Leptospirosis :- CA: leptospira interrogans ~~or L. biflexa~~
aka Weil's Disease :-

Pathogenesis :-

1) Mode of transmission :- (1) Indirect contact with water, moist soil & wet surfaces contaminated with animal urine or
2) Direct contact :- urine & products of parturition placenta of injected animals.
3) Source :- Rats, dogs, cattle & pig.
4) Seasonality - Rainy
5) Risk factors :- lower socioeconomic status urban & rural slum areas Rainfall & floods

☆ PATHOGENESIS :-

1. Septicemic phase :- After entering through mucosa or abraded skin → L. interrogans spill bloodstream & disseminate into brain, liver, lung, heart & kidney.
   - Vascular damage :- penetration & invasion of tissue is due to active motility & release of hyaluronidase.
2. Immune phase :- As Abs develop, spirochetes disappear from blood.
   - Renal Colonization :- Bacilli + proximal renal tubular brush border & excreted in urine

CLF - ✱ IP : 10 (1-30 days)

1) Mild anicteric febrile illness :- 90%. ; biphasic, flu like illness
2) Weil's ds :- (Hepatorenal hemorrhagic syndrome) Severe form of icteric illness ⇓ 10%.

☆ Lab Diagnosis :-

- CSF & blood (in first 10 days)
- Urine (10-30 days of infectn)

MICROSCOPY :-

Wet-film :- highly motile, spiking & translational movements

Staining :- Silver Impregnation

CULTURE & ISOLATION :-

30°C, 4-6 weeks

Media :- EMJH liquid medium
Korthoff's
Fletcher's semisolid

SEROLOGY :-

1. ELISA
2. Lepto dipstick assay
3. Immunochromatographic test (ICT)

SEROVAR SPECIFIC :-

Microscopic Agglutination Test (MAT)
↳ gold standard

Rx :- Oral Doxycycline (100mg BD) - 1 week

~~~ X ~~~ X ~~~ X ~~~

Classifictn of Streptococci

O_2 requirement

- Aerobes + facultative anaerobes → Hemolysis
  - α
    - Viridan streptococci
    - pneumococcus
  - β hemolytic streptococci → 20 Serogroups → Group A : Strep. Pyogenes → >150 M serotypes, > 200 emm genes
  - γ Enterococcus
- Obligate Anaerobes
~~~

Helicobacter pylori :-

curved, gram negative rod

Pathogenesis :

Motility - highly motile

Acid resistance - urease enzyme catalyze urea → ammonia → buffers the gastric acid.

Amidase & arginase

Adhesins : Blood group Ag-binding adhesins.

Resistance to oxidative stress :-

Molecular Mimicry :- LPS of H. pylori is identical to lewis blood group Ag expressed on gastric parietal cell → Immune tolerance

Induction of auto Ab — Contributing to the development of chronic gastritis

Alteration in gastric mucus :- LPS inhibits glycosylation & sulfation of gastric mucus

Lab Diagnosis

Invasive

Endoscopy guided multiple biopsies can be taken from gastric mucosa

HP : WARTHIN STARRY SILVER staining

Gramstaining - Curved -ve bacilli seagull shaped morphology

Culture :-

SKIRROWS MEDIA & CHOCOLATE AGAR

Biopsy urease test

Non-invasive tests

1.) Urea breath test (best, consistent, accurate, scientific quick & simple)

2.) Fecal Antigen Assay

3.) Ab detection by ELISA

Rx :- OBTM quadruple therapy

Omeprazole

Bismuth subsalicylate

Metronidazole

Tetracycline

OAM or OCA :-

Omeprazole

Clarithromycin

Metronidazole

Diff. b/w Amoebic & Bacillary Dysentery

	Amoebic	Bacillary
Patho:-		
Ulcer	Deep	Shallow
Margin	Raised & undermined	uniform
Intervening mucosa	normal	Inflamed
Cellular response	mononuclear	polymorphonuclear
Macro:-		
No. of motn:	6-10/day	>10/day
Amount	copious	small
Color	chocolate	bright red
Odor	offensive	odorless
Rxn →	Acidic	Alkaline
Consist	Not adherent to container	Adherent to container
Micro:-		
RBC	clumps	discrete
pus	few	numerous
mucus	few	numerous
Cysts	+	−
Charcot leyden crystals	+	−
Pyruvate kinase body	+	−
Org.	E. histolytica	Shigella

Lab Diagnosis of E. histolytica :-

Specimen:- Stool - 3 stool alternate days over 10 days because amoebae are shed intermittently

Stool microscopy:-

1) Stool concentration - formalin ether sedimentation method

2) Staining - Trichrome stain or hematoxylin stain

3) Culture methods:-

Polyxenic culture methods

↓

Bacterial supplements such as NIH media & Boeck & Drbohlav egg serum media

Axenic culture media:- (lacks bacterial supplement) eg- Diamond's medium

4.) Stool Antigen Detection (Coproantigen)

⇒ ELISA detecting 170 kDa lectin Ag

→ ICT : Triage parasite panel :-
- Giardia lamblia
- E. histolytica
- Cryptosporidium parvum

5.) Molecular Diagnosis:-
- Nested multiplex PCR
- Real-time PCR
- Biofire film assay

Diarrheagenic E.coli :- 6

1. Enteropathogenic Ecoli → Infantile diarrhea
   Person - to - person spread is seen.
   Non - toxigenic & non-invasive

Mech :- Adhesion to intestinal mucosa mediated by plasmid coded bundle forming pili, which form cup like projections called pedestals.
A/E lesion :- disruption of epithelium
↓
↑ secretion & watery diarrhea

2. Enterotoxigenic E.coli → traveler's diarrhea
   ↳ toxigenic but not invasive ⇒ A/E watery diarrhea

Pathogenesis of ETEC :-
- Attachment to intestinal mucosa :- CFA + colonization factor Ag
- Toxin production - heat labile toxin (↑cAMP) / heat stable (↑cGMP)

3. Entero Invasive E.coli (EIEC)
   ↳ not toxigenic but invasive,
Invasion mediated by :- Virulence marker antigen (VMA)
Dysentery
⇒ Non motile & non-lactose fermenters

4) Entero hemorrhagic E.coli (EHEC)
Transmission :- contaminated food
Low infective dose < 10^2 bacilli
Pathogenesis :- Verocytotonic or Shiga toxin ↓
inhibiting the protein synthesis by inhibiting 60S ribosome
Manifestations :-
1) hemorrhagic colitis :- green bloody diarrhea, abdominal pain, leukocytosis but no fever.
2) hemorrhagic uremic syndrome :-
injury to small vessels of kidney & brain ⇓
Bloody diarrhea, thrombocytopenia renal failure & encephalopathy but no fever
Diagnosis :- Sorbitol Mac Conkey Agar & Rainbow agar
Toxin detection :- demonstration of cytotonicity in Vero cell lines (gold standard method)

5-) Entero aggregative :-
Pathogenesis :- Colonization mediated by aggregative adherence fimbriae I + EAST toxin

6) Diffusely adherent E.coli :-
Ability to adhere to HEp2 cells (diffuse)

Halophilic Vibrios

- Cannot grow in the absence of salt.
- tolerate and grow in higher salt concentration upto 7-10%.

Examples :- V. parahaemolyticus
V. alginolyticus
V. vulnificus

ROTAVIRUS DIARRHEA :-

Viruses causing gastroenteritis :-
RACANS

1. Rotavirus
2. Calcivirus
3. Norovirus
4. Saporivirus
5. Astrovirus
6. Adenovirus

Morphology

Size : 60-80nm, icosahedral symmetry
triple layered wheel shaped capsid
dsRNA

- Protein :- Six structural viral proteins (V_1 - V_7 except V_5) & six non-structural proteins (NSP_1-6)

VP6 - group specific

Pathogenesis :-

Transmission :- feco-oral route

1. destroy enterocytes of small intestine
2. multiply in the cytoplasm of enterocytes & damage their transport mechanism → secretory diarrhea
3. NSP-4 (enterotoxin) induces secretion by altering epithelial cell function & permeability

C/F :- IP = 1-3 days
vomiting, watery diarrhea, fever & abdominal pain

Lab Diagnosis

1) Direct detection of viruses - feces collected early in the illness - ideal specimen

- Immunoelectron microscopy :- Rotaviruses have a sharp triple shelled capsid : look like spokes grouped around the hub of a wheel
- Detecting viral Ag :- ELISA & LAM.
- RT-PCR

VACCINES :-

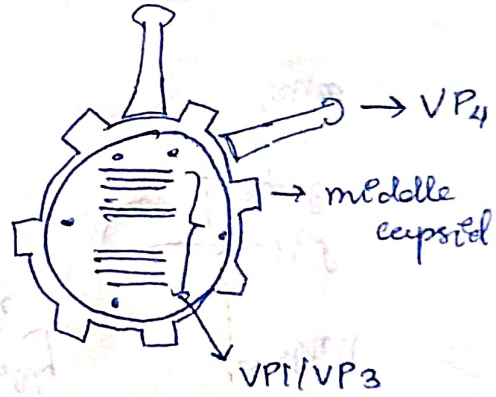
1) ROTAVAC :-

⇒ Live attenuated Rotavirus 116E (G9P(11) strain)
Manufactured by - Bharat biotech

- 3 doses (Schedule) :- orally
- 6, 10, 14 weeks along with DPT & OPV

Side effect - vomiting, irritability

2.) ROTARIX - live attenuated G1P(8) strain) : G3, G4, G9
2 doses : 1st at 6 week
2nd - 4 weeks later



Enterobius vermicularis / Pin worm :-

Large intestinal parasite (nematode)

Pathogenesis & CIF :-

- Most cardinal :- PERIANAL PRURITIS - gets worse at night due to nocturnal migration of female worms.

Repeated scratching → contaminated fingers → autoinfection

Abdominal pain & weight loss in heavy infects.

LAB DIAGNOSIS :-

Microscopy of perianal samples : detects characteristic eggs

1) Cellophane tape - is applied to perianal region and tape is mounted with a drop of saline.

2) NIH swab :- glass rod attached to cellophane tape by a rubber band. Cellophane part of glass rod is rolled over the perineal & perianal skin to collect sample.

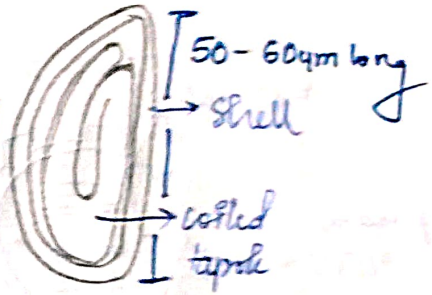
Infective form → embryonated eggs

No. of specimens :- 4-6 consecutive tapes as female worms migrate intermittently.

Timing :- chance of egg depositing
- late evening
- early morning

Eggs :-

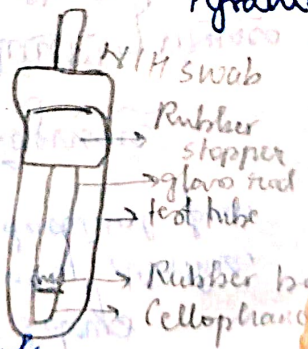
⇒ Planoconvex, 50-60 µm long embryonated egg when freshly passed contains a tadpole shaped larva inside.



⇒ non-bile stained colorless in saline mount

⇒ floats in saturated salt solution

Rx :- Mebendazole
Albendazole
Pyrantel Palmoate



Complications : Rarely, pinworms migrate to FGT, vulvovaginitis pelvic or peritoneal granuloma

HYATID DISEASE aka ECHINOCOCCOSIS :- CYSTIC

- Causative Agent :- Echinococcus granulosus (dog tapeworm)
- Pathogenic form :- Larvae - HYATID CYST - produces cystic lesions in liver & other viscera of man.
- Infective form :- Eggs - embryo with 6 hooklets surrounded by an embryophore.
- Host :- definitive - dogs
  Intermediate - sheep
  Man - accidental intermediate host

Pathogenicity :-

In the duodenum, embryo is released penetrates intestinal wall → PORTAL TRIAD → liver

⇒ hydatid cyst - fluid filled bladder like cyst.

HYATID CYST :- 5-8 cm

Cyst wall → outer pericyst (host derived)
→ middle ectocyst
→ inner endocyst

Brood capsule :- Innerside of endocyst gives rise to brood capsule which contains a no. of protoscolices.

Hydatid fluid - clear, pale, yellow fluid. antigenic, toxic & anaphylactic

C/F :- Infection occurs in childhood but manifests in adult life.

- Cyst :- liver (60-70 %) 5-10 cm
  lung (20 %)
  kidney, muscle, spleen, soft tissue, brain, bone

Symptoms :-

1) Pressure effect - palpable abdominal mass, hepatomegaly, abdominal tenderness, portal HTN & ascites.
2) Obstruction - Cholestasis Cholangitis, dyspnea
3.) pyogenic abscess
4) Anaphylactic Rxns.

Fate - 1) Spontaneous resolution
2) Rupture of cyst → forming 2° cyst & anaphylactic Rxns

Laboratory Diagnosis :-

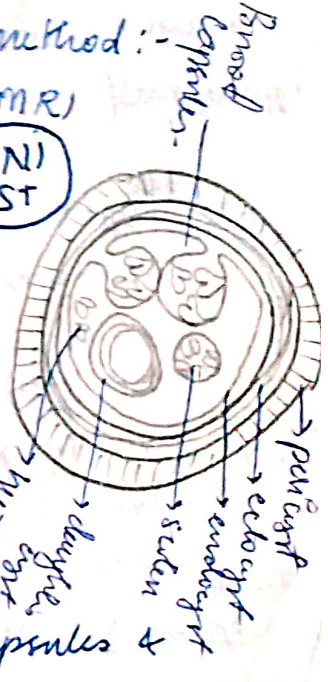
1.) Hydatid fluid microscopy :- fluid aspirated from a surgically removed cyst is subjected to direct microscopy & acid fast staining. → detects - brood capsules & protoscolices

2) Histological Examination :- cyst → H&E stain three layers of cyst wall & attached Brood capsule.

3.) Antibody detection - i) ELISA
2) DIGFA (dot Immunogold filtration assay) ↓ ⊖ Western Blot

4.) Imaging method :- USG, CT, MRI

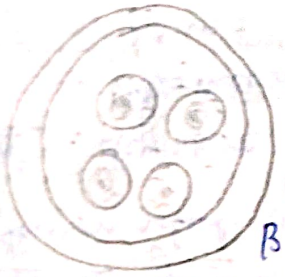
CASONI TEST



Entamoeba Histolytica Cyst:-

Quadrinucleated cysts

- Internal structure of the cyst is appreciated by iodine mount.
- Cyst appear round, 12-15um in size containing (1-4 nuclei)
- Both mature cysts (contain 4 nuclei) & immature cysts (contain 1 or 2 nuclei) are found in stool.
- Cytoplasm of uninucleated cyst contains fibrillar bodies and a large glycogen mass



2) Iron urine :- 0.1 mg/L

⇒

Diphtheria

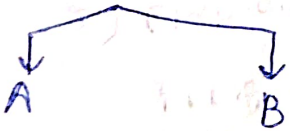
highly infectious childhood disease

CA: Corynebacterium diphtheriae gram positive, non sporing, non capsulated, non-motile bacilli ⇒ club shaped.

1.) Chinese letter or cuneiform arrangement ⇒ snapping division

2.) Metachromatic granules.
↓
polymetaphosphates.
(stain - albert's, Neisser's, Ponder's)

Virulence factors Diphtheria toxin



A
- ADP ribosylation of EF-2 ↓ inhibition
- EF 2 ↓ inhibiting translation

B
- binds to host helps in entry of A

Factors regulating toxin production:-

1) Phage coded: DT is coded by bacteriophage called β corynephage - tox gene

Pathogenesis & CLF:-

Diphtheria is toxemia

Resp. Diphtheria :- faucial diphtheria - diphtheria toxin
↓
Inflammatory response
↓
necrosis of epithelium & exudate formation
⇒ pseudomembrane coat
- Inner band of fibrin
- Surrounded by neutrophils, RBCs & bacteria -

Bull's neck appearance :-
massive submandibular swelling and neck edema.

Patients ⊕ with foul breath, thick speech & stridor

Cutaneous Diphtheria -
punched out ulcerative lesion.

Systemic Complications

1) Cranial nr. involvement
Peripheral neuropathy
Ciliary paralysis

2) Myocarditis, arrhythmias