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PHARMACOLOGY

ANA 202

◆Why do we have the portal vein or liver receiving more blood from the vein than it receive from the artery?

In the hepatic portal system, the liver receives a dual blood supply from the hepatic portal vein and hepatic arteries. The hepatic portal vein carries venous blood drained from the spleen, gastrointestinal tract and its associated organs; it supplies approximately 75% of the liver's blood. The hepatic arteries supply arterial blood to the liver and account for the remainder of its blood flow.

Oxygen is provided from both sources; approximately half of the liver's oxygen demand is met by the hepatic portal vein, and half is met by the hepatic arteries. Blood flows through the liver tissue and empties into the central vein of each lobule. The central veins coalesce into hepatic veins that collect the blood leaving the liver and bring it to the heart.



HEPATITIS B

Hepatitis B is a liver infection caused by the hepatitis B virus (HBV). HBV is one of five types of viral hepatitis. The others are hepatitis A, C, D, and E. Each is a different type of virus, and types B and C are most likely to become chronic

Hepatitis B can be acute (short-term) or chronic (long-term). It's spread through bodily fluids, such as blood and semen. While hepatitis B is treatable, there's no cure for it. Early treatment is key to avoiding complications, so it's best to get regular screenings if you're at risk.

Symptoms

- Jaundice.- Your skin or the whites of the eyes turn yellow, and your pee turns brown or orange.)
- Light-colored poop
- Fever
- Fatigue that persists for weeks or months
- Stomach trouble like loss of appetite, nausea, and vomiting
- Belly pain
- Dark urine
- Abdominal discomfort

Causes

It's caused by the hepatitis B virus.

Transmission of hepatitis B

- Sex.** You can get it if you have unprotected sex with someone who has it and your partner's blood, saliva, semen, or vaginal secretions enter your body.
- Sharing needles.** The virus spreads easily via needles and syringes contaminated with infected blood.
- Accidental needle sticks.** Health care workers and anyone else who comes in contact with human blood can get it this way.

•**Mother to child.** Pregnant women with hepatitis B can pass it to their babies during childbirth. But there's a vaccine to prevent newborns from becoming infected.

Treatment

•Entecavir (Baraclude). This is the newest drug for hepatitis B. You can take it as a liquid or tablet.

•Tenofovir (Viread). This drug comes as a powder or tablet. If you take it, your doctor will check often to make sure it doesn't hurt your kidneys.

•Lamivudine (3tc, , Epivir A/F, Epivir HBV, Heptovir). It comes as a liquid or tablet you take once a day. Most people don't have a problem with it. But if you take it for a long time, the virus might stop responding to the drug.

•Adefovir dipivoxil (Hepsera). This drug, which you take as a tablet, works well for people who don't respond to lamivudine. High doses can cause kidney problems.

•Interferon alfa (Intron A, Roferon A, Sylatron). This medicine boosts your immune system. You take it as a shot for at least 6 months. It doesn't cure the disease. It treats liver inflammation. Long-acting interferon, peginterferon alfa2a (Pegasys, Pegasys Proclick) can also help. This drug can make you feel bad all over or depressed, and it can zap your appetite. It also lowers your white blood cell count, which makes it harder to fight off infection

Diagnosis

•**Hepatitis B surface antigen test**

A hepatitis B surface antigen test shows if you're contagious. A positive result means you have hepatitis B and can spread the virus. A negative result means you don't currently have hepatitis B. This test doesn't distinguish between chronic and acute infection. This test is used together with other hepatitis B tests to determine the state of a hepatitis B infection

•**Hepatitis B core antigen test**

The hepatitis B core antigen test shows whether you're currently infected with HBV. Positive results usually mean you have acute or chronic hepatitis B. It may also mean you're recovering from acute hepatitis B.

•**Hepatitis B surface antibody test**

A hepatitis B surface antibody test is used to check for immunity to HBV. A positive test means you are immune to hepatitis B. There are two possible reasons for a positive test. You may have been vaccinated, or you may have recovered from an acute HBV infection and are no longer contagious.

•**Liver function tests**

Liver function tests are important in individuals with hepatitis B or any liver disease. Liver function tests check your blood for the amount of enzymes made by your liver. High levels of liver enzymes indicate a damaged or inflamed liver. These results can also help determine which part of your liver may be functioning abnormally.

If these tests are positive, you might require testing for hepatitis B, C, or other liver infections. Hepatitis B and C viruses are a major cause of liver damage throughout the world. You will likely also require an ultrasound of the liver or other imaging tests.

CIRRHOSIS

Cirrhosis is a late stage of scarring (fibrosis) of the liver caused by many forms of liver diseases

and conditions, such as hepatitis and chronic alcoholism.

Cirrhosis is a complication of liver disease that involves loss of liver cells and irreversible scarring of the liver. Alcohol and viral hepatitis B and C are common causes of cirrhosis, although there are many other causes.

Symptoms

- Fatigue
- Easily bleeding or bruising
- Loss of appetite
- Nausea
- Swelling in your legs, feet or ankles (edema)
- Weight loss
- Itchy skin
- Yellow discoloration in the skin and eyes (jaundice)
- Fluid accumulation in your abdomen (ascites)
- Spiderlike blood vessels on your skin
- Redness in the palms of the hands
- For women, absent or loss of periods not related to menopause
- For men, loss of sex drive, breast enlargement (gynecomastia) or testicular atrophy
- Confusion, drowsiness and slurred speech (hepatic encephalopathy)

Causes

- Chronic alcohol abuse
- Chronic viral hepatitis (hepatitis B, C and D)
- Fat accumulating in the liver (nonalcoholic fatty liver disease)
- Iron buildup in the body (hemochromatosis)
- Cystic fibrosis
- Copper accumulated in the liver (Wilson's disease)
- Poorly formed bile ducts (biliary atresia)
- Alpha-1 antitrypsin deficiency
- Inherited disorders of sugar metabolism (galactosemia or glycogen storage disease)
- Genetic digestive disorder (Alagille syndrome)
- Liver disease caused by your body's immune system (autoimmune hepatitis)
- Destruction of the bile ducts (primary biliary cirrhosis)
- Hardening and scarring of the bile ducts (primary sclerosing cholangitis)
- Infection, such as syphilis or brucellosis
- Medications, including methotrexate or isoniazid

Diagnosis

Diagnosis of cirrhosis can be suggested by history, physical examination and blood tests, and can be confirmed by liver biopsy.

Treatment

- Treatment of cirrhosis is designed to prevent further damage to the liver, treat complications of cirrhosis, and preventing or detecting liver cancer early.
- Transplantation of the liver is an important option for treating patients with advanced cirrhosis.
- There is no cure for cirrhosis of the liver, and for some people the prognosis is poor. The life expectancy for advanced cirrhosis is 6 months to 2 years depending on complications of cirrhosis,

and if no donor is available for liver transplantation The life expectancy for people with cirrhosis and acholic hepatitis can be as high as 50%.

- The life expectancy is more than 12 years for a person with cirrhosis and no major complications.

LIVER CANCER

Primary liver cancer is a condition or disease that happens when normal cells in the liver become abnormal in appearance and behavior. The cancer cells can then become destructive to adjacent normal tissues, and can spread both to other areas of the liver and to organs outside the liver. Liver cancer is also called hepatic cancer.

Malignant or cancerous cells that develop in the normal cells of the liver (hepatocytes) are called hepatocellular carcinoma. A cancer that arises in the ducts of the liver is called cholangiocarcinoma.

Symptoms

- Losing weight without trying
- Loss of appetite
- Upper abdominal pain
- Nausea and vomiting
- General weakness and fatigue
- Abdominal swelling
- Yellow discoloration of your skin and the whites of your eyes (jaundice)
- White, chalky stools

Causes

•**Type 2 diabetes:** People with diabetes, especially if they also have hepatitis or regularly consume a lot of alcohol, are more likely to develop liver cancer.

•**Family history:** If someone's mother, father, brother, or sister has had liver cancer, they have a higher risk of developing the disease themselves.

•**Heavy alcohol use:** Consuming more than six alcoholic drinks every day for an extended period can lead to cirrhosis. This, in turn, increases the risk of liver cancer.

•**Long term exposure to aflatoxins:** A particular fungus creates a substance called aflatoxin. When mold grows on the following crops, it can lead to the presence of aflatoxins:

- wheat
- groundnuts
- corn
- nuts
- soybeans
- peanuts

The risk of liver cancer only increases following long term exposure to aflatoxins. These substances are less of a worry in industrialized nations where manufacturers regularly test for aflatoxins.

•**Low immunity:** People with weakened immune systems, such as those with HIV or AIDS have a risk of liver cancer that is five times greater than other healthy individuals.

•**Obesity:** Being obese raises the risk of developing many cancers. In people who go on to develop liver cancer, obesity can contribute to cirrhosis and fatty liver disease.

- **Gender:** Around three times as many males get liver cancer as females, according to the ACS.
- **Smoking:** Both former and current smokers have a higher risk of liver cancer than people who have never smoked.

Individuals who have a high risk for liver cancer should have regular screenings for liver cancer. They include those with:

- hepatitis B or C
- alcohol related cirrhosis
- cirrhosis due to hemochromatosis, a disorder that involves deposits of iron salts in body tissue

Diagnosis

- **Blood tests:** These include tests for blood clotting, levels of other substances in the blood, and proportions of red and white blood cells and platelets.
- **Viral hepatitis tests:** The doctor will check for hepatitis B and C.
- **Imaging scans:** An MRI or CT scan can provide a clear picture of the size and spread of the cancer.
- **Biopsy:** A surgeon removes a small sample of tumor tissue for analysis. The results can reveal whether the tumor is cancerous or noncancerous.
- **Laparoscopy:** This is an outpatient surgical procedure that takes place under general or local anesthetic. A surgeon inserts a long, flexible tube with a camera attached through a cut in the abdomen. The camera allows the doctor to see the liver and the surrounding area.

NONALCOHOLIC FATTY LIVER DISEASE

Nonalcoholic fatty liver disease (NAFLD) is an umbrella term for a range of liver conditions affecting people who drink little to no alcohol.

Symptoms

- Fatigue
- Pain or discomfort in the upper right abdomen
- Loss of appetite
- weight loss
- weakness
- nosebleeds
- itchy skin
- yellow skin and eyes
- web-like clusters of blood vessels under your skin
- abdominal pain
- abdominal swelling
- swelling of your legs
- breast enlargement in men
- confusion

Causes

- obesity
- high blood sugar
- insulin resistance
- high levels of fat, especially triglycerides, in your blood

- pregnancy
- rapid weight loss
- some types of infections, such as hepatitis C
- side effects from some types of medications, such as methotrexate (Trexall), tamoxifen (Nolvadex), amiodorone (Pacerone), and valproic acid (Depakote)
- exposure to certain toxins

Treatment

•Medicines

There's not currently any medicine that can treat NAFLD, but various medicines can be useful in managing the problems associated with the condition.

For example, your doctor may recommend medicine to treat high blood pressure, treat high cholesterol, treat type 2 diabetes and treat obesity.

•Liver transplant

If you develop severe cirrhosis and your liver stops working properly, you may need to be put on the waiting list for a liver transplant.

For adults, the average waiting time for a liver transplant is 135 days for transplants from recently deceased donors.

Or it may be possible to have a transplant using a section of liver removed from a living donor.

As the liver can regenerate itself, both the transplanted section and the remaining section of the donor's liver are able to regrow to a normal size.

HEPATITIS C

Hepatitis C is a liver disease caused by the hepatitis C virus (HCV): the virus can cause both acute and chronic hepatitis, ranging in severity from a mild illness lasting a few weeks to a serious, lifelong illness.

The hepatitis C virus is a bloodborne virus: the most common modes of infection are through exposure to small quantities of blood. This may happen through injection drug use, unsafe injection practices, unsafe health care, transfusion of unscreened blood and blood products, and sexual practices that lead to exposure to blood.

Symptoms

- Clay-colored poop
- Dark urine
- Fever
- Fatigue
- Jaundice (a condition that causes yellow eyes and skin, as well as dark urine)
- Joint pain
- Loss of appetite
- Nausea
- Stomach pain
- Vomiting

Causes

Hepatitis C infection is caused by the hepatitis C virus (HCV). The infection spreads when blood contaminated with the virus enters the bloodstream of an uninfected person.

Globally, HCV exists in several distinct forms, known as genotypes. Seven distinct HCV genotypes and more than 67 subtypes have been identified. The most common HCV genotype in the United States is type 1.

Although chronic hepatitis C follows a similar course regardless of the genotype of the infecting virus, treatment recommendations vary depending on viral genotype.

Treatment

- Daclatasvir (Daklinza). You'll take this pill once a day along with sofosbuvir for 12 weeks.
- Sofosbuvir-velpatasvir (Epclusa). This daily pill, which you take for 12 weeks, should cure your disease.
- Ledipasvir-sofosbuvir (Harvoni). This once-daily pill cures the disease in most people in 8-12 weeks.
- Glecaprevir and pibrentasvir (Mavyret). This daily pill offers a shorter treatment cycle of 8 weeks for adult patients with all types of HCV who don't have cirrhosis and who haven't already been treated. The treatment is longer for those who are in a different disease stage. The prescribed dosage for this medicine is 3 tablets daily.
- Ribavirin (Copegus, Moderiba, Rebetol, Ribasphere, Virazole). This comes as a tablet, capsule, or liquid. You take it with food twice a day, in the morning and evening, for 24 to 48 weeks or longer.
- Sofosbuvir (Sovaldi) with interferon and ribavirin. Take this tablet at the same time every day with food. You have to take it along with ribavirin and/or interferon, and you'll probably be on it for 12 to 24 weeks.
- Ombitasvir-paritaprevir- ritonavir (Technivie). You'll take this tablet by mouth, possibly along with ribavirin.
- Ombitasvir-paritaprevir-dasabuvir-ritonavir (Viekira Pack). This treatment is a combo of pills: two that you'll take once a day, and one you'll take twice with meals. You'll take it for 12 to 24 weeks.
- Sofosbuvir-velpatasvir-voxilaprevir (Vosevi). This combination is approved to treat adults with chronic HCV, either with no cirrhosis or with compensated cirrhosis (the stage of the disease that doesn't have symptoms), who've already had certain treatments.
- Elbasvir-grazoprevir (Zepatier). This once-daily pill has cured the disease in as many as 97% of those treated.