

## Role of FNAC in Hepatic lesions: Risk of track metastases

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### Abstract

**Background:** Liver is one of the most common site of metastases in patients with malignancy and the evaluation of space occupying lesions (SOL) of liver in patients with malignancy is important. Its important to differentiate benign from malignant to take necessary decisions. **Materials and Methods:** We have performed a retrospective analysis of liver SOLs for which fine needle aspiration cytology (FNAC) was done in the year 2011. Risks and benefits associated with FNAC were evaluated. **Results:** We analyzed 755 patients who underwent FNAC of which 524 patients had secondary metastases to liver, 148 patients had primary hepatocellular carcinoma, 14 cases were benign neoplasms and 53 were nonneoplastic conditions. Histological correlation with FNAC was available in 112 patients. The sensitivity, specificity, positive predictive value, negative predictive value, and accuracy were 93%, 90.9%, 98.9%, 58.8%, and 92.8%, respectively. Though there were no incidence of bleeding, two patients developed track metastases following FNAC. One was a case of Hepatocellular carcinoma and the other a case of metastatic breast cancer. **Conclusion:** FNAC was very much useful in our setup where most of the patients could not afford for Computer tomography (CT) scan and was useful in counseling them especially in patients with advanced malignancy where no active cancer directed therapy is required.

**Key words:** Fine Needle Aspiration Cytology liver lesions, hepatocellular carcinoma, liver metastases, track metastases

### Introduction

Percutaneous fine-needle aspiration cytology (FNAC) is a less invasive, rapid, and less expensive investigation for the diagnosis of benign and malignant lesions of liver. This was first applied to liver in way back in 1893 by Erlich and later on it was first done percutaneously for diagnostic purposes in 1923.<sup>[1]</sup> It is used for mainly diagnosing primary or metastatic lesions in liver but occasionally may be useful to diagnose inflammatory lesions or diffuse liver diseases which may appear as nonhomogenous regions in imaging mimicking as mass-like lesions. The risks of complications associated with it are bile leak, bleeding, and needle tracking. The incidence of mortality post-FNAC is reported to be around 0.006%-0.031% for abdominal tumors.<sup>[2]</sup> The risk of needle tracking after FNAC for liver tumors was reported to be 0.003%-0.009%.<sup>[3]</sup> But recent studies have shown higher rates of needle tracking (0.4%-5.1%), usually for primary liver tumors.<sup>[4]</sup> There are few reports where the incidence of needle tracking was 12.5% after radiofrequency ablation.<sup>[5]</sup> Hence, the risk of needle tracking may depend on diameter of the needle used.

The aim of the present study was to describe the cytopathological features of liver lesions and its correlation with histopathology and the complications of FNAC with reference to needle seedling.

### Materials and Methods

This is an observational study and we retrospectively analyzed 785 patients who underwent fine-needle aspiration biopsy of liver lesions from 1<sup>st</sup> January 2011 to 31<sup>st</sup> December 2011 at our institute. These patients went for FNAC after clinical, biochemical, and radiological evidence of liver diseases. The cytological material was obtained using 20 or 22 gauge, 90 mm spinal needle performed under ultrasonic guidance with 2-3 passages into the lesion. The smears are stained by papanicolaou, giemsa, and hematoxylin and eosin staining. The specimen for histopathology was obtained in those patients

who underwent surgery. Cellblock study was performed in 14 patients. Cytohistopathological diagnosis was correlated and complications of FNAC were analyzed.

### Results

Of 785 patients who underwent FNAC of liver lesions in the study period, 30 patients had inconclusive report on FNAC and hence were excluded from the study and the analysis was performed for 755 patients. Patients age ranged from 18 months to 95 years (mean 55.55 years) out of which 443 patients were male (58.7%) and 312 were females (41.3%). Neoplastic lesions of liver were more common of which metastases was the most common space occupying lesion (SOL) (69.4%). Primary hepatocellular carcinoma was diagnosed in 148 patients (19.6%). A total of 14 patients had benign neoplasms of which hemangiomas were the most common (11 patients) and none of them developed any complication. Other benign lesions like inflammatory pathology, benign cysts constituted about 7% (53 patients) [Table 1]. FNAC was repeated twice in 34 patients and thrice in 3 patients. In 135 patients with metastatic tumor deposits in liver, extensive workup for primary had not been attempted in view of poor performance status, though FNAC and imaging had concluded them as having metastatic disease in liver.

Of the metastatic lesions which were the most common cause of space-occupying lesions in liver, gastrointestinal tract was the main source of metastases, followed by breast cancer. Lymphoma/leukemic infiltration was identified in four patients. One patient had multiple angiomyolipomas of liver and kidney. Of 755 patients who underwent FNAC, 112 underwent pathological examination. FNAC correlated with pathological examination in 104 patients. Seven patients where FNAC was benign turned out to malignancy on pathological examination and in one patient FNAC was HCC which turned out to be hepatic adenoma on pathological examination. Seven patients whose FNAC was false negative for malignancy includes three cases of Hepatocellular carcinoma (HCC), two cases of metastatic carcinoma, one case of cholangiocarcinoma, and one case of sarcoma which was proven on histopathology. Hence, the sensitivity, specificity, positive predictive value, negative predictive value, and accuracy were 93%, 90.9%, 98.9%, 58.8%, and 92.8%, respectively [Table 2]. Of 94 cases of malignancy diagnosed on FNAC, 45 were primary liver malignancies and 59 were metastases. FNAC could

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**Table 1: Type of lesions in whom fine-needle aspiration cytology was performed**

Cytological diagnosis	No. of patients (755)
Neoplastic lesions	702
Malignant lesions	688
Metastatic lesions	524
Adenocarcinoma	400
Neuroendocrine carcinoma	26
GIST	5
Melanoma	5
Squamous cell carcinoma	3
Lymphoma/Leukemic infiltration	4
Poorly differentiated carcinoma	81
Primary Hepatocellular carcinoma	148
Hepatoblastoma	4
Cholangiocarcinoma	12
Benign lesions	14
Hemangiomas	11
Angiomyolipoma	1
Adenoma	1
Spindle cell tumor	1
Nonneoplastic lesions	53
Pyogenic liver abscess	12
Amoebic liver abscess	8
Simple cyst	25
Hydatid cyst	2
Fatty liver	6

GIST=Gastrointestinal stromal tumor

**Table 2: Cytohistological correlation of liver lesions**

Test	Histopathology positive for malignancy	Histopathology negative for malignancy
FNAC positive for malignancy	94	1
FNAC negative for malignancy	7	10

Sensitivity of fine-needle aspiration cytology: 93%, Specificity of fine-needle aspiration cytology: 90.9%, Positive predictive value: 98.9%, Negative predictive value: 58.8%, Diagnostic accuracy: 92.8%. FNAC=Fine needle aspiration cytology

differentiate primary from metastatic disease in 38 cases out of 45 (84.4%) (Seven cases were diagnosed as HCC after biopsy). A total of 14 cases underwent cell block analysis to differentiate HCC from metastatic adenocarcinoma which concluded eight cases to have HCC and six cases as metastases. There were no mortalities following the procedure and no bleeding episodes, but two cases developed needle tracking following FNAC.

**Case 1**

A 40-year-old female who had underwent left modified radical mastectomy 2 years back following which she received adjuvant radiotherapy and systemic chemotherapy of four cycles of epirubicin, cyclophosphamide, and 5 Fluorouracil presented with pain abdomen for 15 days. An ultrasound abdomen showed multiple hypoechoic lesions involving both the lobes, largest in left lobe of size 4 × 5 cm located 2 cm deep from the liver capsule. Following FNAC, she developed needle track deposits after 3 months [Figure 1a]. Further FNAC of the lesion proved to be malignancy. Given the options of palliative chemotherapy and best palliative care, the patient opted for the later and after 3 more months she demised.



**Figure 1: (a) A 40-year-old female with a scar of left modified radical mastectomy (Arrow) and right hypochondriac region showing track metastases following fine-needle aspiration cytology, (b) A 45-year-old male of left hepatic mass diagnosed as hepatocellular carcinoma presenting with subcutaneous nodule post-fine-needle aspiration cytology after 2 months**

**Case 2**

A 45-year-old HBsAg positive male presented with pain abdomen for 2 months. An ultrasound abdomen showed a huge SOL in right lobe of liver 8 × 9 cm associated with cirrhotic changes in rest of the liver, with minimal ascites. His Eastern Cooperative Oncology Group (ECOG) performance status was three. Alpha fetoprotein, carcinoembryonic antigen levels were within normal limits. FNAC was attempted and it showed moderately differentiated HCC and later within 2 months, we found a 1 × 1 cm subcutaneous nodule at the site of FNAC [Figure 1b]. The patient was advised for palliative chemotherapy but later lost to follow-up.

**Discussion**

FNAC is widely used and is very effective means to obtain tissue for diagnosis in different parts of body. It is mainly used in liver for diagnosing mass lesions. Sometimes, inflammatory lesions and parenchymal disease may present as mass-like lesion in radiographs which may be differentiated from malignancy by FNAC. But the limitations of FNAC in liver lesions are a) It is less useful in patients with diffuse parenchymal diseases like hepatitis/cirrhosis, b) In poorly differentiated tumors difficult to differentiate whether it is primary or metastatic, c) a well-differentiated hepatocellular carcinoma can be missed with a benign lesion, d) risk of needle track seedling especially in cases of HCC and colorectal metastases, and e) risk of bleeding and intraperitoneal tumor spillage.

The discrepancy in benign and malignant lesions may be because our center is a referral center. The diagnostic accuracy in our study (92.8%) was similar with most of the studies reported in literature Swamy *et al.*,<sup>[6]</sup> (97.5%), Mondal (99.5%),<sup>[7]</sup> Kuo *et al.*,<sup>[8]</sup> (86.1%). Few studies have shown the cost-effectiveness of FNAC in diagnosing liver lesions.<sup>[9]</sup> The reported incidence of complications following FNAC was 2.4% and mortality rate was 0.1%.<sup>[3,10]</sup> A systematic review and meta-analysis of eight observational studies of FNAC for HCC published by Silva *et al.*,<sup>[11]</sup> found the incidence of needle tracking was 2.7% overall, or 0.9% per year. The incidence of needle track seedling in our study was 0.6% (one of 148 patients of HCC). Ryd *et al.*,<sup>[12]</sup> performed a study in animal models and showed 10<sup>3</sup>-10<sup>5</sup> cells along the

needle track. The risk of needle tracking depends on size of the tumor, thickness of hepatic parenchyma, number of needle passes, tumor grade, and type of needle used.<sup>[13]</sup>

We have two patients with needle track metastases, one patient developed within 2 months and the other after 3 months. The prognosis of the patients who developed track metastases was studied by Ahn *et al.*,<sup>[14]</sup> where of the eight patients two underwent mass excision (excision of only the nodule) and other six underwent en-bloc wide excision (excision of nodule with surrounding soft tissues), the two patients who underwent mass excision developed recurrence. Hence, they concluded the treatment of patients who develop track seedling to be en-bloc wide excision.

In USA, where “pre-listing biopsy is not mandatory” as per United Network for Organ Sharing (UNOS) criteria, 7% of organs allotted for transplantation occurred in patients who were misdiagnosed as HCC.<sup>[15]</sup> This is very important in our country where there is deficiency of cadaveric organ procurement, it is necessary the right person to obtain it. Hence, preoperative pathological diagnosis may be still useful in our setup.

The frequency of needle track seedling after FNAC of HCC and colorectal metastases was well-described. But the needle track seedling with metastatic breast cancer was not described in literature to the best of our knowledge.

### Conclusion

Though there is controversy regarding the risk of needle track seedling in HCC and liver metastases, the incidence of it is low in our study. In our scenario, where affordability and availability of investigations are limiting factors, FNAC can still be safe, quick, reliable, and cost-effective tool in making diagnosis.

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