LECTURER

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INFECTIOUS DISEASES
with manifestations in oral cavity
OUTLINE

• Bacterial Infections
• Fungal Infections
• Viral Infections
Infectious Diseases

We are surrounded and inhabited by an enormous number of microorganisms.

- Whether the organisms cause disease depends on the microorganism and the body’s defenses.
- Traditionally, the microorganisms are divided according to whether they are disease causing (pathogenic) or non–disease causing (nonpathogenic).
Infectious Diseases

- The oral cavity may be the primary site of involvement of an infectious disease, or a systemic infection may have oral manifestations.

- There are different routes of infection:
  - Transferred through the air on dust particles or water droplets
  - Some may require intimate and direct contact.
  - Some may be transferred by hands or objects.
Infectious Diseases

Microorganisms invading oral tissue can cause local infection, systemic infection, or both.

- Microorganisms in the bloodstream can cause lesions in the oral cavity.
- Microorganisms causing infection in the lungs can be transferred to oral tissue and be present in saliva.
Infectious Diseases

- Oral flora may be affected by changes in salivary flow, administration of antibiotics, and changes in the immune system.

- Opportunistic infection:

  When an organism that usually is nonpathogenic causes disease
Infectious Diseases

Microorganisms may penetrate epithelial surfaces as foreign bodies.

• They stimulate the inflammatory response.
  - This is a nonspecific response that results in edema and the accumulation of a large number of white blood cells.

• They stimulate the immune system
  - This is a highly specific response that results in the production of antibodies to the microorganisms that act as antigens.
Infectious Diseases

• Humoral immunity (antibodies) is an effective defense against some microorganisms.

• Cell-mediated immunity is an effective defense against others such as intracellular bacteria, viruses, and fungi.
Bacterial Infections

- Tonsillitis and Pharyngitis
- Tuberculosis
- Actinomycosis
- Syphilis
- Necrotizing Ulcerative Gingivitis
Tonsillitis and Pharyngitis

- Inflammatory conditions of the tonsils and pharyngeal mucosa
- May be due to many different organisms
- Clinical features may include sore throat, fever, tonsillar hyperplasia, and erythema of the oropharyngeal mucosa and tonsils.
- May be spread by contact with infectious nasal or oral secretions
Tonsillitis and Pharyngitis

Diagnosis and Management

• Laboratory tests can confirm streptococcal cause.

• Group A β (beta)-hemolytic streptococci are related to scarlet fever and rheumatic fever.
Scarlet Fever

- Usually occurs in children
- Patients have a fever and a generalized red skin rash caused by a toxin released by the bacteria.
generalized red skin rash
Scarlet Fever

Oral manifestations in addition to streptococcal tonsillitis and pharyngitis include:

- Petechiae on the soft palate
- “Strawberry” tongue
Tonsillitis and pharyngitis

“Strawberry” tongue
“Strawberry” tongue: Fungiform papillae are red and prominent with the dorsal surface of the tongue exhibiting either a white coating or erythema.
Rheumatic Fever

- A childhood disease that follows a group A β-hemolytic streptococcal infection
- Characterized by an inflammatory reaction involving the heart, joints, and central nervous system
- Heart valve damage may occur.
- This may require the patient to be premedicated prior to dental hygiene treatment.
Tuberculosis

- Usually caused by the organism *Mycobacterium tuberculosis*
- The chief form of the disease is an infection of the lungs
- The organisms are resistant to destruction by macrophages.
- After being engulfed, they multiply in the macrophages and then disseminate in the bloodstream.
The chief form of the disease is an infection of the lungs
Tuberculosis

Signs and symptoms: Include fever, chills, fatigue and malaise, weight loss, and persistent cough

- Miliary tuberculosis
  - Involvement of organs such as kidney and liver in widespread areas of the body

- Scrofula
  - Involvement of submandibular and cervical lymph nodes

- Oral lesions may occur but they are rare.
  - Appear as painful, nonhealing, superficial or deep slowly enlarging ulcers
Scrofula:
Involvement of submandibular and cervical lymph nodes
Oral lesions may occur but they are rare. Appear as painful, nonhealing, superficial or deep slowly enlarging ulcers.
Tongue lesions are common
Oral manifestation of TB

![Graph showing frequency of oral manifestations of TB by year](image)
Source: Oral Medicine: Oral tuberculosis

D P Von Arx & A Husain

British Dental Journal 190, 420 - 422 (2001) Published online: 28 April 2001
Tuberculous osteomyelitis of right mandibular condyle
Diagnosis of Tuberculosis

Oral lesions

- Identified by biopsy and microscopic examination
  - Chronic granulomatous lesions with areas of necrosis surrounded by macrophages, multinucleated giant cells, and lymphocytes

- Tissue

  - May be stained to reveal the organisms
Diagnosis of Tuberculosis

Skin test

- An antigen is injected into the skin.
- Purified protein derivative (PPD)

- A positive inflammatory reaction occurs if the person has previously been exposed to the antigen.

- Chest radiographs may be taken after a positive skin test to see if active disease is present.
**Tuberculosis**

- An increase has been reported in both in the number of reported cases and in cases that are resistant to standard drug regimens.

- Tuberculosis incidence has been related to HIV infection and increased immigration from countries where tuberculosis is endemic.

- It is considered an occupationally transmitted disease in dentistry.
  - Standard precautions can prevent transmission.
  - If the patient has active tuberculosis, treatment can be deferred.
Treatment and Prognosis of Tuberculosis

Combination medications, including isoniazid (INH) and rifampicin

- Treatment may continue for months or years.
- The patient’s physician should be consulted to determine whether the patient is infectious.
Actinomycosis

An infection caused by a filamentous bacterium – *Actinomyces israelii*

- Forms abscesses that tend to drain by sinus tracts
- The organisms are common, normal inhabitants of the oral cavity.
  - Predisposing factors have not been identified but infection is often preceded by extraction or an abrasion of mucosa.
Actinomycosis

- Forms abscesses that tend to drain by sinus tracts:

- **Sulfur granules**: The colonies of organisms appear in pus as tiny, yellow grains.
Actinomycosis
Cervicofacial Actinomycosis
Actinomycosis of the tongue
Actinomycosis

Diagnosis

• Identification of colonies in tissue from the lesion

Treatment and prognosis

• Long-term high doses of antibiotics
Syphilis

- Caused by a spirochete *Treponema pallidum*
- Transmitted by direct contact
- The organisms die when exposed to air and changes in temperature.
- Usually transmitted through sexual contact but may be transmitted through transfusion of infected blood or to a fetus from an infected mother.
Syphilis – historical review
Epidemiology

Men
7.9

Women
1.1

†Reported cases per 100,000 people
## Syphilis

### Stages of syphilis

<table>
<thead>
<tr>
<th>Stage</th>
<th>Oral Lesion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Chancre</td>
</tr>
<tr>
<td>Secondary</td>
<td>Mucous patch</td>
</tr>
<tr>
<td>Latent</td>
<td>None</td>
</tr>
<tr>
<td>Tertiary</td>
<td>Gumma</td>
</tr>
</tbody>
</table>
Syphilis

Three stages

• Primary stage

- The lesion of the primary stage is a chancre
- It forms where the spirochete enters the body.
- It is highly infectious.
- It heals spontaneously and the disease enters a latent period.
Chancre
Syphilis

Secondary stage

- **Diffuse eruptions** occur on skin and mucous membranes
- **Mucous patches**
  - Oral lesions that appear as *multiple, painless, grayish white plaques* covering ulcerated mucosa
  - These lesions are the *most infectious*.
  - They *undergo spontaneous remission* but may recur for months or years.
Diffuse eruptions occur on skin
Plaques muqueuses
Lues II Plaques muqueuses

Lues II Laryngitis
Lues I Ulcus durum

Lues II Plaques muqueuses
Syphilis

Tertiary stage

- Chiefly involves the cardiovascular system and the nervous system

- Gumma
  - A firm mass
  - Noninfectious
  - A destructive lesion that can result in perforation of the palatal bone
Congenital Syphilis

- Transmitted from an infected mother to the fetus
- May cause serious and irreversible damage
- Facial and dental abnormalities
Hutchinson’s triad
A Colour Atlas of Clinical Conditions in Paedodontics
R. Rapp and G. B. Winter

Case in student’s clinical room, 2009.
Diagnosis and Treatment of Syphilis

- Lesions on skin may be identified by dark-field microscopy

- Blood tests include VDRL and fluorescent treponemal antibody absorption test (FTA-ABS)

- Treatment

- Treated with penicillin
Necrotizing Ulcerative Gingivitis

- A painful, erythematous gingivitis with necrosis of interdental papillae

- Most likely caused by both a fusiform bacillus and a spirochete (Borrelia vincentii)

- Associated with decreased resistance to infection
Infectious diseases with manifestations in oral cavity
Necrotizing Ulcerative Gingivitis

• **Diagnosis**
  - Necrosis results in cratering of the interdental papillae.
  - Sloughing of necrotic tissue causes a pseudomembrane over the tissue.

• **Treatment**
  - Gentle debridement
  - Antibiotics if fever is present
## Oral Manifestations of bacterial Infections

<table>
<thead>
<tr>
<th>Disease</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scarlet fever (Group B Streptococcus)</td>
<td>Erythema of hard palate and a white-coated Tongue with erythematous, edematous, fungiform papillae. Later the tongue becomes beefy red (strawberry tongue)</td>
</tr>
<tr>
<td>Diphtheria (Corynebacterium Diphtheriae)</td>
<td>Thick, gray pseudomembrane with erythematous Halo on tonsils, pharynx, gingiva, tongue, buccal mucosa</td>
</tr>
<tr>
<td>Tularemia (Francisella Tularensis)</td>
<td>Painful, necrotic oral ulcers or diffuse stomatitis</td>
</tr>
<tr>
<td>Lepromatous leprosy</td>
<td>Firm yellow-pink ulcerative nodules (lepromas) on the palate or tongue. Macroglossia due to tongue infiltration, Reddening of upper teeth (pink spots) due to infection of dental pulp</td>
</tr>
<tr>
<td>Granuloma inguinale</td>
<td>Painful hemorrhagic ulcers or vegetative nodules, Severe scarring</td>
</tr>
</tbody>
</table>
## Oral Manifestations of bacterial Infections

<table>
<thead>
<tr>
<th>Primary syphilis</th>
<th>Chancre—painless ulceration with indurated borders on the lip, tongue, buccal mucosa, or oropharynx with lymphadenopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary syphilis</td>
<td>Mucous patches—oval plaques on the tongue with a white or gray pseudomembrane. Split papules, macerated, flat-topped papules at the oral commissures (condyloma lata). chronic oral ulcerations</td>
</tr>
<tr>
<td>Tertiary syphilis</td>
<td>Interstitial glossitis with atrophy of filiform and fungiform papillae and fissuring of the tongue, Pre-malignant leukoplakia, gummas involve palate</td>
</tr>
<tr>
<td>Congenital syphilis</td>
<td>Hutchinson teeth in 50%—peg shaped with crescentic notches along incisal edge of incisors. Mulberry or Moon’s molars—rounded or crenated occlusal cusps of first molars</td>
</tr>
</tbody>
</table>
Fungal Infections

SEE LECTURE # 5
Viral Infections

- Human Papillomavirus Infection
- Herpes Simplex Infection
- Varicella-Zoster Virus
- Epstein-Barr Virus
- Coxsackie virus Infections
Human Papillomavirus Infection

- Verruca Vulgaris
- Condyloma Acuminatum
- Focal Epithelial Hyperplasia
Human Papillomavirus Infection

- More than 100 types of human papillomavirus (HPV) have been identified.
- Several have been identified in oral lesions and some in normal oral mucosa.
- Also implicated in neoplasia
Verruca Vulgaris (Common Wart)

- A papillary oral lesion caused by a papillomavirus.
- Usually transmitted from skin to oral mucosa.
- Autoinoculation usually occurs through finger sucking or fingernail biting.
- Usually a white, papillary, exophytic lesion that closely resembles a papilloma.
Usually transmitted from skin to oral mucosa.

Autoinoculation usually occurs through finger sucking or fingernail biting.
Verruca Vulgaris (Common Wart)

Diagnosis

- Biopsy and histologic examination reveal the light microscopic features of this lesion. (Immunologic staining may help identify viruses)

Treatment

- Conservative surgical excision
- Lesion may recur.
- Patients with finger lesions should refrain from finger sucking or fingernail biting to prevent reinoculation.
Condyloma Acuminatum

- A benign papillary lesion caused by a papillomavirus
- Generally transmitted by sexual contact
- May be transmitted to the oral cavity through oral-genital contact or self-inoculation
- Papillary, bulbous pink masses that can occur anywhere in the oral mucosa
- Multiple lesions may be present.

Treatment

- Conservative surgical excision
- Recurrence is common.
Infectious diseases with manifestations in oral cavity
Focal Epithelial Hyperplasia (Heck Disease)

- Characterized by the presence of multiple whitish to pale pink nodules distributed throughout oral mucosa
- Most common in children
- Lesions are generally asymptomatic and do not require treatment.
- Resolve spontaneously within a few weeks
ORAL PATHOLOGY

Infectious diseases with manifestations in oral cavity
Herpes Simplex Infection

• There are **two major forms** of herpes simplex viruses – **type 1 and type 2**

• Oral infections are mostly caused by type 1 and genital infections are most commonly caused by type 2

• Herpes simplex is one of a group of viruses called human herpes viruses (HHV).
Primary Herpetic Gingivostomatitis

• The oral disease caused by initial infection with herpes simplex virus

• Painful, erythematous, and swollen gingiva and multiple tiny vesicles on perioral skin, vermilion border of lips, and oral mucosa may be seen.

• The vesicles progress to form ulcers.

• The patient may have systemic symptoms such as fever, malaise, and cervical lymphadenopathy.

• Most commonly occurs in children between 6 months and 6 years of age
Primary Herpetic Gingivostomatitis
Recurrent Herpes Simplex Infection

• The virus tends to persist in a latent state.

• Usually in nerve tissue of the trigeminal ganglion

• It is estimated that one third to one half of the population in the United States experiences recurrent herpes simplex infection.
Recurrent Herpes Simplex Infection

- The most common location for recurrent infection is on the lips – herpes labialis.
- Also called a cold sore or fever blister.
- Episodes may be stimulated by stress.
- May be sunlight, menstruation, fatigue, fever, and emotional stress.
Recurrent Herpes Simplex Infection
Recurrent Herpes Simplex Infection
Recurrent Herpes Simplex Infection
Recurrent Herpes Simplex Infection

• Occurs intraorally on keratinized mucosa that is attached to bone

• Painful groups of small vesicles that ulcerate and coalesce to form a single ulcer with an irregular border

• The patient may have a prodrome with symptoms such as pain, burning, or tingling.
Recurrent Herpes Simplex Infection
Recurrent Herpes Simplex Infection

- Transmitted by direct contact with an infected individual
- The primary infection occurs at the site of inoculation.
- The amount of virus is highest in the vesicle stage.
- Herpetic whitlow
- A painful infection of the fingers due to a primary or secondary infection
- Herpes simplex can also cause an eye infection.
Recurrent Herpes Simplex Infection
**Comparison of the clinical features of recurrent minor aphthous ulcers and recurrent herpes ulceration**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Minor Aphthous Ulcers</th>
<th>Herpes Simplex Ulceration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Nonkeratinized mucosa</td>
<td>Keratinized mucosa</td>
</tr>
<tr>
<td>Number</td>
<td>One to several</td>
<td>Multiple (crops)</td>
</tr>
<tr>
<td>Vesicle precedes ulcer</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Pain</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Size</td>
<td>&lt;1 cm</td>
<td>1-2 mm</td>
</tr>
<tr>
<td>Borders</td>
<td>Round to oval</td>
<td>Crops of ulcers coalesce to form a large irregular ulcer</td>
</tr>
<tr>
<td>Recurrent</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**D.D. with minor aphthous ulcers**
Diagnosis of Recurrent Herpes Simplex Infection

- Generally based on clinical appearance
- Changes in epithelial cells can be seen microscopically.
Treatment of Recurrent Herpes Simplex Infection

- Antiviral drugs where appropriate
- These drugs have not been shown to be consistently effective in treating lesions except in immunocompromised patients.
Varicella-Zoster Virus

- Causes both *chickenpox* (varicella) and *herpes zoster* (shingles)
- Respiratory aerosols and contact with secretions from skin lesions transmit the virus.
Chickenpox

- A highly contagious disease
- Causes *vesicular and pustular eruptions* of skin and mucous membranes
- *Systemic symptoms* include headache, fever, and malaise.
- Usually occurs in *children*
Herpes Zoster (Shingles)

- Secondary chickenpox in an adult

- Characterized by a unilateral, painful eruption of vesicles along the distribution of a sensory nerve

- Any branch of the trigeminal nerve may be involved if lesions affect the face.

- Vesicles are often preceded by pain, burning, or paresthesia.

- The disease usually lasts for several weeks.

- Neuralgia may take months to resolve.
Diagnosis and Treatment of Varicella Zoster

• Generally made based on clinical features

• Biopsy or smear may show the same type of virally altered epithelial cells seen in herpes simplex infection.

• Varicella generally is treated with supportive care.

• Antiviral drugs may be used for immunocompromised patients and for patients with herpes zoster.
Epstein-Barr Virus Infection

Implicated in several diseases, including:

- Infectious mononucleosis,
- Nasopharyngeal carcinoma
- Burkitt lymphoma
- Hairy leukoplakia
Infectious Mononucleosis

- Characterized by sore throat, fever, generalized lymphadenopathy, enlarged spleen, malaise, and fatigue
- Petechiae may appear on the palate.
- In Europe, infectious mononucleosis occurs primarily among adolescents and young adults.
- Often transmitted by kissing
Generalized lymphadenopathy, enlarged spleen, malaise, and fatigue
Sore throat
Petechiae may appear on the palate.
Hairy Leukoplakia

- An irregular, corrugated, white lesion most commonly occurring on the lateral border of the tongue
- Epstein-Barr virus (EBV) is considered to be the cause of the lesion.
- It occurs most commonly in patients infected with HIV but has also been reported in patients who are not infected with HIV.
Infectious diseases with manifestations in oral cavity
Coxsackie virus Infections

• Causes several different infectious diseases

• May be transmitted by fecal-oral contamination, saliva, and respiratory droplets

• Three have distinctive oral lesions:
  
  - Herpangina
  
  - Hand-foot-and-mouth disease
  
  - Acute lymphonodular pharyngitis
Herpangina

- Characterized by fever, malaise, sore throat, and difficult swallowing (dysphagia)

- Includes vesicles on the soft palate

- Erythematous pharyngitis

- Resolves in less than 1 week without treatment.
Hand-Foot-and-Mouth Disease

• Usually occurs in epidemics in children less than 5 years old

• Multiple macules or papules occur on the skin, typically on feet, toes, hands, and fingers.

• Oral lesions are painful vesicles that can occur anywhere in the mouth.

• Resolves within 2 weeks
Diagnosis and Treatment of Hand-Foot-and-Mouth Disease

Diagnosis

• The distribution of skin lesions and mild systemic symptoms help differentiate the condition from herpes simplex infection.

Treatment

• Generally not required
Measles

• Caused by a type of virus called a paramyxovirus

• A highly contagious disease causing systemic symptoms and a skin rash

• Koplik’s spots may occur in the oral cavity.

• They are small erythematous macules.
N.B. Koplik’s spots occur in the oral cavity before the skin rash
Other Viral Infections That May Have Oral Manifestations

Mumps

- A viral infection of the salivary glands
- Most commonly causes bilateral swelling of the parotid glands
## Oral Manifestations of Viral Infections

<table>
<thead>
<tr>
<th>Virus (HHV)</th>
<th>Manifestations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herpes (HHV-1 and HHV-2)</td>
<td>Lip edema with erythematous, grouped vesicles, erosions, intra-oral hemorrhagic ulcers. Tongue involvement in immunocompromised patients</td>
</tr>
<tr>
<td>Chickenpox (HHV-3)</td>
<td>Oral ulcers on palate or buccal mucosa</td>
</tr>
<tr>
<td>Herpes zoster (HHV-3)</td>
<td>Painful, unilateral, aphthous-like ulcers in second and third trigeminal nerve branch</td>
</tr>
<tr>
<td>Infectious mononucleosis Epstein-Barr virus (HHV-4)</td>
<td>Exudative tonsillitis, uvular edema, palatal petechiae, and, uncommonly, necrotizing ulcerative gingivitis</td>
</tr>
<tr>
<td>Oral hairy leukoplakia Epstein-Barr virus (HHV-4)</td>
<td>White plaques with prominent vertical folds on lateral tongue &gt; dorsal tongue &gt; buccal mucosa and vestibule in immunocompromised individuals</td>
</tr>
<tr>
<td>Congenital Cytomegalovirus (HHV-5)</td>
<td>Yellow dentin and hypoplastic puffed enamel of the teeth, Aphthous-like ulcers</td>
</tr>
<tr>
<td>Roseola infantum (HHV-6) (exanthem subitum)</td>
<td>Erythematous macules on soft palate</td>
</tr>
</tbody>
</table>
## Oral Manifestations of Viral Infections

<table>
<thead>
<tr>
<th>Virus/Infection</th>
<th>Clinical Manifestations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaposi sarcoma HHV-8</td>
<td>Erythematous to violaceous macules on palate, gingiva, tongue. Evolve into painful, ulcerated nodules</td>
</tr>
<tr>
<td>Herpangina (Group A coxsackievirus)</td>
<td>Acute onset, 1- to 2-mm erythematous macules on palate and uvula. Lesions vesiculate and ulcerate, leaving painful superficial erosions</td>
</tr>
<tr>
<td>Hand-foot-and-mouth disease (Coxsackie A-16)</td>
<td>Many small, painful ulcers with surrounding erythema on the tongue, buccal mucosa, palate</td>
</tr>
<tr>
<td>Acute lymphonodular pharyngitis (Gp A Cox)</td>
<td>White or yellow papules with an erythematous base on uvula, tonsils, oropharynx</td>
</tr>
<tr>
<td>Measles (rubeola)</td>
<td>Koplik spots - brightly erythematous macules with white centers on buccal mucosa adjacent to posterior teeth</td>
</tr>
<tr>
<td>Rubella (German measles)</td>
<td>Forschheimer spots—small erythematous macules on palate</td>
</tr>
<tr>
<td>Acute sero-conversion of HIV</td>
<td>Erythema, ulcerations, and secondary candidiasis</td>
</tr>
</tbody>
</table>
Oral Manifestations of Viral Infections

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squamous papilloma (HPV)</td>
<td>Solitary, exophytic, pedunculated, mucosa colored papule, occurs on the palate or tongue</td>
</tr>
<tr>
<td>Verruca vulgaris (HPV)</td>
<td>Solitary or clusters of verruciform papules on the Buccal mucosa, lips, or perioral skin</td>
</tr>
<tr>
<td>Condyloma acuminatum (HPV)</td>
<td>Resemble verruca vulgaris but are larger. Oral Involvement of the labia, lingual frenum, soft palate, and gingiva</td>
</tr>
<tr>
<td>Focal epithelial hyperplasia (Heck disease) (HPV)</td>
<td>Benign, soft, painless 1- to 4-mm papules on the labial, buccal, or lingual mucosae</td>
</tr>
<tr>
<td>Kawasaki disease</td>
<td>Beefy red oropharynx, strawberry tongue (inflammation and papillary enlargement), severe hemorrhagic cheilits</td>
</tr>
</tbody>
</table>
Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS)

See lecture # 6