had gum disease, and if she didn’t do something about it soon, all of her teeth would become loose and fall out.
Case #3

• What questions could you ask?
• Have you been to your dentist recently? “I just had a cleaning and checkup about 4 months ago and they said that everything looked fine. My gum problems started after that visit.”
• Have you changed anything about your brushing or flossing habits in the past few months? “No, I still brush twice a day and floss a few times a week, just like I always have.”
• Have you recently started smoking? “Oh no, I’ve never smoked. I think it’s a filthy, disgusting habit. I try to avoid smokers as much as I can, especially now that I’m pregnant.”

Bacterial Endocarditis Prevention

• Many dental procedures produce a transient bacteremia
  – Gram-positive cocci predominate in the oral aerobic microflora
    • Implicated in most cases of bacterial endocarditis
    • *Streptococcus viridans*
  – Less than 5% of all bacterial endocarditis cases caused by dental procedures

Recommended Antibiotic Prophylaxis for the Prevention of Bacterial Endocarditis

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Adult Dosage</th>
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</thead>
<tbody>
<tr>
<td><strong>Standard regimen (oral)</strong></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>2 g 1 hr before procedure</td>
</tr>
<tr>
<td><strong>Penicillin allergy (oral)</strong></td>
<td></td>
</tr>
<tr>
<td>Clindamycin or Cephalexin or Cefadroxil or Clarithromycin or Azithromycin</td>
<td>600 mg 1 hr before procedure or 2 g 1 hr before procedure or 500 mg 1 hr before procedure</td>
</tr>
<tr>
<td><strong>Unable to take oral medications</strong></td>
<td></td>
</tr>
<tr>
<td>Ampicillin</td>
<td>2 g IM or IV within 30 min before procedure</td>
</tr>
<tr>
<td><strong>Pen allergy and unable to take orally</strong></td>
<td></td>
</tr>
<tr>
<td>Clindamycin</td>
<td>600 mg IV within 30 min before procedure</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>1 g IM or IV within 30 min before procedure</td>
</tr>
</tbody>
</table>
References


Healthy Periodontal Tissues

- PDL
- Alveolar Bone
- Nerve space
- Calculus
- Filling

Periodontal Diseases (Continued)

- Pathogenesis
  - All
    - Poor oral hygiene
    - Lack of professional dental care
    - Tobacco smoking
  - Gingivitis
    - Hormonal changes
      - Puberty, pregnancy, and menopause
  - Refractory Periodontitis
    - Impaired PMN function
Periodontal Diseases (Continued)
• Clinical Findings
  – All
    • Gingival bleeding
    • Changes in gingival tissue
      – Color, consistency, surface texture, contour
  – Both types of periodontitis
    • Loss of connective tissue attachment
    • Tooth mobility in advanced cases
  – Refractory periodontitis
    • No response to conventional therapy
Periodontal Diseases (Continued)

• Etiology
  – Bacterial plaque and calculus
    • Gingivitis
      – Actinomyces species (early)
      – Veillonella and Fusobacterium (later)
    • Periodontitis
      – 90% anaerobic, 75% gram-negative
    • Refractory Periodontitis
      – More resistant or invasive bacteria

Periodontal Diseases (Continued)

Periodontitis

• Bacteria commonly found in active sites
  – C. rectus
  – P. gingivalis
  – P. intermedia
  – F. nucleatum
  – B. forsythus

• Bacteria associated with disease progression
  – P. gingivalis
  – P. intermedia
  – B. forsythus
  – C. rectus
  – A. actinomycetemcomitans

Periodontal Diseases (Continued)

Refractory Periodontitis

• Many suspected pathogens
  – A. actinomycetemcomitans
    • Invasive capabilities
  – P. intermedia
Periodontal Diseases (Continued)

• Treatment
  – All
    • Removal of bacterial plaque and calculus
      – Improved oral hygiene
      – Regular dental prophylaxis
  – Gingivitis
    • Chlorhexidine gluconate 0.12% mouthrinse
      – Rinse with 15mL bid and expectorate

Periodontal Diseases (Continued)

• Treatment
  – Periodontitis
    • Conventional therapy - scaling and root planing
  – Refractory periodontitis
    • Systemic antibiotics in conjunction with conventional therapy
      – Susceptibility testing of remaining flora
    • Combinations of antibiotic therapy may be used and have demonstrated significant improvement in the clinical aspects of the disease

Antibiotic Therapy in the Treatment of Refractory Periodontitis

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Antibiotic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gram-positive</td>
<td>Amoxicillin/clavulanate</td>
</tr>
<tr>
<td>Gram-negative anaerobes</td>
<td>Clindamycin</td>
</tr>
<tr>
<td>Nonoral gram-negative facultative rods</td>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td>Black-pigmented bacteria and spirochetes</td>
<td>Metronidazole</td>
</tr>
<tr>
<td>P. intermedia, P. gingivalis, A. actinomycetemcomitans</td>
<td>Tetracycline</td>
</tr>
<tr>
<td>A. actinomycetemcomitans</td>
<td>Metronidazole/amoxicillin</td>
</tr>
<tr>
<td>P. gingivalis</td>
<td>Azithromycin</td>
</tr>
</tbody>
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Periodontal Abscess

• Pathogenesis
  – Most often associated with advanced periodontal disease
  – Originate within a deep periodontal pocket
    • May extend into the supporting bone or be isolated to the soft tissue

Periodontal Abscess (Continued)

• Clinical Findings
  – Usually a dull, continuous, well-localized ache that intensifies during mastication
  – May exhibit a fluctuant swelling, increased tooth mobility, and purulence
    • Acute abscess - swelling and severe pain develop when path of drainage becomes obstructed
    • Chronic abscess - pus drains through pocket

Periodontal Abscess (Continued)

• Etiology
  – Primarily gram-negative anaerobic rods
    • Porphyromona gingivalis
    • Fusobacterium spp.
    • Capnocytophaga
    • Vibrio spp.
Periodontal Abscess (Continued)

• Treatment
  – Drainage must be established in cases of swelling and severe pain
  – Adequate debridement of the infected area
    • Often requires surgery
  – Systemic antibiotics indicated with fever
    • Penicillin, amoxicillin, clindamycin, cephalosporins, macrolides