Imaging investigations

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Ultrasonography Ultrasonography is the initial investigation of choice in patients with jaundice to determine whether or not the bile duct is dilated, the coexistence of gallstones or gross disease within the liver such as metastases. It may also define the presence or absence of a mass in the pancreas (Figure 72.6). However, obesity and overlying bowel gas often make interpretation of the pancreas itself unsatisfactory . Computed tomography Most significant pathologies within the pancreas can be diagnosed on high-quality CT scans, with three-dimensional reconstruction if necessary . A specific pancreatic protocol should be followed. An initial unenhanced CT scan is essential to determine the presence of calcification within the pancreas and gallbladder (Figure 72.7). Then, following rapid injection of intravenous contrast, scanning is performed in the arterial and venous phases. The stomach and duodenum should be outlined with water and distended to define the duodenal loop. Pancreatic carcinomas of 1–2 /uni00A0 cm in size can usually be demon - strated (Figure 72.8). Endocrine tumours are also well imaged on CT (Figure 72.9). In patients with pancreatitis, necrotic areas within the gland can be identified by the absence of contrast enhancement on CT . Inflammatory collections and pseudocysts can be seen (Figure 72.10). CT-guided drainage is helpful in the treatment of pancreatic collections, cysts and pseudocysts, and facilitates percutaneous fine-needle or Trucut biopsy . Magnetic resonance imaging With magnetic resonance imaging (MRI) the pancreas can be clearly identified, and the anatomy of the bile duct and the pancreatic duct, together with fluid collections, can be defined. Magnetic resonance cholangiography and pancreatography (MRCP) has largely replaced diagnostic endoscopic cholangi - ography and pancreatography (ERCP) as it is non-invasive and less expensive (Figure 72.11). Using the technique in conjunc - tion with intravenous injection of secretin, emptying of the pancreatic duct can be demonstrated to show the absence or obstruction. presence of

Figure 72.6 Ultrasound scan showing a mass in the head of the pan creas (marked by an arrow) and a dilated pancreatic duct in the body of the gland (courtesy of

Dr Alison McLean). (b) Figure 72.7 (a) Unenhanced computed tomography scan of a man with chronic pancreatitis, showing a focus of calci /f_i cation (marked by an arrow) in the head of the pancreas and a cyst adjacent to that. Oral contrast has been administered. (b) The same area after injection of intravenous contrast.

3 1 4 2 Stomach Pseudocyst

Figure 72.8 Contrast-enhanced computed tomography scan of a patient with a carcinoma of the pancreatic head. The main bulk of the tumour lies inferior to the section shown here. The dilated bile duct (1) and main pancreatic duct (2) can be seen, with tumour in /f_i ltration around them. There is a thrombus in the superior mesenteric vein (3). The gallbladder is distended (4). Figure 72.9 Computed tomography scan showing a hypervascular insulinoma (arrow) adjacent to the splenic vein. Local excision of the tumour resulted in normoglycaemia. Figure 72.10 Computed tomography scan of a large pseudocyst in relation to the body and tail of the pancreas. Figure 72.11 Magnetic resonance cholangiopancreatography in a patient with obstructive jaundice. A dilated common bile duct was seen on ultrasonography, but no pancreatic mass lesion was visible on computed tomography. The bile duct and the main pancreatic duct are seen very well, with a stone visible in the lower part of the bile duct and another in the neck of the gallbladder. (a) (b) Contrast in duodenal loop Catheter Figure 72.12 Endoscopic retrograde cholangiopancreatography.

/uni00A0 (a) Normal pancreatic duct with /f_i lling of the duct of Santorini from the duct of Wirsung. (b) Diagrammatic outline of (a) .

cholangiopancreatography ERCP is performed using a side-viewing fibreoptic duo denoscope. The ampulla of Vater is intubated, and contrast is injected into the biliary and pancreatic ducts to display /uni00A0 the anatomy radiologically (Figure 72.12). In pancreatic carci noma, the main pancreatic duct may be narrowed or completely obstructed at the site of the tumour (Figure 72.13), or the distal bile duct may be narrowed. Concurrent narrowing of both ducts results in the so-called double duct sign (Figure 72.14 Changes seen in chronic pancreatitis include the presence of pancreatic duct strictures, dilatation of the main pancre atic duct with stones, abnormalities of pancreatic duct side branches, communication of the pancreatic duct with cysts and bile duct strictures (Figures 72.15–72.17). A plain radiograph 2 1 (Figure 72.18). In addition to imaging, bile or pancreatic fluid and brushings from duct strictures can yield cells that confirm - the suspected diagnosis of carcinoma (Figure 72.19). Brush cytology taken from malignant strictures at the time of ERCP yields a positive diagnosis in 40–50% of patients. ERCP also - allows the placement of biliary and pancreatic stents.). - (b)

Figure 72.13 Endoscopic retrograde cholangiopancreatography: pancreatic carcinoma. Irregular stricture of the main pancreatic duct (arrow) with dilatation distal to the obstruction. Figure 72.14 Endoscopic retrograde cholangiopancreatography depicting a malignant stricture in the lower part of the common bile duct (1) and in the main pancreatic duct (2), an appearance referred to as the double duct sign (courtesy of Dr George Webster). Figure 72.15 Endoscopic retrograde cholangiopancreatography: chronic pancreatitis. Most of the opacities lie within the duct system and are stones. Gross dilatation of ducts in the body and tail are due to obstruction by stones in the head of the pancreas. (a) Partially /f_i lled cyst Dilated CBD Stricture Small cyst Dilated PD Figure 72.16 (a) Endoscopic retrograde cholangiopancreatography: relapsing acute pancreatitis. Normal biliary tree. Pancreatogram shows stricture of the main duct in the body with distal dilatation and cyst formation. (b) Diagrammatic outline of (a) . CBD, common bile duct; PD, pancreatic duct.

(b) Dilated chain of lakes Stricture Catheter Figure 72.17 (a) Endoscopic retrograde cholangiopancreatography: chronic pancreatitis. Long stricture of the pancreatic duct in the head; distal pancreatic duct shows sacculation with intervening short stric tures, ‘chain of lakes’. (b) Diagrammatic outline of (a) . Figure 72.18 Plain abdominal radiograph: chronic pancreatitis. Multiple opacities can be seen in the region of the head and tail of the pancreas.

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