HEPATITIS B

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HISTORY:

• Hepatitis was first described by Hippocrates during the fifth century BC. He was not actually describing hepatitis but epidemic jaundice. It’s now known that epidemic jaundice was most likely caused by the hepatitis virus.

• First documented by Lurmen in 1883 was hepatitis caused by direct inoculation of blood or blood products (hepatitis B), during a smallpox immunization campaign. Thousands of people received smallpox vaccines that were made using human lymph. Weeks to months after receiving the vaccine 15% of the vaccinated developed jaundice, which did not occur in the unvaccinated workers.
During the 20th century there were many “long-inoculation” outbreaks, at risk were described as those who...

- Attended clinics for venereal diseases, diabetes or tuberculosis
- Received a blood transfusion
- Inoculated with mumps or measles convalescent-phase serum
- Military personnel that received the vaccine for yellow fever during WWII.

Yellow fever vaccines just as the smallpox one, contained human serum. A study was done that showed that 97% of those who received the serum containing vaccine had evidence of hepatitis B infection. Only 13% of those who received the vaccine without human serum had evidence of HBV (hepatitis B virus). Confirming that this vaccine was the main cause of this outbreak.
In 1947, Macullum and Bauer proposed the current nomenclature for both hepatitis A and B. Hepatitis B or “homologous serum” hepatitis is transmitted by percutaneous exposure to blood products, with an inoculation period of about 2-6 months.

Macallum and Bauer's observations were confirmed by Kungman and collaborators at Willowbrooke Institute through a series of studies during the 1960s and 1970s.

During the same time of the Willowbrooke studies (1963), Dr. Baruch Blumberg was researching the genetics of disease susceptibility, when he stumbled upon an antigen that could detect hepatitis B (HBV) in the blood.

Two years after discovering the hepatitis B causing antigen, Dr. Blumberg and Dr. Irving Millman invented the hepatitis B vaccine.
EXAMPLE CASE:

• After an extensive search to find a real case example of someone with hepatitis B I came up short. My belief for this is because there is vaccine available for hepatitis B, unlike other diseases. But I gathered enough information to put together a timeline of what someone’s life who has become infected would look like-

• Day One- Patient is infected, possibly through the use of a dirty needle or by sexual contact

• (Patient may not show symptoms for up to six months)

• Day 45- patient begins feeling flu-like symptoms (fever, abdominal pain, fatigue, jaundice, nausea)

• Day 45-48- Symptoms continue, patient seeks medical attention

• Day 49- Doctor assesses patient's condition, runs tests including those on patient's liver.
Day 51 - liver tests come back abnormal, doctor orders new tests focused on hepatitis B, including…
- Hepatitis B surface Antigen (HBsAg), comes back “Positive”
- Hepatitis B surface Antibody (anti-HBs), comes back “Negative” (meaning patient was not vaccinated)
- Hepatitis B core antibody (anti-HBc), comes back “Positive”
- Hepatitis B “e” antibody (anti-HBe), comes back “Positive and High” levels”
- Hepatitis B “e” antigen (HBeAg), comes back “Negative”
- Hepatitis B DNA (HBV DNA), comes back “Positive”

Day 53 - Since patients anti-HBe levels came back at a high level, the doctor is able to conclude the replication has slowed down. Since the HBeAg levels came back negative that also gives the doctor a clue that the patient has acute hepatitis B, and the body is taking care of it.
- Doctor advises patient about chronic Hep. B. and to look for signs of returning symptoms. If symptoms do return patient will be put on antiviral drugs and other medicines that slow down the progression of hepatitis B.
ETIOLOGIC AGENT AND VIRULENCE FACTORS:

General Information regarding Hepatitis B-

• Hepatitis B is a viral infection.
• 42nm partially double stranded DNA.
• 27nm nucleocapsid core, with an outer lipoprotein coat (envelope).
• Round in shape.
• A part of the Hepadnaviridae family.

*Hepadnaviridae: enveloped double stranded virus which causes liver infection.

Virulence Factors-

• Large amounts of surface antigens (HBsAg) will accumulate into non-infectious structures. The main purpose of these structures is to distract the host’s immune system. The immune system will attach to the non-infectious structures and begin fighting them off, this leaves less host defenses to fight off the actual viral infection.
DISEASE DESCRIPTION:

- Hepatitis B has an incubation period of approx. 2-6 months. Symptoms usually occur after the incubation period, but may not happen at all.

Symptoms-
- Fatigue
- Jaundice
- Nausea
- Fever
- Abdominal Pain
- Loss of appetite
- Joint pain

- Once hepatitis B virus enters your body it infects the hepatocytes (liver cells). Your immune system reacts to the virus by targeting those hepatocytes, thus causing the inflammation of the liver.

Hepatitis B comes in two forms: Acute or Chronic-
- In acute hepatitis B, the body’s immune system is able to fight off the infection by itself, which can take up to 6 months. These people usually recover fine, and have no long term effects.
- In chronic hepatitis B, the body’s immune system is not enough to fight off the infection. The virus continues to replicate over months to years. These people often develop severe scarring on the liver (cirrhosis) and eventually liver cancer.
MODE OF TRANSMISSION:

- Hepatitis B surface antigen (HBsAg) is found in basically every bodily fluid of the infected person. But, only the blood (plasma and serum), semen, or vaginal secretions have been found to be infectious.

- Transmission occurs via percutaneous and/or premucosal exposure with or during...
  - Sexual Contact
  - Birth
  - Injection drug use
  - Sharing of razors or toothbrushes
  - Tattoos or piercings (if inadequate sterilization occurs)
  - Medical/Dental procedures (if inadequate sterilization occurs)
DIAGNOSTIC PROCESS:

• Blood tests are performed to detect antigens and their respective antibodies in the patient.

• These tests include:
  • Hepatitis B surface antigen (HBsAg)
  • Hepatitis B surface antibody (anti-HBs)
  • Hepatitis B core antibody (anti-HBc)
  • Hepatitis B “e” antibody (anti-Hbe)
  • Hepatitis B “e” antigen (HBeAg)
  • Hepatitis DNA (HBV DNA)

• Levels of each different test can help doctors conclude if they are dealing with either acute or chronic hepatitis B.
METHODS OF PREVENTION AND TREATMENT:

• The best way to protect yourself against hepatitis B is to get vaccinated!

• If you’re not vaccinated you can still help prevent becoming infected by…
  • Using condoms with all sexual partners
  • Do not use other peoples razors or tooth brushes
  • Cover up open cuts with band aids
  • Do not share injection needles with others.

• (Treatments vary depending on if you’re diagnosed with acute or chronic hepatitis B.)

• Treatment for chronic hepatitis include…
  • Antiviral drugs
  • Lamivudine
  • Adefovir
  • Entecavir
  • Tenofovir
  • Telbivudine

• Currently, there is not much treatment for acute hepatitis B, as the body is doing the treatment itself.
**NUMBER OF CASES (YEARLY):**

United States-
- 2,895 new cases in 2012 (Acute Hepatitis B)
- A 2006 data report by the CDC estimated there are between 800,000 and 1.4 million people living with chronic hepatitis B in the US. It was later determined that the real number could be almost double their 2006 estimate, coming in at 2.2 million.

Oregon-
- 25 new cases in 2012 (Acute hepatitis B)
- The chronic hepatitis B rate per 100,000 in Yamhill County is between 1.98-4.68
- In a 2006 survey, it was found that men age 30-39 were of the most infected by chronic hepatitis B.
IMPORTANCE OF HEPATITIS B:

• As with the case with most diseases that we can now vaccinate for, hepatitis is becoming less of an issue than back in the 1950s when little was known about it. The vaccine (as with most vaccines) is an incredible thing, with helping keep cases of hepatitis down.

• But as we see a decline in vaccination rates, especially here in Oregon, hepatitis could soon be problematic once again, luckily we have developed better ways to manage chronic hepatitis.

• As for preventing more cases, there have been many controversial movements. Such as one where churches began passing out sterilized needles to the homeless population, in the hopes of cutting down on blood to blood infections.

• As with most preventable illnesses the most important tool we can offer people is education. Teaching more people about what hepatitis is, how it’s spread, how they can prevent it and to seek medical attention if they think they’re at risk.
REFERENCES


McMahon, Brian J. (2009). The Natural History of Chronic Hepatitis B Virus Infection. Perelman School of Medicine, S45-S55.
