A guide to Nuclear Medicine Imaging of common Hepatobiliary Disorders

SKG RADIOLOGY

Many disorders of the hepatobiliary system are functional and repeated medical and radiological workup often reveals no cause. Nuclear Medicine provides functional information and has an important role in assessing patients with unexplained biliary symptoms.

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The Hepatobiliary scan is often called a HIDA scan after the first but no longer used Iminodiacetic acid (IDA) imaging agent. The currently used IDA agent is Hepatolite (Disofenin).

Correct preparation for a HIDA scan is essential. Patients who have a gallbladder should be fasted for at least 4 hours (but not longer than 24 hours) prior to the study and Morphine or related narcotic agents should not be administered in the 12 hours before imaging. Patients who do not have a gallbladder (post-cholecystectomy) do not need to fast.

A recent meal will cause the gallbladder to contract and may result in non-visualisation of the gallbladder. With prolonged fasting, bile in the gallbladder becomes viscous and impairs filling of the gallbladder. Morphine and related drugs cause spasm of the sphincter of Oddi and will alter bile flow dynamics.

In normal individuals, peak liver uptake is before 10 minutes, and tracer enters the common bile duct, gallbladder and duodenum by 30 minutes. The upper normal limit for visualisation of the gallbladder is one hour. After adequate filling, the gallbladder ejection fraction (EF), if required, is assessed by slow infusion of cholecystokinin (CCK). If the gallbladder is not visualised by one hour, Morphine is given IV to differentiate cystic duct obstruction from impaired function due to chronic cholecystitis.

Common clinical indications for HIDA scanning

1. Acute right upper quadrant pain; ?acute cholecystitis

Cholelithiasis is present in about 60% of patients with acute RUQ pain, but less than half will have acute cholecystitis. Because acute cholecystitis is caused and characterised by cystic duct obstruction, a non-invasive test that detects cystic duct obstruction ie HIDA scan, is recommended.

Case 1 (Acute Cholecystitis): 53yo male presented with acute RUQ pain. Ultrasound was negative for gallstones. The gallbladder was not visualised at 60 min post injection of HIDA nor after administration of Morphine. Refer figure 1.

2. Chronic biliary symptoms and gallstone(s) on ultrasound; ?chronic calculous cholecystitis

Gallstones are common but only about 15% of patients with gallstones will develop biliary colic. If gallbladder function is impaired by chronic calculous cholecystitis, filling of the gallbladder will be delayed and Morphine is usually required to augment filling of the gallbladder. If filling is normal, function can be further assessed by CCK infusion. Large gallstones may appear as filling defects.

Case 2 (Chronic Calculous Cholecystitis): 61yo male with recurrent epigastric pain and mobile 34mm gallstone on Ultrasound. There was no activity in the gallbladder at 60 minutes and Morphine infusion was required to establish that the cystic duct was patent. Refer figure 2.

3. Chronic biliary symptoms and normal ultrasound; ?chronic acalculous cholecysitis.

Patients with chronic acalculous cholecysitis present with recurrent episodes of unexplained biliary pain. These patients typically have normal filling of the gallbladder on a HIDA scan but poor gallbladder contractility with infusion of CCK.

Case 3 (Chronic Acalculous Cholecystitis): 37yo female with recurrent epigastric pain referred to the right shoulder. Ultrasound showed some biliary sludge. Filling of the gallbladder was normal. CCK infusion resulted in minimal emptying of the gallbladder. The gallbladder EF was <5% (lower normal 35%). Refer figure 3.

4. Chronic biliary symptoms post cholecystectomy; ?sphincter of Oddi dysfunction

After cholecystectomy, about 10 to 20 % of patients have recurrent biliary colic. This pain may be caused by residual or recurrent common bile duct stones, strictures or sphincter of Oddi dysfunction (SOD). SOD is partial biliary obstruction at the level of the sphincter. The stenosis may be fixed or functional due to hypertonicity (dyskinesia). Dyskinesia is a paradoxical response induced by infusion of CCK. The diagnosis of SOD is established by analysis of liver and common bile duct time activity curves and termed the Hopkins score (>5 abnormal).

Case 4 (SOD): 55yo female with post cholecystectomy syndrome. The HIDA scan was accompanied by slow infusion of CCK. Transit of tracer into the small bowel was delayed and the biliary tree was dilated throughout the study. The Hopkins score equalled 6 (>5 abnormal). Refer figure 4.

In conclusion, the HIDA scan has an important role in the investigation of patients with unexplained biliary symptoms.

Figure 1

Figure 2

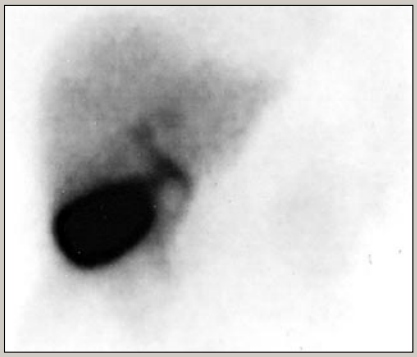

Figure 3

Figure 4

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