Imaging of the hepatobiliary System, Spleen and Pancreas

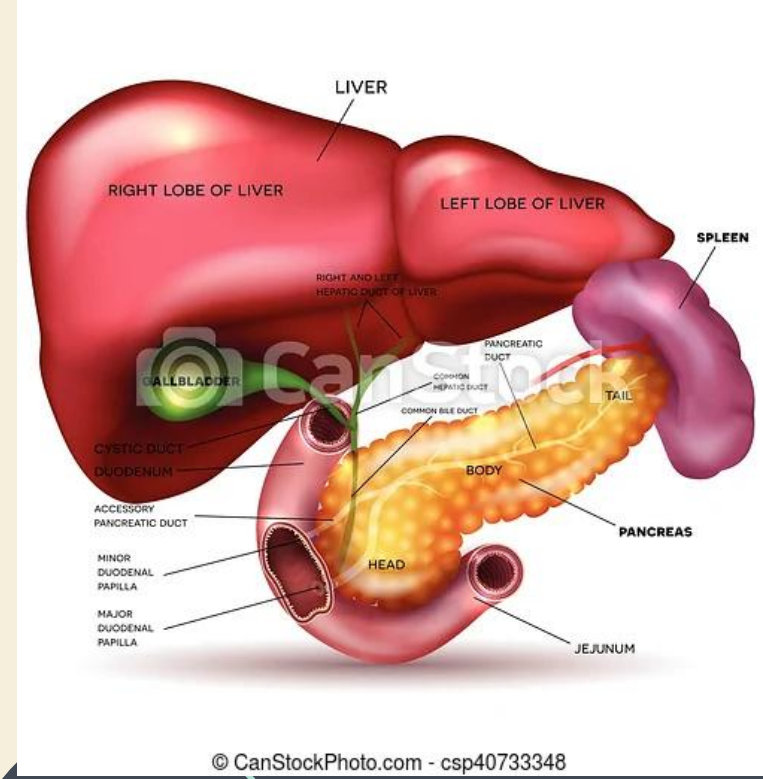
Dr. Saja Ali Ahmed

MBChB , FIBMS-RAD

Lecturer at Al-Kindy College of Medicine

University of Baghdad

2022



Learning objectives

1. **To know the imaging techniques used to evaluate hepatobiliary system ,spleen and pancreas.**

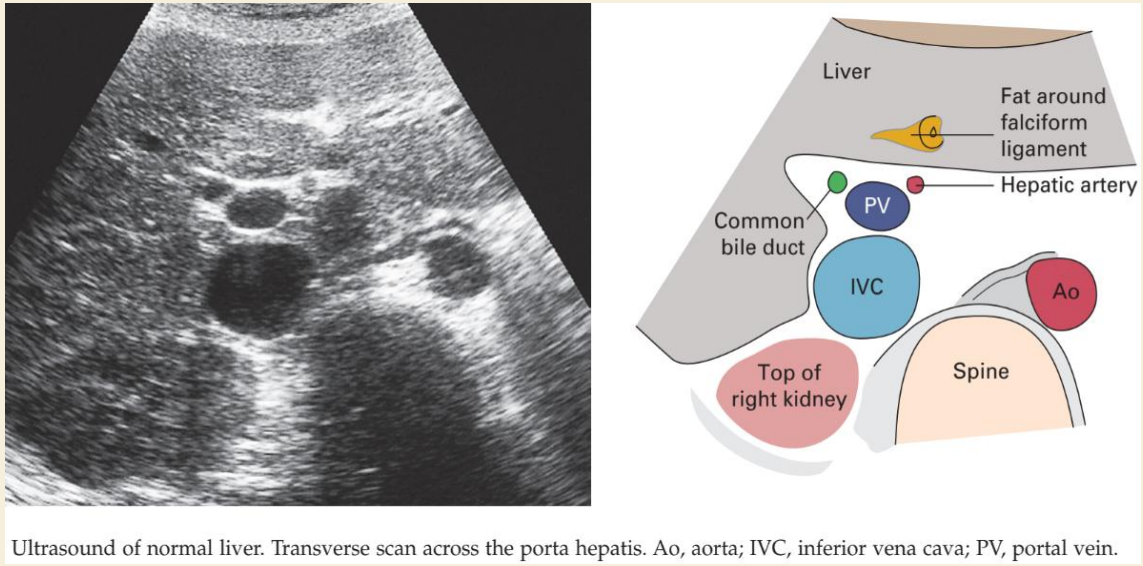
2. **To know the normal appearance of the hepatobiliary system ,spleen and pancreas on the different imaging modalities.**

3. **To know the commonest pathology affecting the hepatobiliary system ,spleen and pancreas their radiological appearance .**

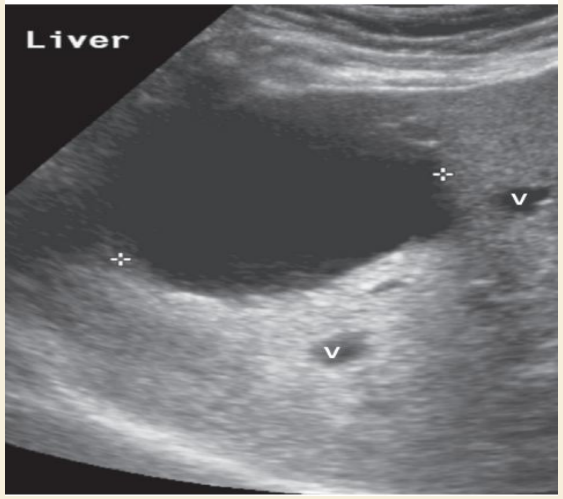
LIVER

➢ Imaging techniques

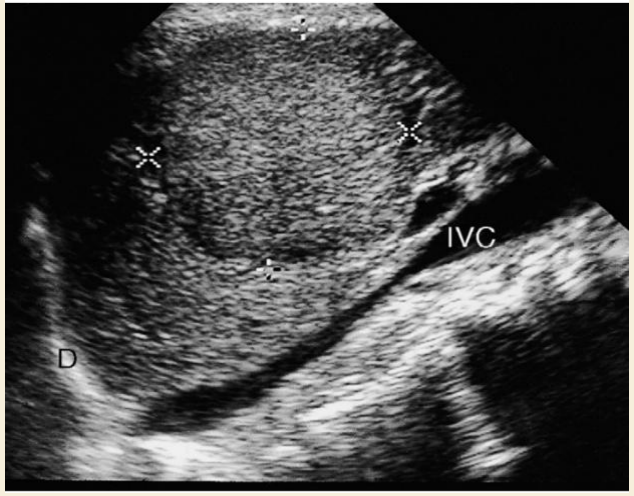
❖ Ultrasound: Focal masses, Diffuse parenchymal diseases….



Ultrasound of normal liver. Transverse scan across the porta hepatis. Ao, aorta; IVC, inferior vena cava; PV, portal vein.



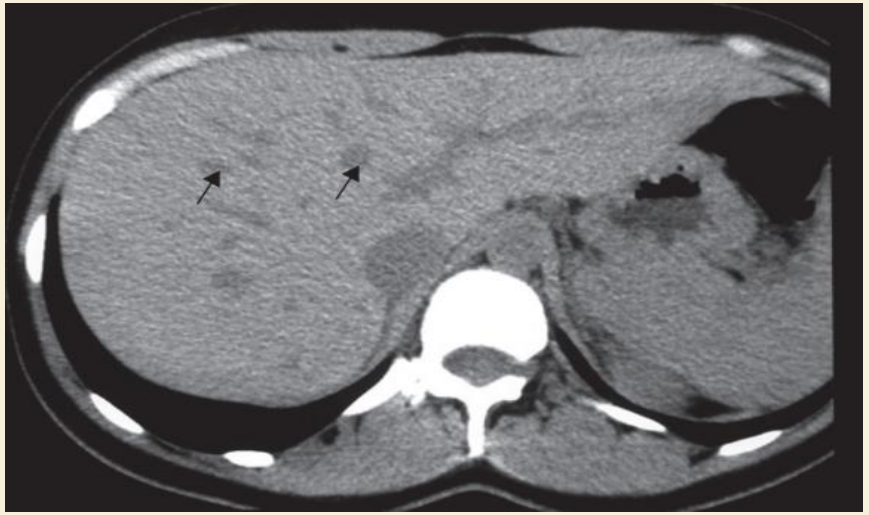
Ultrasound of a benign cyst.



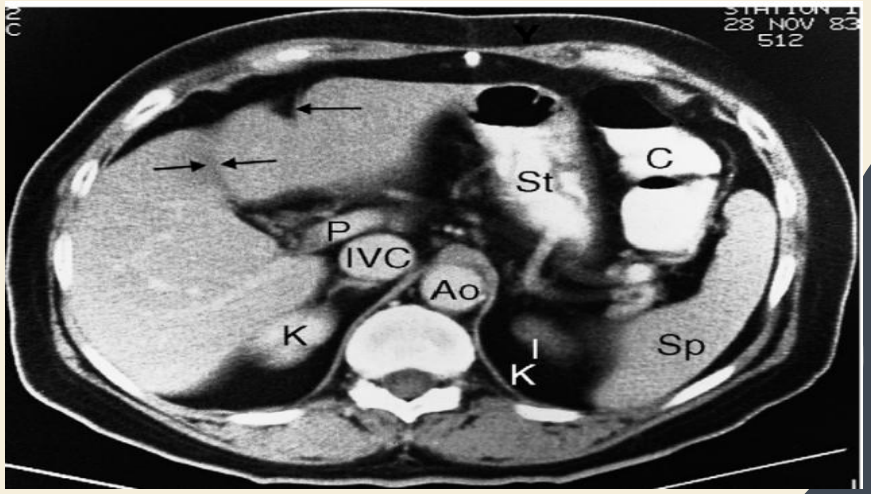
Ultrasound of a solid mass.

❖ Computed tomography

- **Intravenous contrast medium** is usually given in order to increase the density of normal liver parenchyma and to emphasize the density difference between the normal parenchyma and lesions.
- the different phases of liver opacification by taking scans at varying times after the injection of contrast.**(dynamic study arterial ,venous ,delayed)**
- The liver has a dual blood supply from the hepatic artery and portal vein.
- **Most metastases** are best demonstrated as low attenuation areas during the portal venous phase 60–70 seconds.
- Scanning during the arterial phase, about 30 seconds after the injection of contrast, will show lesions such as **haemangiomas, hepatomas(HCC) and highly vascular metastases (e**.g. carcinoid).



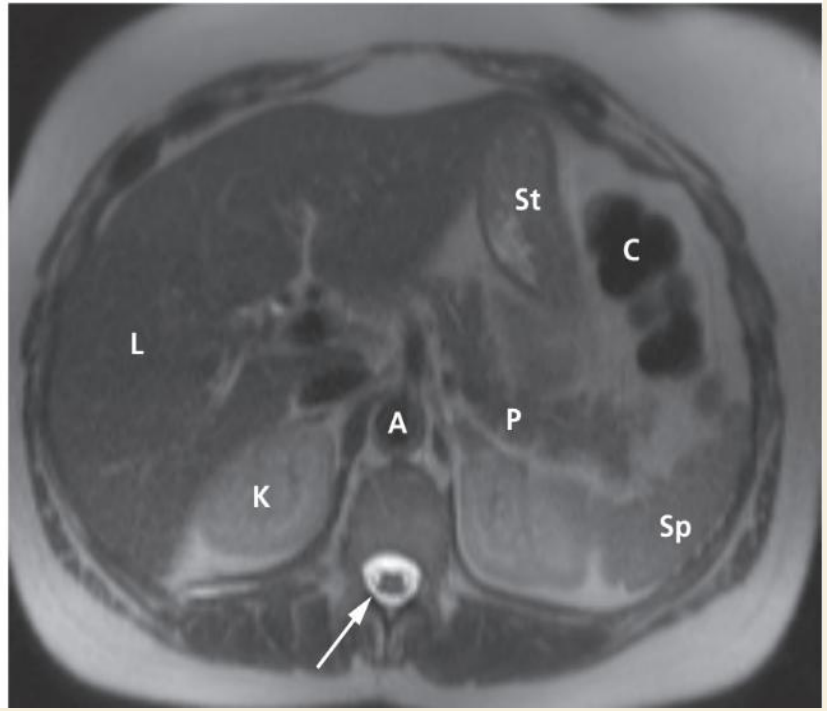
CT scan of normal liver showing unopacified veins (arrows), which should not be confused with metastases.



CT scan of normal liver through the porta hepatis (enhanced scan). The single arrow indicates a fissure for the falciform ligament, and the double arrows a fissure for the gall bladder, which divides t he liver into the right and left lobes.

❖ Magnetic resonance imaging

- Give additional information to ultrasound and CT.
- **Intravenous contrast (dynamic contrast)** is used to improve visualization and help characterize lesions.



Normal T2-weighted MRI scan of the upper abdomen. The liver parenchyma (L) shows intermediate signal intensity. The cerebral spinal fluid has high signal intensity (arrow). A, aorta; C, splenic flexure of colon; K, kidney; P, pancreas; Sp, spleen; St, stomach.

❑ Liver masses

❖ Types of liver masses

Malignant

- Metastases
- Hepatocellular carcinoma (HCC)
- Cholangiocarcinoma
- Fibrolamellar carcinoma
- Sarcomas (rare)

Benign

- Hepatic cysts
- Haemangiomas
- Biliary hamartomas
- Hepatic adenomas (can have malignant potential)
- Focal nodular hyperplasia
- Liver abscesses
- Regenerating nodules in cirrhotic liver

❑ Malignant liver neoplasms:

- **Metastases,** notably from carcinoma of the stomach, colon, pancreas, lung and breast, are much more common than primary tumours .
- Metastases are often multiple, situated peripherally and of variable size.
- **At ultrasound,**

✓ Usually decreased echogenicity compared with the surrounding parenchyma.

✓ may show increased echogenicity

✓ when they undergo central necrosis they may even resemble cysts.

✓ A metastasis may have an echogenic centre, giving an appearance described as a **'target lesion**'.

- **At CT, metastases are seen as**

✓ lower in density than the contrast-enhanced surrounding parenchyma.

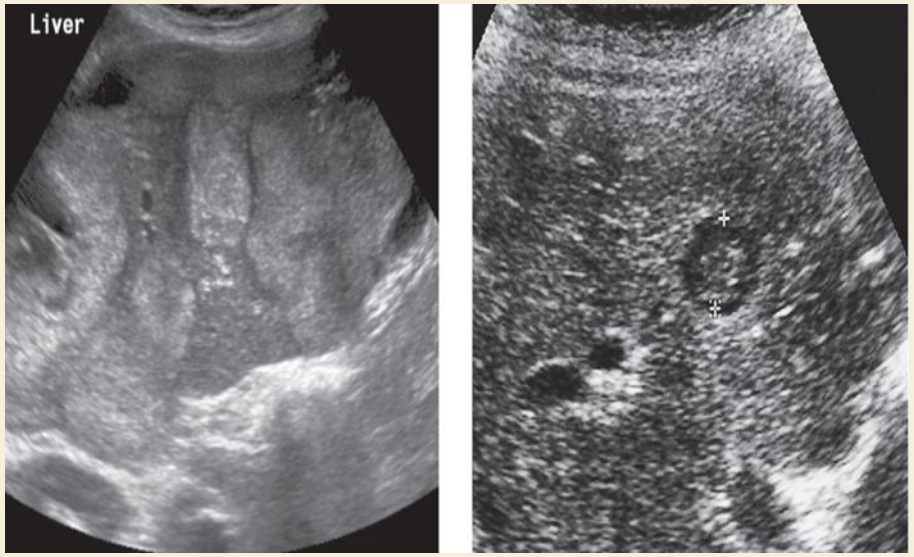
✓ Intense contrast enhancement is sometimes seen within the tumour, or immediately surrounding it – a useful differentiating feature, which is not seen with cysts.

✓ Some metastases, notably carcinoid, are hypervascular and appear as high density areas on arterial phase images.

- **Magnetic resonance imaging is an excellent method of demonstrating metastases, which typically have**

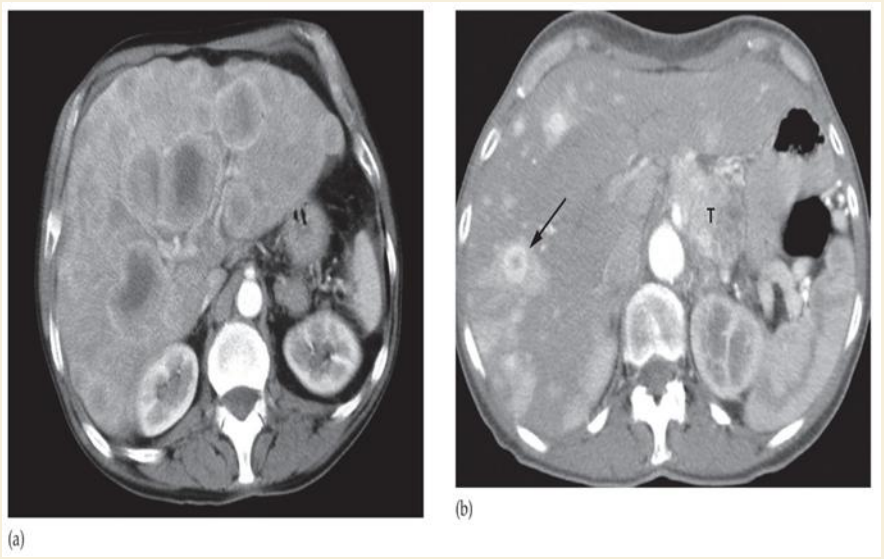
✓ Signal lower than normal liver on a T1-weighted scan and a high signal intensity on a T2-weighted scan.

✓ Various intravenous contrast agents may be used to aid their visualization.

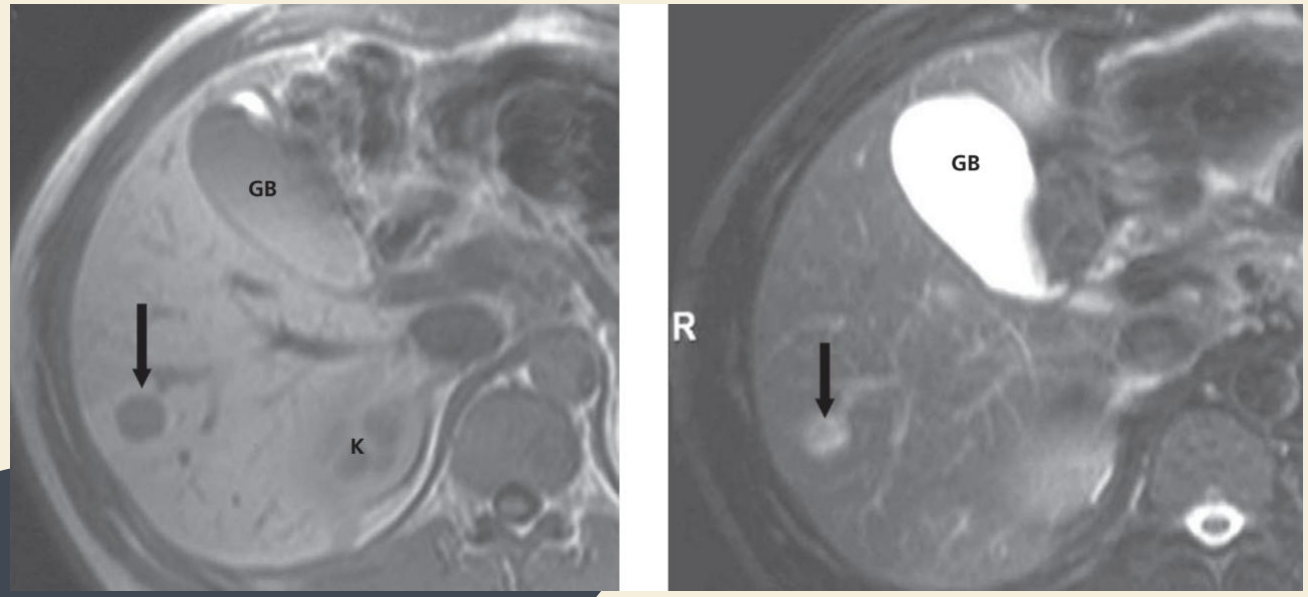


(a) (b)

Ultrasound of liver metastases. (a) Multiple hyperechoic metastases scattered throughout the liver.(b) The cursors indicate a metastasis showing reduced echogenicity, but with an echogenic centre known as a target lesion.



CT scan of liver metastases. (a) There are a large number of low density lesions in both lobes of the liver, which show enhancement around their edges. (b) Vascular metastases (arrow) appearing as areas of high density on this arterial phase image.

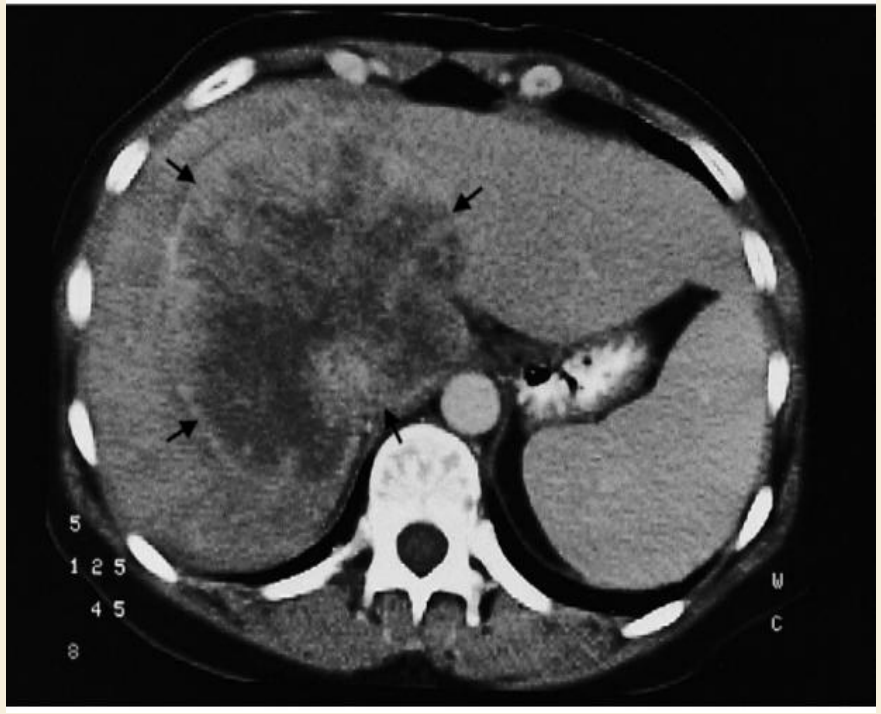


liver metastasis on MRI. (a) T1-weighted MRI scan showing a solitary low signal intensity focus in the liver (arrow). (b)T2-weighted MRI (with fat satura showing the same metastasis. This is of higher signal intensity than the normal liver parenchyma;

- Primary carcinomas of the liver, which include hepatocellular carcinoma (HCC) and cholangiocarcinoma, are usually **solitary but they may be multifocal**.

- Their CT ,ultrasound and MRI features **are similar to metastatic neoplasms**.

- **Fibrolamellar carcinoma** is a rare tumour, often presenting in adolescents/young adults as a large mass, often with a central calcified scar.



CT scan of hepatoma showing a large mass of variable density (arrows).

❑ Benign liver masses

- Seen frequently in the general population.
- Most are **cysts,** some are **haemangiomas.**
- Focal nodular hyperplasia and adenomas are rare but can closely resemble malignant masses.
- MRI can be very helpful in differentiating benign from malignant lesions.
- Interpretation of abnormalities seen in patients **with established cirrhosis** can be difficult as there is a spectrum of abnormalities ranging from benign **regenerating nodules,** through **dysplatic nodules**, to **HCC.**

Liver cysts

- single or multiple
- usually **congenital** in origin; some are due to infection.
- **Multiple** hepatic cysts occur in **adult polycystic disease**
- **At ultrasound,** liver cysts show the typical features of cysts

✓ sharp margin.
✓ no echoes within the lesion.
✓ intense echoes from back walls with acoustic enhancement deep to the larger cysts

- **At CT, cysts show**

✓ very well-defined margins
✓ have attenuation values similar to that of water
✓ It is often not possible to characterize small lesions, and with lesions below 1 cm in diameter it may be difficult to distinguish cyst from neoplasm.

- **At MRI.have the expected signal intensity of water,**

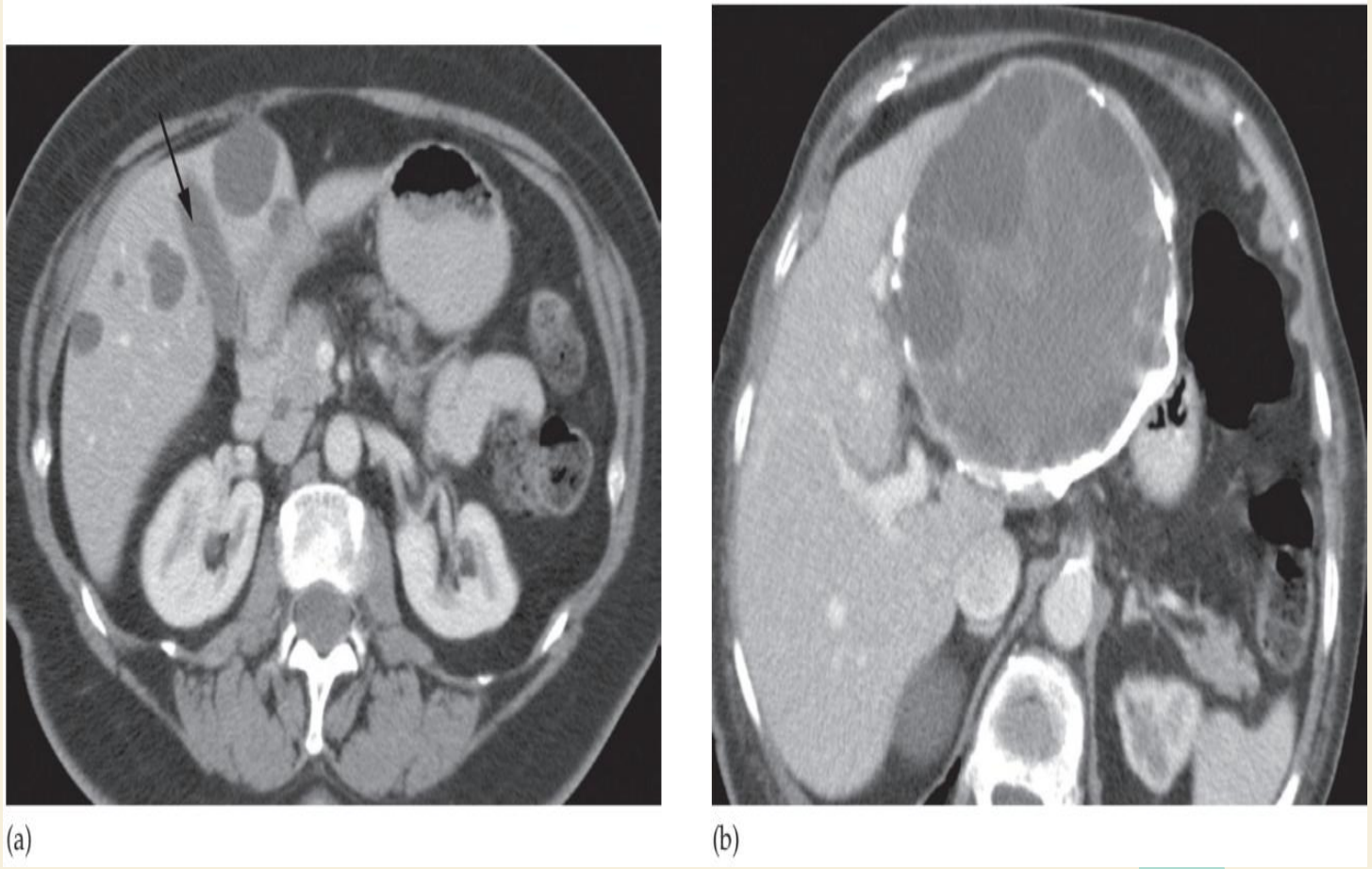
✓ low signal on a T1-weighted
✓ high signal on a T2-weighted scan.

- **Cysts due to echinococcus (hydatid) disease may be**

✓ single or multiple
✓ few show calcified walls
✓ Daughter cysts may be seen within a main cyst at both ultrasound and CT ,
✓ Unless these features are present, hydatid cysts may prove indistinguishable from simple cysts at both ultrasound and CT.

- **Occasionally metastases can have a cystic appearance.**

US: Right hepatic simple cyst (Star) posterior acoustic enhancement (Arrow)



CT scan of liver cysts. (a) Simple cysts. CT shows several well-defined, low attenuation lesions of near water density. Note their density is equivalent to the bile in the gall bladder (arrowed). (b) Complex cyst. CT scan showing a multilocular hydatid cyst with calcification in its wall.

Haemangiomas of the liver

- common incidental finding .
- rarely requires treatment.
- Occasionally, they can cause significant haemorrhage, especially following trauma, and therefore percutaneous biopsy should be avoided if possible.
- **By ultrasound typically shows**

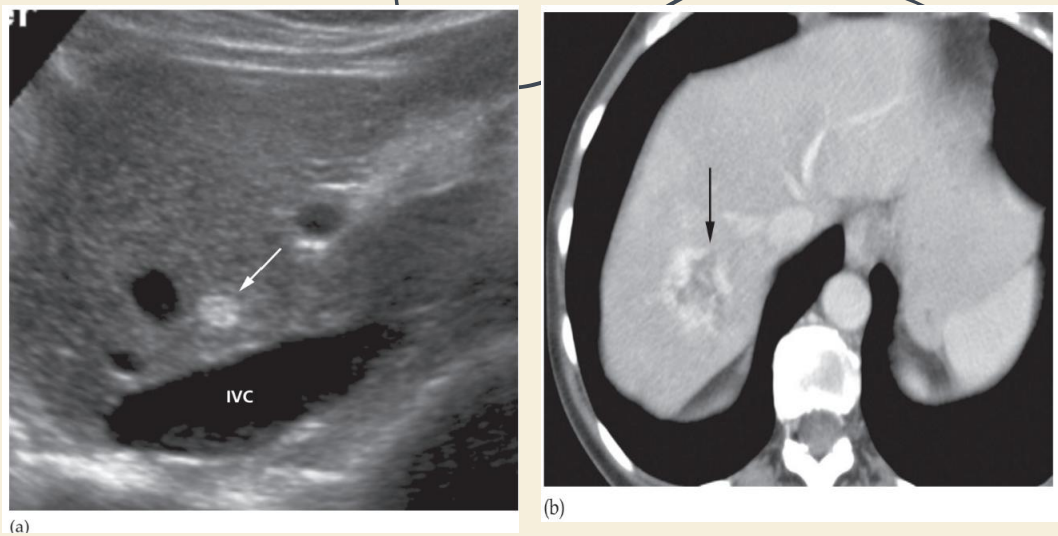
✓ well-defined lesion
✓ peripheral location
✓ echogenic masses.

- **By CT, there is usually**

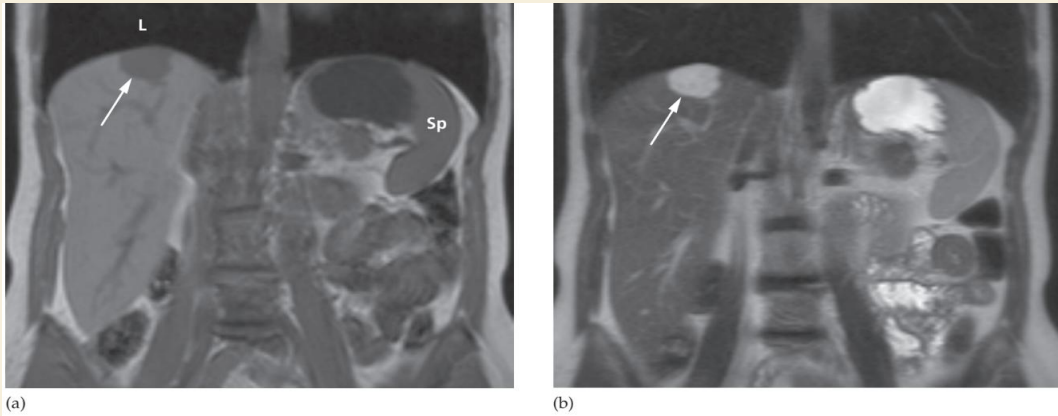
✓ characteristic enhancement pattern characterized by sequential contrast opacification, beginning as nodular or globular areas of enhancement at the periphery and proceeding toward the centre over time until the density increases to become similar to that of the surrounding liver.

- **By Magnetic resonance imaging shows**

✓ uniform very high intensity on T2-weighted images



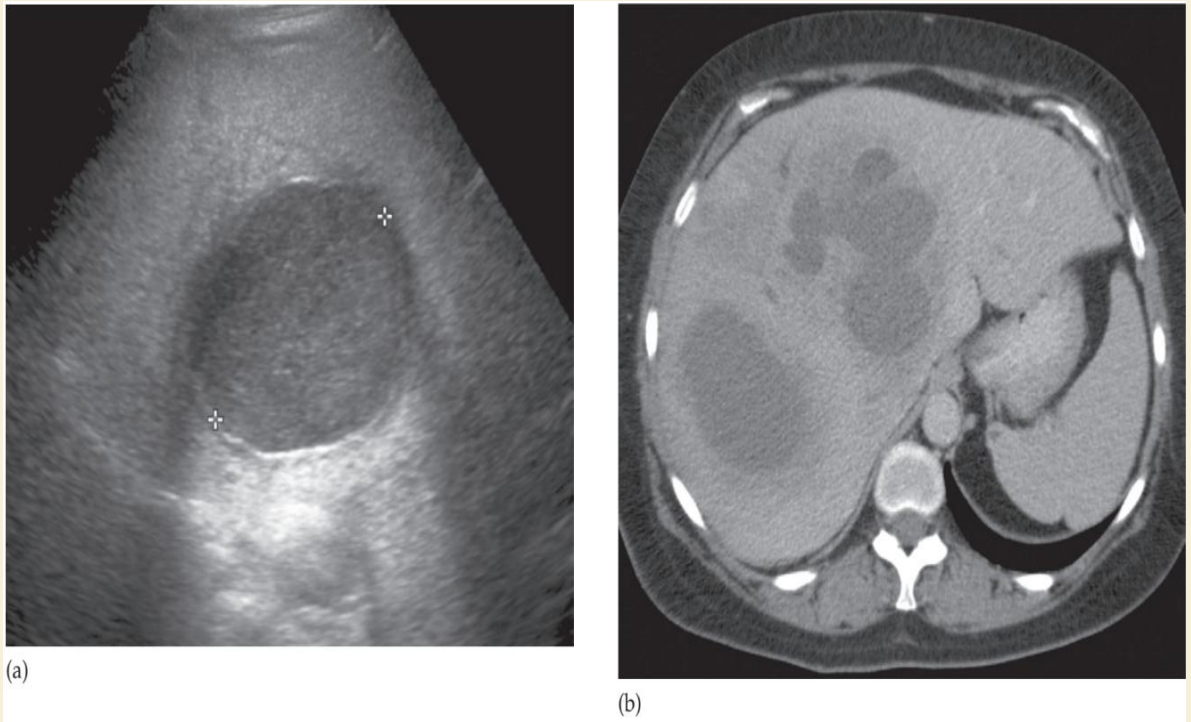
Haemangioma (a) Ultrasound scan showing an echogenic mass in the right lobe of the liver (arrow)(b) CT scan, after intravenous contrast enhancement showing a low density lesion in the right lobe of the liver (arrow) with peripheral nodular enhancement.



MRI of a haemangioma. (a) Low signal intensity focus (arrow) on a coronal T1-weighted image. (b) High signal intensity focus (arrow) on a coronal T2-weighted image.

Liver abscesses

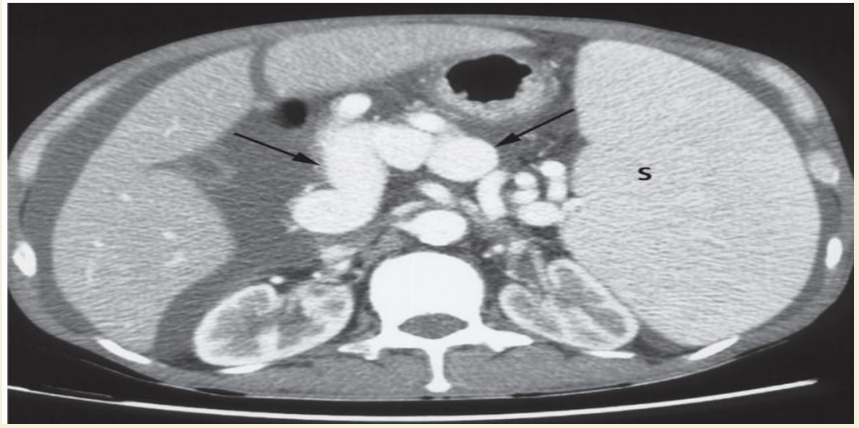
- appear somewhat **similar to cysts** but usually they can be distinguished
- Hepatic abscesses tend to have **fluid centres**, with **walls** that are **thicker**, and more **irregular** than those of simple cysts.
- Although the CT attenuation values in the centre may be the same as water, usually they **are higher**.
- **At ultrasound**, a layer of necrotic debris may be seen within the abscess.
- Occasionally, **chronic abscesses calcify.**
- Abscesses cannot usually be distinguished from necrotic tumours at either ultrasound, CT or MRI, but the **clinical situation** should aid in making the distinction.
- **Aspiration and drainage** are invariably undertaken in any case of suspected abscess and are conveniently performed under ultrasound guidance.



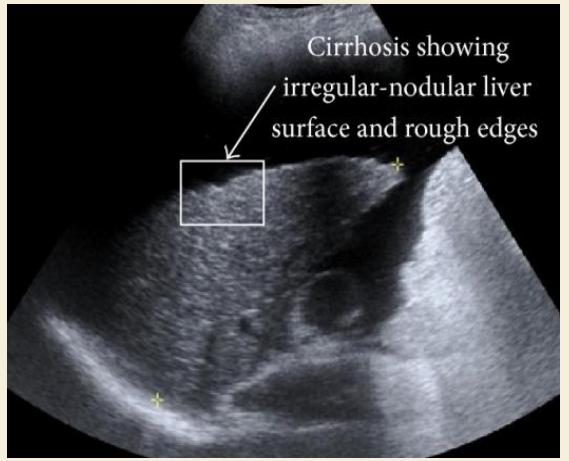
Liver abscess. (a) Ultrasound scan showing an area of mixed echogenicity in the liver. (b) CT in another patient showing multifocal areas of low attenuation.

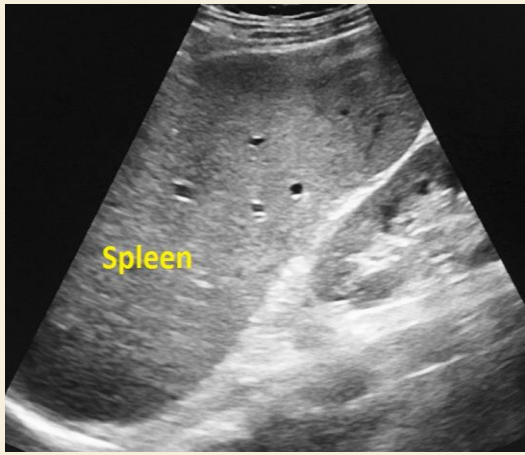
Cirrhosis of the liver and portal hypertension

- In portal hypertension the pressure in the **portal venous system is elevated** due to obstruction of the flow of blood in the portal or hepatic venous systems.
- **most frequent cause are**
✓ **Cirrhosis of the liver**
✓ occlusion of the hepatic veins (Budd–Chiari syndrome)
✓ thrombosis of the portal vein, particularly following infection of the umbilical vein in the neonatal period or secondary to pancreatitis.
- **Portosystemic anastomoses develop** , to enter the vena cava, bypassing the liver.
- the most important sites for these collaterals are varices **at the lower end of the oesophagus** and in **the upper abdomen**
- **The signs of cirrhosis of the liver at CT and ultrasound are**
✓ The **texture** of the liver at ultrasound may be **diffusely abnormal**
✓ **reduction in size** of the **right lobe of the liver**
✓ **Irregularity** of the **surface** of the liver.
✓ **Splenomegaly.**
✓ **Ascites**
- For persistent bleeding varices, **TIPSS (transjugular intrahepatic portosystemic shunt)** can be undertaken. In this procedure, a connection between the portal and systemic venous system is created by placing a stent.



Varices on CT due to portal hypertension. There is marked enhancement of multiple serpinginous vessels in the upper abdomen (arrows), extending into the splenic hilum. There is splenomegaly and ascites.



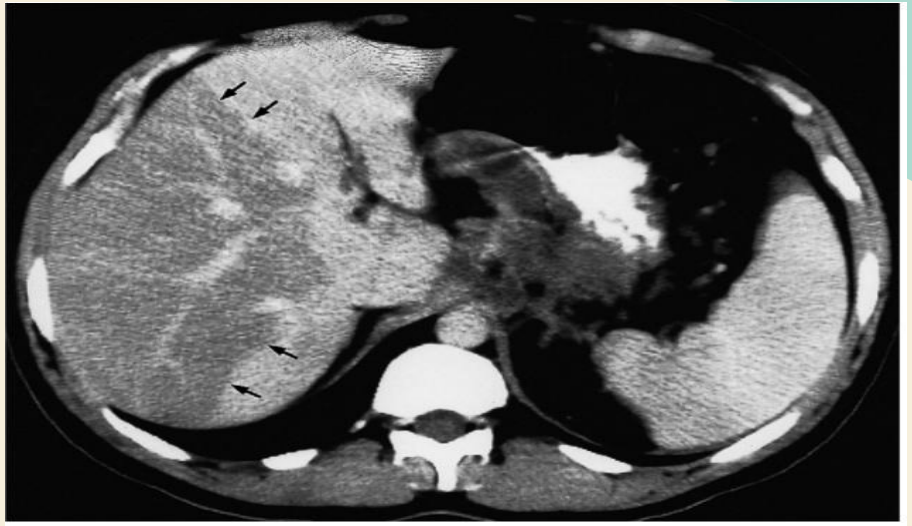


Fatty infiltration of the liver

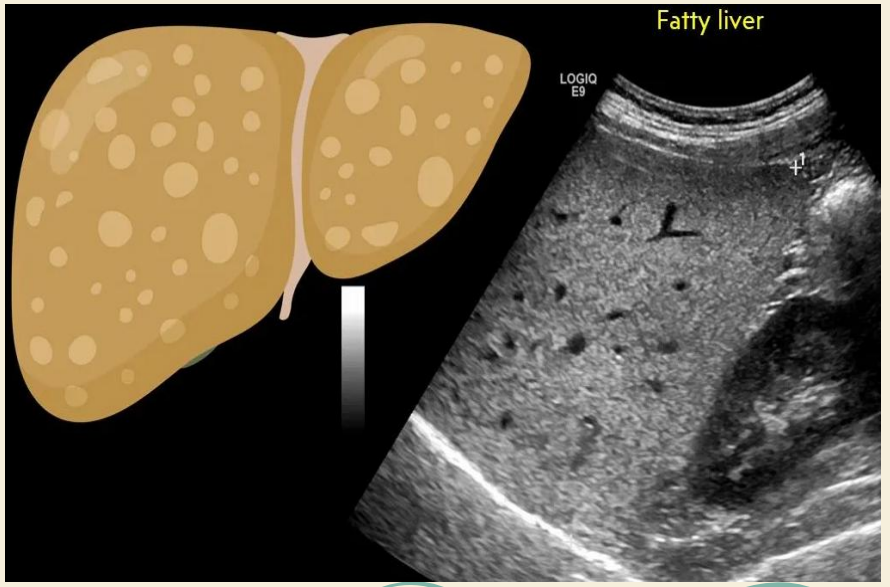
- relatively frequent finding, particularly in those with
- ✓ Hypercholesterolaemia.
- ✓ Obesity.
- ✓ Diabetes.
- ✓ patients on chemotherapy
- ✓ Alcohol intake to excess.
- Fatty infiltration may involve the **whole liver,** or it may **just involve individual subsections.**
- **on CT scans** fatty infiltration leads to a **reduction in the attenuation of the** affected parenchyma causing **low density area with no mass affect ,**vessels are then seen as relatively high attenuation structures against a background of low density parenchyma.

On ultrasound, the liver parenchyma shows **increased echogenicity**, the so-called 'bright liver',

. **MRI can** be very helpful in problem cases because fat gives a characteristic set of signals.



Fatty degeneration of the liver shown by CT as a largef ocal area of reduced attenuation in the right lobe of the liver(arrows).



Liver trauma

- the commonest abdominal injury that leads to death.
- the most frequent injury are

❖ Parenchymal lacerations

❖ Subcapsular and intrahepatic haematomas .

- Focused assessment with sonography for trauma **(FAST scan)** Is standard in assessment of patients

With abdominal trauma is a rapid bedside examination that

examines four areas for free fluid:

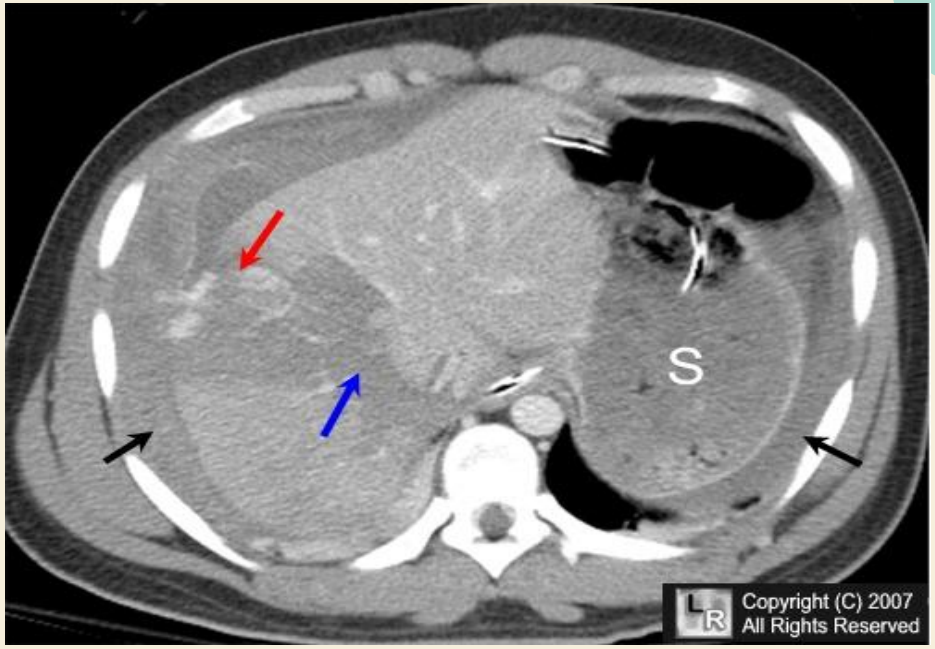
✓ perihepatic ,peri splenic space, pelvis, pericardium

- CT scanning is more sensitive and specific,

✓ CT protocol in liver trauma include **post contrast multi phase (arterial and venous).**

✓ **lacerations** are recognized as low density areas relative to the contrast-enhanced parenchyma.

✓ **Leakage** of contrast indicates **active bleeding.**



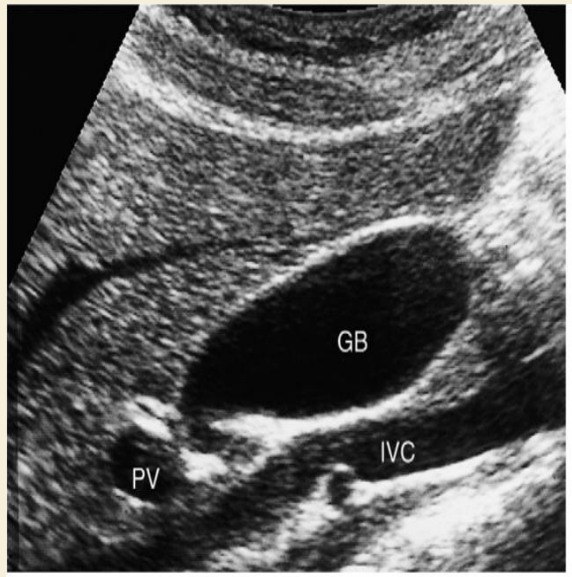
Liver laceration with extravasation. An enhanced axial CT scan through the right lobe of the liver (blue arrow), blood in the peri extravasation of the intravenous contrast (red arrow).

BILIARY SYSTEM

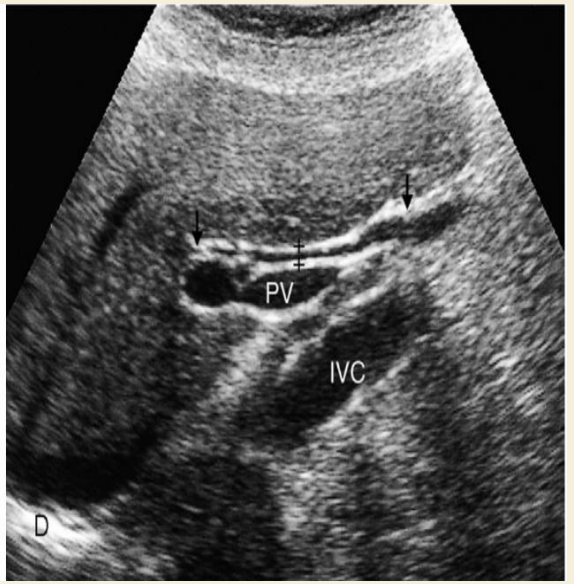
Imaging techniques

❖ Ultrasound

- Is the **initial method** of imaging.
- It is important that the **gall bladder should be full of bile**, the **patient is asked to fast** in order to prevent gall bladder contraction
- The normal gall bladder **wall is so thin** that it is sometimes barely perceptible ,Gall bladder wall **thickening** suggests either **acute or chronic cholecystitis**.
- The **common hepatic or common bile duct can be visualized**; it is seen as a small, tubular structure lying **anterior to the portal vein** in the porta hepatis and should **not measure more than 7mm** in diameter **unless the patient has had a cholecystectomy, when it may be larger**.
- The **normal intrahepatic biliary tree** is of such **small calibre t**hat only small portions a few millimetres long may be seen at ultrasound.

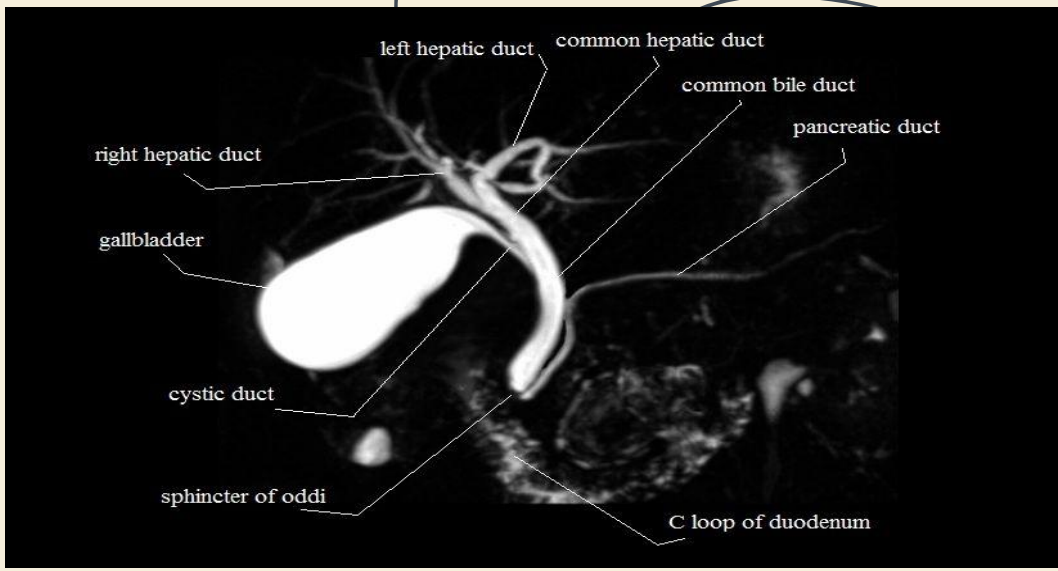


Ultrasound of normal gall bladder. Note the thin wall and absence of echoes from within the gall bladder. GB, gall bladder; IVC, inferior vena cava; PV, portal vein.



Normal common bile duct. Longitudinal ultrasound scan showing the common bile duct, situated between the arrows, lying anterior to the portal vein. The common bile duct measures 4mm in diameter (crosses). D, diaphragm; IVC, inferior vena cava; PV, portal vein.

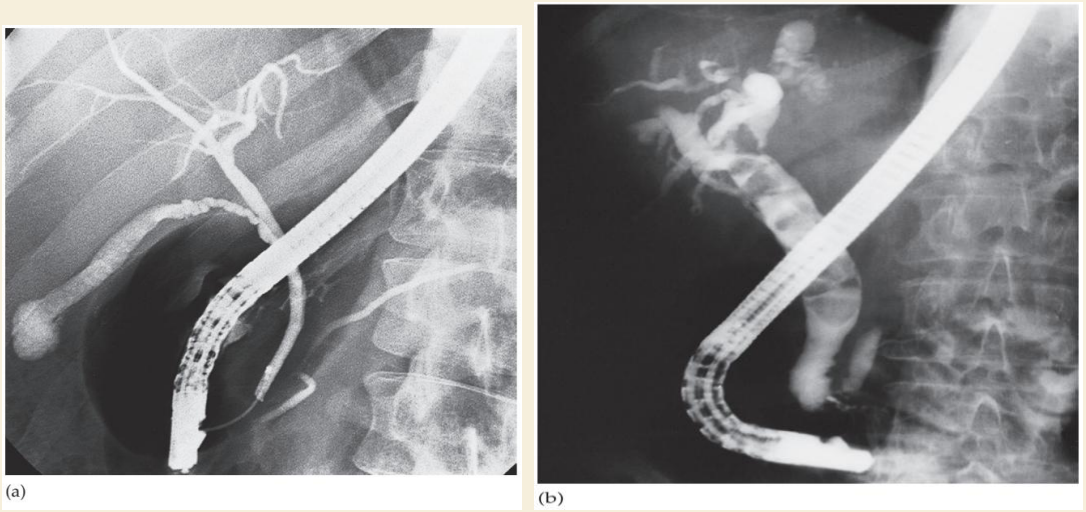
Magnetic resonance cholangiopancreatography



- uses **special fluid-sensitive** sequences to visualize the biliary and pancreatic ducts.
- The examination is **non-invasive and no contrast agents** are needed.
- Magnetic resonance cholangiopancreatography
- (MRCP) is **replacing ERCP in** many instances as a non invasive investigation for biliary and pancreatic disorders although **ERCP is necessary** for any endoscopic **biopsy or treatment.**

Endoscopic retrograde cholangiopancreatography

- Consists of **injecting contrast material** directly into the common bile duct through a **catheter inserted into the papilla of** Vater via an endoscope positioned in the duodenum.
- In the **case of stones** in the common bile duct, **sphincterotomy and endoscopic basket** or balloon extraction may be employed.
- With **obstruction due to tumour, biopsies or brushings** can be obtained and the obstruction relieved with **stents.**
- **Pancreatitis** is an **occasional complication of ERCP.**

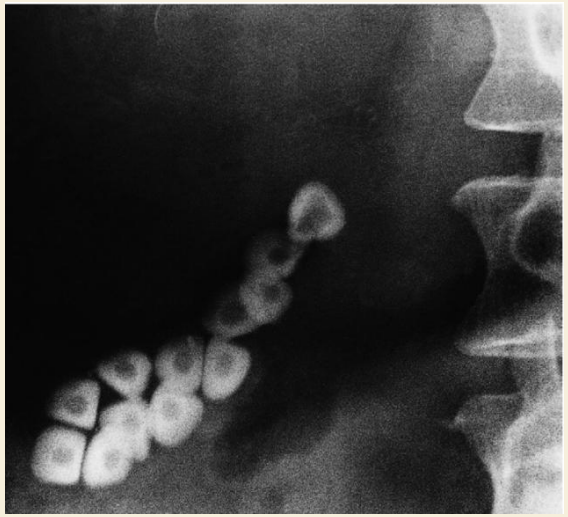


ERCP.(a) A normal biliary system has been shown by injecting contrast through a catheter passed from the endoscope into the common bile duct. The pancreatic duct has also been filled. (b) A dilated ductal system with numerous large calculi in the hepatic and common bile ducts.

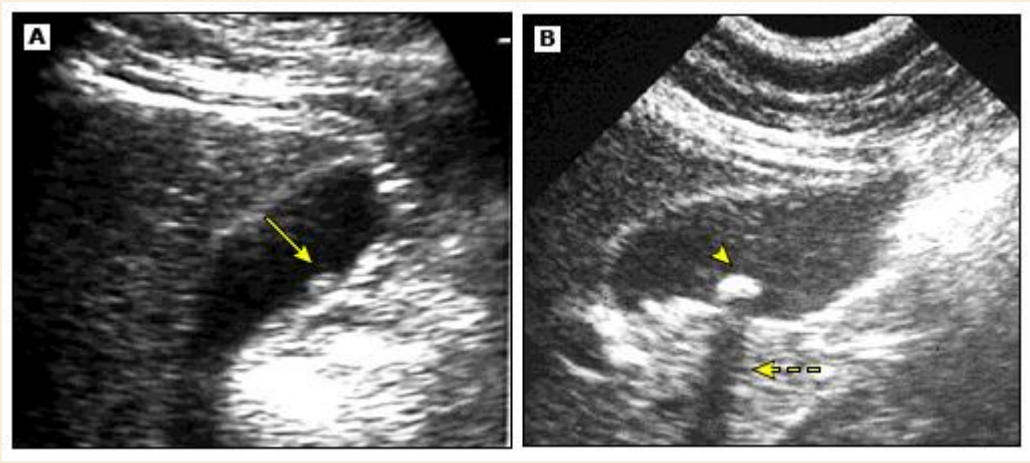
Gallbladder stones

- Are a **frequent finding in adults**, particularly **middle-aged females.**

- **At plain film**
- ✓ 20% of gall stones contain sufficient calcium to be visible on plain film ,They typically have a **dense outer rim with a more lucent centre.**
- **At ultrasound, gall stones are seen as**
- ✓ **strongly echogenic foci** within the **dependent portion** of the gall bladder.
- ✓ **Acoustic shadows** are usually seen behind stones.
- ✓ The presence of an acoustic shadow **is an important diagnostic feature for confirming stones** in the gall bladder or common bile duct. **Acoustic shadowing is not seen with polyps.**
- ultrasound is **much less reliable for detecting stones in the common bile duct,** which are better demonstrated **with MRCP.**



Radio-opaque gall stones. Plain film showing multifaceted stones with lucent centres.



Ultrasound images of a gallbladder adenomatous polyp (arrow) compared with a gallstone (arrowhead). Note the shadow cast by the stone (dashed arrow) compared with the absence of a shadow behind the polyp.

➢ cholecystitis

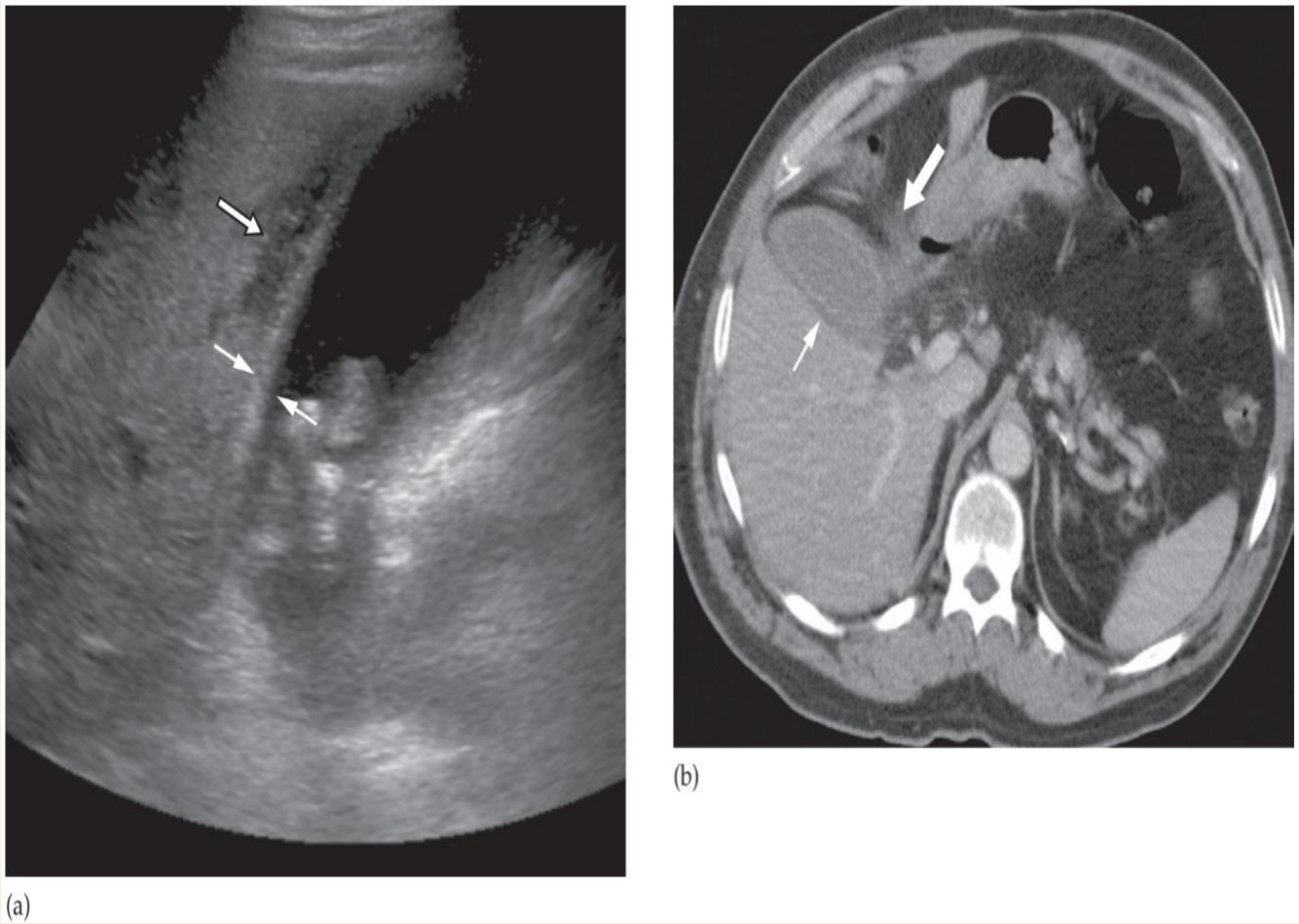
❖ **In acute cholecystitis ultrasound** will usually detect

- gall stones
- inflammatory debris
- gall bladder wall thickening
- rim of fluid adjacent to the gall bladder.

On CT,

- the gall bladder wall is thickened.
- surrounding inflammatory change seen as stranding in the adjacent fat.

❖ **In chronic cholecystitis,** the gall bladder is often **contracted and thick-walled.**



(a) (b)

Acute cholecystitis. (a) Ultrasound showing a thick, oedematous gall bladder wall indicated by the thin arrows. There is also evidence of fluid adjacent to the gall bladder indicative of acute inflammation (thick arrow).
(b) CT scan of acute cholecystitis showing a thick-walled gall bladder with adjacent oedema and inflammatory change as evidenced by a surrounding low attenuation rim (thin arrow) and lack of clarity (stranding) in the adjacent fat (thick arrow).

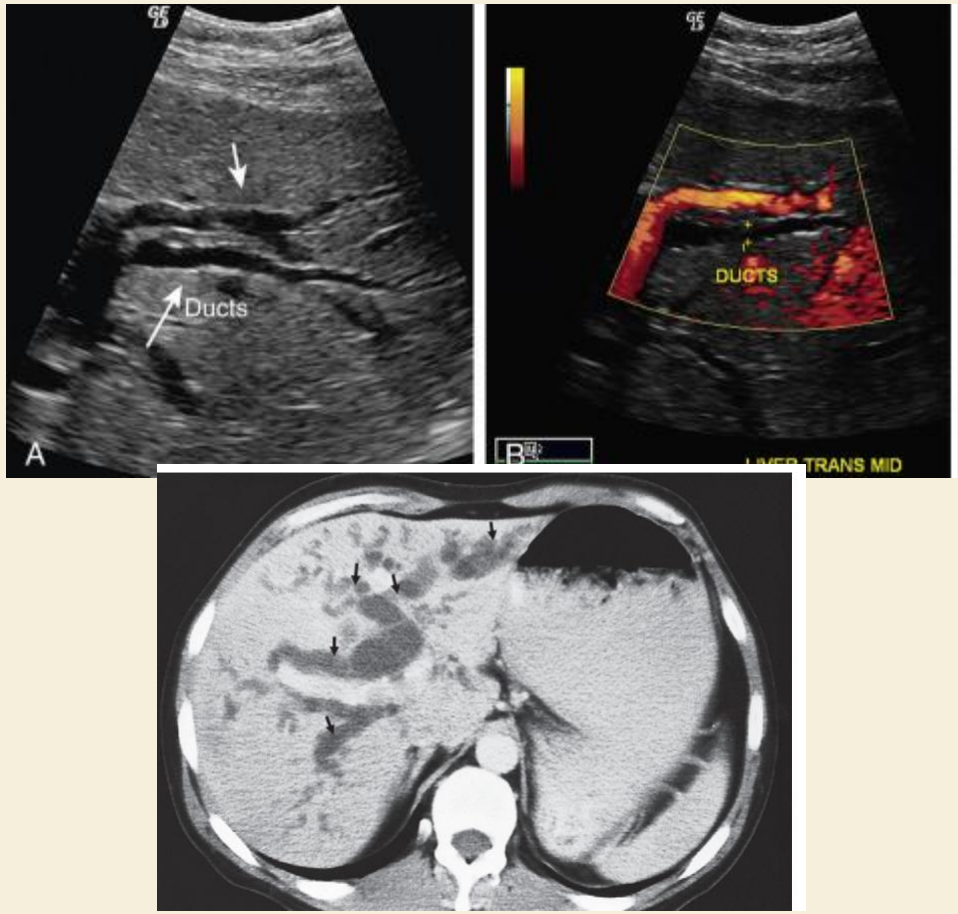
Jaundice

- Clinical examination and biochemical tests often permit the cause of jaundice to be diagnosed.
- Imaging tests may be required when there is **doubt as to the nature** of the jaundice.
- The basis of this distinction is **dilated biliary ducts** are a **feature of jaundice from biliary obstruction.**
- Imaging is used to determine **the site and, if possible, the cause of obstruction.**

➢ **Major causes of biliary obstruction**

✓ **Impacted stone in the common bile duct**
✓ **Carcinoma of the head of the pancreas**
✓ **Carcinoma of the ampulla of Vater**
✓ **Cholangiocarcinoma**

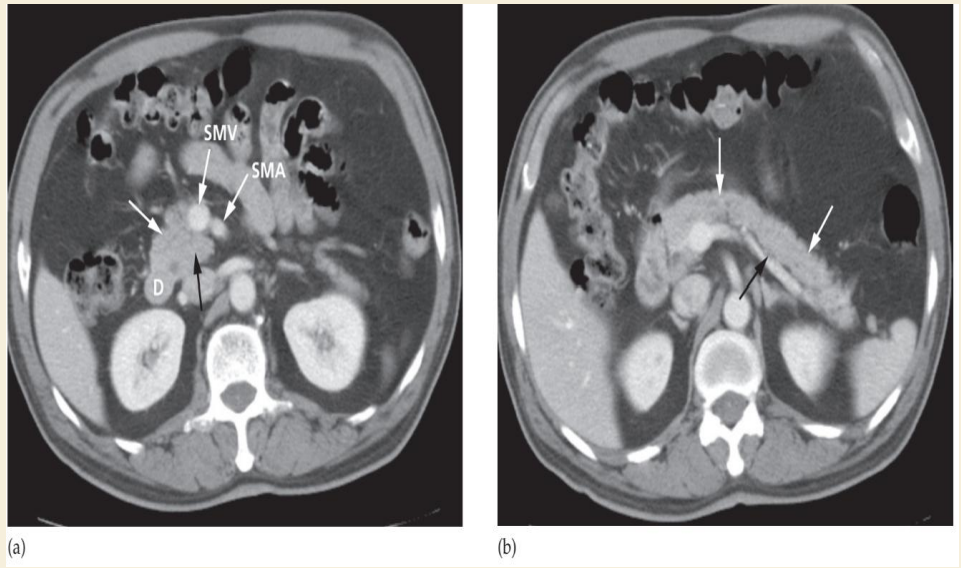
- **Dilatation** of the intra- and extrahepatic biliary system can be identified at **ultrasound ,CT and MRI.**
- **Ultrasound** is the first test to be performed, dilated intrahepatic biliary ducts are seen at ultrasound as **serpentine structures paralleling the portal veins**, a finding known as the '**double channel sign**'.
- **gas in the duodenum** obscures the **lower end of the common bile duct**.
- **MRCP is often more helpful than CT** in delineating **the biliary tree**
- **CT is more often used** for further **evaluation and staging** of a distal obstruction secondary to an **underlying pancreatic malignancy**.



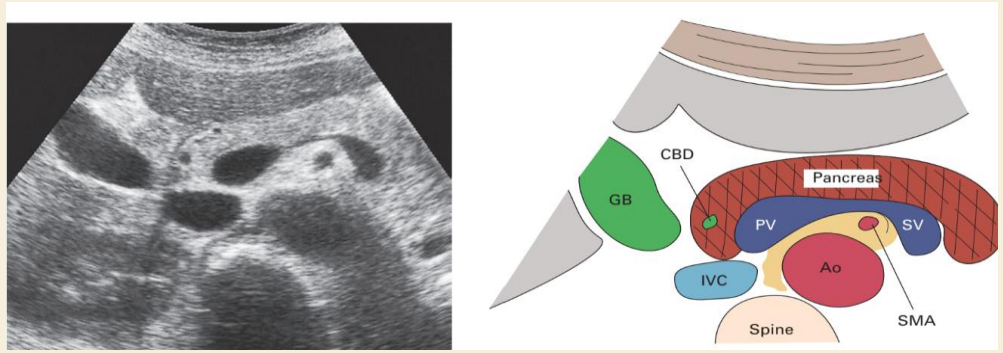
Intrahepatic duct dilatation. A, Transverse ultrasound image of the left lobe of the liver shows a dilated bile duct (long arrow) posterior to a portal vein branch (short arrow). B, Color Doppler ultrasound image shows flow within the portal vein branch. C, Computed tomography image at the axial level.

PANCREAS

- **Computed tomography** is the mainstay for **imaging the pancreas.**
- A **major advantage of CT over transabdominal ultrasound** is that it can image the pancreas **regardless of the amount of bowel adjacent to it.**
- **The splenic vein ,** another very useful landmark. **Lying behind the pancreas,**
- **Atrophy** is a common feature of **ageing.**
- **At ultrasound**, the pancreas gives reasonably **uniform echoes of medium to high level compared with the adjacent liver .**
- **The pancreatic duct** may be seen, with the normal lumen being **no more than 2mm in diameter.**



CT scan of normal pancreas. Note that several sections may be needed to display the pancreas. (a) The head of the pancreas(white arrow) nestling between the second part of the duodenum (D) and the superior mesenteric vessels (SMA and SMV). The uncinate process lies anterior to the inferior vena cava (black arrow). (b) CT scan taken 3cm higher, showing the body and part of the tail (white arrows). Note the splenic vein (black arrow), which lies posterior to the body of the pancreas.



Ultrasound of normal pancreas (transverse scan). Ao, aorta; CBD, common bile duct; GB, gall bladder; IVC, inferior vena cava; PV, portal vein; SMA, superior mesenteric artery; SV, splenic vein.

Pancreatic masses

❖ **Major causes of pancreatic masses**

Malignant causes
• Adenocarcinomas
• Metastases to body of pancreas (e.g. melanoma)

Malignant potential causes
• Neuroendocrine tumours:
– insulinoma
– gastrinoma
– glucagonoma
– VIPoma(vasoactive intestinal peptide)
• Mucinous cystadenomas
• Intraductal papillary mucinous neoplasm

Benign causes
• Serous cystadenomas
• Focal pancreatitis
• Pseudocysts

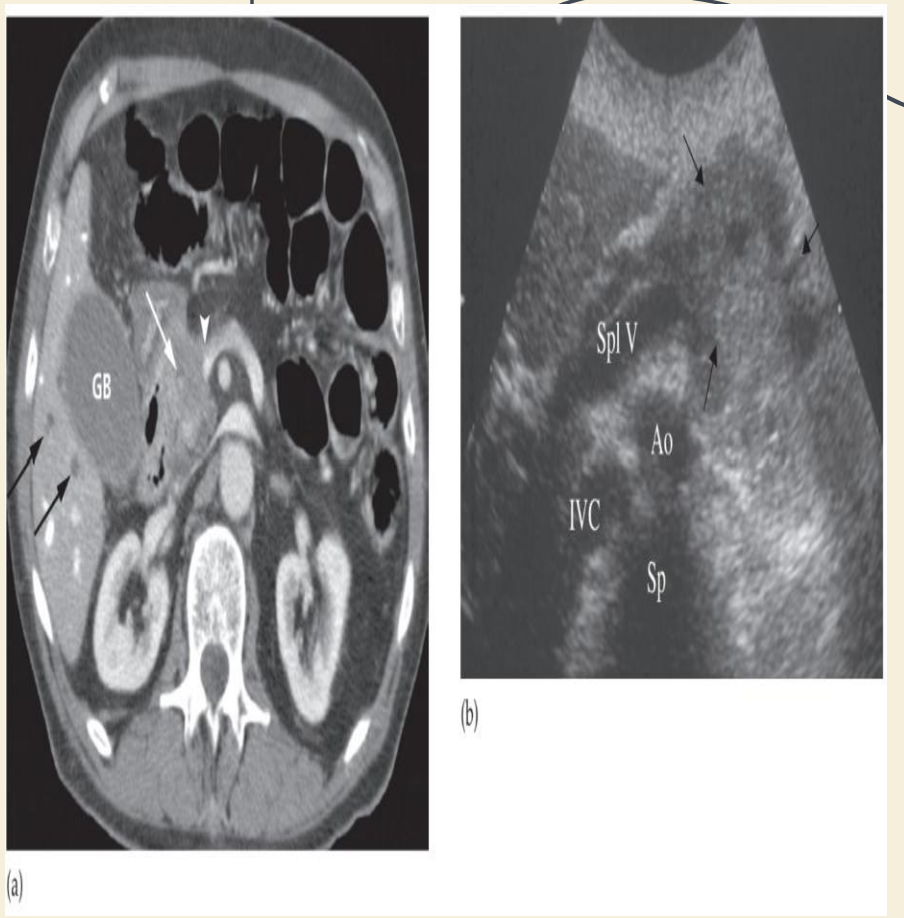
Pancreatic masses

- **Most neoplasms** of the pancreas are **adenocarcinomas,**
- **two-thirds** of which occur in the **head of the pancreas.**
- Tumours arising in the **head may obstruct the common bile duct**, giving rise to jaundice, and are, therefore, sometimes **diagnosed when relatively small.**
- Tumours arising **in the body and tail** have to be **fairly large to give rise to signs** orsymptoms, pain being the cardinal symptom.
- The **important sign of carcinoma of the pancreas** at both CT and ultrasound is, a **focal mass within or deforming** the outline of the gland
- On **contrast-enhanced CT,** the tumour appears of **lower density** compared with the normal pancreatic tissue.
- **The main pancreatic duct** may be **dilated distal to an obstructing** tumour mass and can be identified on all imaging modalities.

➢ **Irresectable tumors at presentation:**

✓ the presence of liver metastases,
✓ lymphadenopathy,
✓ retroperitoneal invasion,
✓ tumour encasement of arteries and veins

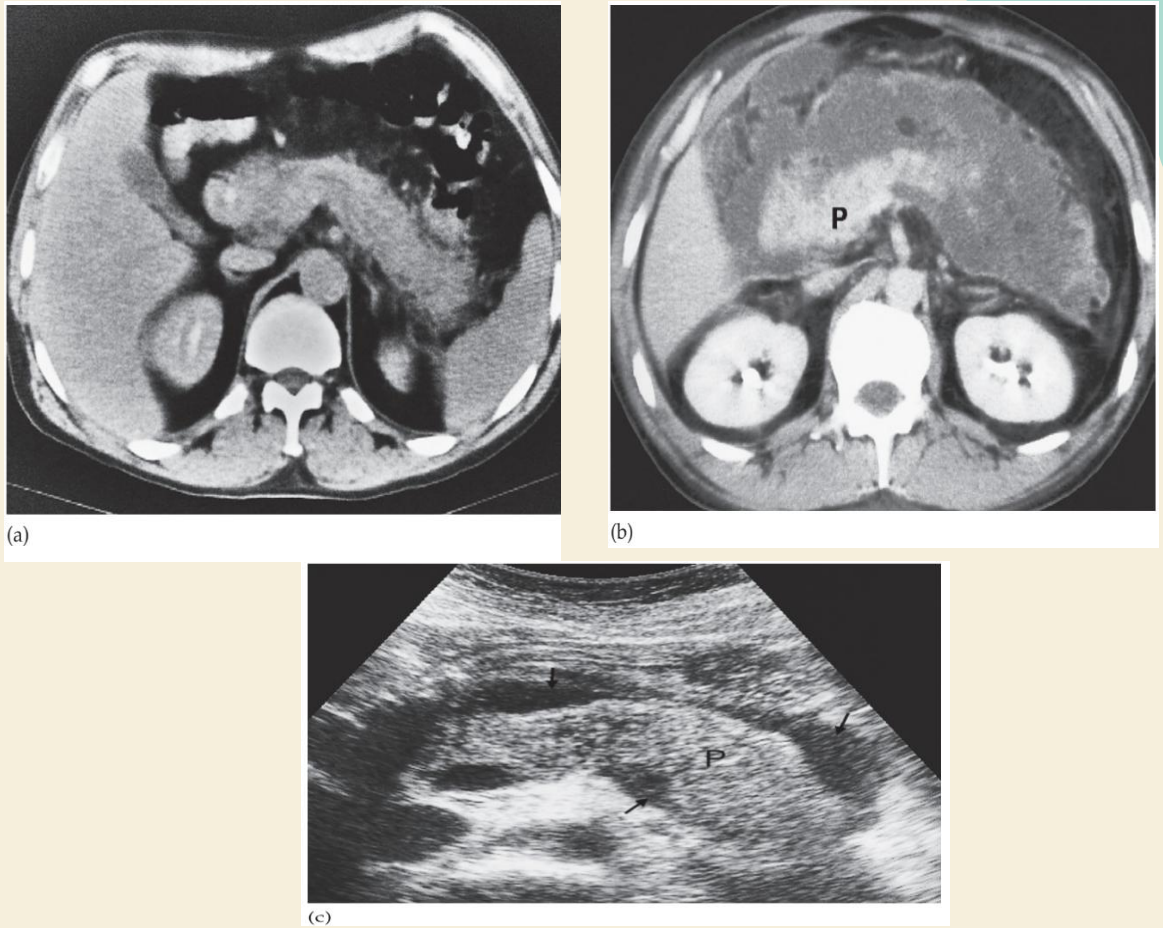
- **The pancreatic neuroendocrine tumours**, of which **insulinoma is the commonest** example, is difficult to detect as they are usually **small and do not deform the** pancreatic contour.
- They may be seen on ultrasound, CT or MRI **as small round hyper vascular masses** within the pancreas .



Carcinoma of the pancreas. (a) CT scan showing a focal mass in the head of the pancreas (white arrow), which involves the portal/mesenteric vein confluence (arrow head) and may preclude curative Note the dilated intrahepatic bile ducts (black arrows) and distended gall bladder (GB). (b)Transverse ultrasound scan showing a large mass in the body of the pancreas (arrows)

Acute pancreatitis

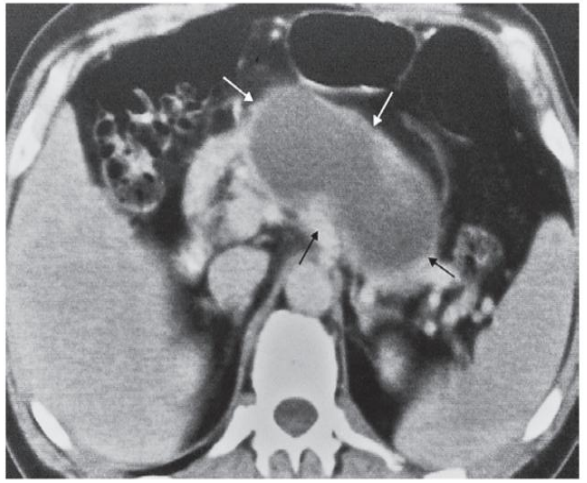
- Acute pancreatitis causes **abdominal pain, fever, vomiting and leucocytosis,** together with **elevation of the serum amylase.**
- **The findings at CT** The pancreas is usually
- ✓ **enlarged**, often diffusely
- ✓ may show **irregularity** of its outline
- ✓ extension of the **inflammatory process into the surrounding** retroperitoneal fat – **features that are well seen at CT.**
- ✓ There may be **low density areas** at CT and **echo-poor areas** at sonography, representing oedema and focal necrosis
- ❑ the purpose of imaging is to **assess the severity** of the disease and to demonstrate **complications:**
- ❖ **necrosis and non-viable** if it does **not enhance** at CT after intravenous contrast.
- ❖ **abscess** appears as a **localized fluid collection**, which may **contain gas.**
- ❖ **Vascular complications** are serious and these include splenic vein thrombosis, arterial erosion and the formation of a pseudoaneurysm.
- ❖ **Pseudocysts formation.**



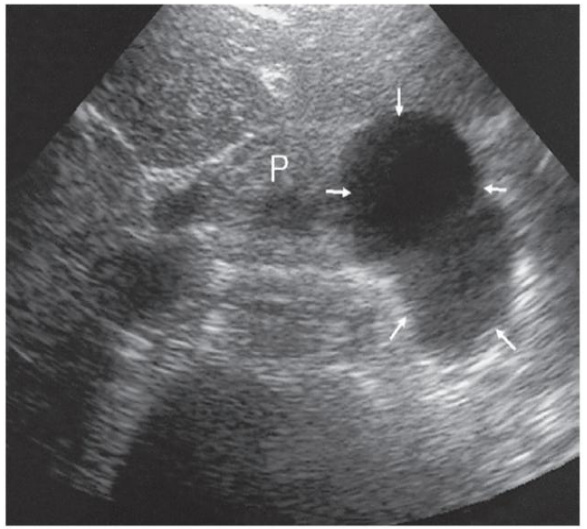
Acute pancreatitis. (a) CT scan showing diffuse enlargement of the pancreas with ill-defined edges. (b) CT scan showing considerable inflammation around the pancreas (P). (c) Transverse ultrasound scan showing a swollen pancreas (P) with some fluid around the pancreas (arrows).

Chronic pancreatitis

- Chronic pancreatitis results in **fibrosis**, **calcifications, and ductal stenoses and dilatations**.
- **Pseudocysts** are seen.
- The calcification in chronic pancreatitis is mainly due to **small calculi within the pancreas**; they are often recognizable on **plain films and CT.**
- the pancreas **may atrophy focally or generally.**
- **Atrophy** is a **non-specific sign**; it is frequently seen in normal **elderly people** and also **occurs distal to a carcinoma.**
- The **pancreatic duct** may be **enlarged and irregular**, a feature that is **visible at CT**, **very well demonstrated with ERCP and MRCP**



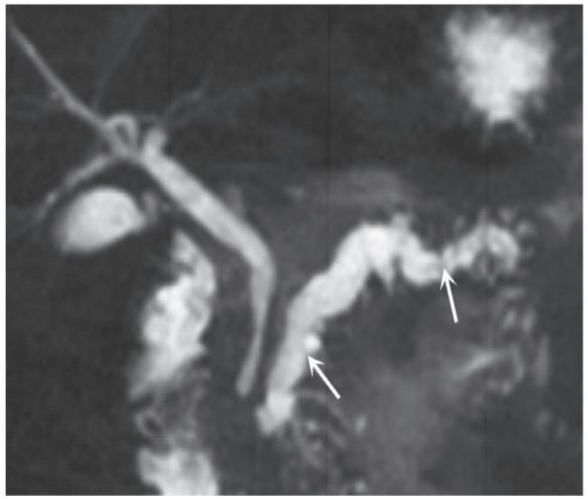
(a)



(b)

Fig. 7.41 Pancreatic pseudocyst. (a) CT scan showing a large cyst arising within the pancreas (arrows). (b) Transverse ultrasound scan. The arrows indicate a pseudocyst arising from the body of the pancreas (P). Same patient as Fig. 7.40c, 6 weeks later.

(a)



(b)

Fig. 7.42 Chronic pancreatitis. (a) CT scan showing numerous small areas of calcification within the pancreas (arrows). (b) MRCP showing a normal biliary duct system but irregular dilatation of the pancreatic duct (arrows).

❖ SPLEEN

- **At ultrasound,** the spleen has a **homogeneous appearance** with the same echo density as the liver. **CT and MRI are excellent** ways to examine the spleen.

❖ **The commonly encountered splenic masses are**

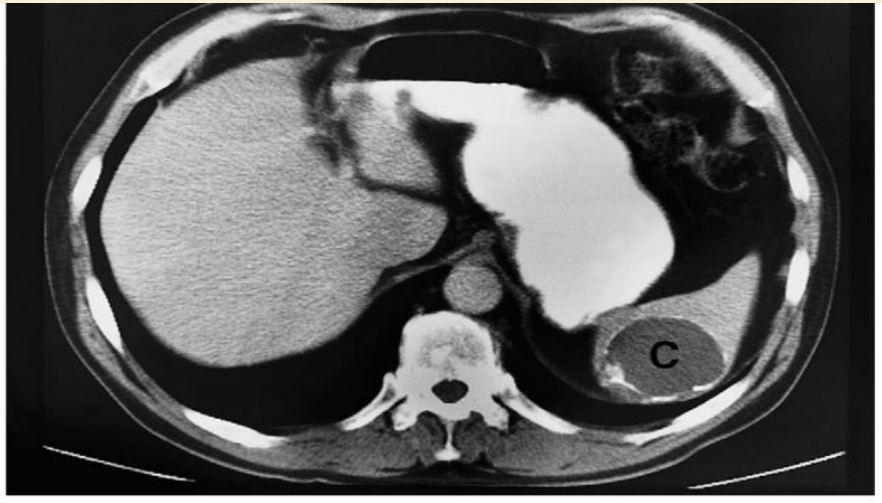
✓ cysts, including hydatid cysts
✓ abscesses
✓ tumours.

- **Lymphomas are much commoner than metastases**, which are rare in the spleen.
- Many conditions **cause enlargement** of the spleen include

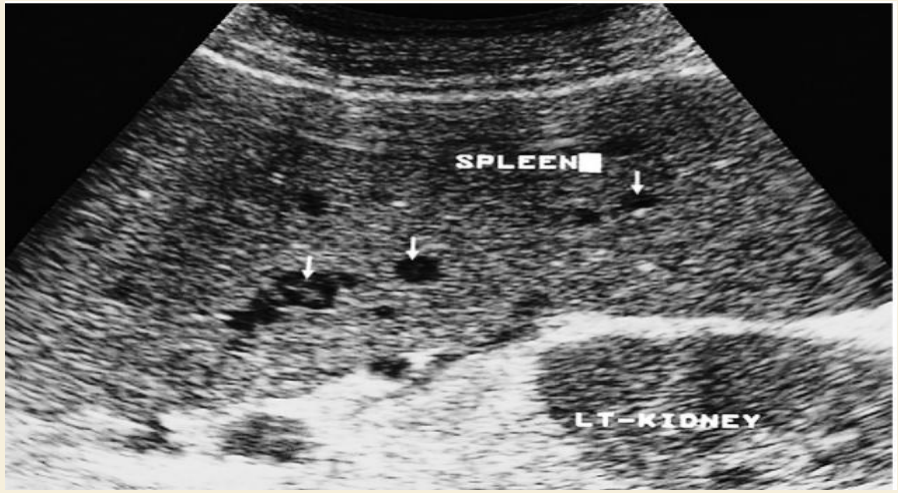
✓ lymphoma,
✓ portal hypertension
✓ Chronic infection
✓ various blood disorders, e.g. haemolytic anaemias and leukaemia.

- As the appearance of the enlarged spleen in all these conditions is similar**, imaging does little except** confirm the presence of **splenomegaly.**
- **Splenic infarction** may occur secondary to **severe pancreatitis, pancreatic carcinoma, sickle cell disease or trauma.**

➢ It is well demonstrated on CT as either **focal or complete loss of normal enhancement following intravenous contrast**



CT scan of a hydatid cyst (C) in the spleen with calcification in its walls.

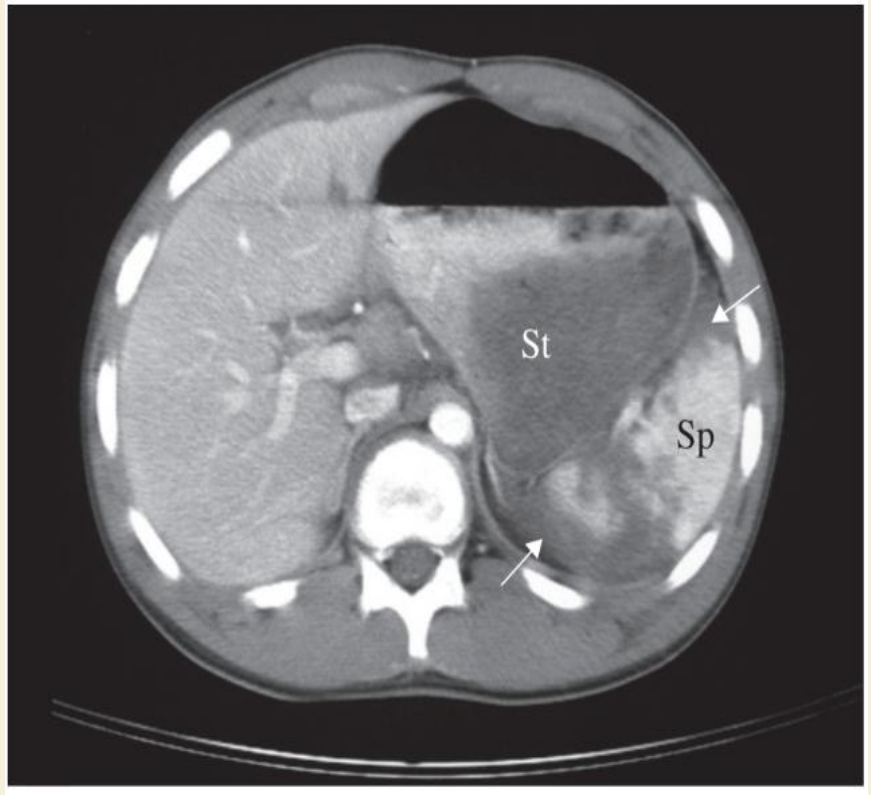


Lymphoma. Ultrasound showing an enlarged spleen with several hypoechoic areas within it; some of these are arrowed.

Splenic trauma

- **The spleen** is the **most commonly injured organ** in blunt abdominal trauma.
- **lacerations**, **contusions** or **haematomas** may result.
- **Rupture** may be delayed until some time after the injury.
- Splenic injury **may be detected by ultrasound**, **but CT is a superior method of investigation**

as not only does it demonstrate better the damage to the spleen, but it can also show **intraperitoneal blood** and visualize **injuries to other abdominal organs**, particularly the adjacent liver and left kidney .



Ruptured spleen on CT. The spleen is shattered with low density blood (arrows) adjacent to the fragments. Sp, spleen;St, stomach.

Take home messages:

1. Most common malignant lesions of the liver is metastasis, which is characterized by multiple variable in size lesions.
2. Liver abscess can differ from liver cyst as the wall is thicker more irregular in abscess ,with hight attenuated central due to debris.
3. MRCP is non invasive non contrast study as compared to ERCP used to evaluate the biliary system, how ever ERCP has the benefit of diagnostic(biopsy from tumour)and therapeutic(stone removal).
4. Acute cholecystitis on imaging characterized by thick wall gall bladder, stone ,surrounded inflammation with pericholecystic collection.
5. Role of the imaging in jaundice ,to evaluate the biliary system, when dilatation is confirmed to know the site and cause of obstruction.
6. Role of imaging in acute pancreatitis' to assess the severity and to know the complication.
7. Chronic pancreatitis on imaging characterized by diffuse calcification, pseudocysts formation, pancreas duct stenosis and dilatation .
8. Spleen is the most common organ to be injured in abdominal trauma ,CT is superior method of investigation.