International Surgery Journal
Sonarkar R et al. Int Surg J. 2021 Jan;8(1):159-164
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20205874

Original Research Article

Space occupying lesions of liver- clinical presentation, investigations and management: a longitudinal study

Rajiv Sonarkar, Giriraj Gajendra*, T. R. V. Wilkinson, Shreyas Sonawane

Department of Surgery, NKP Salve Institute of Medical Sciences, Nagpur, Maharashtra, India

Received: 17 October 2020
Revised: 02 December 2020
Accepted: 03 December 2020

***Correspondence:**
Dr. Giriraj Gajendra,
E-mail: girirajgajendra@gmail.com

ABSTRACT

Background: Liver is a common site for space occupying lesions. The objective of this study was to determine the aetiologies of space occupying lesion of liver and their clinical presentation and correlate imaging; to evaluate the treatment modalities of space occupying lesion of liver and their outcome.
Methods: A 2-year tertiary care teaching hospital based longitudinal study with 63 patients was done. Selection criteria was defined and a prestructured proforma was made to assess and note the findings.
Results: The mean age of occurrence of space occupying lesions of liver was 47.19±14.53 years. Space occupying lesions of liver was commonly observed in 5th decade of life. Males were affected more than females. Metastatic lesion of liver were the most common cause of liver SOL (34.9%) followed by liver abscesses.
Conclusions: Majority of space occupying lesions are metastatic lesion followed by liver abscesses. Majority of space occupying lesions were surgically managed.

Keywords: Benign liver lesions, Liver abscess, Liver imaging, Malignant liver lesions, Space occupying lesion

INTRODUCTION

Liver is a common site for space occupying lesions. There various aetiologies for space occupying lesion of liver and these are classified into developmental, neoplastic, inflammatory and miscellaneous; and these may or may not be manifested with symptoms. Space occupying lesions of liver occur frequently thus clinicians interested in liver diseases should have a thorough understanding of their presentations, diagnosis and treatment. The various SOL liver occur frequently and varies in different geographic regions and different populations.

In most part of the world, metastatic lesion of liver and liver abscess are the common causes of SOL liver. Hepatic metastasis are common than primary malignant tumors of liver and colorectal malignancy is the most common primary of majority of the liver metastasis. Liver abscesses are the most important cause of morbidity and mortality in tropical countries; there are various mode of treatment of liver abscess i.e. medical, aspiration and pigtail catheter drainage under ultrasound guidance.

Modern imaging techniques have led to the recognition of various SOL liver and also some incidental lesion in asymptomatic patients. Ultrasound has proved to be very important diagnostic and therapeutic aid in the field of liver diseases. Its flexibility, easy availability, non-invasive and lack of dependence on organ function makes it most ideal for imaging the liver.[1] Computed tomography (CT) considered important imaging investigation has high sensitivity and specificity as compared to ultrasound for detecting SOL liver.[2]

With this view in mind, we studied to evaluate the various aetiologies of SOL liver and to study their clinical presentation, investigations and different management.

METHODS

The present study was carried out in tertiary care academic hospital from November 2017 to October 2019. A total of 63 cases were recruited in this study on accrual basis as per inclusion and exclusion criteria.

Inclusion criteria

Patients, whether symptomatic or asymptomatic, clinically suspected or detected on imaging and diagnosed as having space occupying lesion of liver; both gender and >18 years of age.

Exclusion criteria

Patient not consenting to participate in study due to financial or personal reason or for any procedure.

Study design

This was an observational analytical study.

Study population

All patients presenting in the NKP Salve Institute of Medical Sciences and Lata Mangeshkar Hospital, Nagpur Surgery out patient department with pain in right upper abdomen, lump in right upper abdomen or asymptomatic patients undergoing ultrasound abdomen.

Statistical analysis

The data on categorical variables was shown as n (% of cases) and the data on continuous variables was presented as mean and standard deviation (SD). The inter-group statistical comparison of distribution of categorical variables was done using Chi-Square test or Fisher's exact probability test. The statistical agreement between two diagnostic methods was tested using Cohen-kappa technique. The diagnostic efficacy indices such as sensitivity, specificity, positive predictive (PPV), negative predictive value (NPV) and accuracy was calculated using appropriate gold standard. All results are shown in tabular as well as graphical format to visualize the statistically significant difference more clearly.

RESULTS

A total number of 63 patients fulfilling the inclusion and exclusion criteria were enrolled prospectively. The results of the study are as follows.

The mean age of occurrence of space occupying lesions of liver was 47.19±14.53 years with a range from 21 years to 80 years. Majority of the patients were between 31-60 years of age i.e. 66.7%. Of the 63 patients 36 (57.1%) were male and 27 (42.9%) were female. Metastatic lesion of liver was seen in mean age of 59 years i.e. 6th decade of life whereas liver abscess was mainly seen in mean age of 41.3 years. Hydatid cyst of liver, out of 6 cases out of 5 (83.33%) occur in 5th decade of life. Of the 63 patients enrolled 36 (57.1%) were male and 27 (42.9%) were female. The male to female gender ratio in the entire study was 1.33:1.00. In metastatic lesion of liver patients M:F=1:1, liver abscess M:F=3.4:1. While benign liver SOL M:F ratio was 1:6. In this study, 48 (76.2%) patients of space occupying lesion of liver had pain in right upper abdomen, while some diagnosed malignancy case with metastatic lesion of liver 45.45% patients had pain in abdomen while 95% patients of liver abscess had pain in abdomen. 19 (30.2%) patients of space occupying lesion of liver presented with fever in which 95% were diagnosed to have liver abscess. 7 patients of liver SOL had icterus, of which 4.7% were diagnosed with liver abscess while 22.72% patients of metastatic lesion of liver had icterus. In this study 54.0% patients had hepatomegaly, 68.18% of them had diagnosed with metastatic lesion of liver while 70.5% patients of liver abscess had hepatomegaly.

Table 1: Distribution of lesions in space occupying lesions of liver.

Final diagnosis	No. of cases	Percentage
Simple hepatic cyst	3	4.8
Hydatid cyst of liver	6	9.5
Hepatic abscess	21	33.3
Benign liver SOL	7	11.1
Malignant (primary HCC)	4	6.3
Malignant (metastatic)	22	34.9
Total	63	100.0

On haematological and biochemical investigations; 27 patients had raised total leucocyte count, in which 95.3% patients had liver abscess. 12 patients had raised serum bilirubin, in which 40.9% diagnosed with metastatic lesion of liver while 4.7% cases of liver abscess had raised serum bilirubin. Of 63 cases patients, 12 patients had raised alkaline phosphatase, in which 31.8% had metastatic lesion of liver and 14.2% diagnosed with liver abscess.

Primary malignancy of liver secondaries

In present study majority of the patients were of liver secondaries (34.9%). Carcinoma breast was most common primary for liver secondaries i.e. 40.8% followed by 27.2% followed by colorectal carcinoma in 27.2% patients. 9.5% had periampullary carcinoma.

Correlation between ultrasonography and computed tomography

All 63 cases ultrasonography was done in which, 27 (42.8%) had hepatic abscess, 25 (39.7%) had malignant findings, 6 (9.5%) had hydatid cyst of liver, 3 (4.8%) had benign liver SOL, 2 (3.2%) had simple hepatic cyst and 5 (7.9%) had normal USG. Of 63 cases studied 49 patients contrast CT abdomen was done in which, 24 (38.1%) had malignancy (primary and secondaries lesion of liver), 10

(15.9%) had hepatic abscess, 7 (11.1%) had benign liver sol, 6 (9.5%) had hydatid cyst of liver, 2 (3.2%) had simple hepatic cyst and 14 (22.2%) did not have CT.

Considering CT as a gold standard due to high sensitivity and specificity, CT findings were compared with USG abdomen findings. The correlation are as follows: Of 2 cases with simple hepatic cyst on CT, 1 (50.0%) had simple hepatic cyst on USG and 1 (50.0%) had malignancy on USG. Of 6 cases with hydatid cyst of liver on CT, 6 (100.0%) had hydatid cyst of liver on USG. Of 10 cases with hepatic abscess on CT, 9 (90.0%) had hepatic abscess and 1 (10.0%) had malignancy on USG.

Of 5 cases with benign liver SOL on CT, 2 (28.6%) had normal USG, 3 (42.9%) had benign liver SOL and 2 (28.6%) had malignancy on USG. Of 5 cases with benign liver SOL on CT/MRI, 2 (28.6%) had normal USG, 3 (42.9%) had benign liver SOL and 2 (28.6%) had malignancy on USG. Of 21 cases with malignancy on CT, 3 (12.5%) had normal USG, 1 (4.2%) had hepatic abscess and 20 (83.3%) had malignancy on USG. Findings on USG showed statistically significant association with the findings on CT/MRI with (p value<0.001) (Table 2).

Table 2: Distribution of USG findings according to CT findings in the study group (n=44, common cases on whom USG and CT done).

	CT findings										
	Simple hepatic cyst		Hydatid cyst of liver		Hepatic abscess		Benign liver SOL		Malignant		P value
USG findings	n	%	n	%	n	%	n	%	n	%	
Normal	0	0.0	0	0.0	0	0.0	2	28.6	3	12.5	0.001***
Simple hepatic cyst	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0	
Hydatid cyst of liver	0	0.0	6	100.0	0	0.0	0	0.0	0	0.0	
Hepatic abscess	0	0.0	0	0.0	9	90.0	0	0.0	1	4.2	
Benign liver SOL	0	0.0	0	0.0	0	0.0	3	42.9	0	0.0	
Malignant	1	50.0	0	0.0	1	10.0	2	28.6	20	83.3	
Total	2	100.0	6	100.0	10	100.0	5	100.0	21	100.0	

Values are n (% of cases), p value by Chi-Square test. P value<0.05 is considered to be statistically significant. ***P value<0.001

iagnostic efficacy indices of USG against CT

Considering CT as a gold standard due to high sensitivity and specificity, CT findings were compared with USG abdomen findings. The correlation are as follows:

USG showed relatively higher accuracy (perfect agreement) for hydatid cyst of liver diagnosis against CT as a gold standard (accuracy of 100.0%).

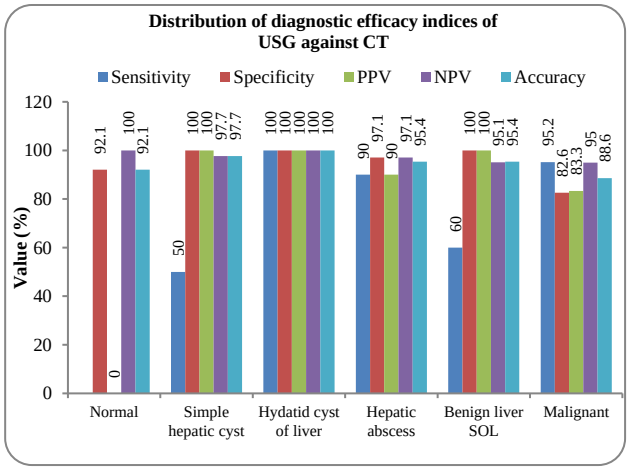

Figure 1: Distribution of diagnostic efficacy indices of USG against CT as a gold standard.

USG showed relatively lower accuracy for malignancy diagnosis against CT as a gold standard (accuracy of 88.6%) (Figure 1).

Management of space occupying lesion of liver

Simple hepatic cyst

Total 3 cases diagnosed with simple hepatic cyst on imaging studies, 2 (66.7%) managed conservatively and 1 (33.3%) managed by surgery. One of total 3 cases diagnosed with simple hepatic cyst on imaging studies cyst patient was symptomatic and on imaging had a large volume cyst in liver, hydatid cyst of liver was ruled out by serology and patients was managed by laparoscopic cyst evacuation.

Hydatid cyst of liver

Total 6 cases diagnosed with hydatid cyst of liver on imaging studies, 5 (83.3%) managed by open cyst evacuation and 1 (16.7%) managed laparoscopically. One patient was treated by laparoscopic cyst evacuation, this patient had postoperative complication of bile leak which was managed conservatively and bile leak resolved over a period of 10 days.

Liver abscess

Of 21 cases studied with liver abscess, 8 (38.1%) had aspiration, 10 (47.6%) had pigtail catheterization, 3 (14.3%) had both types of treatment given. Aspiration was done in mean volume of 84.6cc, pigtail was done in mean volume of 326 cc and both procedure was done in mean volume of 450 cc. Mean volume reduction in aspiration group was 65.37±23.49 over a mean hospital stay of 10.5 days. Pigtail catheter group patient volume reduction was 76.58%±16.74 over mean hospital stay of 11.3 days. And both aspiration + pigtail group had mean volume reduction of 90.33±5.51 over a period of 14.6 days.

Distribution of mean % volume reduction did not differ significantly across three treatment groups of hepatic abscess (p value >0.05). But clinically significant because large volume abscess cavity drained by both pigtail and aspiration under ultrasound guided had almost similar hospital compared to other group (Table 3).

Table 3: Inter-group comparison of mean percent volume reduction according to treatment of hepatic abscess.

Volume reduction (%)	Aspiration (n=8)	Pigtail catheterization (n=10)	Both (n=3)	P-value (inter-group)
	Mean±SD	**Mean±SD**	**Mean±SD**	
Volume reduction (%)	65.37±23.49	76.58±16.74	90.33±5.51	0.159^{NS}

Values are mean and SD, P-value by analysis of variance (ANOVA). P-value<0.05 is considered to be statistically significant. NS-Statistically non-significant.

Metastatic lesion of liver (liver secondaries)

In present study most cases were present of liver secondaries. And most common primary of liver secondary was carcinoma breast therefore palliative chemotherapy was started after which some patients underwent palliative surgery. Other cases were referred outside as hepatic resection facility was not available in institute.

DISCUSSION

Traditionally, definitive diagnosis of space occupying lesions of liver is done by imaging data provided by ultrasonography, laparoscopy or computed tomography**.** Computed tomography is considered a gold standard imaging investigation due to high sensitivity and specificity for diagnosis of space occupying lesions of liver. Liver biopsy is gold standard investigation of most of the liver diseases but biopsy is unnecessary for diagnosis if adequate laboratory, clinical and imaging data are available.[3] In present study , we have enrolled 63 cases of space occupying lesions of liver and observed the following parameters and compared with standard literature.

Distribution of space occupying lesions of liver in this study

In this present series, metastatic lesions of liver were found to be the most frequent which comprised of 34.9% of total cases followed by liver abscess which was found in 33.3%. Frequency of hydatid cyst of liver was 9.5%, other lesion encountered in this study were simple hepatic cyst (4.8%), benign liver SOL (11.1%), hepatocellular carcinoma (6.3%). Various author have done similar studies whose findings are shown below.

Simple hepatic cyst

In present study mean age of simple hepatic cyst was 49.3 years. Most commonly seen in 7th decade of life. Study done by Eva-Maria et al, Abou-Shady et al and Dardik mean age were 64.7, 48 and 66.5 years of age respectively.[4-6] Abou-Shady et al observations was similar with present study.[5]

Hydatid cyst of liver

In present study mean age of hydatid cyst was 51 years, most commonly seen in 5th and 6th decade life Jawed et al, Palanivelu et al and Ezer et al studies shown mean age 36.52, 38.6 and 52.5 year.[7-9] Most of the studies showed hydatid cyst was seen in 4th decade of life.

Liver abscess

In present study the frequency of liver abscess is maximum in 5th decade of life. Jayakar et al and Christopher et al also had shown similar results.[10,11]

Metastatic lesions of liver

In present study mean age metastatic lesions was 59 years of age and commonly lesions diagnosed in 6th decade of life. Sheefa et al and Edris et al shown mean age of 55.5, 57.7 and 59.4 years similar to present study.[12,13]

Primary hepatocellular carcinoma

In present study 4 cases of primary hepatocellular carcinoma were diagnosed in 6th decade of life. According to our results, it shows that there is an association between the age of patients and developing hepatic cancer, with most cancer associated with age group of 6th and 7th decade of life. According to

American Cancer Society, the average age at diagnosis of liver cancer is 63. More than 95% of people diagnosed with liver cancer are 45 years of age.

Correlation of ultrasonography and computed tomography

In present study USG showed relatively higher accuracy for hydatid cyst of liver diagnosis against CT as a gold standard (accuracy of 100.0%). Similar results were seen in Hima et al, it also showed high diagnostic accuracy of USG for hydatid cyst of liver.[14]

In present study the sensitivity and specificity of USG for hepatic cyst was 50.0% and 100.0% respectively. Almost similar results were seen with Vishwanath et al showed 40.00% and 99.00%.[15] But in other study Patel et al showed sensitivity and specificity 100% and 98.55%.[16] Hima et al showed sensitivity and specificity 98.0% and 100% respectively.[14]

In present study the sensitivity and specificity of USG for hydatid cyst was 100.0% and 100.0% respectively. Hima et al showed almost similar results sensitivity and specificity of 92.3% and 100.00% respectively.[14] Vishwanath et al showed results sensitivity and specificity of 75% and 98.00% respectively.[15]

In present study the sensitivity and specificity of USG for hepatic abscess was 90.0% and 97.10% respectively. Patel et al showed almost similar sensitivity and specificity 94.6% and 95% respectively.[16]

In present study the sensitivity and specificity of USG for Malignancy was 95.2% and 82.6% respectively. Vishwanath et al showed sensitivity and specificity of 76.9% and 92.4% respectively.[15] Hima et al study showed sensitivity of 77.2% and specificity of 93.4%.[14]

Primary for liver secondaries

In present study carcinoma breast was the most common primary detected i.e. 40.8% followed by colorectal carcinoma next common primary in 27.25%. While in all other study Patel et al, Mallick et al, Dietrich et al colorectal carcinoma was the most common primary.[16-18]

So this study shows that carcinoma breast is the emerging cause of liver secondaries.

Management of space occupying lesion of liver

In this study, total 21 cases diagnosed with liver abscess in which imaging guided aspiration only of hepatic abscess done in 8 cases (38.1%), imaging guided percutaneous pigtail catheter drainage done in 10 cases (47.6%) and both done in 3 cases (14.3%).

In present study, most of the metastatic lesion of liver was from carcinoma breast. So, all these patients were advanced carcinoma breast therefore all patients were started on palliative chemotherapy and depending on the response to chemotherapy, many patients undergone simple mastectomy (palliative) to improve their standard of living.

Table 4: Studies showing mean volume of abscess aspirated.

Studies	Singh et al[16]	Patel et al[13]	Present study
Volume of cavity aspirated	40-170 cc (84.6)	118-572 cc (249)	27-120 (75.8)
No. of liver abscess cases	30	08	08

Table 5: Studies showing mean volume of abscess drained by pigtail.

Studies	Singh et al[16]	Patel et al[13]	Present study
Volume of cavity drained by pigtail catheter	98-770 cc (302)	150-680 (298)	100-1200 cc (326)
No. of liver abscess cases	30	27	10

CONCLUSION

In present study, metastatic lesion of liver was the most common space occupying lesion followed by liver abscess. Mean age of presentation was 59 years seen equally in males and females. Carcinoma breast is the emerging primary for liver secondaries. So when ever suspected in cases of advanced carcinoma breast contrast CT abdomen should be done. USG showed relatively lower accuracy for malignancy diagnosis against CT (accuracy of 88.6%). So, as per present study in case of benign liver SOL on ultrasonography in old age patients, whenever doubt of diagnosis contrast CT should be done to confirm the diagnosis. In case of liver abscess, if large volume than pigtail should be preferred for early volume reduction and less hospital stay.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Jarnagin WR, ed. Blumgart's Surgery of the Liver, Biliary Tract and Pancreas. 5th edn. Elsevier Saunders; 2013.
2. Bryan PJ, Dinn WM, Grossman ZD, Wistow BW, McAfee JG, Kieffer SA. Correlation of computed tomography, grey scale ultrasonography, and radionuclide imaging of the liver in detecting space occupying processes. Radiology. 1977;124(2):387-93.

3. Feldman M, Friedman LS, Brandt LJ. Sleisenger and Fordtran's Gastrointestinal and Liver Disease Pathophysiology, Diagnosis, Management. 10th edn. Elsevier Saunders; 2016:24.
4. Kaltenbach TEM, Engler P, Kratzer W, Oeztuerk S, Seufferlein T, Haenle MM, et al. Prevalence of benign focal liver lesions: ultrasound investigation of 45,319 hospital patients. Abdom Radiol. 2016;41(1):25-32.
5. Abou-Shady M, Zakaria H, Alwaraky M. Nonparasitic liver cysts: different treatment strategies. Egypt J Surg. 2016;35(4):438.
6. Dardik H. Solitary hepatic cysts. J Am Coll Surg. 2001;192(6):804.
7. Akther J, Khanam N. Clinico epidemiological profile of hydatid diseases in central india, a retrospective & prospective study. Int J Biol Med Res. 2011;2(3):603-6.
8. Palanivelu C, Jani K, Malladi V, Senthilkumar R, Rajan PS, Sendhilkumar K, et al. Laparoscopic management of hepatic hydatid disease. J Soc Laparosc Surg. 2006;10(1):56-62.
9. Ezer A, Nursal TZ, Moray G, Yildirim S, Karakayali F, Noyan T, et al. Surgical treatment of liver hydatid cysts. HPB. 2006;8(1):38-42.
10. Jayakar SR, Nichkaode PB. Liver abscess, management strategies, and outcome. Int Surg J. 2018;5(9):3093.
11. Christopher S, Kumar A, Achar S. Liver abscess-various modalities of treatment and its clinical outcome. Int Surg J. 2016;3(4):1868–74.
12. Sheefa H, Lata J, Basharat M, Rumana M, Veena M. Utility of FNAC in conjunction with cell block for diagnosing space-occupying lesion (SOL) of liver with emphasis on differentiating hepatocellular carcinoma from metastatic SOL: Analysis of 61 cases. Oman Med J. 2016;31(2):135-41.
13. Edris AMM, Ali IM, Bakeit SB, Abashar M, Siddig EE. Diagnostic importance of ultrasound-guided fine needle aspiration in diagnosing hepatic lesions among sudanese patients 2015. Asian Pacific J Cancer Prev. 2016;17(2):553-5.
14. Hima BP, Shukla AK, Krishnappa N. Sonographic evaluation of focal and diffuse hepatic lesions. J Evol Med Dent Sci. 2014;3(45):11114-30.
15. Thimmaiah VT. Evaluation of focal liver lesions by ultrasound as a prime imaging modality. Sch J App Med Sci Ed. 2013;1(6):1041-59.
16. Patel S, Nichkaode PB, Bansod PY, Akhtar M. Imaging and cytopathological correlation of space occupying lesions in liver: a prospective observational study. Int Surg J. 2017;4(5):1687-96.
17. Mallick SI, bhusan Sarkar P, Dasgupta S, Kar A, Mukherjee S, Bothra SJ, et al. Evaluation of liver space occupying lesion with special reference to etiology and co-morbid condition. Int J Curr Res Rev. 2015;7(1):28-33.
18. Dietrich CF, Kratzer W, Strobel D, Danse E, Fessl R, Bunk A, et al. Assessment of metastatic liver disease in patients with primary extrahepatic tumors by contrast-enhanced sonography versus CT and MRI. World J Gastroenterol. 2006;12(11):1699.
19. Singh S, Chaudhary P, Saxena N, Khandelwal S, Poddar DD, Biswal UC. Treatment of liver abscess: Prospective randomized comparison of catheter drainage and needle aspiration. Ann Gastroenterol. 2013;26(4):332-9.

Cite this article as: Sonarkar R, Gajendra G, Wilkinson TRV, Sonawane S. Space occupying lesions of liver- clinical presentation, investigations and management: a longitudinal study. Int Surg J 2021;8:159-64.