Pathology

3rd Stage
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Lecture 4

Diseases of the gallbladder and biliary tree

Cholelithiasis (gall stones):More than 95% of biliary tract diseases are due to gallstones. Two main types of gall stones:

- Cholesterol stones (containing crystalline cholesterol monohydrate)
- Pigment stones (bilirubin calcium salts)

* 80% no obvious cause (other than age and gender)

1.Cholesterol stones : arise exclusively in the gall bladder, consist of 50% - 100% cholesterol and are of two types (pure and mixed cholesterol stones)

***Pure cholesterol stones (rare stones)** :are typically single, pale yellow, round stones (radiating crystals of cholesterol on transection)

***Mixed cholesterol stones (commonest type in western countries):** With the increase in the concentration of calcium salts, the stones appear grey-white to black, typically multiple with round or faceted surfaces (laminated when fractured).

Pathogenesis of Cholesterol Stones

1. The bile must be **supersaturated** with cholesterol
2. **hypomotility** of the gallbladder promotes crystal nucleation
3. cholesterol **nucleation** in the bile is accelerated
4. hypersecretion of **mucus** in the gallbladder traps the nucleated crystals, leading to their aggregation into stones

Risk factors of cholesterol gall stones **(6 Fs, female, forty, fertile, fatty, fair and positive family history)**

- Demography (more in western countries)
- Advancing age
- Female sex hormones (female gender, pregnancy and oral contraceptive pills)
- Obesity, insulin resistance and rapid weight reduction
- Gallbladder stasis
- Inborn disorders of bile acid metabolism and dyslipidemia syndromes

2. Pigment stones: can arise anywhere in the biliary tree, are of two types :
a. Black pigment stones: generally associated with chronic hemolysis and cirrhosis, occur in sterile gallbladder bile, are numerous, fragile, brown to jet black in color.

b. Brown pigment stones :due to biliary infections, occur in infected intrahepatic or extrahepatic bile ducts, single or few, brown to green with a **soap**-like consistency.

Pathogenesis of Pigment Stones : due to disorders associated with increased unconjugated bilirubin in bile

- ✓ **Risk factors:**
- ❖ Demography (more in Asian countries)
- ❖ Chronic hemolysis, e.g. sickle cell anemia
- ❖ Biliary infection, e.g. Escherichia coli and liver flukes
- ❖ Gastrointestinal disorders e.g. ileal diseases like Crohn disease or ileal resection or bypass, cystic fibrosis with pancreatic insufficiency
- ❖ Liver cirrhosis

Complications of cholelithiasis

- Inflammation: e.g. Cholecystitis, cholangitis or pancreatitis
- Empyema, mucocele
- Perforation, fistula and gallstone ileus
- Obstructive cholestasis
- Increased risk for gall bladder carcinoma

Cholecystitis: Inflammation of the gallbladder

- ❖ It almost always occurs in association with gallstones
- ❖ Could be : acute , chronic or acute superimposed on chronic

Acute Cholecystitis : Acute inflammation of the gallbladder

- ✓ 90% → due to obstruction of the neck of the gallbladder or cystic duct by a stone
- ✓ 10% → Cholecystitis without gallstones

So acute cholecystitis includes acute calculous and acute acalculous cholecystitis.

1. Acute calculous cholecystitis: Is acute inflammation of gall bladder that contains stone that obstructs the neck of gall bladder or cystic duct**.** It is the **most common major complication of gallstones**

Pathogenesis: It initially results from **chemical irritation and inflammation** of the gallbladder wall due to **obstruction of bile outflow:**

- Stone obstruction causes stasis and concentration of bile within lumen that will damage the mucosa
- Distention of gall bladder and increased intraluminal pressure, that may compromise blood flow (leading to ischemia) and stimulate the release of prostaglandins causing inflammation
- Bacterial infection may occur as a late event

2. Acute acalculous cholecystitis: It represents 5-10% of cases of acute cholecystitis

.The incidence of gangrene and perforation is much higher in acute acalculous cholecystitis than in acute calculous cholecystitis

.Most cases occur in seriously ill patients

.Is thought to result from ischemia and bile stasis (the cystic artery is an end artery without a collateral circulation).

Most common predisposing factors of acute acalculous cholecystitis :

- ☒ Major nonbiliary surgery
- ☒ Sepsis, severe trauma, severe burns
- ☒ Other contributing factors (gall bladder stasis and sludging, vascular compromise and eventually bacterial infection).

Morphology of acute cholecystitis (both types)

Gross

- ❖ Enlarged, bright red to violaceous gall bladder
- ❖ In calculous cholecystitis: stone found in neck of the gallbladder or cystic duct
- ❖ If the exudate is pure pus → indicates empyema of the gallbladder
- ❖ Green-black necrotic organ → indicates gangrenous cholecystitis

Histopathology

Features of acute inflammation (edema , leukocyte infiltration , vascular congestion , abscess and gangrenous necrosis)

Chronic Cholecystitis :occurs following repeated attacks of acute cholecystitis or in the absence of previous attacks**.** It is **almost always** associated with gall stones.

Pathogenesis of chronic cholecystitis

- Supersaturation of bile predisposes to chronic inflammation and stone formation
- 1/3 cases → M.O can be cultured, e.g. E. coli and enterococci
- Unlike acute calculous cholecystitis, obstruction of gallbladder outflow by stones is not requisite in chronic cholecystitis

Thank you