Radiology Techniques Department

Special Radiological Procedures-1

lecture 9

Computed tomography of the liver and biliary tree

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Computed tomography of the liver and biliary tree

Indications

1. Suspected focal or diffuse liver lesion

2. Abnormal liver-function tests

3. Right upper-quadrant pain or mass

4. Hepatomegaly

5. Assessment of portal vein, hepatic artery or hepatic veins

6. Suspected portal hypertension

7. Pyrexia of unknown origin

8. Characterization of liver lesion

9. Staging known primary or secondary malignancy

10. To facilitate the placement of needles for biopsy

11. Assessment of patients with surgical shunts or transjugular intrahepatic portosystemic shunt (TIPS) procedures

12. Follow-up after surgical resection or liver transplant

Contraindications

The most common contraindications to ionized radiological examination with iv iodinated contrast agent are:

1. Pregnancy

2. Allergy to iodinated contrast agents

3. renal impairment

Technique

* The **portal vein** **(hepatic portal vein)** is a blood vessel that carries blood from the gastrointestinal tract, gallbladder, pancreas and spleen to the liver. This blood contains nutrients and toxins extracted from digested contents.

*Approximately **75%** of total liver blood flow is through the **portal vein**, with the **remainder** about **25%** coming from the **hepatic artery**.

*The blood leaves the liver to the heart in the hepatic veins.

Single-phase (portal phase) contrast-enhanced computed tomography

1. This is the technique for the majority of routine liver CT imaging.
2. The liver is imaged during the **peak of parenchymal enhancement** around **60–70 s** after the start of a bolus injection.
3. **Slice thickness** will depend upon the CT scanner specification but should be **5 mm or less**.

Multiphasic contrast-enhanced computed tomography (dynamic study)

1. The fast imaging times of helical/multislice CT enable the liver to be scanned **multiple times** after a single bolus injection of contrast medium.
2. **Most primary liver tumours *receive*** their blood supply from the hepatic artery. unlike **normal hepatic parenchyma**, which receives about **75%** of its blood supply from the **portal vein**.

Most important phase of contrast-enhanced liver CT are (Triphasic or triple phase):

1. **Early arterial phase** (**15-25 seconds** time from injection)
2. **portal phase (60-70 seconds** time from injection**)**
3. **delayed phase (3 minutes** time from injection**)**

* Some centres, use a **late arterial phase** **35-40 seconds** time from injection where 35 sec is the optimal time (quadruple phase).

*Liver tumours (particularly hypervascular tumours) will therefore enhance strongly during **the arterial phase** due to most primary liver tumours receive their blood supply from **the hepatic artery**.

*Some tumours are visible during early-phase arterial scanning and others during the late arterial phase **35 s** after the start of a bolus injection (Fig 6).

*In general, late arterial and portal venous scans are appropriate to investigate suspected hypervascular metastases.

*Some centres, use a 'delayed' phase scan at **3 min** to help identify and characterize primary liver tumours.

***Haemangiomas** often show a characteristic peripheral discontinuous nodular enhancement and progressive centripetal 'fill-in'. After the initial dual- or triple-phase protocol, delayed images at **5 min** for **small lesion** and **10 min** for **large lesion.**

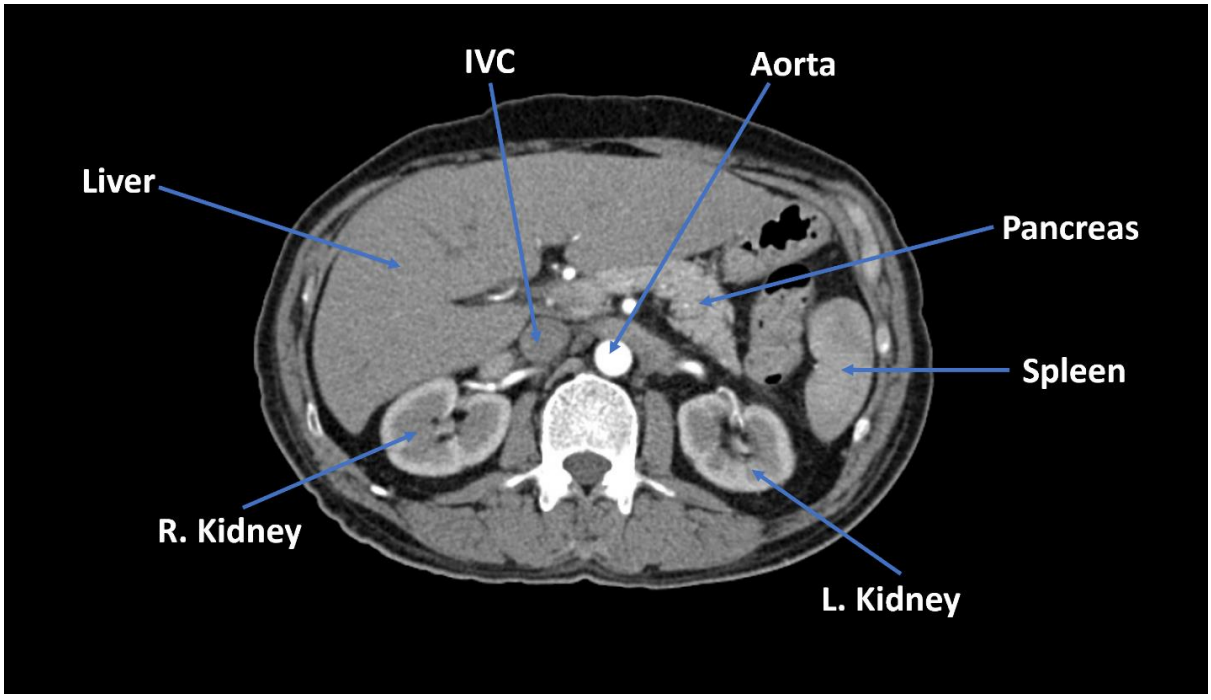

Figure (1). Normal liver CT

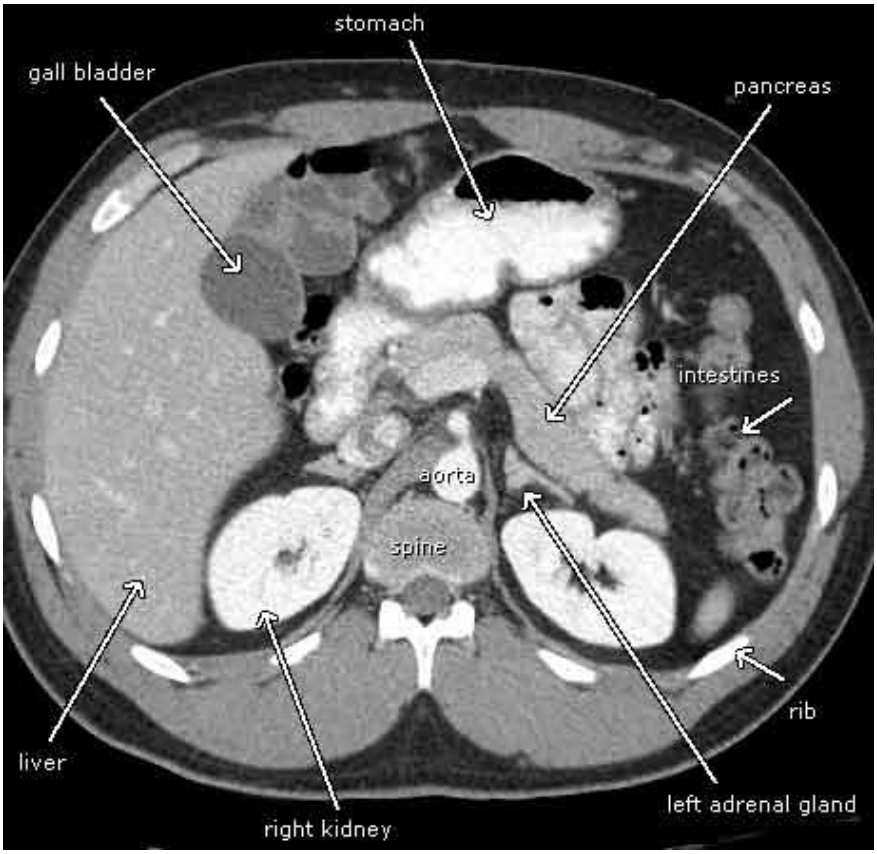

Figure (2). Normal liver CT

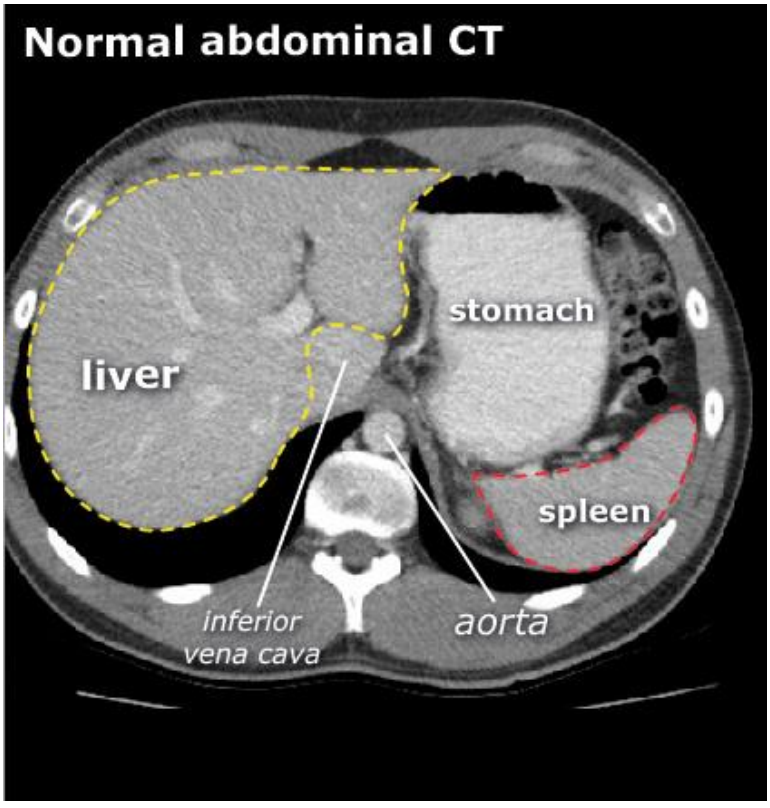

Figure (3). Normal liver CT

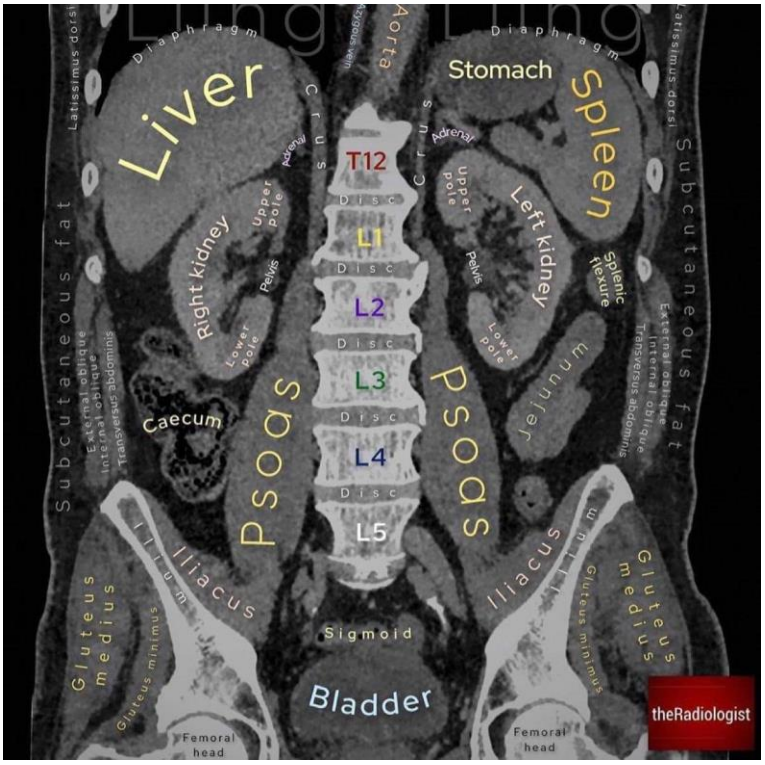

Figure (4). Normal liver CT

Figure (5). Normal liver CT

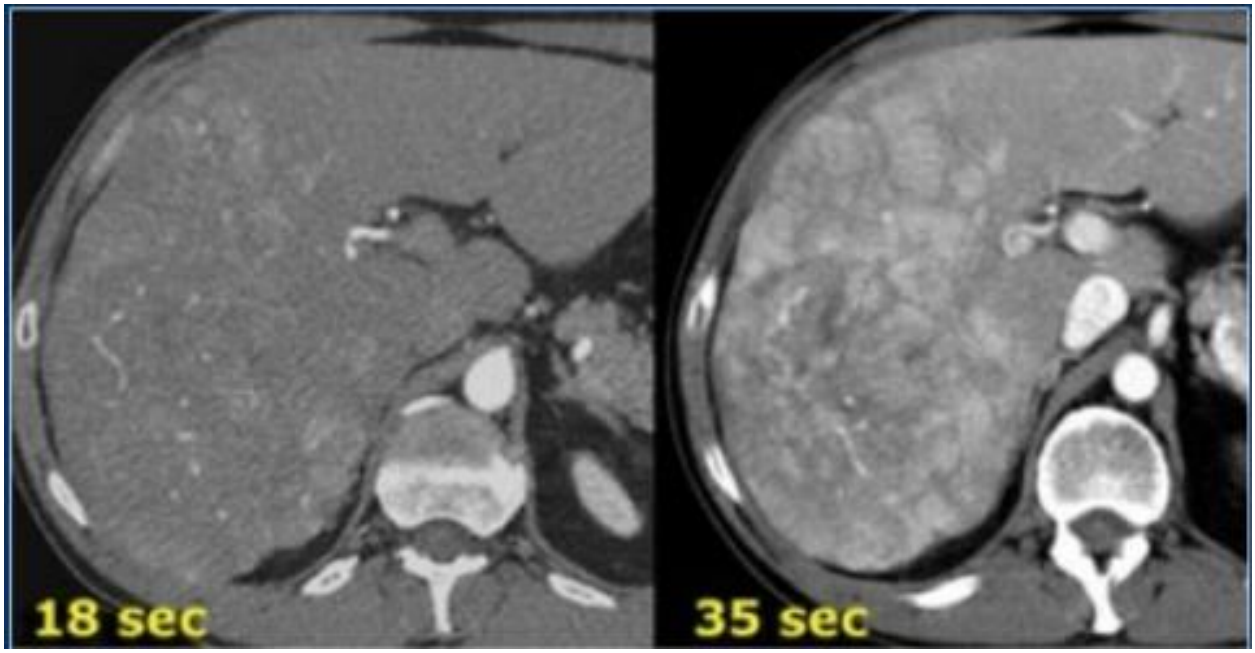

Figure (6). Hypervascular lesion is seen in late arterial phase.

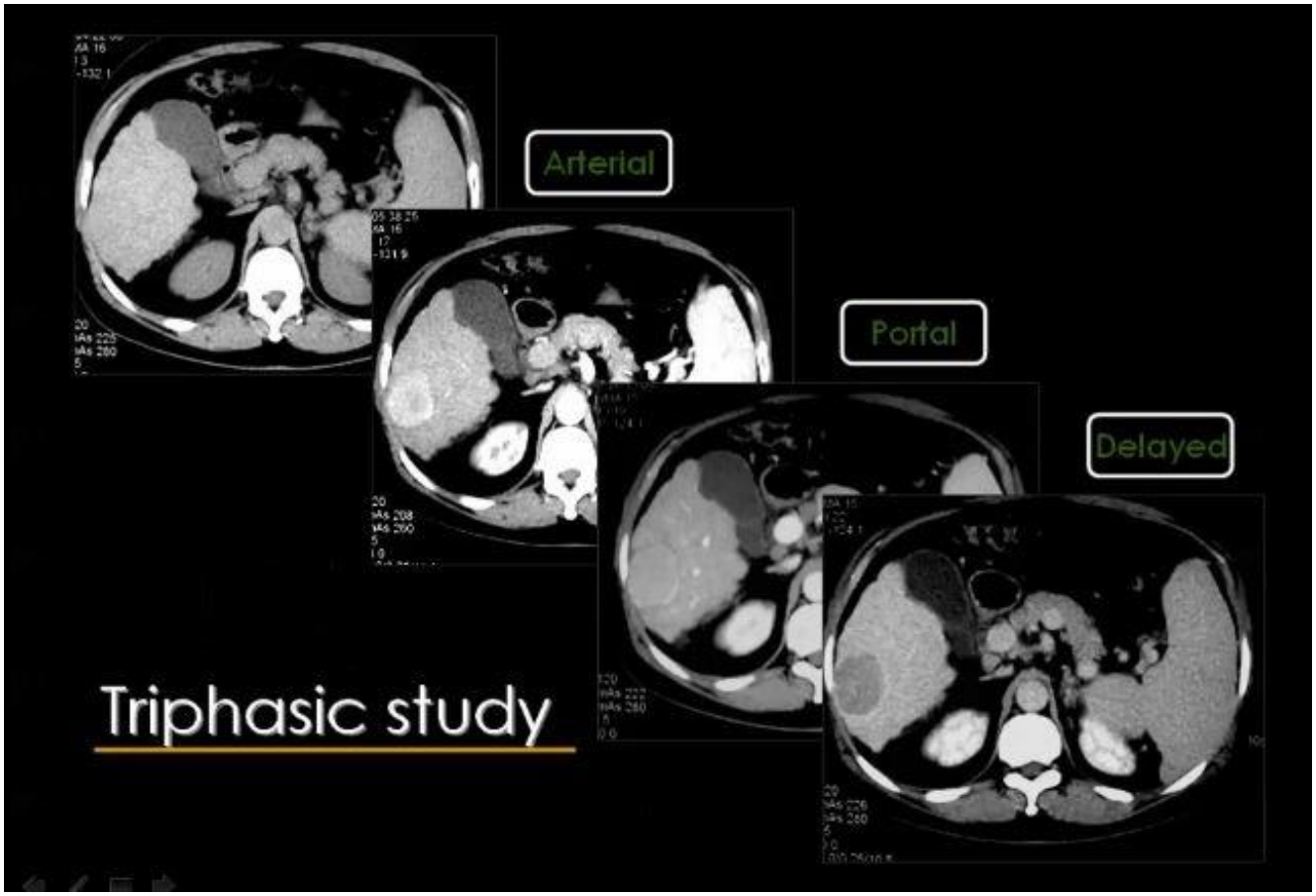

Figure (7). Triphasic of contrast liver CT