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QUESTIONS BANK LECTURE NOTES REPORTS MANAGER ADMINISTRATION SIGN OUT

Resource view

Resource name	Dental microbiology and infectious disease
Resource description	This is lecture notes on microbiology and infectious disease in dentistry
Resource content	

MICROBOBIOLOGY IN DENTISTRY

Content:

1. Viruses
2. Bacteria and their Diseases
3. Hepatitis Infection
4. Herpes Viruses
5. HIV Infection
6. Fungal Infection
7. Immunisation Schedule

HERPES VIRUSES

1. Herpes Simplex Virus Type 1 (HSV 1)

   Causes gingivostomatitis, herpes labilais (cold sore)

   Becomes latent in the trigeminal ganglia

2. HSV-2.
   Causes mainly genital herpes. The typical presentation is very painful genital ulcers. But may cause oral herpes virus.

3. Human herpes virus type 3 (HHV- 3). This is varicella zoster virus. Causes chicken pox as a primary infection and then causes **shingles**.
   Becomes latent in the dorsal or trigeminal ganglia.



4. Human herpes virus type 4 (HHV-4) . This is Ebstein Bar virus (EBV). It causes infectious mononucleosis, Burkitt 's lymphoma, HIV associated hairy leukoplakia. Cause Hodgkin lymphoma in HIV patient, nasopharyngeal carcinoma, and post transplant lymphoproliferation syndrome (PTLD)

5. Human herpes virus type 5 (HHV-5). This is also also called cytomegalovirus. It causes infection mononucleosis (negative monospot)

6. Human herpes virus type 6 (HHV-6): Causes Roseola infantum/sixth disease.

7. Human herpes virus type 7 (HHV 7): Causes Exanthema subitum

8. Human herpes virus type 8 (HHV 8): Causes Kaposi sarcoma in HIV patients

Herpes Simplex Virus: there are two strains of the (HSV) in humans: HSV-1 and HSV-2. Whilst it was previously thought HSV-1 accounted for oral lesions (cold sores) and HSV-2 for genital herpes.

But there is often overlap between the two viruses.

Primary infection: may present as a severe gingivostomatitis, cold sores, or genital ulcers.

Management:

Gingivostomatitis: oral aciclovir, chlorhexidine mouthwash

Cold sores: topical aciclovir

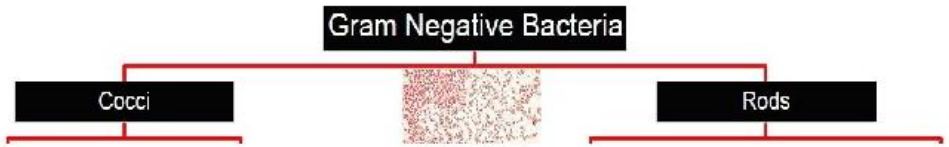
Genital herpes: oral acyclovir.

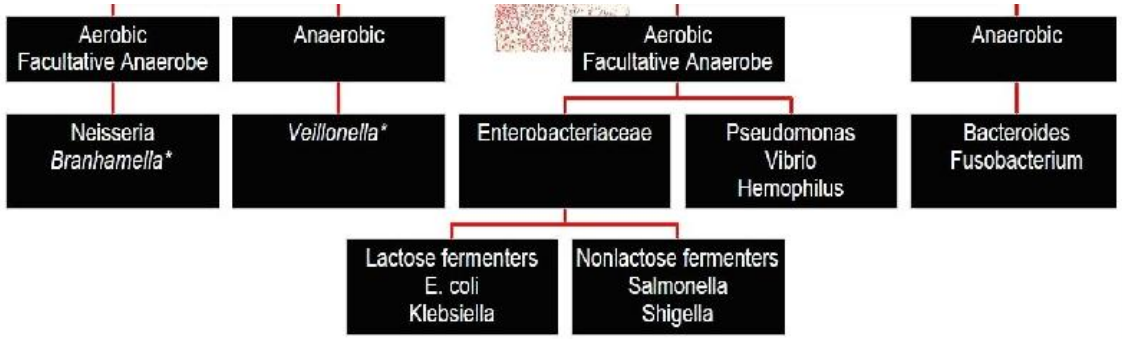
MICROORGANISM AND THEIR INFECTION

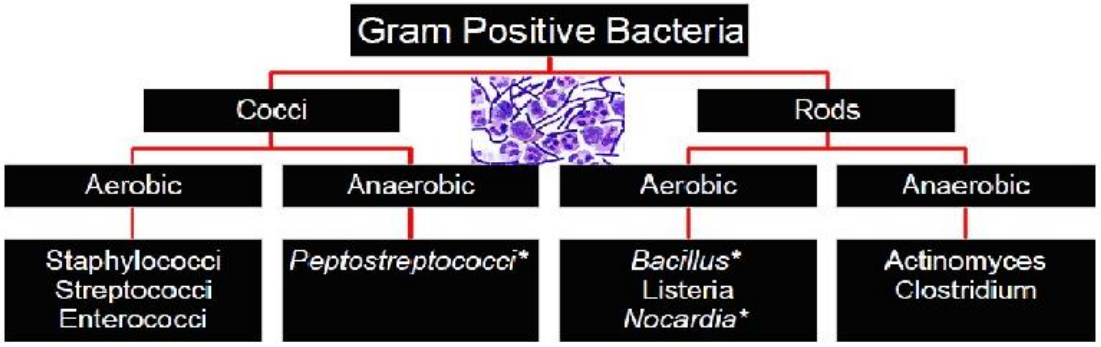
Morphology	Gram +Ve examples	Gram –Ve examples
Circular (coccus)	Staphylococcus Streptococcus	Neisseria
Rods (Bacillus)	Clostridium Corynebacterium Bacillus Listeria	Enterics: -E.coli -Shigella -Salmonella

	Mycobacterium (acid fast) Gardenella (Gram variable)	-Yersinia -Klebsella -Proteus -Enterobacter -Vibrio -Campylobacter Helicobacter Pseudomonas RESPIRATORY: -Haemophilus -Legionella -Bordetella ZOONOTIC -Pasteurella
Branching filamentaous	Actinomyces Norcadia (weak acid fast)	
Pleomorphic		Rickettsiae Chlamydia
Spiral		Spirochetes -Treponema -Borrelia -Leptospira
NO cell wall	Does not stain with gram stain	

BACTERIA AND THEIR DISEASES







BACTERIA	DISEASE	MANIFESTATIONS
Corynebacterium diphtheriae	Diphtheria	Pharyngitis with pseudomembranes in throat, lymphadenopathy
Pseudomonas aeruginosa		Pneumonia or simply cell death
Shigella	Dysentery	Diarrhoea and vomiting with blood in the stool
E. coli	Gastroenteritis and UTI	
Bacilus anthracis	Anthrax	
Vibrae cholera	cholera	Rice watery diarrhoea
Bordetella pertussis	Whooping cough	cough
Clostridium tetani	Tetanus	Muscle rigidity and locked jaw

Clostridium botulinum	Botulism	Captured in tined food, causes paralysis,
Clostridium perfringens	Gas gangrene	Gas gagrene
Streptococcus pyogenes	Cellulitis, pneumonia	
Staphylococcus aureus	Pneumonia, cellulitis, osteomyelitis	
Treponema Pallidum	Syphillis	

Clostridium difficile is a Gram positive rod often encountered in hospital practice. It produces an exotoxin which causes intestinal damage leading to a syndrome called

pseudomembranous colitis. *Clostridium difficile* develops when the normal gut flora are suppressed by broad-spectrum antibiotics. **Clindamycin is historically known to cause**

Pseudomembranous colitis but the aetiology has evolved significantly over the past 10 years. **Second and third generation cephalosporins are now the leading cause**

Symptoms:

Diarrhea,

Fever

Abdominal pain

If severe, toxic dilatation diagnosis is made by detecting *Clostridium difficile* **TOXIN** (CDT) in the stool

Management:

Oral metronidazole for 10-14 days

If severe or not responding to metronidazole then oral vancomycin may be used.

For life-threatening infections a combination of oral vancomycin and intravenous metronidazole should be used first.

Campylobacter Infections

Campylobacter are a group of germs (bacteria) that are a common cause of food poisoning in the UK

Campylobacter germs (bacteria) are commonly found in raw meat, particularly raw poultry such as chicken, turkey, etc. Cooking meat thoroughly usually kills the bacteria. Campylobacter may also be found in unpasteurised milk or untreated water

COMMON ANTI-VIRAL DRUGS:

Acyclovir or Ganciclovir: Used in Herpes simplex and herpes zoster infection e.g cold sores, chicken pox, shingles.

Mechanism of action: it inhibits viral DNA polymerase enzymes by chain termination.

FOOT AND MOUTH DISEASE

Causative organism: Coxsackie virus A and Enterovirus

Symptoms: Fever, mouth ulcers, small spots in the mouth, hands and foot which disappear within a few days.

TETANUS INFECTION

Causative organism: Clostridium tetani

Symptoms: mild spasm of the jaw muscles also known as lock jaw or trismus. This will cause a patient difficulty in opening their mouth.

Spasms of the muscles of the neck, chest, back and abdomen. Spasm of the back muscle causes what is known as **opisthothonus**.

Mechanism: the tetanus toxin blocks release inhibitory neurotransmitters glycerine and gamma amino butyric acid (GABA).

Treatment: Tetanus immunoglobulin also called tetanus antibodies or anti tetanus toxin.

HEPATITIS

Viral origin, types of hepatitis: A, B, C, D, E, G

HEPATITIS- A:

Usually transmitted by contamination due to lack of hygiene. Seen in patients travelling to endemic areas and it is noted to be more stable outside the body

i. Faeco-oral transmission

ii. Diagnosis: Hepatitis A virus antigen in faeces

iii. Cinical features:

- Diarrhoea

- Vomiting

- Abdominal pain

- Jaundice

- History of eating out in restaurants, buying fruits in the street, and history of travel to endemic areas like Africa or Asia.

- dia

HEPATITIS- B: It is a DNA virus

Highly infectious blood borne infection.

Modes of transmission:

- Needle stick injuries in health care professionals
- Intravenous drug abuse
- Sexual intercourse
- Blood transfusion (especially in patients who frequently receive blood such as in haemophilia)

Signs & symptoms:

- Incubation period: 2-3 months
- - usually sub-clinical infection
- - acute hepatitis can completely resolve (30%)
- - fatal fulminant hepatitis (1%)
- - 9% remain as carriers

- May cause mild fever, jaundice, malaise

- Liver damage will lead to ascites, encephalopathy, and gastrointestinal haemorrhage.

Diagnosis & Prevention:

- **Diagnosis**: is by serology
- **Prevention**: active immunity: Hepatitis B vaccination especially in high risk group dentists, doctors, health care assistants

- **Passive immunity**: Anti hepatitis B immunoglobulin following a single exposure with Hepatitis B positive individuals

HEPATITIS- C:

Can cause both acute HCV infection and chronic HCV infection

Acute HCV

Is usually asymptomatic.
20-30% present with jaundice and abnormal liver function tests

Chronic HCV

Around 75% of patients infected with hepatitis C will develop chronic infection.
Only 25% develop acute hepatitis C, which usually resolves completely.
Blood borne virus, RNA VIRUS

Cannot be grown in tissue culture.

Intravenous route of transmission is major route of transmission

- Clinical features: acute is mild and sub-clinical
  - Chronic is more common. The patient may develop chronic liver disease or can develop in hepatocellular carcinoma
- Prevention & treatment:
  - Changes in behaviour
  - Encouraging needle exchange schemes (Needle Exchange Programme - NEP)

    - This is when the IVDU is encouraged not to share needles. Rather, they are given new needles every time they

    return used needles.
  - Non availability of vaccine
  - Treatment with interferons & ribavarin (Interferon alpha and beta)

HEPATITIS- D: Its an RNA virus

- Requires the presence of hepatitis B virus to replicate.

- Hepatitis D virus (HDV) infection develops only in patients who are positive for hepatitis B surface antigen (HBsAg)

- Infection may be acquired along with HBV (co-infection), or after HBV infection (super-infection)

- Route of transmission is the same as for hepatitis B

- HDV increases the severity of HBV

- Hepatitis D does not cause an infection on its own

HEPATITIS- E: Recently discovered. Its an **RNA virus**

- Faeco-oral contamination from contaminated drinking water

- It causes acute hepatitis infection just like hepatitis A

- Self limiting infection

- Mainly in adults

- No chronic carrier state

- Not major cross-infection risk in surgery

N.B.: Hepatitis A and E cause acute infections

HEPATITIS- G: AN RNA virus. Not major cross-infection risk in surgery

- More incidence in blood donors, haemophiliacs, IV drug abusers

Serology is a dying art form which still occurs at regular intervals in medical exams. It is important to remember a few key facts:

HEPATITIS B SEROLOGY

HBsAg

Period: serological marker detected during the first 3-5 weeks after being infected. The mean time from exposure to detection of HBsAg is 30 days.

Carrier status: The persistence of HBsAg for > 6 months defines carrier status.

Notes:

- Among those who are HBsAg-positive, those in whom HBeAg is also detected in the serum, are the most infectious.
- Those who are HBsAg-positive and HBeAg-negative (usually anti-HBe-positive) are infectious but generally of lower infectivity.
- The presence of HBeAg implies high infectivity. HBeAg is usually present for 1-3 months after the acute illness

Surface antigen (HBsAg) is the first marker to appear and causes the production of anti HBs

HBsAg normally implies acute disease (present for 1-6 months)

If HBsAg is present for > 6 months then this implies chronic disease

Anti-HBs implies immunity (either exposure or immunisation)

Anti-HBc implies previous (or current) infection. **IgM anti-HBc** appears during acute or recent hepatitis B infection and is present for about 6 months (c=current or recent)

HBeAg results from breakdown of core antigen from infected liver cells as is therefore a marker of infectivity (e=infectivity)

Previous immunisation: anti-HBs positive, all others negative

Previous hepatitis B (> 6 months ago), not a carrier: anti-HBc positive, HBsAg negative

Previous hepatitis B, now a carrier: anti-HBc positive, HBsAg positive

2 doses of hepatitis A vaccine is required for immunity: 1 and then 2nd one is given after 6-12 months of the first one.

3 doses of hepatitis B vaccine is required for immunity: 1st dose, then 2nd is given after 1 month and 3rd after 6 months of the first dose.(0,1,6)

PREVALENCE:

Hepatitis A. 40% is the commonest.

Hepatitis B: 5-10%

Hepatitis C 1-5%

Notes: Hepatitis B and C usually become chronic.

Hepatitis A usually causes acute hepatitis.

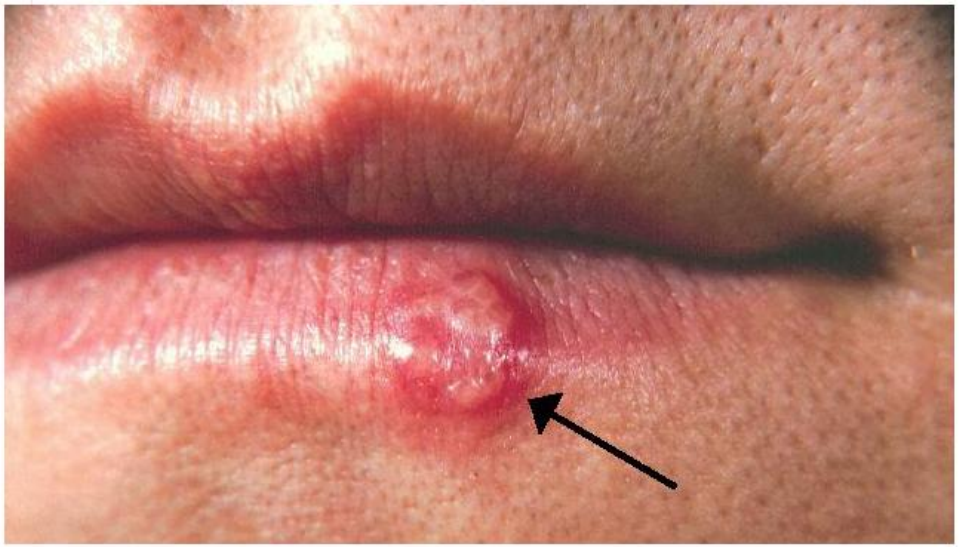
Hepatitis C can be transmitted to people who are vaccinated with Hepatitis B.

Hepatitis D usually co-exist with Hepatitis B. It never exists on its own.

HERPES

Types of herpes:

- HSV I: ocular (ophthalmicus)/ oral (labialis)





Primary Herpetic gingivostomatitis:

Spread: by contact, saliva

Incubation period: 5 days

Childhood: mild symptoms

Clinical features: fever

Cervical Lymphadenopathy

Vesicles in gingiva, tongue, buccal mucosa

They rupture and form superficial ulcers

Treatment: symptomatic treatment and bed rest

Self limiting (10 days)

Acyclovir in early stage can shorten and reduce the severity

Secondary (reactivation)

Can cause cold sores on muco-cutaneous junction of lip

Acyclovir topical

In immunocompromised:

Oral lesions-reactivation of virus

Systemic acyclovir is usually required i.e oral acyclovir

- HSV 2: genital
  - Transmitted during sexual contact
  - Painful ulcers around the genital area
  - Acyclovir orally is the treatment

HIV:

A retroviral infection transmitted by sexual contact or body fluids. RNA virus

- Pandemic infection
- Replication:
  - RNA dependant DNA polymerase
  - CD4 cells are targeted by HIV and destroyed by cytotoxic cells
  - It is least stable outside the body
- Transmission:
  - Heterosexual transmission
  - IV drug abusers
  - Occupational exposure:Needle stick injury
  - Haemophiliacs due to repeated blood transfusions

- Vertical transmission from mother to fetus

- Pathogenesis: HIV replicates rapidly and destroys many cells in the immune system everyday

  - The ability of HIV to disable the the natural immune system and alter the antigenicity by repeated mutation

- Clinical features:

  - The initial symptoms can just be like glandular fever and can be asymptomatic for few months to 8 years

  - Lymphadenopathy and fever

  - Later opportunistic infections like oral candidiasis and tuberculosis

  - Malignancies like Kaposi's sarcoma

- Weight loss, AIDS related dementia

- ORAL manifestations:
  - Erythematous/ pseudomembranous oral candidiasis
  - Oral hairy leukoplakia

    Asymptomatic, white, hyperkeratotic EBV related lesions present on the lateral margins of the tongue
  - Kaposi's sarcoma

    Karposi's sarcoma appears in different colours such as

    Purple/dark blue/brown/red







Palate most common

- Non-hodgkins lymphoma (related to EBV)

Rapidly growing swelling's on the neck, armpit or groin

Other symptoms include night sweats, fever, weight loss, lethargy and body itching·

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- Diagnosis: Screening: ELISA (Enzyme Linked Immunosorbent Assay)
  - Confirmation: Lymph node biopsy
- Prevention: Public education and safe sex
  - Universal infection control in dentistry and medicine

- No vaccination available

- Treatment: Chemotherapy (sometimes with monoclonal Ab's)
  - Treatment of opportunistic infections like candida and TB
  - Treatment of malignancy
  - Supportive treatment

CANDIDIASIS: (This is the same as thrush)

- - It usually causes curd-like white patches or sometimes - erythematous plaques on the buccal mucosa.
- - May be difficult to remove
- - Lesions bleed if scraped
- - Seen in patients who are immuno-compromised e.g
  - Long term corticosteroids

    Oral

    Inhaled
  - Malignancy

Signs & symptoms:

- Fissuring of mouth corners **angular stomatitis/cheilitis**
- On the oral cavity - **oral candidiasis/ oral thrush**
- Vaginal candidiasis
- Oesophageal candidiasis

Diagnosis & treatment:

- Clinical diagnosis & history
- Microscopy shows mycelia/spores & culture can also be done
- Oro-pharyngeal candidiasis: nystatin swirl & swallow

Treatment in immune compromised:

- Drug of choice in HIV: azole e.g fluconazole
- Disseminated candidiasis: IV Fluconazole or Amphotericin B alone or along with 5-fluorocytosine

NORMAL CHILDHOOD IMMUNISATION SCHEDULE

Time Period	**Immunization**
2 months	Diphtheria, Tetanus, pertussis (DTP), Haemophilus influenza type B, Polio, Pneumococcal infection ,
3 months	Diptheria, Tetanus, pertussis. Haemophilus influenza type B,

	Polio, Meninigitis type C
4 months	Diptheria, pertussis, Tetanus, Haemophilus influenza type B, Polio, Pneumococcal infection, Meningitis C
12-13 months	Haemophilus influenza type B, Pneumococcal infection, MMR, Meningitis C
3 year and 4 months	DTP booster Polio booster MMR booster
13-18 years	DTP booster Polio booster Human papilloma virus (girls)

MEASLES:
This is an acute infection of childhood caused by a single-stranded RNA virus.

Clinical features:
1) Fever, cough, coryza, conjuctivitis.
2) Koplik spots are pathognomonic and appear on the buccal mucosa. These are red small spots with a bluish white speck on the centre.
Investigations: Serology, RNA detection in the saliva.
Treatment: Supportive therapy

ERYTHERMA MULTIFORME: This is a skin condition considered to be a hypersensitivity reaction to infections or drugs.
It is a self limiting disease that affects the skin. Mucus membranes are affected a little.
The major form-more severe, more serious and with more extensive involvement of both skin and mucosa is also known as Steven-Johnson Syndrome.

Common infectious that can cause erytherma multiforme: Herpes simplex virus, (HSV) 1 and HSV 2 , fungal infections, other viruses.
Drugs like penicillin, sulfanamides NSAIDs, e.t.c

Creutzfeldt-Jakob disease

Creutzfeldt-Jakob disease is the best known of the human prion diseases. Prion disease is thought to arise from the transformation of normal host-encoded prion proteins to aberrantly folded protease resistant isoforms.

A prion is an abnormal protein that can be transmitted via blood transfusion or surgical instruments.

Once the prion has been transmitted, it transforms other proteins in the body. Accumulation of these abnormal proteins in the brain will usually cause dementia.

CJD is common in patients who revive frequent blood transfusions, e.g haemophilic patients

Treatment: Currently there is no available treatment for CJD

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