Postoperative jaundice

Principles of Surgery
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Intro

**Jaundice** is defined as yellow discolouration of the skin, sclera and heavily perfused areas in a patient with hyperbilirubinemia. It can be detected with serum bilirubin levels > 34 \( \mu \text{mol/L} \)

**Incidence** of Postoperative hepatic dysfunction 1% (mild jaundice to hepatic failure) 1

Incidence of abnormal postoperative liver function tests (LFT’s) 25 – 75%. 2

47% of cirrhotic patients develop jaundice after general anaesthesia. 2

**Diagnosing** the cause of postoperative jaundice:

- History
- Physical examination
- Biochemical tests
- Hepatobiliary Imaging
Etiology of postoperative jaundice:
Prehepatic (bilirubin production exceeds excretion)
Hepatocellular insufficiency
Posthepatic (obstruction of bile flow)
Diagnosing the cause of postoperative jaundice:
History
Physical examination
Biochemical tests
Hepatobiliary Imaging
Etiology – Prehepatic

Accounts for a minority of cases of postop jaundice
Present within days after surgery
Jaundice do not develop unless the bilirubin production exceeds three times normal levels
The bilirubin overload is due to
• Hemolysis
• Reabsorption of hematoma

An additional factor is the impaired ability of the liver to excrete the increased loads of bilirubin postoperatively due to fasting, malnutrition, chronic liver disease, hepatotoxic drugs and anaesthesia.

Hemolysis is caused by
• The destruction of fragile transfused red blood cells
• ABO or Rhesus- incompatibility of blood transfusion
• Extracorporeal circulation
• Effects of drugs
• Congenital hemolytic disease ie. sickle cell disease, thalassemias, G6PD deficiency.
• Infections ie. malaria
Etiology – Hepatocellular insufficiency

Most common cause of postoperative jaundice.

This is mediated by a process of inflammation, ischaemia-reperfusion, necrosis or massive hepatic resection.

Usually present 1-2 weeks after surgery

**Ischaemic liver injury** is a common cause and its pathogenesis is multifactorial:

- Ischaemia – reperfusion ie. following shock.
- Anaesthetic agents (by also reducing hepatic blood flow)
- Biventricular heart failure (Chronic hepatic congestion due to right heart failure, in combination with left heart failure has an increased incidence over the hepatic ischemia of left heart failure alone.)
- Patients with ischaemic liver injury have a mortality as high as 75% due to co-morbid conditions

**Drug-induced hepatitis** is mostly caused by volatile anaesthetic agents, but also phenytoin, rifampin, isoniazid, tetracyclin, penicillin, paracetamol and the sulfonamides.

- Halothane hepatitis is caused by direct hepatotoxicity, reduction of hepatic blood flow and immunologic reactions (usually seen with repeated administration over short periods)
Sepsis – patients with blood stream infection often have intrahepatic cholestasis. The cholestasis can arise as a result of direct bacterial invasion of the liver, hemolysis or endotoxin production with bilirubin and bile salt transport impairment.

Medication can also cause intra-hepatic cholestasis:
- TPN
- Erythromycin
- Chlorpromazine
- Methyltestosterone

Benign postoperative cholestasis presents mostly with deranged LFTs without jaundice, only 1% with jaundice.

Jaundice after liver transplantation can be due to many causes:
- Organ rejection (Acute and Chronic)
- Hepatic artery thrombosis
- Bile leak
- Drug toxicity
- Viral hepatitis especially CMV, hepatitis C
Etiology – Posthepatic

Extrahepatic obstruction rarely causes postoperative jaundice, but should always be excluded:

- Surgical injury to the bile ducts
- Retained common bile duct stones
- Stricture of extrahepatic bile duct
- Cholangitis
- Acute postoperative cholecystitis
- Pancreatitis
- Tumor obstruction of bile duct

The importance of diagnosing which of the above is causing the postoperative jaundice is to determine if the jaundice is correctable.

The treatment, apart from general supportive measures, is determined by the diagnosis:

- Stop blood transfusions if hemolysing
- Stop possible drugs causing hepatitis or cholestasis
- Early administration of antibiotics for septicaemia, cholangitis, cholecystitis
- Early enteral nutrition
- ERCP with sphincterotomy or stent for extrahepatic biliary obstruction
- Cholecystectomy or cholecystostomy for postop cholecystitis
Diagnosing the cause of postoperative jaundice

History

- Ask about a **family history** or **known** cause of jaundice ie. Cirrhosis, Hepatitis, Gilbert syndrome, Dubin-Johnson syndrome, ulcerative colitis, and sclerosing cholangitis. ?HIV?

- **Type of surgery** (upper abdominal surgery higher risk for iatrogenic injury to bile ducts) and

- **Type of anaesthesia** – was a volatile gas used? Did the patient have a period of hypotension? Was the patient on vasopressors? Phenytoin? Anti-TB drugs?

- **Feeding** – hepatic steatosis is more common when dextrose is the only caloric source. The coadministration of lipids reduces the risk.

- **TPN cholestasis** is uncommon in adult patients – more common in premature neonates. It usually develops after at least 3 weeks of administration.

- The history of the **onset** of the jaundice helpful – onset within days after surgery in a previously healthy patient favour hemolysis due to drugs, breakdown of fragile transfused red blood cells, resorption of hematoma, acute rejection of a transplanted liver. -- onset within weeks usually indicate a intra-hepatic cause for the jaundice ie. hepatitis, cholestasis but extrahepatic causes should always be excluded.

- **Pregnancy** and Heart failure also predispose to postoperative jaundice

- Pruritis is caused by accumulating bile salts and not by bilirubin.
Diagnosing the cause of postoperative jaundice
Clinical examination

Scleral tissue = high in elastin which has a high affinity for bilirubin and **scleral icterus** is a very sensitive sign for jaundice.

**Dark urine** = due to conjugated bilirubin filtered by the renal glomeruli (unconjugated bilirubin is tightly bound by albumin and not filtered or secreted)

**Acholic stools** appear silvery and is mostly due to extrahepatic obstruction of the bile ducts where almost no bile, which contains the conjugated bilirubin, reaches the duodenum and thus no urobilinogen or stercobilin is produced in the ileum.

**Fever** can be due to septicaemia, cholangitis, cholecystitis, viral hepatitis or malaria.

Right upper quadrant tenderness is a non-specific sign but a positive Murphy sign suggest cholecystitis.

**Splenomegaly** may be seen with portal hypertension due to liver cirrhosis.

Look and percuss for **ascites**.

Other signs of liver cirrhosis are gynecomastia, testicular atrophy, palmar erythema, spider angiomata and Dupuytren’s contractures.

Malignant biliary obstruction often is painless and patients are severely wasted and lymphadenopathy is present.

**Encephalopathy** may indicate acute liver failure.
Diagnosing the cause of postoperative jaundice

Biochemistry

Urine dipstix – test for the presence of conjugated bilirubin or hemoglobinuria

Blood tests

- Unconjugated hyperbilirubinemia = prehepatic causes
- Increased reticulocyte count and reduced haptoglobin levels indicate hemolysis
- Aspartate aminotransferase AST and lactate dehydrogenase LDH elevated with hemolysis
- Alanine aminotransferase ALT and alkaline phosphatase ALP not significantly elevated with hemolysis
- Peripheral blood smear may reveal abnormal red cell morphology
- Coombs-test can help diagnose immune hemolytic anemia
- Conjugated hyperbilirubinemia = hepatocellular and posthepatic causes of jaundice
- In general, LFT’s do not correlate with disease severity and do not help with the diagnosis in this group of patients. However, the ALT and AST are elevated much more than the ALP and gamma-glutamyl transpeptidase GGT levels with hepatitis and the opposite usually occurs with posthepatic biliary obstruction.
- To stratify a patient with liver disease according to the Child-Pugh Classification, a prothrombin time (clotting profile) must be done in addition to the serum albumin and serum bilirubin.
- Drug levels ie. phenytoin, paracetamol
- FBC – leukocytosis and raised CRP indicate an underlying infection causing the jaundice
- If hepatitis is suspected do serology for hepatitis viruses A, B, C
- Do UKE – remember hepatorenal syndrome
Diagnosing the cause of postoperative jaundice
Hepatobiliary imaging

Plain abdominal X-ray  show gallbladder stones in only 15% of cases.
Ultrasound  -abdominal or endoscopic-  is the first-line imaging to be done
•  sensitivity over 90% for detecting dilated extrahepatic bile ducts, non-invasive, inexpensive.
•  will also demonstrate gallbladder wall thickness and is the imaging technique of choice for the detection of stones within the gallbladder, but often misses stones in the common bile duct.

CT scan
•  Also highly sensitive for the detection of dilated bile ducts, but less sensitive for the detection of stones within the gallbladder. Gives better definition of mass lesions/tumors.
•  May illustrate a bile leak or biloma after upper abdominal surgery

ERCP (endoscopic retrograde cholangiopancreatography)
•  ‘gold standard’ for diagnosing biliary obstruction
•  Diagnostic and therapeutic. Invasive.
•  Sphincterotomy with removal of stones or stenting of the biliary stricture

MRCP (magnetic resonance cholangiopancreatography)
•  Non-invasive alternative to ERCP for the diagnosis of biliary obstruction (NOT therapeutic)
•  Indicated where ERCP is hazardous, difficult or impossible.

PCT (percutaneous transhepatic cholangiography)
•  May be useful for diagnosis and drainage of patients with biliary obstruction proximal to the hepatic duct.
•  Avoid in patients with suspected cholangitis, always give antibiotics.

Intra-operative cholangiography  is indicated in all cases of cholecystectomy.

HIDA scan  can be done to confirm a diagnosis of cholecystitis.
References