LEPTOSPIRROSIS
MICROBIOLOGY

• Common in tropical countries

• Spread by rats

• 2 Species
  L- Interrogans
    Pathogenic
  L-Biflexa
    Non pathogenic

• Rigid spiral organisms with one or both ends hooked-
  Cork screw movement
ENVIRONMENT

Favorable conditions:

• Optimum temperature - 28° to 32°C

• Water – unpolluted, non saline

• pH 6.2 to 8

• Rain fall
OCCUPATIONS AT RISK

• Agriculture
• Live stalk handling
• Poultry
• Veterinary
• Underground sewers
• Rodent controllers
ENVIRONMENT POLLUTION

- Inadequate drainage
- Insufficient garbage disposal
- Stay dog, cattle, pig, rodents & pets
- Bare foot walking,
- Contaminated over head tank
- Swimming, hunting and boating
TRANSMISSION

- Through abrasion in skin, intact mucous membrane
- Ingestion
- Inhalation
- Transplacental infection of fetus in-utero
- Laboratory accidents
- Rarely- via animal bites and directly from person to person
PATHOGENESIS

• Initial septicemic phase: 3 to 7 days, presence of leptospirosis in blood, CSF, etc. Influenza like symptoms.

• Immune phase: 1 to 4 weeks - Appearance of antibodies, Disappearance of organisms except kidney, urine & aqueous humor.
MECHANISMS

• Direct bacterial invasion
• Bacterial migration
• Enzymes, metabolites, toxins
• Hyaluranidase - bacterial penetration
• Cytotoxic factor - vascular endothelial damage
• Hemolysin - hemolysis
• Vi antigen - virulence & serum resistance
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MECHANISMS - CONT..

Immunological reaction

• Appearance of IgM followed by IgG
• Effective in clearing organisms but also induce inflammatory reactions

Non specific inflammatory factors

• Hypovolaemia
• Hyperviscosity
• Intravascular coagulation
Capillary stasis & anoxia

\[ \text{Increased blood viscosity} \]
\[ \text{Increased capillary permeability} \]

\[ \text{Hemoconcentration} \]
CLINICAL FEATURES

• Acute febrile infection from vasculitis
• Hallmark- extreme variability of Clinical features
• Non specific signs & symptoms- 70%
• Meningitis- 20%
• Hepato renal dysfunction- 10%
• Incubation period 7 to 12 days
• Onset- sudden : Anicteric & Icteric
ANICTERIC LEPTOSPIROSIS

Initial septicaemic phase – 3 to 7 days

• Fever, chills, headache, malaise, vomiting

• Myalgia, abdominal pain

• Less common- epistaxis, chest pain, hemoptysis, confusion, delirium

• O/E: Extreme muscle tenderness, conjunctival suffusion, hepatosplenomegaly cutaneous rash & pre tibial erythema
**ICTERIC LEPTOSPIROSIS- HEPATIC**

- Also called as Weil syndrome.
- Less common < 10% of cases
- Hepatic & renal dysfunction
- Hemorrhagic & cardio vascular collapse
- **O/E:** Hepatic tenderness, jaundice - 4 to 6 days after onset
- **Investigation:**
  - Increased bilirubin & CPK
  - Increased ALP & mild increase of transaminases
  - Abnormal ECG
  - Transient thrombocytopenia
OTHER SYSTEM INVOLVEMENT

• Renal
  Hematuria, proteinuria, casts
  Features of azotemia
  Non oliguric acute renal failure (in 16-40% of cases)
  Increased renal parameters

• Hemorrhagic
  epistaxis, hemoptysis, hematemesis & malena
  Internal bleeding
OTHER SYSTEMS – CONT..

• CVS – Cardiomegaly, cardiac failure, arrhythmia, hemorrhagic myocarditis

• Eye- conjunctivitis, uveitis, choreo-retinitis

• RS- ARDS, Bronchopneumonia, hemorrhagic alveolitis

• CNS- Myalgia, aseptic meningitis, encephalitis, seizures, cranial nerve palsy, hemiparesis

• Mortality – 5-15%
Differential Diagnosis

- Viral fever
- Malaria
- Enteric fever
- Viral hepatitis
- Septicemia
- Acute cholangitis
DIAGNOSIS

- Definite diagnosis of Leptospirosis is based on serology or by isolation of organism
- Isolation by culture is the Gold standard
- Positive dark field microscopy is not confirmatory
- Culture takes 4 to 8 weeks, growth can take up to 8 weeks.
- Serology is the mainstay in diagnosis
DEFINITE DIAGNOSIS

• Suggestive CF & positive culture or Increase titer of MAT or IgM ELISA

• Or MAT > 1/800
PROBABLE DIAGNOSIS

• Suggestive CF + high initial MAT > 1/200

• Or Persistent high MAT > 1/100

• Or Leptodipstick > 2+

• Or PSAT > 2+

• Review diagnosis if response is not satisfactory
INVESTIGATIONS

• Microscopy
  – Rapid inexpensive
  – Presumptive diagnosis
  – False +ve or false –ve

• Culture- Blood, CSF – first 1 to 10 days
  Urine – after 2\textsuperscript{nd} week

• Animal inoculation- Guinea pig
**SEROLOGY**

- **MAT**- gold standard +ve after 7 days, peaks 3 to 4 weeks, persist for 3 to 4 months after recovery, false +ve or –ve
- **PSAT**–Serological genus specific test using a nonpathogenic patoc strain, Agglutination test, false +ve or –ve Read as 1+, 2+, 3+, etc
- **DRIDOT Assay**- Latex agglutination test, based on binding of leptospiral antibodies present in serum sample causing fine granular agglutination Read within 30 seconds
- **IGM ELISA** to detect IGM antibodies against leptospirosis using nonpathogenic broadly reacting antigen
INVESTIGATIONS - CONT.

• L eptodisc assay- Rapid method- IgM antibodies in serum- takes 3 hrs
• Latex flow test- to detect IGM Ab- Result within 10 min
• Newer methods
  • PCR
  • Nucleic acid probe
  • Bio typing
TREATMENT - SPECIFIC THERAPY

- Early diagnosis & prompt institution of antimicrobial therapy
- Within 7 days from the onset of illness
- To be started before the endothelial injury & immune phase
DRUG OF CHOICE

• Inj. Benzyl penicillin 6-8 million U/m²/day IV, Q4-6 to 7 days

• Alternatively > 8 years Doxycycline oral/IV 5mg/kg/day in 2 divided doses for 7 days

• Erythromycin 50mg/kg/day in 4 divided doses oral/IV for 7 days

• Other drugs: Amoxy+ Clav, Ampicillin, Cefuroxime, Ceftriaxone, Cefixime
MANAGEMENT OF COMPLICATIONS

- Hypovolemia
- Hypotension
- Shock
- Renal azotemia
- Fluid & electrolyte balance
- Aseptic meningitis
FAILURE OF TREATMENT

- Delay in diagnosis & initiation of therapy
- Inadequate dose of antibiotic for inadequate duration
- Lack of supportive care
- Revision of diagnosis
PROGNOSIS

• Depends on complications, time of diagnosis & initiation of microbial therapy

• Supportive care
PREVENTION

• Rodent control measures

• Protection of water sources

• Proper disposal of wastage

• Adequate sanitation & drainage

• Avoidance of bare foot walking
PREVENTION

• Vaccination of cattle

• Personal protection of high risk occupation groups with protective foot ware, aprons, etc.

• Health education

• Doxycycline 200mg PO once a week for travelers to endemic areas
Thank You