Miscellaneous Infectious Syndromes

SKIN AND SOFT TISSUE INFECTIONS (SSTI)

- Arise from invasion of organism through skin or from organisms that reach the skin from blood as a part of systemic infection
- Skin comprises of epidermis, dermis and subcutaneous tissues. Hair follicles and sweat glands originate in the subcutaneous tissues. Infection can involve any of these layers of skin

Infective skin manifestations & causative agents

Skin lesions	Description	Common etiological agents
Macule	Flat, non-palpable discoloration of skin (<5 cm size). If size exceeds 5 cm, is called as patch	Dermatophytes Viral rashes (e.g. enterovirus)
Papule	Elevated lesions usually <5 mm in size that can be felt or palpated	Molluscum contagiosum Scabies (*Sarcoptes scabiei*) Warts (Human Papilloma virus)
Plaque	Multiple papules my become confluent to form plaque which are palpable lesions >5 mm	

Infective skin manifestations & causative agents

Skin lesions	Description	Common etiological agents
Nodule	Firm lesions >5 cm size	*Staphylococcus aureus, porothrix, Mycobacterium marinum*
Vesicle	Fluid-filled lesions with a diameter less than 0.5 cm	Herpes simplex virus, varicella-zoster virus
Bulla	Fluid-filled lesions with a diameter more than 0.5 cm	*Clostridium* Herpes simplex virus *Staphylococcus aureus*

Infective skin manifestations & causative agents

Skin lesions	Description	Common etiological agents
Pustule	A fluid-filled vesicle containing neutrophils (i.e. pus) and is less than 0.5 cm in diameter	*Candida* *Staphylococcus aureus* *Streptococcus pyogenes*
Abscess	A fluid-filled lesion containing neutrophils and is more than 0.5 cm in diameter	

Infective skin manifestations & causative agents

Skin lesions	Description	Common etiological agents
Scale	Excess dead epidermal layer	Dermatophytes *Streptococcus pyogenes*
Ulcer	Break in epithelial lining extending into the epidermis/dermis	*Bacillus anthracis* decubitus ulcers of leprosy
Erysipelas	Painful, red, indurated swollen lesion involving dermis with a well-marked raised border Associated fever and	*Streptococcus pyogenes* Other streptococci

Infective skin manifestations & causative agents

Skin lesions	Description	Common etiological agents
Cellulitis	Diffuse spreading infection involving deep layers of dermis Ill-defined flat red, painful lesions Associated fever and lymphadenopathy	*Streptococcus pyogenes* *Staphylococcus aureus*

Infective skin manifestations & causative agents

Skin lesions	Description	Common etiological agents
Impetigo	Erythematous lesions which may be bullous or non-bullous with exudates and golden-yellow crusts	Non-bullous: *Streptococcus pyogenes* Bullous: *Staphylococcus aureus*
Hidradenitis	Chronic infection of obstructed sweat glands	*Staphylococcus aureus* *Streptococcus anginosus* group

Hair Follicle Infections

Skin lesions	Description	Common etiological agents
Folliculitis	Superficial infection of single hair follicle, presents as pustule	*Staphylococcus aureus*
Furuncle	Deeper infections of the hair follicles, presents as abscess, spread deeply into dermis and subcutaneous tissues	
Carbuncle	Represents the coalescence of a number of furuncles	

Infection of fascia and muscles

Skin lesions	Description	Common etiological agents
Necrotizing fasciitis	Rapidly spreading infection of fascia	*Streptococcus pyogenes*
Pyomyositis	Pus formation in the muscle layer	*Staphylococcus aureus* *Streptococcus pyogenes*
Myonecrosis	Extensive necrosis of the muscle layer with gangrene formation	Clostridial myonecrosis Other anaerobic

Agents causing surgical site wound infection

Bacterial agents	Fungi
For most clean wounds: - *Staphylococcus aureus* - Coagulase-negative staphylococci *Enterococcus*	*Candida albicans*
If bowel integrity is compromised: Gram-negative flora like *E. coli* and Anaerobic organisms like *Bacteroides, Prevotella,* etc.	

Agents causing burn wound infections

Bacteria	Fungi
Staphylococcus aureus (may be MRSA) *Pseudomonas aeruginosa* Coagulase-negative staphylococci *(e.g. S. epidermidis)*	*Candida albicans*

Clinical types of SSTIs

- **Primary lesion:** An area of tissue with impaired structure/function due to damage by trauma or disease
- **Secondary lesion:** A lesion arising as a consequence of any primary infection

Laboratory Diagnosis

- **Specimen Collection**

- Pus from wound collected by sterile swab
- Pus from abscess collected by incision and drainage or needle aspiration
- Vesicle or bulla fluid, collected by needle aspiration or sterile swab
- Subcutaneous infections: from the base of the lesion or biopsy of the deep tissues
- Skin scrapings, plucked hair or nail clippings in suspected fungal infections

Microscopy

- **Gram staining**
- **KOH mount** for suspected fungal infections (e.g.dermatophyte)
- **Tzanck smear** of the vesicle fluid suspected of herpes simplex or varicella virus infections

Culture

- **Aerobic culture** - inoculated onto blood agar and MacConkey agar and incubated overnight at 37°C
- **Atypical *Mycobacterium:*** Lowenstein Jensen medium
- **Dermatophytes:** Sabouraud's dextrose agar
- **Anaerobic organisms**: Robertson's cooked meat broth and BHIS (brain heart infusion agar with supplements)

Culture

- **Quantitative Culture**

- Performed to determine the number of colony forming units/gram of the tissue collected from the wound

- **Identification**

- Accurate identification of the causative agent is done based on colony morphology, culture smear, and biochemical reactions

- **Antimicrobial Susceptibility Test**

TREATMENT

	Definition	Surgical treatment	Empirical antibiotic
For purulent SSTIs (abscess, furuncle, carbuncle)			
Mild	Purulent infection without systemic signs of infection	Incision and drainage	No
Moderate	Purulent infection with systemic signs of infection	Incision and drainage and send for culture sensitivity	Oral cotrimoxazole or cephalexin or any other orally

TREATMENT

	Definition	Surgical treatment	Empirical antibiotic
For purulent SSTIs (abscess, furuncle, carbuncle)			
Severe	Failed treatment for moderate SSTIs Immunocompromised patient Severe systemic features	Incision and drainage and send for culture sensitivity	IV vancomycin

TREATMENT

	Definition	Surgical treatment	Empirical antibiotic
For non-purulent SSTIs (necrotizing infection, cellulitis, erysipelas)			
Mild	Typical cellulitis/erysipelas with no focus of purulence and no systemic signs of infection		Oral cephalosporins or dicloxacillin
Moderate	Typical cellulitis/erysipelas with		IV penicillin or ceftriaxone

TREATMENT

	Definition	Surgical treatment	Empirical antibiotic
For non-purulent SSTIs (necrotizing infection, cellulitis, erysipelas)			
Severe	Failed oral antibiotic treatment Immunocompromised patient Severe systemic features Following present: bullae, skin sloughing, hypotension, or evidence of organ dysfunction	Emergency surgical debridement	Vancomycin *plus* piperacillin/ tazobactam

SEXUALLY TRANSmITTED INFECTIONS

SEXUALLY TRANSMITTED INFECTIONS

- Agents causing local manifestations such as:
  - Genital ulcers
  - Urethral discharge
  - Vaginal discharge
  - Genital warts
  - Pelvic inflammatory diseases.
- Agents transmitted by sexual route, producing only systemic manifestations and do not cause local manifestations (e.g. HIV)

Causative agents of STIs

Agents causing local manifestations	
Genital ulcers	
Syphilis	*Treponema pallidum*
Herpes genitalis	Herpes simplex viruses
Chancroid	*Haemophilus ducreyi*
Lymphogranuloma venereum	*Chlamydia trachomatis*
Donovanosis	*Klebsiella granulomatis*

Causative agents of STIs

Agents causing local manifestations	
Urethral discharge	
Gonorrhea	*Neisseria gonorrhoeae*
Non-gonococcal urethritis (NGU)	*Chlamydia trachomatis* (D-K) *Ureaplasma urealyticum Mycoplasma genitalium Mycoplasma hominis* Herpes simplex virus *Candida albicans Trichomonas vaginalis*

Causative agents of STIs

Agents causing local manifestations	
Vaginal discharge	
Vulvovaginal candidiasis	*Candida albicans* Non-albicans *Candida* species
Bacterial vaginosis	*Gardnerella vaginalis* *Mobiluncus* species
Trichomonal vaginitis	*Trichomonas vaginalis*
Genital warts	

Causative agents of STIs

Agents causing systemic manifestations	
Pelvic inflammatory diseases (PID)	*Neisseria gonorrhoeae* *Chlamydia trachomatis*
No genital lesions but only systemic manifestations	HIV Hepatitis B virus (HBV) Hepatitis C virus (HCV)

STIs with genital ulcer

Feature	Incubation period	Genital ulcer	Lymphadenopathy
Syphilis	9 – 90 days	Painless, indurated single	Painless, moderate swelling (no bubo)
Herpes	2-7 days	Multiple painful	Absence or moderate swelling (no bubo)
Chancroid	1-14 days	Painful, soft Single or multiple	Painful, soft, marked swelling leads to bubo
LGV	3 days – 6 wks	Painless	Painful and soft

Laboratory Diagnosis of STIs

- **Specimen Collection**
- Discharge from the infected area - vaginal or urethral discharge in a sterile container
- **Sterile swabs may be used to collect the discharge**: Charcoal impregnated swabs are used for suspected gonococcal infection
- Fluid from the vesicles (genital herpes)

Microscopy

- **Wet mount examination:** vaginal discharge

- Trichomoniasis: Pus cells along with motile trophozoites

- Candidiasis: Yeast cells along with pseudohyphae

- **Gram-stained smear**

- Bacterial vaginosis—clue cells (vaginal epithelial cells studded with gram variable pleomorphic coccobacilli) → *Gardnerella vaginalis*

- Gonorrhea—intracellular kidney-shaped diplococci

- Candidiasis—gram-positive budding yeast cells along with pseudohyphae

Microscopy

- **Giemsa stain**
- *Klebsiella granulomatis* - Donovan's bodies
- *Chlamydia trachomatis* - inclusion bodies
- **Dark field microscopy and silver impregnation -** in syphilis - spirally coiled bacilli

Culture

- Specimens are inoculated onto the appropriate culture media/cell line:
- Thayer-Martin medium—for *N. gonorrhoeae*
- Chocolate agar added with isovitalex and vancomycin— for *H. ducreyi*
- McCoy cell line—for *Chlamydia trachomatis*
- Sabouraud's dextrose agar (SDA)—for *Candida* species
- Vero cells, monkey kidney cell line - herpes simplex virus.

Serology

- VDRL or RPR test -syphilis
- **Molecular Test**
- Multiplex PCR and real-time PCR

- *C. trachomatis* (opacity protein gene or 16s or 23s rRNA)
- *Gonorrhoeae* (16s or 23s rRNA gene)
- *T. pallidum* (47 kDa *tpp* gene or *polA* gene)
- *H. ducreyi* (16s rRNA) and HSV (*TSK3 gene*)

Treatment - Urethritis

- Ceftriaxone + Azithromycin - ensure cure and prevent further development of resistance
- Ceftriaxone - act against gonococcus
- Azithromycin - *C. trachomatis*
- Treatment to both the sexual partners

Congenital infections

Congenital infections

- Infection that crosses placenta to infect the fetus
- Often lead to defects in fetal development or even death
- **TORCH**

- Toxoplasmosis
- Other infections (congenital syphilis, hepatitis B, Coxsackie virus, Epstein-Barr virus, varicella-zoster virus, *Plasmodium falciparum and human parvovirus)*
- Rubella
- Cytomegalovirus (CMV)
- Herpes simplex virus

Perinatal Infections (During Delivery)

- Occur while the baby moves through an infected birth canal
- Usually caused by the agents of STIs or fecal contamination

- Cytomegalovirus
- *Neisseria gonorrhoeae*
- *Chlamydia species*
- Herpes simplex virus
- Human papilloma virus (genital warts)
- Group B streptococci

Postnatal Infections (After Delivery)

- Spread from mother to baby following delivery, usually during breastfeeding

- CMV
- HIV
- Group B streptococci

Eye infections

Eye infections

- **Infections involving external structures of the eyes:** eyelid (blepharitis), conjunctiva (conjunctivitis), cornea (keratitis) & sclera (scleritis)
- **Infections involving internal structures:** Retina (retinitis), uvea (uveitis) and aqueous humor or vitreous humor (endophthalmitis)

Causative agents of Ocular infections

Infections	Organisms
Blepharitis (Infection of eyelids)	*Staphylococcus aureus*
Conjunctivitis (Infection of conjunctiva)	*Haemophilus influenzae* *Staphylococcus aureus* *Chlamydia trachomatis* *Neisseria gonorrhoeae* *Moraxella lacunata* (angular conjunctivitis) Adenovirus, Herpes simplex virus
Keratitis (Infection of cornea)	*Staphylococcus aureus* *Streptococcus pneumoniae*

Causative agents of Ocular infections

Infections	Organisms
Scleritis (Infection of sclera)	*Staphylococcus aureus*
Chorioretinitis and uveitis (Infection of choroid, retina, and uvea)	*Mycobacterium tuberculosis* *Treponema pallidum* *Borrelia burgdorferi* Cytomegalovirus *Toxoplasma gondii*
Endophthalmitis (Infection of aqueous humor or vitreous humor)	*Staphylococcus aureus* *Streptococcus pneumoniae* *Pseudomonas aeruginosa*

EAR INFECTIONS

EAR INFECTIONS

- **Otitis externa**: Inflammation, irritation, or infection of the outer ear and ear canal
- **Symptoms** –

- Itchy ear canal
- Discharge/ pus in ear canal
- Earache that is aggravated when the ear lobe is pulled

Agents causing otitis externa

- **Acute otitis externa**
- *Staphylococcus aureus (MC), Streptococcus pyogenes*
- *Pseudomonas (malignant otitis externa),* Other GNB
- *Aspergillus species, Candida species*
- **Chronic otitis externa:** Anaerobes (most common), *Pseudomonas*

Otitis media

- Infections of middle ear
- Earache and ear discharge
- Usually begins as sore throat, cold or respiratory problem → spread to the middle ear
- **Symptoms** : Intense earache, headache, fever and nausea

- Leaking of discharge from ear → rupture of tympanic membrane

Organisms causing otitis media

- **Acute otitis media**
- *Streptococcus pneumoniae: MC, (33%, in children)*
- *Haemophilus influenzae type b (second MC)*
- *Moraxella catarrhalis*
- *Streptococcus pyogenes*
- Respiratory syncytial virus
- Influenza virus
- **Chronic otitis media -** Anaerobes (MC)

Quick Assessment

- **Which of the following sexually transmitted infection produces painful genital ulcers and painful lymph nodes?**

a. Syphilis

b. Chancroid

c. Herpes

d. Donovanosis

- **The agent of malignant otitis externa is:**

a. *Staphylococcus aureus*

b. *Pseudomonas species*

c. *Streptococcus pyogenes*

d. *Candida species*

Thank you....!