کلیه حقوق مادی و معنوی این اثر متعلق به دانشگاه علوم پزشکی مجازی می‌باشد.
بسم الله الرحمن الرحيم
Gallstone in pediatrics

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• The incidence of gallstones (GS) has been increased recently
Pathophysiology of GS disease

Bile is composed of:
- Water
- Phospholipids
- Bilirubin
- Bile pigments
- Cholesterol
Gallstone formation

This process must have:

- Nucleation
- Supersaturation solution
- Environmental or gallbladder stasis
Consequences of gallstones

- Irritation and inflammation of GB mucosa
  - Chronic calculous cholecystitis
- Obstruction of cystic duct
  - Acute cholecystitis
- Obstruction of CBD
  - Biliary pancreatitis
  - Choledocholithiasis
Classification of GS

- Cholesterol stones
- Pigment stones: Black pigment, Brown pigment
- Mixed stones
- Biliary pseudolithiasis
Appearance of human cholesterol gallstone
• >70% of gallstones (pigment type)

1. **Black pigment** (Ca-bilirubinate and glycoprotein matrix, are a frequent complication of chronic hemolytic anemias: SCA; Thalassemia; WD; cirrhosis)

2. **Brown pigment** stones (Unconjugated bilirubin is the predominant component, -high β-glucuronidase activity of infected bile-mostly in infants as a result of biliary tract infection)
• **15–20% (cholesterol stones):** obese teenager girls; disturbance of EHC-ileal resection, ileal Crohn disease, CF

• **Mixed stones** (a mixture of cholesterol, organic matrix, and calcium bilirubinate.)

• **biliary pseudolithiasis:** (in >40% of children who are treated with ceftriaxone for at least 10 days)
The clinical course of gallstone disease ranges from the
- asymptomatic carrier status
- to uncomplicated symptomatic disease with pain attacks
- and to complicated symptomatic disease including acute cholecystitis, common bile duct stones, pancreatitis, cholangitis, and, rarely, bowel obstruction.
History

Strongly consider in those with:

- Nonspecific intermittent abdominal pain with risk factors
- Jaundice with low grade elevated liver enzyme
Physical examination

- Murphy sign
- Hepatomegaly
- RUQ pain
- Splenomegaly
- Ultrasonographic Murphy sign
Gallstone formation is multifactorial, including a complex interplay of:

- ethnic background
- increasing age
- female gender
- family history or genetics
- obesity
- rapid weight loss and a sedentary lifestyle

Gallstone disease (GD), exhibiting a prevalence of 10–20% in adults. GD is a common indication for surgical intervention in developed countries.
Causes of Gallstones

- CF
- Crohn’s disease
- NEC
- Trauma
- Sepsis
- TPN
- Hemolytic disease
- Abdominal surgery

- Acute renal failure
- Prolonged fasting
- Low calorie diet
- Rapid weight loss
- Obesity
- Wilson disease
- Crohn disease
- **drugs**
Drugs

• Furosemide
• Octreotide
• Cyclosporine
• Tacrolimus
• Ceftriaxone.......>Pseudolithiasis
Differential diagnosis

• Cholecystitis
• Cholestasis
• Pancreatic pseudocyst
• Biliary dyskinesia
Diagnostic work up

- Imaging
- Work up
- Lab test
Imaging

- KUB: small bowel obstruction; perforation (air under diaphragm)
- US: method of choice
- Hepatobiliary scan: for GB dysmotility
- MRCP
- ERCP
Lab. Tests

- Hematologic work up and PBS
- Lipid profile
- Sweat chloride test
- Evaluation of Wilson disease
- AST, ALT, GGT, Bilirubin
Gallstone in Neonates

• Sepsis
• TPN
• Dehydration
• Prolonged use of diuretics
Gallstone in infants

- More in <12 month
- Most of them spontaneous resolution
Treatment

• During the neonatal and infancy:
  • Asymptomatic: Observation
  • Symptomatic (Acute cholecystitis): cholecystectomy
Therapy of the biliary colic

- First line: NSAIDs (ketorolac 30-60 mg or ibuprofen 400mg, diclofenac 75 mg)
- A valid alternative to NSAIDs (meperidine, butorphanol, hydromorphone
  - During acute pain, fasting is necessary

Cholecystectomy

- Elective cholecystectomy is the definitive treatment of “symptomatic and uncomplicated” gallstones
Prophylactic cholecystectomy

- Prophylactic cholecystectomy should be considered in subgroups of gallstone patients bearing a high risk of becoming

Oral litholysis with bile acids

- Reserved for a subgroup of patients who cannot undergo surgery because of overall risk, refuse surgery, or have mild/moderate symptoms to three episodes of biliary pain every month which are control and stones amenable to dissolution
Older children and adolescent:
- Asymptomatic: controversial (?)
- Symptomatic: Cholecystectomy
Acute cholecystitis

Impaction of a stone in the cystic duct => Proliferation of bacteria => Biliary sepsis.

- S/S: fever; RUQ pain; a palpable mass.
- Jaundice (Children > adults)
- Diagnosis by: US (the method of choice); Hepatobiliary scintigraphy
- Marked elevations of the $\text{D.bili}$; ALKP; GGT
- Patients with cholecystitis and persistent fever or concern for obstruction (should be hospitalized and started on antibiotics)
- Cholecystectomy is curative.
Asymptomatic patients with cholelithiasis

1. In patients with chronic hemolysis or ileal disease, cholecystectomy can be carried out at the same time as another surgical procedure.

2. In children with sickle cell disease, elective laparoscopic cholecystectomy at the time of gallstone diagnosis, before symptoms or complications develop.
Complication of gallstones

18% present with a complication:
• acute calculous cholecystitis
• Ascending cholangitis
• Biliary hepatitis,
• pancreatitis,
• choledocholithiasis
• Biliary obstruction
Prevention

• Regular exercise
• Proper body weight management
• Decrease in the consumption of fatty food
• Stone formation occurs owing to the precipitation of the insoluble constituents of bile which are:

1. Cholesterol
2. Bile pigments
3. Ca salts
Gallstones are solid conglomerates of different sizes made of cholesterol crystal, mucin, calcium bilirubinate, and protein, forming inside the gallbladder.

Three types of gallstones develop in the gallbladder and bile ducts, distinguished by their chemical composition:

- Pure cholesterol
- Pure pigment
- Rare stones

In industrial countries cholesterol gallstone account for about 75% for stone, black pigment stone for 20% and brown pigment stone for 5%
Any comment / question?