Many viruses cause Hepatitis, .. of these five are commonly describe as Hepatitis V.

1. Hepatitis (A) viruses (HAV)
2. Hepatitis (B) viruses (HBV)
3. Hepatitis (D) viruses (HDV)
4. Hepatitis (E) viruses (HEV)
5. Hepatitis (C) viruses (HCV)

Other Viruses e.g.

- Epstein Bar virus (EBV)
- Cytomegalo virus (CMV)

Causes inflammation of the liver but not called Hepatitis Viruses

Yellow fever Viruses
Hepatitis A virus (HAV)

Replication
- Similar that of Enterovirus and poliovirus

Transmission of epidemiology
- HAV unlike HBV, it is rarely transmitted via blood because Level of viraemia is low
- Transmitted by fecooral route
  - V. appear in faces 2 weeks before appearance of symptoms

Cause Hepatitis A disease
- Chronic infection does not occur.
- Children are most frequently infected group
- V. appear in faces 2 weeks before appearance of symptoms

The virus has following properties
- Replication in cytoplasm of the host cell
  - SS+RNA
  - Icosahedra
  - Non Enveloped

V. belong to Atypical Enteroviruses classified in picornaviridae virus family also called heparna virus or Enterovirus 72
Pathogenicity & immunity

Pathogenicity is not completely understood

No CPE in tissue culture infected by HAV

There is no chronic infection

Hepatitis caused by different viruses that cannot be distinguished pathologically

IgM antibodies early detected at the first time of jaundice

Then IgG remain & produce for long time

HAV. Probably replaced in GIT

Spread via blood

Liver

HAV unlike HBV, there is no evidence that the immune attack on the hepatocytes play a role in pathogenesis

Hepatocyte are infected
Clinical manifestation of hepatitis is same regardless of which hepatitis virus cause. Clinical finding include:

- Fever
- Anorexia
- Nausea
- Vomiting
- Jaundice (short incubation period)
- Most of cases asymptomatic

Lab. dx includes:
- Detection of IgM
- 4fold rise of IgG Ab titer
- Isolation of the virus

Treatment & control:
- No antiviral drugs
- Proper hygiene
- Vaccination (passive immunity, inactivated vaccine)
- Hyper—immune serum

Most cases resolve spontaneously in 2-4 weeks whereas in HBV it 10-12 weeks.
Hepatitis B virus (HBV)

- Disease: Hepatitis B
- Properties:
  - V. belong to family hepadna
  - Within the core there is DNA depended DNA polymerase
  - Icosahedra nucleocapside
  - There is surface or antigen (HBS Ag)

- Enveloped
- Partially ds circular DNA genome
- Under electron microscope, the patient serum reveals three different types of particles with different sizes

1. Long Filamented of 22 nm wide
2. Many 22 nm Spherical
3. Few 42 nm version
Another important Ag

Core Ag (HBC Ag)

HBE Ag (HBE Ag)

HBE Ag indicator of transmissibility

Hepatitis Bs has group surface Ag

A of 2 set of group surface Ag

d or y

w or r

This lead to 4 serotypes

adw

adr

ayw

ayr

Both of them are located in the core but have different In important antigenicity

This is useful in epidemiological study because there are concentrated in certain geographic area
Transmission & epidemiology

The most important mode of Transmission is via blood

Needle stick injuries can transmit the V. indicated that only very small amount of blood in necessary to produce disease as in case of drug users

Enveloped. V. e.g. HBV are more sensitive to environment than non Enveloped VS.

So Enveloped Vs. are more efficiently transmitted by closed (intimate) contact, like sexual contact or blood

while Non Enveloped viruses like HAV are quite stable & they are transmitted well via the environment e.g. fecal, oral, transmission

Very important notice

HBV is found high in area in which high evidence of hepatoma indicated HBV may be tumor human viruses

Because Immunization against HBV lead to reduce of incidence of Hepatoma
Pathogenesis & immunity of HBV

Man get infection through the blood

Infection of hepatocyte cause

Necrosis  Inflammation

Ag — Ab complexes cause some early

Some complication in chronic hepatitis e.g.

Vasculitis
glomerulonephritis

Arthralgia

HBV-DNA are exist primarily as episome in the cytoplasm of persistently infected cells

But small amount of HBV – DNA is integrated into host cell

So high rate of hepatocellular carcinoma occur in chronic carriered

Immune response against viral Ag on infected hepatocyte play a very important role in pathogenesis because

About 10% of patients with HB become chronic carriered of (HBV unlike HAV) patients

Attributed to persistent infection of hepatocytes

Prolonged presence of HBV & HBS Ag in the blood

Immunity long life Immunity mediated Ab against HBV

Some complication in chronic hepatitis e.g.
Clinical finding

HB 1.p

12 – 10 weeks this is more longer than that of HA 3 – 4 weeks

More chronic carrier are asymptomatic but some have chronic hepatitis which lead to liver cirrhosis and death

Many HBV infection are a symptomatic & detected only by presence of HBS Ab

Clinical symptom similar to that of other hepatitis but with HBV

Symptom more sever

Life threatening

Life threatening Symptom more sever
Treatment of prevention of HBV infection

**Treatment**

Alfa interferon is clinical important for Treatment of chronic hepatitis B infection

**Prevention**

either by

1. Hyper immunoglobulin (anti HBS IG) of high titer HBs Ab is used to provide Immediate passive protection to individual sexually contact with HBS Ag person & neonat from infected mothers

2. Vaccination

Page 11

3. Any person with a history of hepatitis (of any type) should not donate blood because NA HB virus may be present

4. All blood for transfusion should be screened for HBS Ag

Or Both of them
Vaccination

In activated Vaccine consisting of HBs — Ag prepare from spherical particles purified from the serum of infected individual was used.

Vaccine contain HBS - Ag produced in yeast by genetic engineering technique.

Both of them is highly effective preventing HB.

This Vaccines mainly use for:

- users of narcotic drugs ( illicit drugs )
- Patient with sexual transmitted disease
- Patient receiving Multiply transfusion blood
- Health care person
  - Dentist
  - Medical staff
  - Lab workers
  - Surgeon
Non – A, Non B Hepatitis viruses

Hepatitis C Viruses (HCV)

Transmission

Via blood

Sexual contact like HBV

Properties

Classified as member of Flaviviruses family

Envelope

SS+ RNA genome

Resembling yellow fever virus

Clinical finding

The ensuring chronic liver disease and predisposition of cellular carcinoma

Resemble HB as far as infection

Treatment and prevention

No vaccine

No specific antiviral drugs but alpha IFN is provide for use in chronic active HCV

No antibodies
Hepatitis D Viruses

It is unusual virus because

Named: delta or defective Delta agent (HDV)

So (HDV) is defective virus because its genome does not carry code for its own envelope protein.

So HD infection can only occur in patients previously infected by HBV since the virus can replicate only in HBV-infected cells.

Transmission:
- Via blood

Genome surrounding by envelope composed of HBS Ag.

Transmission:
- Via blood

Lab dx:
- Detection of HD – Delta Ag - IGM AB

Envelope of HB contains HBS Ag.

SS - RNA circular

It has small RNA genome (SS – circular RNA with no sequence homology to HBV DNA)

Treatment & prevention:
- No vaccine is available
- Neither treatment

Severity:
- Chronic carrier state can occur

Sexual contact like HBV
Hepatitis E virus (HEV) is a member of the calicivirus family with ss+RNA. It is clinically similar to a cut hepatitis A which includes an incubation period of 70–10 days (40 days). The virus has a spherical non-envelope icosahedral particle. It comes in two subtypes: A (Burma subtype) and B (Mexico subtype). HEV is transmitted through the fecooral route and is waterborne, causing hepatitis especially in children. It can be fatal in pregnancy, especially in women. HEV is distributed in developing countries, especially Asia and Africa.
Clinically similar to a cut hepatitis A which include:

- Preictoric period
  - Loss of appetite, B
  - Nausea
  - Vomiting
  - Abnormal pain
  - Diarrhea

- Ictoric period
  - Urine deepness
  - Jaundice appears on skin and sclera within 2 weeks

- Convalescent period
  - Jaundice disappears gradually
  - Liver and spleen function return normal

- Serologically
  - Anti HEIgG
  - Anti HEIgM
  - RT – PCR
  - IF
  - IEM
  - In feces

Prevention
- Best sanitation
- Vaccination

15page