Section: Pathology

Research

RADIOLOGICAL AND HISTOLOGICAL CORRELATION OF ULTRASOUND GUIDED FINE NEEDLE ASPIRATION OF FOCAL LIVER LESIONS IN A TERTIARY CARE CENTRE OF BIHAR

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Abstract

Background: Fine needle aspiration (FNA) has proven to be a very effective means of obtaining tissue from many different body sites for diagnosis. Fine needle aspiration (FNA) of liver in diagnosing hepatocellular carcinoma and liver metastases is proven to be a safe, sensitive and specific method when guided by ultrasound (US) or computed tomography (CT). The aims and objectives are to evaluate the correlation of FNA diagnosis of focal liver lesions with that of radiological and histopathological diagnosis. **Materials and Methods:** This prospective study was undertaken in the Department of Pathology, SKMCH, Muzaffarpur, Bihar from June 2019 to July 2020. Fifty-two patients who were detected to have focal liver lesions by US/CT imaging were chosen and subjected to FNA followed by trucut biopsy under US guidance. **Result:** This prospective analysis was done on fifty-two patients, among which 42 were males accounting to 75% of our study population with focal liver lesions and 10 were females which was 25%. The peak incidence of focal liver lesions was highest in the age group of 61-70 years in the males and 41-50 years in the females Males formed the majority of the cases reported as Hepatocellular carcinoma contributing to 20 of the 24 cases of which 45% were in the sixth decade **Conclusion:** Ultrasound guided FNA of liver lesions is a rapid, inexpensive, safe, highly accurate and minimally invasive technique for obtaining a tissue diagnosis in solid focal lesions of the liver.

INTRODUCTION

Fine needle aspiration (FNA) has proven to be a very effective means of obtaining tissue from many different body sites for diagnosis. Fine needle aspiration (FNA) of liver in diagnosing hepatocellular carcinoma and liver metastases is proven to be a safe, sensitive and specific method when guided by ultrasound (US) or computed tomography (CT). Numerous studies have reported a sensitivity between 67% and 100% and accuracy rate as high as 96%.[1] This diagnostic method was first applied to the liver as early as 1895. FNA is used predominantly for diagnosing mass lesions when there is a question of a neoplastic process, either primary or metastatic. The procedure, however, has not been successful in identifying diffuse liver disorders, such as hepatitis or cirrhosis. The risk of malignancy growing along the biopsy tract is small but real, with a reported incidence up to 1:1,000 in abdominal biopsies. Severe complications and mortality rate are low, and was reported in 0.04% to 0.05% and 0.004% to 0.008% respectively in two large reviews which included a combined total of more than 65,000 abdominal biopsies.[2] In most cases, the diagnosis presents no significant challenges to the pathologist. Problems tend to occur when the lesion is a very well differentiated hepatocellular process, which the pathologist must identify as benign or malignant or a poorly differentiated neoplasm that arises in a patient without any other known malignancy, for which the pathologist must determine if it is a primary or metastatic lesion. Hepatic masses are increasingly being detected on radiography with the use of sophisticated abdominal imaging studies. Specific diagnoses can often be suspected based on sensitive radiographic imaging techniques (computed tomography, magnetic resonance imaging) coupled with clinical data and blood investigations. Except for haemangioma, however, histopathological diagnosis remains the gold standard in determining tumor classification and appropriate clinical treatment.[3] The varied array of primary benign and malignant masses and the high rates of metastases to the liver account for much of the diagnostic difficulty encountered. Primary tumors can be solid or cystic and can arise from

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epithelium (hepatocyte, bile duct epithelium, neuroendocrine cells) or mesenchymal cells (principally endothelium), or heterotopic tissues.[4] The majority of malignant hepatic neoplasms in normal liver represent metastatic carcinoma derived from virtually any primary site, whereas in patients with cirrhosis, hepatocellular carcinoma (HCC) is more common. Although diagnosis of the primary hepatic neoplasms is often straightforward in resection specimens, definitive classification of a biopsy specimen (core or fine-needle aspiration) showing evidence of benign appearing hepatocytes can be quite difficult. The most common problem encountered in biopsy specimens is in making the distinction between HCC and metastatic carcinoma.[5] The selective use of immunohistochemistry can be quite useful in this situation. Since fine-needle aspiration (FNA) has assumed a primary diagnostic role in the evaluation of hepatic masses, this prospective study has been done focussing on the value of percutaneous FNA in the diagnosis of focal liver lesions and their radiological and histological correlation.

Aim of Study

1. To investigate the value of percutaneous FNA in the diagnosis of liver tumors.
2. To evaluate the correlation of FNA diagnosis of focal liver lesions with that of radiological and histopathological diagnosis.

MATERIALS AND METHODS

This prospective study was undertaken in the Department of Pathology, SKMCH, Muzaffarpur, from June 2019 to July 2020. Fifty-two patients who were detected to have focal liver lesions by US/CT imaging were chosen and subjected to FNA followed by trucut biopsy under US guidance. The aspirations were performed either to confirm or exclude suspected primary or metastatic liver malignancy based on clinical findings in symptomatic patients.

Inclusion Criteria

Candidates for liver biopsy must be carefully selected, as this procedure, by nature, is invasive.

Exclusion Criteria

1. Impaired hemostasis with prothrombin time more than 3 seconds over control, PTT more than 20 seconds over control, thrombocytopenia and markedly prolonged bleeding time (Mahal et al38 in 1979 noted 22 bleeding episodes in3800 percutaneous liver biopsies)
2. Severe anemia (Hb <8 g/dL)
3. Local infection near needle entry site, such as right sided pleural effusion or empyema, right lower lobe pneumonia, local cellulitis, infected ascites or peritonitis
4. Tense ascites (low yield technically, risk of leakage)
5. High-grade extrahepatic biliary obstruction with jaundice (increased risk of bile peritonitis)
6. Septic cholangitis
7. Possible hemangioma
8. Possible echinococcal (hydatid) cyst
9. Uncooperative patient
10. Poor performance status
11. Advanced

Specimens

At least two to three liver cores, each more than 2 cm in length was routinely fixed in 10% buffered formalin, specimen processed and the tissues stained with hematoxylin and eosin. Cytological preparation - fluid from aspirating syringe was smeared on clean microscope slides and sent to Cytology Laboratory. Smears were air-dried and stained with May-Grunwald-Giemsa as well as fixed in 95% alcohol and stained by the Papanicolaou method and hematoxylin and eosin.

RESULTS

This prospective analysis was done on fifty two patients, among which 42 were males accounting to 75% of our study population with focal liver lesions and 10 were females which was 25%. The peak incidence of focal liver lesions was highest in the age group of 61-70 years in the males and 41-50 years in the females Males formed the majority of the cases reported as Hepatocellular carcinoma contributing to 20 of the 24 cases of which 45% were in the sixth decade as shown in table 3. The incidence of liver secondary's was also high in males (14 cases) and in seventh decade, as that of hepatocellular carcinoma. Considering histopathology as the gold standard for definitive diagnosis of any lesion, of the 52 cases of our study, 49 cases correlated well with the FNA. Thus in 93.83% of focal liver lesions, FNA findings were consistent with that of HPE. Of the 26 cases diagnosed to be HCC by biopsy, 20 cases were also diagnosed as HCC by FNA. The percentage of correlation with respect to HCC was 94.76%. Of the 19 secondary adeno carcinomatous deposits diagnosed by biopsy, 10 cases were found to have correlated well with that of FNA (82.52%). The other cases of Cholangiocarcinoma, hepatic adenoma, hepatoblastoma, secondary synovial sarcoma deposit and secondary squamous cell carcinomatous deposit correlated well with respect to FNA and HPE. Another case which had radiological evidence of malignancy, proved to be an abscess by both HPE and FNA. For 2 cases for which definitive typing of malignancy could not be done by biopsy, FNA was also not contributory and IHC was done. Hep Par 1 was the marker used which showed positivity Indicating probable origin from the hepatocytes. In 2 cases both cytology and

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histopathology were negative for malignancy inspite of radiological findings, which might be due to non-representative sampling technique. A case of liver cell dysplasia was diagnosed by biopsy, though cytology showed evidence of adenocarcinoma which probably could be non-representative sample. Radiological diagnosis of focal liver lesions was unifocal in 27 cases (42.31%) and multifocal in 25 cases (57.69%). With respect to HCC, unifocal lesions accounted to 46.76% and multifocal 59.33%. The liver secondaries were unifocal lesion in 10cases (35%) and multifocal in 12 cases (65.) Radiological correlation with the histological diagnosis was 59.96 % with 30 cases of imaging diagnosis correlating well with HPE.

Table 1: Distribution of Focal Liver Lesions - FNA

Lesion	Number of Cases	Percentage of Total
Hepatocellular Carcinoma	20	38.4
Adenocarcinoma	12	23.07
Squamous Cell Carcinoma	1	1.9
Synovial Sarcoma	1	1.9
Secondaries Not Specified	1	1.9
Cholangiocarcinoma	1	1.9
Hepatic Adenoma	1	1.9
Hepatoblastoma	4	7.69
Carcinoma Not Specified	3	5.7
Unrepresentative/Inadequate	6	11.5
Others	2	3.84
Total	52	

Table 2: FNA – Histopathology Correlation Lesion

LESION	HPE (n)	FNAC (n)	% of Correlation
Hepatocellular Carcinoma	26	20	91.67
Adenocarcinoma	19	10	81.25
Adenocarcinoma	1	1	100
Squamous Cell Carcinoma	1	1	100
Synovial Sarcoma	1	1	100
Secondaries Not Specified	1	1	100
Cholangiocarcinoma	1	1	100
Hepatic Adenoma	1	1	100

Table 3: HPE & Imaging Correlation in Liver Malignancy

LESION	HPE	IMAGING	%
HEPATOCELLULAR CA	20	14	41.67
SECONDARIES 20	21	21	100.00
HEPATOBLASTOMA	1	1	100.00

DISCUSSION

Literature supports the usefulness of FNA in diagnosing benign and malignant liver lesions. The overall sensitivity varies from 67-100% in diagnosing malignant liver lesions. The specificity was 99%. The positive predictive value was 99%, whereas the negative predictive value was 71%. This was in accordance to our study with sensitivity of 95.7%, specificity of 80%, positive predictive value of 97.8% and the negative predictive value of 66.7%.[6] The relationship between size of lesion and proportion in which a correct diagnosis was made was studied by Reading et al (1988) 40 and correct diagnosis was made by FNA in 79% of lesions 1 cm or less in diameter . False positive were due to sampling error or are were based on aspiration material that often was scanty. With regard to HCC, FNA is accurate with a sensitivity rate 80 to 95% and a specificity of 100%.[7] Jacobsen et al 1983 , Droese et al 1984 , Hajdu et al 1989, Fornari et al 1990, Edoute et al 1991 were able to produce the cytological diagnosis which corresponds closely to histology of the tumor. There is no agreement as to the superiority of cytology or microhistology in the diagnosis of focal liver lesions The cytology may be inadequate in some patients, particularly in those with vascular lesions, in fibrotic, dense tumors, in lymphomas and in well differentiated primary liver cancer. Edoute et al51 in 1991-1996 prospectively studied the accuracy of non-guided FNA of liver lesions in 107 patients.[8] The sensitivity was 81%, specificity 100%, positive predictive value 100%, negative predictive value 85%.The overall diagnostic accuracy rate was 91%. The relationship between non guided FNA (true +ve &false –ve) and type of suspected malignant liver lesions demonstrated by different kinds of imaging (Radioisotope, ultrasound, CT among 52 patients with malignant liver disease was also studied by them. In our study the sensitivity of CT was 68% and specificity was 80%. Bakshi et al53 in 2006 correlated 41 FNA from pediatric liver SOL with clinical, radiological findings and histopathological diagnosis. The overall FNA sensitivity was 95%, specificity was 100%, positive predictive value was 100% and negative predictive value was 92.3% and diagnostic accuracy was 96.9%. In our study, the 2

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cases of pediatric liver SOL reported as hepatoblastoma in FNA, correlated well with the imaging and histopathological diagnosis.[9]

They proved FNA was 2-24% more sensitive than needle core biopsy. Yu and Coworkers (1998)55 have studied diagnostic efficacy of FNA using an 18 gauge automated cutting needle in small (3cm or less) focal hepatic lesions of different pathologies and different sizes (≤1cm; 1-2cm; 2-3cm). The sensitivity for diagnosing malignancy was 96%, specificity 100%, positive and negative predictive value were 100 and 96% respectively. In 1983 Jacobson et al56 compared the coarse needle biopsy versus fine needle aspiration biopsy in the diagnosis of focal liver lesions of 55 patients.[10] The sensitivity of FNA for hepatic malignancy was 99.5% and specificity was 100%. Bile, centrally placed nuclei and intranuclear inclusions were the most specific cytologic criteria of HCC with trabecular pattern consisting of sinusoidal capillarization and endothelial rimming of the malignant hepatocytes as the predominant pattern. In our study also the smears of HCC showed similar characteristic features.[11] Devi VL et al60 also found that trabecular pattern covered by endothelium was the most common pattern in a study of smears of 32 cases of FNA of HCC as in our study.

CONCLUSION

From this study it has been proved that FNA technique yielded higher number of positive diagnosis of malignancy than obtained with core needle, because aspirated material obtained with fine needle, represents a considerably larger area since repeated aspirations are performed in various directions. Ultrasound guided FNA of liver lesions is a rapid, inexpensive, safe, highly accurate and minimally invasive technique for obtaining a tissue diagnosis in solid focal lesions of the liver.

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