MORE ABOUT....THE LIVER

AN APPROACH TO OBSTRUCTIVE JAUNDICE

J E J KRIGE, *FRCS, FACS, FCS (SA)*
Associate Professor, *Surgical Gastroenterology, Department of Surgery, and MRC/UCT Liver Research Centre, University of Cape Town and Groote Schuur Hospital, Cape Town*

J M SHAW, *MB BCh, FCS (SA)*
Specialist, *Surgical Gastroenterology, Department of Surgery, University of Cape Town and Groote Schuur Hospital, Cape Town*

A wide array of special investigations, including expensive and invasive procedures, are now available to the clinician to evaluate the jaundiced patient. Fortunately, in most patients, the cause of jaundice can be established without resorting to sophisticated investigations by taking a careful history, by doing a thorough examination and by obtaining basic liver function tests and viral serology markers and, if necessary, by performing liver ultrasonography (US). In a minority of patients, a computed tomography (CT) scan, a magnetic resonance cholangiopancreatogram (MRCP) or an endoscopic retrograde cholangiopancreatogram (ERCP) and further invasive tests may be necessary to confirm the diagnosis.

Extrahepatic jaundice is usually due to biliary obstruction caused by a stone in the common bile duct or carcinoma of the head of the pancreas. Pancreatic pseudocyst, chronic pancreatitis, sclerosing cholangitis, bile duct stricture or parasites in the bile duct are less common causes.

First steps in the diagnosis of jaundice

- Clinical history
- Physical examination
- Urine examination
- Stool examination
- Biochemistry
  - Bilirubin
  - Alkaline phosphatase
  - Gamma-glutamyltransferase
  - Transaminases
- Viral markers
- Haematology
  - Haemoglobin
  - White blood cells
  - Platelets
  - International normalised ratio (INR)

Jaundice is categorised as prehepatic, hepatic or posthepatic, depending on the underlying disease. Haemolysis is the most common cause of prehepatic jaundice. Hepatic parenchymal and intrahepatic cholestatic jaundice may be indistinguishable clinically and biochemically from cholestasis due to bile duct obstruction. The most common intrahepatic causes of jaundice are viral hepatitis, alcoholic hepatitis and cirrhosis, primary biliary cirrhosis and drug-induced jaundice. Extrahepatic jaundice is usually due to biliary obstruction caused by a stone in the common bile duct or carcinoma of the head of the pancreas. Pancreatic pseudocyst, chronic pancreatitis, sclerosing cholangitis, bile duct stricture or parasites in the bile duct are less common causes.

History

Typically, a patient with cholestatic jaundice has yellow sclera, dark-brown urine, pale stools and pruritus of varying severity. Information regarding the initial onset and duration of jaundice and whether the clinical course is progressive or intermittent and associated with pain, fever or rigors should be sought (Table I).

Table I. **Clinical evaluation of the jaundiced patient**

Ask about	Look for
Duration of jaundice	Depth of jaundice
Previous attacks of jaundice	Scratch marks
Pain	Stigmata of cirrhosis
	Palmar erythema
Chills, fever	Clubbing
	White nails
Pruritus	Dupuytren's contracture
	Gynaecomastia
Drug exposure	Ascites
	Liver
Previous biliary surgery	Size
	Shape
	Surface
Anorexia, weight loss	Tenderness
Colour of urine, stool	Gallbladder enlargement
Contact with other jaundiced patients	Splenomegaly
	Abdominal mass
History of injections or transfusions	Colour of stools

Early or mild jaundice is easy to overlook when the bilirubin level is below 50 µmol/l and if the examination is performed under artificial light.

Episodes of cholangitis are recognised if the jaundice is associated with colicky right upper-quadrant or epigastric pain, rigors and pyrexia. Jaundice without significant pain, or pain predominantly radiating to the back, indicates pancreatic pathology.
Fluctuating jaundice suggests intermittent obstruction caused by a stone in the ampulla of Vater or a periampullary carcinoma. Weight loss, anorexia and anaemia suggest associated malignancy, particularly if marked and of short duration. Pruritus may be present in all forms of jaundice and can be progressive or fluctuate in intensity. If marked pruritus occurs in a middle-aged woman, primary biliary cirrhosis should be considered.

A careful history of foreign travel is important, not only because of the possibility of viral hepatitis, but also because of exposure to unusual diseases such as malaria and other parasitic infections. A history of previous contact with jaundiced patients, blood transfusion, any injections, needle-stick exposure, or tattooing may provide the clue to a diagnosis of viral hepatitis. A careful drug history must be obtained as an increasing number of medications are associated with hepatocellular dysfunction. Excessive alcohol intake and occupational exposure to particular infections or to hepatotoxins are of special relevance. Some forms of jaundice are familial, e.g. Wilson's disease, α_1-antitrypsin deficiency, haemolysis and Gilbert's syndrome. A history of autoimmune disease suggests chronic active hepatitis or primary biliary cirrhosis.

Physical examination

Early or mild jaundice is easy to overlook when the bilirubin level is below 50 µmol/l and if the examination is performed under artificial light.

Whenever possible, natural light should be used. The sclera, the undersurface of the tongue and the anterior abdominal wall are the best places to look for early icterus. In patients with chronic cholestasis the following may be present: extensive scratch marks on the arms and legs, xanthelasmas on the eyelids and xanthomas on extensor surfaces and finger clubbing. Purpura on the forearms or shins suggests thrombocytopenia due to hypersplenism. Other cutaneous features of alcoholic cirrhosis include liver palms, white nails, and spider naevi. Foetor and a flapping tremor indicate marked liver decompensation.

Hepatomegaly is common in both hepatic and posthepatic jaundice. Palpation of an enlarged irregular liver suggests cancer and a shrunken nodular liver is likely to be due to cirrhosis. The presence of ascites, dilated peri-umbilical veins with collateral veins on the abdominal wall, and splenomegaly indicates cirrhosis, portal hypertension and liver decompensation. A non-tender, palpable gallbladder in a jaundiced patient suggests malignant common duct obstruction, but absence of a palpable gallbladder does not rule out cancer. Particular attention is paid to the colour of the stool found on rectal examination and inspection of the dark-brown urine which froths when shaken because of the detergent effect of bile acids.

Laboratory tests

In haemolytic disease, the increased bilirubin is mainly unconjugated. Since unconjugated bilirubin is insoluble in water, the jaundice in haemolysis is acholuric. Jaundice caused by hepatic parenchymal disease is characterised by elevations of both conjugated and unconjugated serum bilirubin. Both intrahepatic cholestasis and extrahepatic obstruction raise conjugated bilirubin. Since conjugated bilirubin is water soluble, bilirubinuria occurs. In non-infective extrahepatic obstruction, only slight increases of aspartate aminotransferase (AST) levels occur. In patients with common duct stones and cholangitis, levels as high as 100 µmol/l may occur. These high levels are transient and associated with increases in lactate dehydrogenase (LDH) concentration. In general, AST levels above 100 µmol/l suggest viral hepatitis. Viral markers are tested for hepatitis A, B and C, cytomegalovirus and Epstein-Barr virus infections.

Serum alkaline phosphatase originates in liver, bone and intestine. Normally, liver and bone contribute equally and the intestinal contribution is small. Hepatic alkaline phosphatase is produced by epithelial cells lining the intrahepatic bile ducts. Alkaline phosphatase levels are raised with intrahepatic cholestasis, cholangitis or extrahepatic obstruction or may occur with focal hepatic lesions in the absence of jaundice. In cholangitis with incomplete extrahepatic obstruction, serum bilirubin levels may be normal or mildly elevated with high serum alkaline phosphatase levels. Bone disease may complicate the interpretation of abnormal alkaline phosphatase levels. If increased levels are suspected to be from bone, serum calcium, phosphorus and 5'-nucleotidase or gamma-glutamyl transferase levels should be measured, as the latter two enzymes are also produced by bile ducts and are elevated in cholestasis, but remain unchanged with bone disease.

Changes in serum protein levels may reflect hepatic parenchymal dysfunction. In cirrhosis, the serum albumin falls and the globulins increase. Serum globulins reach high values in some patients with primary biliary cirrhosis.

Imaging tests for jaundice

Chest X-ray
Abdominal X-ray
Ultrasound
CT scan
Magnetic resonance imaging (MRI)
MRCP
ERCP
Percutaneous transhepatic cholangiogram (PTC)
Liver biopsy
Laparoscopy

Diagnosis

The principal objective is to distinguish surgical or obstructive jaundice from non-surgical jaundice. History, physical examination, biochemical liver tests, viral serology and US allow an accurate diagnosis of the cause of jaundice to be made, mostly without invasive tests. Since most jaundiced patients are not critically ill when first seen, diagnosis and therapy can be stepwise, with each subsequent test logically selected according to the information available at that point.

Only severe or worsening cholangitis requires urgent intervention.

US is the first-line imaging investigation used in the jaundiced patient and has the advantage of being non-invasive and quick to perform, but requires experience in technique and interpretation.

The demonstration of dilated bile ducts confirms extrahepatic biliary obstruction. A definitive diagnosis can be obtained by demonstrating gallstones in the gallbladder, common bile duct stones or a mass in the head of the pancreas. In patients without dilated ducts hepatocellular disease is a likely diagnosis. CT scanning is complementary to US and provides information on liver texture, gallbladder pathology, bile duct dilatation and pancreatic disease (Fig.1). CT is particularly valuable for the recognition of small lesions in either the liver or the pancreas.
If US demonstrates dilated bile ducts, MRCP is the next investigation of choice and provides non-invasive imaging of the level and nature of the bile duct obstruction. If further non-operative intervention is necessary to define the extent more accurately or alternatively relieve the biliary obstruction, either ERCP or PTC are the second-line procedures used. ERCP is advisable when the obstruction involves the lower common bile duct (gallstones or carcinoma of the pancreas) (Figs 2 and 3).

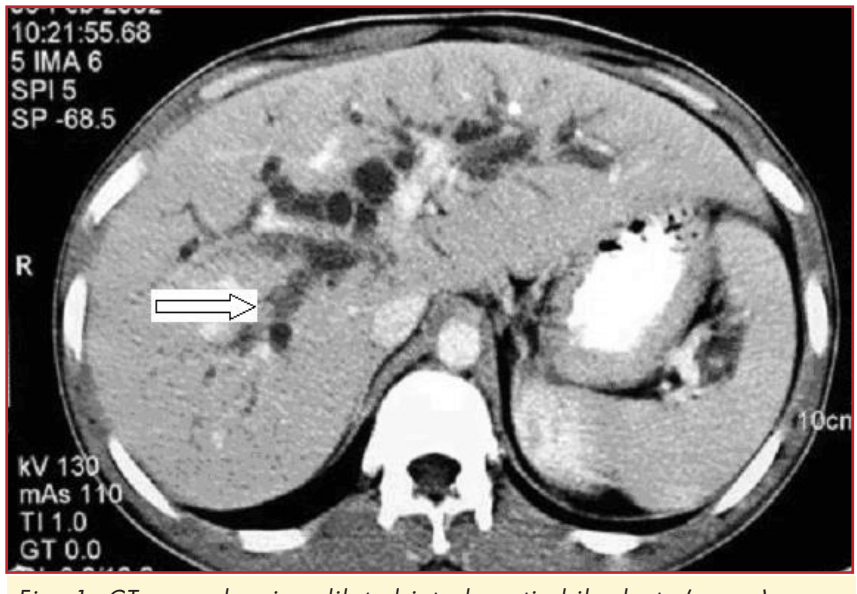

Fig. 1. CT scan showing dilated intrahepatic bile ducts (arrow).

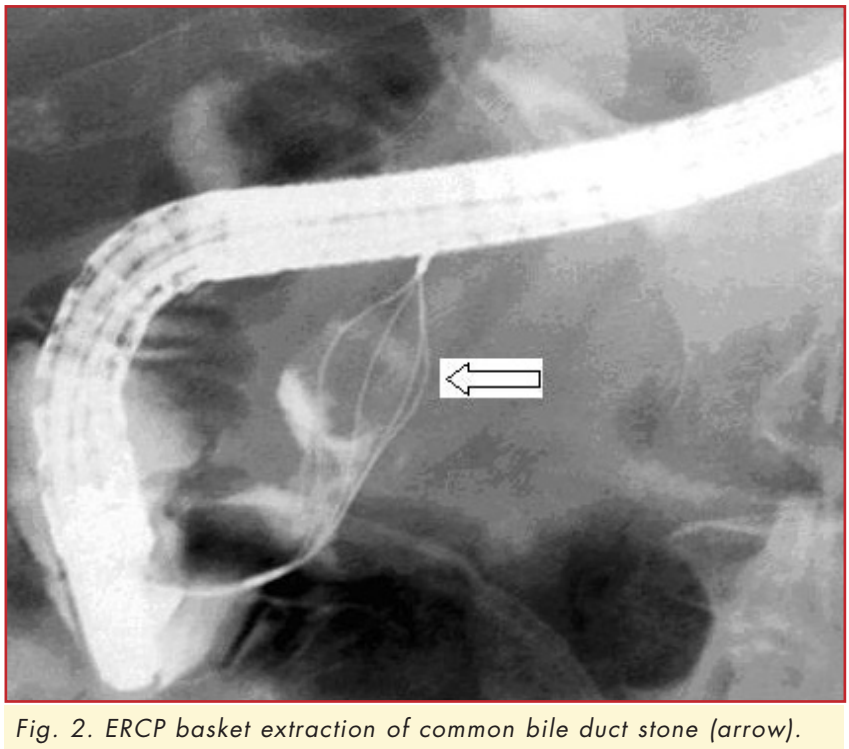

Fig. 2. ERCP basket extraction of common bile duct stone (arrow).

PTC is preferred for higher obstructions (hilar stricture or cholangiocarcinoma of the hepatic duct bifurcation) because better biliary opacification of the ducts above the obstruction provides more information when planning surgery.

In most patients a low obstruction of the common bile duct is drained endoscopically while doing the ERCP, either by sphincterotomy and stone removal

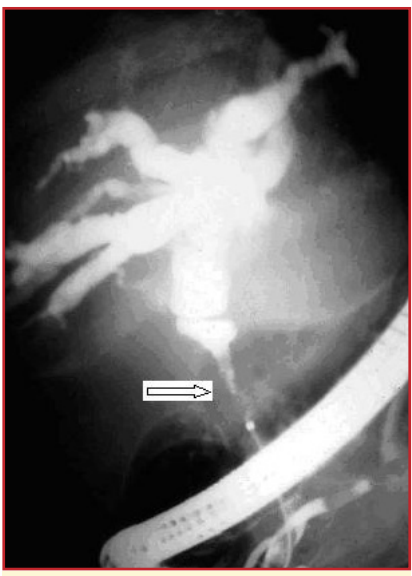

Fig. 3. ERCP demonstrating malignant biliary obstruction (arrow).

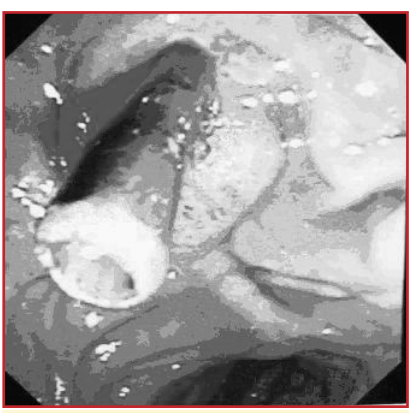

Fig. 4. Endoscopic biliary stent.

or by inserting an intraluminal trans papillary plastic biliary stent (Fig. 4). This may be the definitive treatment for inoperable carcinomas or frail patients with common bile duct stones. For patients who have biliary infection and require surgery, stenting provides effective preoperative biliary drainage by allowing the infection and jaundice to resolve and liver function to recover. In patients who have irresectable hilar cholangiocarcinoma, expandable metal biliary stents provide effective palliation. Percutaneous US-guided liver biopsy may be required to determine the nature and histological stage of intrinsic parenchymal liver disease, while laparoscopy with US is used in selected patients to assess and stage liver, biliary or pancreatic tumours before resection.