IJPRP

Indian Journal of Pathology: Research and Practice

Volume 7 Number 3, March 2018
DOI: http://dx.doi.org/10.21088/ijprp.2278.148X.7318.7

Original Research Article

Fine Needle Aspiration Cytology of Liver Mass Lesions with Cytoradiological Correlation

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(Received on 06.02.2018,
Accepted on 26.02.2018)

Abstract

Background: Introduction of Guided fine needle aspiration allowed accurate positioning of the needle when lesion were small or deep.

Aim: The present study was undertaken to know the pathological spectrum of hepatic mass lesions and to correlate the cytoradiological findings.

Methods and Materials: This study was performed on admitted and OPD patients of SNMC, Bagalkot over a period of six months. Image guided fine needle aspiration cytology was carried out and aspirates were examined, and compared with radiological diagnoses.

Results: The present study included 51 cases of hepatic lesion masses. Presenting age ranged from 23 to 84 years with most common predisposition in the seventh decade of life. Males were more commonly affected than females. Metastatic tumours were more common than hepatocellular carcinoma. The most common metastatic hepatic lesion was Adenocarcinoma followed by squamous cell carcinoma, urothelial carcinoma and lymphoma. Multiple SOL was more common radiologically for both primary malignancy and metastatic lesions. Cytoradiological correlation was found to be 95.91%.

Conclusion: The study concludes that fine needle aspiration cytology of the hepatic lesion is an effective and safe method for a quick, early and accurate diagnosis without any serious complications related to the procedure.

Keywords: Guided FNAC; Liver; HCC; Metastasis.

Introduction

The evaluation and management of discrete hepatic masses is common clinical problem. Appropriate clinical management of these masses depends on obtaining accurate diagnosis [1]. A diagnostic modality such as fine needle aspiration [FNA], which offers accuracy without significant complications and which requires minimal intervention at low cost, warrants consideration early in the investigative sequence [4]. Introduction of ultrasonography and computed tomography allowed precise localization of the lesion and accurate positioning of the needle when lesions were small or deep [3]. The present study was undertaken to know the pathological spectrum of hepatic mass lesions and to correlate the cytoradiological findings.

Methodology

Image guided FNAC was performed on a total of 51 cases, in which lesion/pathology in the liver was suspected and hepatic mass was confirmed on radiological

examination. This study was performed on admitted and OPD patients of Shree Nijalingappa medical college and HSK hospital from Jan 2017 to June 2017. Ultrasound guidance was usually preferred for its simplicity, real-time monitoring and flexible needle placement. Computed Tomography (CT) guidance was reserved for lesions that were not demonstrated by ultrasound. Proper aseptic care was taken by cleaning the skin surface with povidone iodine before every FNAC. Aspiration was done using 22 gauge, disposable spinal needle attached to a 10mL disposable syringe which was introduced into the lesion under radiological guidance. The cytological material obtained were smeared on clean glass slides as quickly as possible, wet-fixed or air-dried and stained by Papanicolaou (Pap), May-Grunwald Giemsa (MGG), and haematoxylin and eosin stains. The smears were thoroughly screened. Various cytological features of the smears were recorded and cytological diagnoses was offered which was correlated with radiological diagnosis.

Results

Diagnostic yield of image guided FNA in our study was 96.07% and out of total 51 cases two aspirates were inadequate for cytological evaluation and were excluded. Age of the patient ranged from 23 to 84 years with maximum cases in the seventh decade of life. There was a male predominance with a male to female (MF) ratio of 2.2:1. The most common clinical presentations were abdominal pain, appetite loss, abdominal mass, breathlessness and weight loss.

Radiological findings revealing single space occupying lesion (SOL) were 19 and multifocal lesions were seen in 32 cases. Fourteen out of 19 single SOL were malignant hepatic masses and two were benign. All the multifocal lesions were malignant lesions radiologically (Table 1). Cytological examination revealed that non malignant lesions comprised minority of the three cases (5.9%) and included one case each of haemangioma, fatty change and cirrhotic nodule. Smears of haemangioma showed few scattered spindle cells with bland nuclei in the background of hemorrhage. Smears of fatty change showed clusters of benign looking hepatocytes with vacuolated cytoplasm and eccentrically placed nuclei and smears of cirrhosis showed individually scattered and loose cohesive clusters of hepatocytes, mild anisonucleosis, cohesive clusters of bile duct epithelial cells and strands of fibrous tissue.

Malignancy was the most common liver lesion with 46 cases (90.2%). Metastatic tumours with 23 cases (50%) were the most common malignant lesion followed by 19 cases (41.3%) of hepatocellular carcinoma (HCC) and one case (2.17%) of cholangiocarcinoma. Three cases (6.52%) were rendered cytological diagnosis suspicious of HCC. Among the metastatic tumours, the most common was adenocarcinoma with 20 cases (86.95%) , One case (4.35%) each of squamous cell carcinoma, urothelial carcinoma and lymphoma (Table 2). The diagnosis of metastatic lesion was made in correlation with the clinical and radiological evidences of primary lesions.

The smears from metastatic adenocarcinoma showed

Table 1: Radiological findings in cytologically diagnosed malignancy

Radiology	Primary	Metastsis	Total
Single SOL	8	6	14
Multiple SOL	15	17	32
Total	**23**	**23**	**46**

Table 2: Spectrum of lesions in the present study

		Cytological Dignosis	Number	Percentage
Non Neoplastic		Fatty change	1	2
		Cirrhosis	1	2
Benign		Haemangioma	1	2
Malignant	HCC	HCC grade I	4	8.2
		HCC grade II	14	28.6
		HCC grade III	1	2
		Suspicious of HCC	3	6.1
		Cholangiocarcinoma	1	2
	Metastasis	Adenocarcinoma	20	41.1
		Squamous cell carcinoma	1	2
		Urothelial Carcinoma	1	2
		Lymphoma	1	2
Total			49	100

Table 3: Cytoradiological correlation of liver lesions

		Cytological Diagnosis		
		Malignant	**Benign**	**Total**
Radiological Diagnosis	Malignant	46	1	47
	Benign	0	2	2
	Total	46	3	49

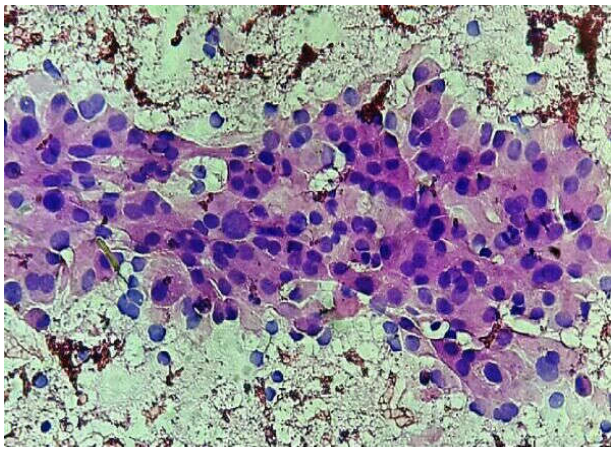

Fig. 1: Hepatocellular carcinoma: thickened trabeculae and cells showing anisonucleosis. (H&E, 400x)

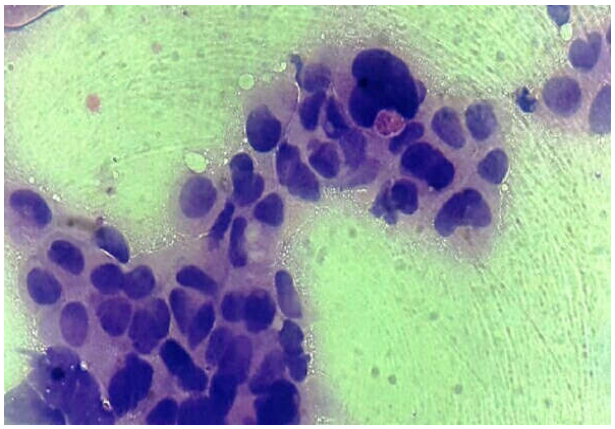

Fig. 2: Hepatocellular carcinoma grade III: pleomorphic cells showing anisonucleosis. (H&E, 400x)

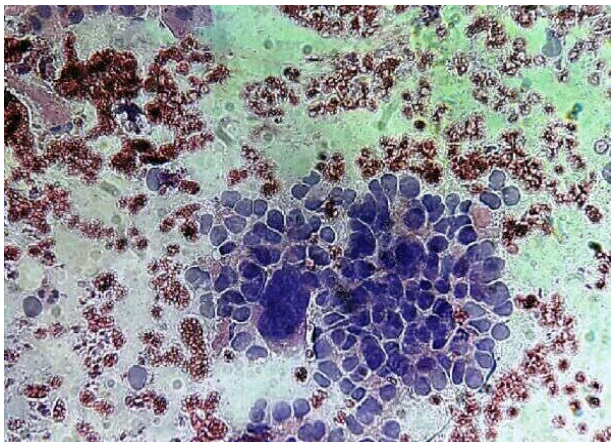

Fig. 3: Cholangiocarcinoma: Pleomorphic cells arranged in clusters showing nuclear crowding. (H&E, 400x)

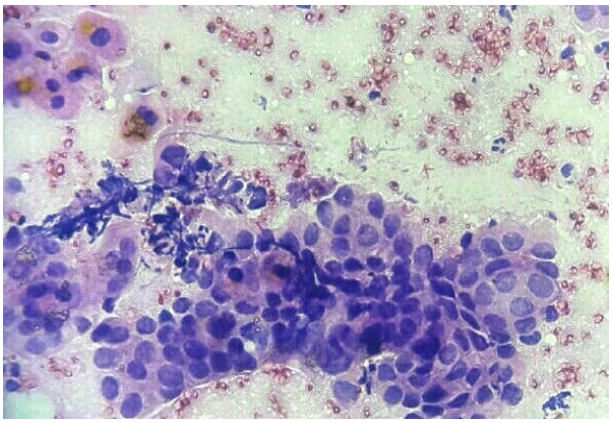

Fig. 4: Metastatic adenocarcinoma: Tumour cells arranged in clusters and microacinar pattern. Few normal looking hepatocytes in the left top corner. (H&E, 400x)

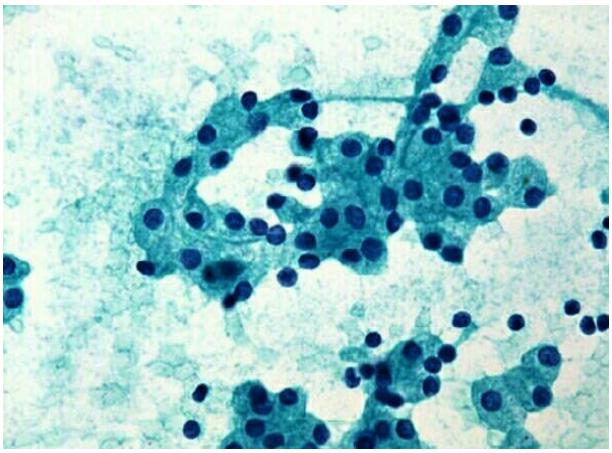

Fig. 5: Metastatic Urothelial carcinoma: Cells with eccentrically placed nucleus, abundant cytoplasm and cytoplasmic tailing. (PAP, 400x)

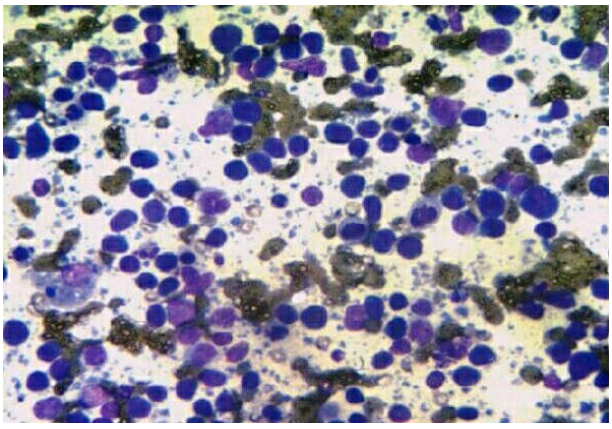

Fig. 6: Metastatic Lymphoma: Dispersed large lymphoid cells with scant cytoplasm.(MGG, 400x)

clusters and sheets and microacinar pattern of round to cuboidal cells with enlarged hyperchromatic, prominent nucleoli and moderate amount of eosinophilic or vacuolated cytoplasm. The cells showed increased nuclear cytoplasmic (NC) ratio and anisonucleosis . Twenty cases diagnosed as metastatic adenocarcinoma showed primaries most commonly from gall bladder with eight cases followed by six cases from the colon, two cases from the lungs, two from the pancreas, one case each from rectum and stomach. The smears from the metastatic squamous cell carcinoma showed individually scattered and clustered round to polygonal cells with hyperchromatic pleomorphic nuclei and abundant cytoplasm. Few tadpole like cells and individual cell dyskeratosis are seen. One case of squamous cell carcinoma had primary in gall bladder. Smears studied from the metastatic urothelial carcinoma showed individually scattered, clusters and sheets of round to polygonal cells with eccentrically placed hyperchromatic nuclei and eosinophilic cytoplasm. Few cells were showing cytoplasmic tails with bulbous ends. Few multinucleated cells were also seen. One case of urothelial carcinoma had primary in bladder. Smears from the metastatic lymphoma showed monotonous population of large lymphoid cells and bare nuclei with few hepatocytes and scattered lymphocytes in the background of necrotic debris. One case of metastatic lymphoma had its primary from the pancreas.

The commonest primary hepatic lesion was HCC. HCC was further differentiated into three grades depending upon the differentiation. Four cases (21.05%) showed grade I (well differentiated), 14 cases (73.68%) showed grade II (moderately differentiated) and 1 case (5.27%) showed grade III (poorly differentiated). The smears from HCC grade I showed hepatocytes individually scattered, in clusters and in thickened trabeculae with endothelial rimming. Hepatocytes show increased NC ratio with centrally placed round to oval nucleus. Bare nuclei and transgressing of the vessels are seen.

The smears from the HCC grade II were cellular and showed hepatocytes arranged in singles, clusters and thickened broad trabeculae. Cells were showing high NC ratio and many bare nuclei were seen. The smears from the HCC grade III showed cells arranged in singles, clusters and sheets. Cells showed anisocytosis, anisonucleosis, hyperchromasia, prominent nucleoli. Large bizarre bare nuclei was also seen.

Smears studied from the cholangiocarcinoma showed individually scattered, clusters and microacinar pattern of cuboidal to columnar cells with enlarged, hyperchromatic nucleus, prominent nucleoli and moderate amount of cytoplasm. Cells also showed anisonucleosis. Cytoradiological correlation in our study was 95.91% with two discordant cases.

Discussion

The use of fine needles to obtain tissue for cytological diagnosis was first used by Lucatello in 1895. In 1935 Flora in France started using a needle which measured 0.5mm in diameter to reduce the complications. In 1972 Rasmussen et al described a method of FNA under the direct guidance of ultrasonic scanning. In 1976 Haaga et al described a method for precise localization of the lesion by CT. This allowed accurate positioning of the needle when the lesion was very small and deep. Over the last 15 to 20 years of the twentieth century, it became increasingly clear that percutaneous FNA of single or multiple focal lesions of liver demonstrated by palpation, nuclear scan, ultrasonography, CT scan and at laparoscopy is both accurate and safe.

Focal hepatic lesions range from cysts and inflammatory processes to neoplasms, be they benign or malignant, primary or metastatic. FNA under image guidance offers accuracy at a low cost without major complications. The contraindications of FNAC are hemorrhagic diathesis, prolonged prothrombin time, vascular structure in the path and suspected extrahepatic obstructive jaundice. The main advantage of FNAC is the possibility of multiple passes, sampling a wide area or multiple sites, which increases the chances of obtaining adequate viable cells. Adequacy of the sample can be checked immediately and the procedure causes the patient very little discomfort.

The diagnostic yield in our study was 96.07% which was as high as the study done by Khanna et al [4] which recorded 98.4%. This is because the study employed the technique of immediate cytological assessment by means of rapid staining procedures and joint presence of both radiologists and pathologists which is recommended. Various causes of inadequacy are hemorrhagic, necrotic smears, or smears from non- representative area. In present study causes of inadequacy were hemorrhagic and non- representative smears. An aspirate that obtains material only from surrounding tissue of the tumour may show reactive and proliferative changes, whereas an aspirate from the center of a large tumour may sample only degenerative and necrotic material. Hence, for the aspirate to be representative the needle should pass through entire mass which can be achieved in ultrasound guided FNAC.

Present study showed age range from 23 to 84years and a male predominance with MF ratio of 2.2:1 which was comparable to the study done by Meena SP et al [5], which recorded age range of 23 to 90 and MF ratio of 1.2:1.

Malignancy was the most common hepatic lesion with 90.2% was comparable to the other studies done by agarwal et al [2] (91.09%) and Khanna et al [4] (88.7%). Metastatic deposits were the most common malignancy

with 50% than HCC with 47.82%. The study done by Agarwal et al [2] showed an incidence of metastatic deposits as high as 93.2% of all liver malignancies. The liver is one of the most frequent site of metastases. Malignant tumour originated in any site in the body may metastasize to liver by lymphatic, venous or arterial routes. Present study showed adenocarcinoma as the most common metastatic hepatic lesion with 82.6% which was comparatively high when compared to other studies done by Balani et al [1] with 52% and Agarwal et al [2] with 56.16%. In the present study the most common site of primary in case of metastatic deposits in the liver were gall bladder followed by the colon. This observation was identical to the observations of Balani et al [1].

Among the HCC cases Grade II was the most common with 73.68% which was comparable to 56.3% recorded by Khanna et al [4]. Important cytological criteria useful in distinguishing HCC from non neoplastic liver are increased nucleocytoplasmic ratio, arrangement of tumour cells in trabecular pattern and atypical naked hepatocytic nuclei. Other secondary criteria useful in differentiation are nuclear features i.e., irregularly granular chromatin, uniformly prominent and multiple nucleoli [6]. The salient features separating HCC from metastatic adenocarcinoma given by Greene et al [7] were tumour cells in HCC are polygonal or polyhedral, whereas cells are usually columnar or cuboidal in adenocarcinoma; cells in HCC have abundant eosinophilic and granular cytoplasm with one or two macronucleoli, whereas adenocarcinoma cells may show mucin secretion, and presence of more than two nucleoli is common. Three cases was cytologically diagnosed as suspicious of HCC. All the three cases were scanty cellular and showed individually scattered round to polyhedral cells with increased NC ratio, enlarged hyperchromatic nuclei with prominent nucleoli and abundant eosinophilic cytoplasm. Few atypical bare nuclei were also seen in a hemorrhagic background.

Present study also showed one case (1.96%) of cholangiocarcinoma. The study done by Balani et al [1] recorded four cases (7.7%) of cholangiocarcinoma. It is very difficult to differentiate cholangiocarcinoma from metastatic adenocarcinoma. Although subtle differences in the cytological presentation of certain metastatic cancers (such as of the colon) may be obvious to very experienced observers, the diagnosis of cholangiocarcinoma is a diagnosis of exclusion [8]. The presence of proliferating ductules, in particular more than ten ductular clusters has been suggested as a cytological feature to distinguish cholangiocarcinoma from metastatic adenocarcinoma. The diagnosis of cholangiocarcinoma is made only after ruling out other primary sites clinically [9].

Present study showed 65.21% of all primary hepatic lesions were radiologically multiple SOL and 73.91% of all metastatic deposits in the liver were radiologically multiple SOL. One case which was radiologically diagnosed as HCC was given as cirrhosis in cytology (Table 3) and one case which was diagnosed as HCC radiologically was diagnosed cytologically as Mets SCC. Radiologically it showed a single SOL in liver. Two cases which was diagnosed as HCC produced only hemorrhagic materials and rendered as inadequate for opinion on cytology. Both the cases showed very small single SOL radiologically. Cytoradiological correlation in the study done by Khanna et al [4] was 92% which was comparable to the present study 95.91%.

Conclusion

The study concludes that FNAC of the hepatic lesion is an effective and safe method for a quick, early and accurate diagnosis without any serious complications related to the procedure. Close collaboration of the pathologist and the radiologist and correlation with the clinical history, yield the best results.

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