Oral Infections

*Disclosures:
1) No conflicts of interest to report such as financial, personal, or organizational
2) For all human subjects related research presented herein, Institutional Review Board (IRB) approval was obtained, along with informed consent from study patients, and in accordance with the Declaration of Helsinki and the International Ethical Guidelines
3) For all animal research presented herein, Institutional Animal Care and Use Committee (IACUC) approval obtained
4) Evidence-based presentations and non-commercial

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Oral Infections

• Presence of oral infection can negatively impact quality of life
• *Infectious disease* paradigm, culturing and sensitivity testing, contamination?
• Accurate *diagnosis* is key, and often based on clinical presentation and parameters
• Symptoms may be *inflammatory* or non-existent
• Seek appropriate *consultation*
• *Etiology* is microbial organisms that have evolved and co-existed millions of years
  – *Fungal, Viral and Bacterial*
FUNGAL

• Oral fungal infections are superficial (biofilm) and are mostly caused by Candida species (C. albicans)
• Opportunistic infection, disease not commonly seen in healthy individuals even if they harbor the organism
• Often seen in the immunocompromised, the elderly, or in patients taking antibiotics which alters oral flora
Candidiasis

An opportunistic infection, by a *dimorphic* organism which can involve nearly any site

Systemically candidemia is the 4^th^-5^th^ most common cause of nosocomial septicemia in most hospitals
In oral mucosal cases, one pathogen usually \((C. \text{ albicans})\) predominates, but there are many clinical presentations described:

- Pseudomembranous
- Erythematous
- Central Papillary Atrophy
- Angular Cheilitis
- Hyperplastic
- Cheilocandidosis
- Chronic Mucocutaneous
- HIV-associated
Pseudomembranous

White plaques that can be wiped off classically, but almost never associated with a subjacent ulcer or bleeding base
Erythematous

More common variant than pseudomembranous
Central Papillary Atrophy

- Formerly: median rhomboid glossitis
Angular Cheilitis

Saliva pooling is thought to predispose to infection in this area, such as when sufficient VDO is lacking with prostheses.

May be associated with superimposed bacterial infection (skin Staph & Strep).

Ideally treat with Vytone® (iodoquinol) cream, 1%, 28.4g tube (30g), qid.
Hyperplastic

Often mistaken for true leukoplakia (dysplasia) because does not wipe off, and cultures may often be negative because organisms are difficult to dislodge from their keratotic plaque

Biopsy when in doubt…
Cheilocandidosis

Lip licking habits thought to be key to etiology

May have superimposed bacterial infection also, making it difficult to treat
Chronic Mucocutaneous
HIV-associated

• All types described earlier can be seen in immunocompromised patients, particularly HIV

• Evidence to support correlation with immune status (AIDS) and disease prognosis
Diagnosis

- Culture
- Cytology
  - Wet mount
  - KOH wet mount
  - PAS or Pap-PAS
- Biopsy
Swab and let incubate >3 days in Sabourad’s agar at room temperature

0, 1+, 2+, 3+ scoring
Scanning Electron Microscopy of Budding Yeast
Fungal Treatment

- Local ( clotrimazole ) or systemic ( fluconazole )?
- Underlying disorders, work-ups?
- Disinfect etiologic material ( bleach / nystatin ) ( dentures, toothbrushes, toys, etc... )
Prescription

Name: ___________________ Date:________

Address:__________________________________________________________

RX:  Mycelex troches (clotrimazole)

Disp: 70 (seventy)

Sig: Dissolve one tablet in mouth five times per day with dentures out, for 14 days

Doctor:__________________________________________________________

DEA #:________________________ License #________
Pre-treatment  Post-treatment

1 week
Prescription

Name: _____________________________ Date:________

Address:________________________________

RX: Nystatin suspension
    100,000 U/ml

Disp: 500 ml

Sig: Soak partials nightly, 2 wks
Prescription

Name: ___________________ Date: __________

Address: ____________________________________________

RX: Fluconazole 100mg tabs

Disp: 10 tabs

Sig: One tab daily for 10 days

Doctor:_____________________________________________

DEA #:________________ License #________
Herbal Remedies For Candidiasis

- **ALOE**, fresh juice is used to boost white blood cells which kill yeast cells.
- **BARBERRY**, has antifungal properties useful in killing yeast cells.
- **CINNAMON**, a decoction is held in the mouth for treating thrush.
- **ECHINACEA**, stimulates macrophages which kill yeast cells.
- **GARLIC**, has antifungal properties and can be used liberally in food preparation or taken as capsules.
- **LAVENDER**, applied topically or added to bathwater for treating skin infections.
- **OLIVE LEAF**, powerful antimicrobial. Capsules or tinctures are taken internally.
- **OREGANO**, oil has powerful antifungal properties.
- **PAU D'ARCO**, antifungal, antibiotic, used internally to boost immune system.
- **PEPPERMINT**, antifungal, used as an infusion. Oil is available in capsules.
- **ROSEMARY**, has antifungal properties useful in killing yeast cells.
- **THYME**, oil is an antifungal which can be diluted and used topically.

*Currently there is a lack of sufficient evidence to support their use*
VIRAL

• Self-limiting in most cases, younger patients to adults, inflammatory symptomatology and clinically lesions may mimic vesiculobullous disease (transudate vs. exudate)

• Some are sexually transmitted diseases, with medico-legal implications (e.g. children)

• Treatment palliative in most cases, sometimes additional tests necessary for accurate diagnosis clinically

• Some conditions are thought to be stress-induced...
Chickenpox – VZV (herpesvirus)
Herpes labialis (HSV)
Hand Foot Mouth (Coxsackie virus)
Infectious Mononucleosis (EBV)
Condyloma (HPV)
HPV

- HPV-related oropharyngeal cancers expected to outnumber cervical HPV cancers in a little over a decade?
- HPV vaccination (e.g. Gardasil or Cervarix) to prevent oropharyngeal cancers?
- Prevent potentially high-risk sexual practices?
- Biopsy squamous lesions and determine if HPV positive and subtype (e.g. high risk 16,18?)
- All oral cancer biopsy specimens should be tested for HPV via in situ hybridization?
**Saliva screening and prevention**

**Result:** POSITIVE - HIGH RISK HPV IDENTIFIED

<table>
<thead>
<tr>
<th>HPV Type(s) Identified</th>
<th>Patient Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Types</td>
<td>High</td>
</tr>
</tbody>
</table>

**Type** | **Clinical Significance**
---|---
16 | This HPV Type is classified as being of high risk for the development of cancer.
18 | This HPV Type is classified as being of high risk for the development of cancer.

**Interpretation:**

This sample is positive for the following HPV type(s) (16,18). This HPV infection is considered a high risk for development of dysplasia or neoplasia of the ororespiratory tract. See comment.

**Comment:**

- **Significance:** HPV of the ororespiratory tract is caused by person to person contact with implications for the development of cancers such as those involving the oral mucosa, the tonsils and the base of tongue. The diagnosis of dysplasia and cancer are based on the morphologic assessment of a cytology or tissue specimen obtained from biopsy.

- **Risk:** The assignment of risk of a given HPV type involves several factors including the time duration of the infection, the patient's hormonal and immune status and whether there are coincident social habits or underlying disease that increase the general risk of malignancy. The HPV type identified in this sample is listed as high risk, meaning that these viruses have been associated with malignant changes in infected cells.

- **Consider:** A current recommendation following the result of a high risk HPV infection is close observation and repeat testing for persistent HPV one year (12 months) later.

**Methodology:** Genomic DNA was extracted from the submitted specimen and amplified by Polymerase Chain Reaction (PCR) using primers specific for the human papilloma virus (HPV) Genome. HPV DNA positive PCR products were subjected to digestion by restriction enzymes. Digested DNA fragments were then separated on a polyacrylamide gel, visualized by aid of ethidium bromide and HPV genotype determined by matching the fragment pattern to that of known HPV restriction fragment patterns.
Oral Hairy Leukoplakia (EBV, HIV indicator)
Viral cytopathic effect (ballooning degeneration) as seen on PAP-PAS stained exfoliative cytology specimen (Tzanck)
Viral Treatment

- Palliative, hydration
- Non-aspirin NSAID’s prn to avoid potentially fatal Reye’s Syndrome in kids
- Underlying disorders, work-ups?
- Acyclovir / Valacyclovir for adult Herpes virus infections
- Cryotherapy, cautery or laser ablation for HPV lesions (avoid caustic chemicals)
BACTERIAL

• Most oral bacterial infections start as a *biofilm* disease, but can potentially spread to represent *planktonic* disease (exudate vs. transudate)
• Most oral bacterial infections are *odontogenic*, meaning they originate from tooth or tooth supporting structures such as the periodontium
• Many infections start with *aerobic* bacteria initially and then shift to *anaerobes*
• Patients may complain of *inflammatory* symptomatology or none at all!
• Poor oral hygiene, certain systemic conditions or medications may *increase risk* for oral infection
Gingivitis
Periodontitis and osteomyelitis
Parulis from pulpitis or periodontitis
Abscess from pulpitis or periodontitis spreading to soft tissue fascial planes
Cellulitis
Actinomycosis
Drug-Induced Gingival Hyperplasia
Osteonecrosis of the Jaws Associated with Anti-Resorptive Therapy
Bacterial Treatment

• Remove source of biofilm infection when possible
  – caries removal, scaling, extraction, I&D, debridement/curettage/sequestrectomy

• Antibiotics
  – Oral vs IV
  – Oral chlorhexidine irrigation
  – Empirical (target usual suspects) or culture and sensitivity testing for more targeted therapy

• Underlying disorders, work-ups?
Summary

- Fungal, viral and bacterial infections have unique clinical characteristics and features
- Recognition of these features such as lesion morphology and patient presentation can aid in diagnosis often without any additional tests or work-up
- Treatment is aimed at the specific group of organisms involved
THANK YOU!

Questions?