



ORIGINAL RESEARCH PAPER

Radiodiagnosis

CHARACTERISATION OF FOCAL LIVER LESIONS WITH TRIPHASIC COMPUTED TOMOGRAPHY OF LIVER

KEY WORDS: Triphasic CT, hydatid cyst, hemangioma, HCC

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ABSTRACT

To evaluate the diagnostic role of enhancement pattern of focal liver lesions on triphasic computed tomography in different phases- arterial, portal and delayed. Triphasic spiral liver CT is a standardized CT procedure which enables the detection and characterization of a large variety of liver lesions. Multidetector Triple phase CT allows highly precise imaging during the arterial, venous, and delayed phases of hepatic enhancement. Optimal acquisition timing, in combination with thinner collimation, permits improved lesion detection and will also show improved characterization of lesions.

INTRODUCTION

The liver has a dual blood supply (75% portal venous, 25% hepatic arterial) due to which multiphase helical computed tomography (CT) is a highly suitable technique for hepatic evaluation with imaging in two (arterial and portal venous) or more phases. Multiphase helical CT has become an essential tool in the detection and characterization of liver tumors.^[1]

Presently helical computed tomography (CT) is the modality of choice in imaging for evaluation of the liver and the detection of liver lesions.^[2]

Triphasic helical CT allows for more accurate detection and characterization of focal liver lesions. Triple phase CT acquire separate series during the hepatic arterial-dominant, and portal venous- dominant phases add a temporal hemodynamic component to the morphological depiction of tumors.^[3] Optimal acquisition timing, along with thinner collimation permits improved lesion detection and characterization of lesions.^[4]

AIMS AND OBJECTIVES

To evaluate the diagnostic role of enhancement pattern of focal liver lesions on triphasic computed tomography in different phases- arterial, portal and delayed.

MATERIAL AND METHODS

Our study included 50 patients with focal liver lesions who are subjected to triple-phase CT, presented to the department of radiodiagnosis and imaging, which included outpatients and inpatients patients of Government general hospital, Kurnool medical college, Kurnool. In our study, Triphasic CT of the liver is performed on fifty non-consecutive patients age ranging from 19 years to 80 years, with clinically suspected liver disease or previous imaging studies depicted liver lesions.

The diagnosis of liver lesions is diagnosed based on classical enhancement patterns in triple-phase CT. Histopathology /Microbiology correlation is done wherever necessary. The detection of multiple lesions with similar CT features in the presence of histologically proven tumor was consistent with metastatic disease. Only one lesion per patient was analyzed. In patients with multiple lesions, the dominant lesion (based on size) or a characteristic lesion (when no dominant lesion was apparent) is analyzed.

TECHNIQUE

Patients are kept nil orally 4 hours before CT scan to avoid complications while administrating contrast medium. Risks of contrast administration were explained to the patient, and consent was obtained prior to the contrast study.

Triple-phase helical CT images of the liver are obtained with General Electrical (GE) Bright Speed Elite 16 slices MDCT machine with 5-mm collimation, 1.25-mm reconstruction interval, the gantry rotation speed of 0.98 seconds, the pitch of 1.675:1, 120 kV, and 220 mA. Once unenhanced helical CT had been performed through the entire abdomen, 80 to 100 mL of iodinated contrast was injected intravenously through a 20-gauge cannula at a rate of 3 mL/sec with an automated power injector. For the arterial-dominant phase, the delay between the start of contrast material administration and helical scanning is 20 seconds. The portal-dominant phase is obtained after 70 seconds and the delayed phase after 180 seconds.

RESULTS AND DISCUSSION

The diagnosis of liver lesions is diagnosed based on classical enhancement patterns in triple-phase CT. Histopathology / Microbiology correlation is done wherever necessary. The detection of multiple lesions with similar CT features in the presence of histologically proven tumour was consistent with metastatic disease.

Diseases diagnosed by Triphasic CT of the liver based on their enhancement patterns on the arterial, venous and delayed phases of post-contrast study included four cases of simple cysts (8 %), nine hepatocellular carcinoma (18%), eleven hydatid cysts (22%), seven liver abscesses (14 %), ten haemangiomas (20 %), six liver metastases (12%) from a primary elsewhere in the body, one intrahepatic cholangiocarcinoma (2%). Two cases (4 %) could not be characterized, and biopsy of the lesions revealed giant hemangioma and metastasis.

The maximum incidence of focal liver lesions in our study is seen among the patients aged 50 years and above which showed similarity with Shrestha Jain et al.^[5]

Age distribution of focal liver lesions in percentages include 16(19-30y), 16(31-40y), 28(41-50y), 40(>50y).

Male predominance (68%) is observed in our study which coincided with studies of Shreshtha Jain et al^[5] and Ahirwar CP et al^[6]. Appearance of lesions on unenhanced CT are classified as hypodense (54%), hypodense with peripheral calcifications (16%), isodense (20%) and heterogenous (10%) In our study, 18 (36 %) lesions showed no contrast enhancement, 3 metastasis, 4 simple cysts, and 11 hydatid cysts. 32 patients showed contrast enhancement in various patterns on triple-phase CT which included the following [Table no.1]

5. Ahirwar CP, Patil A, Soni N. Role of triple-phase computed tomography findings for evaluation of hepatic lesions. International Journal of Research in Medical Sciences. 2016 Aug;4(8):3576.
6. JAIN S, KHANDURI S, SHAH JK, YADAV P, KRISHNAM A. Role of MDCT in Detection and Characterisation of Focal Liver Lesions. Journal of Clinical & Diagnostic Research. 2019 May 1;13(5).

Table 1: Enhancement Pattern Of Hepatic Lesions On Triphasic CT Scan

Arterial/Venous/Delayed	Lesion	No of Patients
Hypo/hypo/hypo	Simple Cysts	4
	Hydatid Cysts	11
	Metastases	3
	Total	18
Hyper/hypo/hypo	Hepatocellular Carcinoma	5
Hyper/Hyper/hypo	Metastases	4
Hyper/iso/hypo	Hepatocellular Carcinoma	3
Iso/hyper/iso	Hepatocellular carcinoma	1
Hyper(rim)/hyper(rim)/hyper(rim)	Abscess	7
Hyper/hyper/hyper	Typical Haemangioma	8
Iso/hyper/hyper	Atypical Haemangioma	2
Nodular hyper(rim)/Nodular hyper(rim)/Nodular hyper (rim)	Atypical haemangioma	1
Iso/hyper(rim)/hyper(rim)	Intra hepatic cholangio Carcinoma	1

The most common lesions in the liver are benign lesions. Hydatid cysts are most common among benign lesions in our study probably due to endemicity. The peripheral nodular enhancement pattern in the arterial phase with the centripetal filling of contrast is associated with the diagnoses of hemangioma with PPV of 90.9%. The most common malignant lesions are Hepatocellular carcinomas, followed by metastasis. Abnormal internal vessels or variegated pattern of enhancement is associated with a diagnosis of HCC with PPV of 100 %. Portal vein involvement is present in 44.4% of cases of HCC in our study.

Histopathological/microbiological confirmation was done in 32 patients. The proven lesions are 8 hydatid cysts, 6 metastases, 9 HCC's, 7 abscesses, and 2 indeterminate lesions turned out to be hemangioma and metastasis from mesothelioma.

CONCLUSION:

Triphasic spiral liver CT is a standardized CT procedure which enables the detection and characterization of a large variety of liver lesions. Multidetector Triple phase CT allows highly precise imaging during the arterial, venous, and delayed phases of hepatic enhancement. Optimal acquisition timing, in combination with thinner collimation, permits improved lesion detection and will also show improved characterization of lesions.

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