Original Article

Role of guided Fine needle aspiration cytology in diagnosis of abdominopelvic masses

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Abstract
Introduction: *The introduction of modern diagnostic imaging techniques, mainly ultrasonography (USG) has enabled the detection, location and sampling of lesions at the site that are inaccessible to surgical biopsies and are considered as first step in the investigation, thereby, quickly satisfying the avidity of clinicians for a rapid diagnosis. We hereby report FNAC findings in guided FNA of abdominopelvic masses and their histopathological correlation at a tertiary care hospital.*
Aims: *To assess the utility of guided Fine Needle Aspiration Cytology (FNAC) and biopsy as an initial diagnostic modality in patients with abdominopelvic masses.*
Material and Methods: *The study included 63 palpable and non- palpable abdominopelvic masses, which were detected clinically or radiologically. Ultrasonography/ Computed Tomography guided FNAC was done. Papanicolaou stain, H&E stain and Giemsa stains were used.*
Results: *Out of 63 images guided FNACs of abdominopelvic masses, non-neoplastic lesions were found in four patients and neoplastic in 56 patients. Of these 56 cases, 12 were benign and 44 malignant. In three cases, FNAC was inconclusive. Mean age of patients was 43.6 years with 30 (47.6%) males and 33 (52.38%) females. The most common organ involved was liver (15 cases) followed by ovary (13 cases). The most common malignant lesion in the liver was Hepatocellular carcinoma. Overall, the sensitivity of this study was 90.47% and specificity 100%.*
Conclusions: *Guided FNAC is simple, safe and cost-effective procedure that can be utilized preoperatively, for frozen section and follow-up.*
Keywords: *Guided FNA, Abdominopelvic masses.*

Introduction

The introduction of modern diagnostic imaging techniques, mainly ultrasonography (USG) has enabled the detection, location, and sampling of the lesions in sites that are not easily accessible. Guided FNA is a readily accepted, rapidly growing and an important diagnostic technique

which is an accurate, safe, simple, rapid, economical and an efficacious method which can be used for cyto-histologic diagnosis and confirmation of various intra-abdominal and pelvic lesions. The basic principle of an ultrasound guided FNAC is that, the rather complicated three-dimensional problem of hitting a small target is converted to a much simpler two dimensional imaging technique.[1]As diagnosis is rapidly available on FNAC, the appropriate medical or surgical therapies can be started earlier, thus avoiding unnecessary, expensive and often invasive diagnostic procedures.[2] The aim of our study was to assess the utility of Guided FNAC and biopsy as an initial diagnostic modality in patients with abdominopelvic masses. Our objectives were to study the cytomorphological features of abdominopelvic lesions, age and sex distribution and distribution of lesions in various organs. Then categories the lesions as non-neoplastic and neoplastic (Benign or Malignant).

Materials and Methods

This is prospective cross-sectional study of 63 cases with clinically and radiologically diagnosed abdomino-pelvic masses, referred for FNAC over the period of 2 years from July 2014 to June 2016. Excluding all superficial well-defined swellings, pulsatile swelling, patients with bleeding disorders, patients diagnosed with pregnancy and suspected peritonitis. After getting ethical clearance of the institutional ethics committee, written informed consent was taken from each patient. Detail histories were taken and per-abdomen palpation of masses were done. Relevant investigations like bleeding time, clotting time, platelet count, PT/INR were done before procedure. The radiologist localized anatomical location of the lesions before aspiration. Mostly anterior approach and if need lateral or posterior approach was used mainly for retroperitoneal masses. With proper aseptic precautions, the shortest possible needle path from the skin to the mass was chosen, avoiding the intervening pleural sinus, organ or vascular structure. 20 cc airtight

disposable syringes attached with 21-23 gauge needles and for deep-seated lesions, 26-gauge Lumbar Puncture needle were used. The puncture sites were anesthetized with 5% Xylocaine. The aspiration was done with multiple slow and swift back and forth reciprocal movements under negative pressure until material filled-up the core of the needle and appeared in the hub. The material obtained on aspiration was expelled over a clean glass slide, thin smears were made by opposition technique, fixed immediately in 95 % alcohol for subsequent Papanicolaou's stain (PAP), H&E stain, and air-dried slides stained with Giemsa. Image guided biopsy was also done in some cases for histopathological correlation.

Results

This study included 63 patients of abdominopelvic mass in which non-neoplastic (infective) lesions were found in four patients(6.34%), Neoplastic were in 56 patients, of which benign lesions were present in 15 cases(23.80%) and malignant were in 40 cases, in which primary malignancy were in 35 cases (55.55%) and metastatic were in six cases (9.52%). Three cases (4.76%) were inconclusive because of inadequate aspiration. Out of 63 cases, female were 33 (52.38%) and male were 30 (47.6%) and most of the patients were belongs to age group 31-40 years (26.98%) followed by 41-50 years (22.22%), 51-60 years (20.63%), 21-30 years (14.28%), 61-70 years (7.93%), 11-20 years (3.17%), 71-80 years (3.17%) and 1-10 years (1.5%). The site of origin of most of abdomino-pelvic masses were liver (15 cases, 23.80%) followed by ovary (13 cases, 20.63%) and retroperitoneal proper masses(12 cases, 19.04%). The most common malignant lesions in liver were hepatocellular carcinoma (HCC) (seven cases) [Figure1A,1B], followed by metastatic carcinoma to liver (five cases,33.33%). Most common site of metastasis to liver was colon (three cases), followed by stomach and gall bladder. There was one case of cholangio-carcinoma [Figure 1D] and one of hydatid cyst. One case was inconclusive because of poor

cellularity. The second most common site was ovary (13 cases, 20.63%), where more commonly malignant lesions (eight cases, 61.53%) were found. Serous cystadenocarcinoma [Figure 1H] and dysgerminoma [Figure 1I] (two cases each) were the most common malignant lesions of ovary. Other organs involved were GIT and Pancreas (seven cases each), biliary system and retroperitoneal lymph nodes (four cases each) and one case of spleen was seen. Infective (non-neoplastic) cases were four in number, among which tuberculous lymphadenitis (two cases) followed by one case of each granulomatous spleen and hydatid cyst of liver seen.

The cytomorphology with histological findings were well correlated in 58 out of 60 cases, from the tissue obtained from trucut biopsies or surgical specimen. The infective and metastatic cases were 100% concordant cytohistological correlation, but in benign and primary malignancy, there were disconcordance. All lesions of Liver, GIT, pancreas & periampullary mass, biliary system, retroperitoneal lymph nodes and spleen were 100% concordance with histopathological diagnosis. Among ovarian lesions, all were diagnosed cytologically were confirmed by histopathological examination except one case of mucinous cystadenoma that was later diagnosed as mucinous cystadenocarcinoma on histopathology. Similarly, for all retroperitoneal proper masses cytohistological correlation were done except two cases, one case of benign spindle cell tumor diagnosed cytologically, turned to be leiomyosarcoma and lipoma as liposarcoma on histopathology.

The cytological appearance of HCC varies with the degree of differentiation. Out of seven cases of HCC, four cases were well to moderately differentiated which showed malignant hepatocytes, arranged in thick trabeculae (>3) and papillary clusters with anisonucleosis, hyperchromasia and intranuclear vacuolation and prominent nucleoli with endothelial cells wrapping and transgressing blood vessels. Three cases were poorly differentiated HCC.

Cholangiocarcinoma cytologically resembles that of adenocarcinoma. The presence of mucin favors the diagnosis of cholangiocarcinoma over poorly differentiated HCC.

All ovarian lesions (11 cases) cytologically diagnosed benign or malignant were confirmed histologically except two malignant cases, anaplastic large cell lymphoma and NHL because patient went to cancer institute for chemotherapy after cytological diagnosis. Other ovarian lesions were serous cystadenoma (one case), mucinous cystadenoma (two cases), fibroma-thecoma (two cases), dysgerminoma (two cases) [Figure 1I] and one case of serous cystadenocarcinoma [Figure 1H] and mucinous cystadenocarcinoma (two cases).

Out of 12 cases of retroperitoneal masses, one case was inconclusive. Malignant lesions (six cases) were more common than benign lesions (five cases). No metastatic lesion was reported. Distribution of lesions were three cases of fibromatosis, two cases of pleomorphic sarcoma (Figure 1G) and one case of each paraganglioma (Figure 1E), benign spindle cell tumor (schwannoma), leiomyosarcoma, liposarcoma, small round cell tumor (Figure1D) and non-Hodgkin's lymphoma.

Out of seven cases of periampullary mass and pancreas, six cases were primary malignancy and one case was inconclusive. Primary malignancy included periampullary adenocarcinoma (three cases), solid pseudopapillary neoplasm (two cases) and pancreatic neuroendocrine tumor (one case). [Figure1F]. No benign and metastatic lesion noted.In gastrointestinal masses (seven cases), most common lesions were adenocarcinoma (five cases) and two cases of gastrointestinal stromal tumor were seen. Tuberculous lymphadenitis (two cases) were more common among retroperitoneal lymphadenopathy followed by NHL (one case) and metastatic adenocarcinoma (one cases) in para-aortic lymph node.In biliary system most common lesions were adenocarcinoma (three cases) followed by cholangiocarcinoma (one case). One case of splenic mass reported as

granulomatous lesion on cytology, confirmed as tuberculosis on histopathology.

Therefore, the concordance (diagnostic accuracy) between cytological diagnosis and histopatho-logical diagnosis was 94.82% in this study.

Sensitivity and specificity of guided FNAC was 92.86% and 100% respectively. Positive and negative predictive value was 100% and 84.21% and diagnostic accuracy was 94.82%.
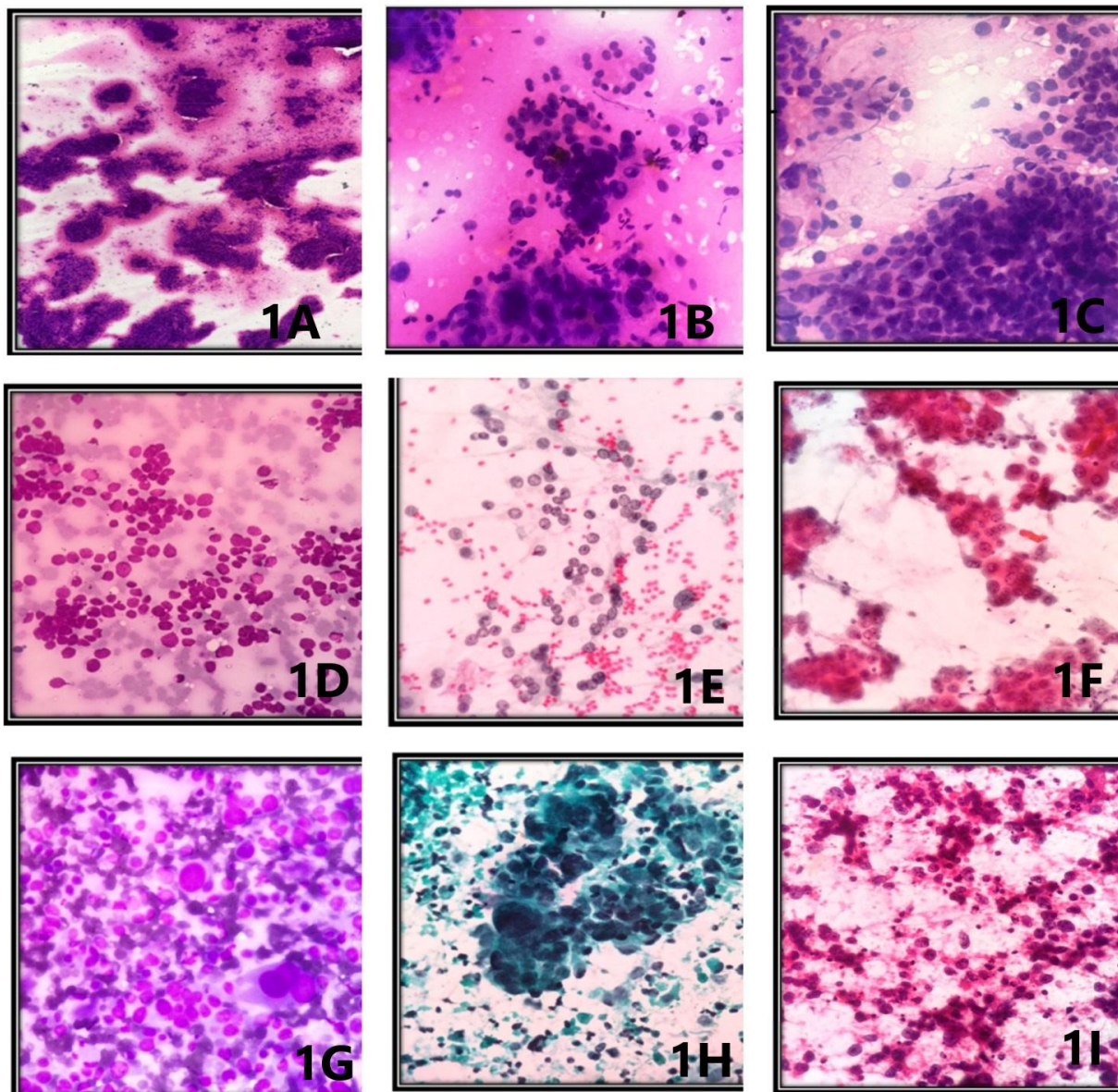

Figure1A: Hepatocellular carcinoma [H&E, 200X]

Figure1B: Hepatocellular carcinoma [H&E, 400X]

Figure 1C: Cholangiocarcinoma [H&E, 200X]

Figure1D: Small Round cell tumor [H&E, 200X]

Figure1E: Paraganglioma [H&E, 200X]

Figure1F: Neuroendocrine tumor of pancreas [H&E, 200X]

Figure1G: Pleomorphic Sarcoma [H&E, 200X]

Figure1H: Papillary serous cystadenocarcinoma ovary [PAP, 400X]

Figure1I: Dysgerminoma ovary [H&E, 200X]

Table 1: Organ-wise distribution of lesions and its cyto-histological diagnosis

ABDOMINOPELVIC ORGANS	CYTO-HISTOLOGICAL DIAGNOSIS
Liver (15)	Hepatocellular carcinoma (7) Cholangiocarcinoma (1) Metastatic Adenocarcinoma: colon(3) and stomach & GB (1 Each) Hydatid cyst (1)
Ovary (13)	Serous cystadenoma (1) Mucinous cystadenoma (2) Fibroma-Thecoma (2) Non-Hodgkin's lymphoma (1) Anaplastic large cell lymphoma (1) Dysgerminoma (2) Mucinous cystadenocarcinoma (2) Serous adenocarcinoma (2)
Retroperitoneal Proper (12)	Fibromatosis (3) , Paraganglioma (1) Benign spindle cell tumor (1) (Schwannoma) Pleomorphic sarcoma (2) Leiomyosarcoma (1) Liposarcoma (1), Small round cell tumor (1) Non-Hodgkin's lymphoma (1)
Pancreas and Periampullary mass (7)	Adenocarcinoma (3) Solid pseudopapillary neoplasm (2) Pancreatic neuroendocrine tumor (1).
Gastrointestinal tract (7) Stomach (3) Intestine (4)	Gastrointestinal stromal tumor (GIST) (2) Adenocarcinoma (1) Mucinous adenocarcinoma with signet ring cell (2) Mucinous adenocarcinoma (2)
Lymph nodes (4)	Tuberculosis (2) NHL (1) and Metastatic adenocarcinoma (1)
Biliary lesions (4)	Adenocarcinoma of Gall bladder (3) Cholangiocarcionoma of CBD (1)
Spleen (1)	Granulomatous lesion (1) (Tuberculosis)

Discussion

Because of technological advances in the field of radio diagnosis, inaccessible lesions can sampled safely under guidance, leading to reduction in rate of open biopsy and two staged surgical procedures. Close co-operation between radiologist and cytopathologist ensures rapid diagnosis in a cost-efficient manner.[3] In this cross-sectional study, 63 patients of abdomino-pelvic masses enrolled on clinical and radiological ground.Out of 63 (100%) cases of abdominopelvic masses, female were 33 (52.38%) and male were 30 (47.6%; M: F ratio = 1:1.1). In the study population most of the patients belonged to age of 31-60 years (69.83%).Sidhalingreddy and Andola [4]studied FNAC of intra-abdominal lesions in 34 cases, there were 101 males and 133 females with a male to female ratio of 1:1.3 and majority of the patients i.e. 146 (59.6%) were in the age group of 30-60 years. Hemalatha et al [1] studied 90 cases of clinically or radiologically diagnosed abdomino-pelvic masses and majority of the patients were females and most of the patients were between 21-30 years and 51-60 years of age. Dosi et al[5]observed maximum number of patients were in the age group of 51–60 years, followed by 61–70 years with the mean age of the sample was 52 years . Male to female ratio was 1.07:

The most common organ involved in the present study was the liver followed by ovary and retroperitoneal proper similar to the observation made by Sidhalingreddy and Andola.[4] Zawaret al[6] also found liver masses were the most common abdominal lesion. The ovary was not included in their studies; therefore, the second most common site was the large intestine. In the present study, majority of lesions were space-occupying lesions of liver (15 cases) and most of them were malignant lesions (13 cases).

The most common malignant lesion in the liver was primary hepatic malignancy (53.33%) [Hepatocellular carcinoma (seven cases),

[Figure1A,1B] and cholangiocarcinoma (one cases), Figure 1C] followed by metastatic carcinoma (five cases, 33.33%) and one was non-neoplastic lesion and one was inconclusive. No benign lesions reported in the liver.However, Dhameja et al [7] studied total 57 cases, in which 54 cases (94.7%) diagnosed as neoplastic and three cases as non-neoplastic lesions (5.2%). Of total 54 cases, only 12 cases (22.2%) were diagnosed as primary hepatic malignancies and in which four (7.4%) were hepatoblastomas and eight (14.8%) hepatocellular carcinomas. Secondary (metastatic) hepatic malignancies were more common than primary hepatic malignancy, comprised 42 cases of total 54 neoplastic lesions (77.7%) among which Adenocarcinomas (63%) were more common. Nasitet al [8] studied prospectively, FNAC of 150 cases of hepatic masses and they observed that out of the 150 cases, 142 cases (94.66%) were malignant, five cases (3.3%) were benign and three cases (2%) were inflammatory. Swamy et al [9] studied ultrasound guided FNAC of 72 cases of hepatic masses and among them neoplastic lesions (68.06%) were more common than non-neoplastic lesions (30.56%). The majority of the neoplastic lesions were hepatocellular carcinomas (36.12%) followed by metastatic adenocarcinomas (19.45%). In present study, most common liver metastasis was adenocarcinoma from colon, which was similar to previous studies of Das et al [10] and Leiman G. [11]The HbsAg test was done in all seven cases of hepatocellular carcinoma, out ofwhich fivewere tested positive and other two were negative. 71.42% of HbsAg positivity was seen in hepatocellular carcinomas and three (42.85%) out of seven cases were alcoholic. Sidhalingreddy and Andola[4] found six HBsAg positive cases, out of nine cases of HCC and 66.7% of HBsAg positivity were seen inHCC in their study. Sanyal et al[14] concluded in their study that both HBV and HCV infection increase the risk of developing liver cancer. 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.[15] In the present study population, no complications occurred during and after the procedure. The incidence of needle track seedling was 0.6% (one of 148 patients of HCC) in study done by Reddy et al. [16]

Among the 13 cases of ovarian masses, most common lesions were malignant (eight cases, 61.54%); a similar observation was made out in the study done by Sobha et al[17] (58.3%) and Pranab et al [18] (87.5%), which was different from the observation made by Sidhalingreddy and Andola.[4] In their study, benign lesions were more common and most of them were cystadenomas. Similar to the present study, Sidhalingreddy and Andola[4] also diagnosed serous cystadenocarcinoma wrongly as serous cystadenoma on cytology.

Regarding the retroperitoneal lesions, Mangal et al [19] stated that the diagnosis of retroperitoneal lesions is one of the most difficult areas in surgical pathology. Both primary and malignant tumors grow silently in the retroperitoneal space before any clinical signs and symptoms. Therefore, FNAC has a promising role in establishing the diagnosis in this region. Among retroperitoneal mass proper, malignant lesions (six cases, 54.55%) were more common than benign lesions (five cases, 45.45%). In the malignant soft tissue lesions, there were two cases of pleomorphic sarcoma (MFH), one each of leimyosarcoma, liposarcoma, small round cell tumor and NHL. Mangal et al [19] and Chakrabarti et al[20] also found MFH to be most frequently encountered sarcoma. Fibromatosis was most common lesions among benign retroperitoneal proper masses which was different from Mangal et al.[19] and Chakrabarti et al [20] in which lipoma was most common benign lesion.

Although few studies have reported complications like mild local pain, bleeding and tumor seeding of the needle tract but most of the literature supports the safety of FNAC. No complications happened in the present study. Other studies like

Sidhalingreddy and Andola[4] had also not found any complication during and after the procedure. The sensitivity of guided FNAC ranged from 90.0 to 94.11%. In the present study, it was 92.86%. Ahmad et al,[12] Hemalatha et al,[1] Suman et al[13] and Sobha et al[17] were 94.11%, 94.1%,100%,90 % respectively. Similar to the present studies, all the studies had 100% specificity. The diagnostic accuracy in various studies ranged from 90.0 to 96.5%. In the present study diagnostic accuracy was 94.82%, which was comparable tothat of most of the studies.

Conclusion

USG/CT guided FNAC is relatively simple, cost-effective, quick and safe procedure with high accuracy can used as a routine outpatient procedure, as first line of investigation for palpable, non-palpable and inaccessible abdominopelvic lesions. In addition, Guided FNAC used as pre-operative procedure, for frozen section examination and in follow up of patients. Routine supplementation of FNA with cellblock or core biopsy is better than either method alone.

References

1. Hemalatha AL, Sumana SV, Sushma S, Suma JK, Varna I, Aditya A. Ultrasound Guided Fnac of Abdominal–Pelvic Masses. J ClinDiagn Res 2013;7:273-7.
2. Langlois S, Le P. Fine needle aspiration cytology. In: Orell SR, Sterrett GF, Whitaker D. Imaging methods for guidance of aspiration cytology. 4th Ed. New Delhi: Churchill Livingstone; 2005.p.31-40.
3. Mehdi G, Maheshwari V, Afzal S, Ansari HA, Ahmad I. Image-guided fine needle aspiration of retroperitoneal masses: The role of the cytopathologist. J Cytol 2013;30:36-41.
4. Sidhalingreddy, Andola SK. Fine Needle Aspiration Cytology of Intra- Abdominal Lesions. Journal of Clinical and Diagnostic Research 2011;5:551-8.
5. Dosi S, Gupta G, Kawatra M, Chakrabarti PR, Agrawal P, Jain MR. Role of radiological-assisted cytology in intra-abdominal lesions: A 3 years experience in a tertiary care center. Int J App Basic Med Res 2016;6:101-5.
6. Zawar MP, Bolde S, Shete SS. Correlative study of fine needle aspiration cytology and histology in intra abdominal lumps. SMJ 2007;4.
7. Dhameja N , Rai V, Singh R. Fine Needle Aspiration Cytology of Liver Space Occupying Lesions - A Study of 57 Cases from a Tertiary Care Centre. IJSR 2016:5.
8. Nasit JG, Patel V, Parikh B, Shah M, Davara K. Fine-needle aspiration cytology and biopsy in hepatic masses: A minimally invasive diagnostic approach. Clin Cancer Investig J 2013;2:132-42.
9. Swamy MC, Arathi C, Kodandaswamy C. Value of ultrasonography-guided fine needle aspiration cytology in the investigative sequence of hepatic lesions with an emphasis on hepatocellular carcinoma. J Cytol 2011;28:178-84.
10. Das DK, Tripathi RP, Chachra KL, Sodhani P, Parkash S, Bhambhani S. Role of guided fine needle aspiration cytology in diagnosis and classification of liver malignancies. Trop Gastroenterol 1997;18:101-6.
11. Leiman G. Liver and Spleen. In: Orell SR, Sterret GF, Whitaker D, editors. Fine needle aspiration cytology. 4th Ed. New Delhi: Churchill Livingstone; 2005.p.293-316.
12. Ahmad SS, Akhtar K, Akhtar SS, Alia Nasir AA, Khalid M, Mansoor T. Ultrasound Guided Fine Needle Aspiration Biopsy of Abdominal Masses. JK Science 2006;8:200-4.
13. Sumana BS, Muniyappa B. Ultrasonography Guided Fine Needle Aspiration Cytology with Preparation of Cell Blocks in the Diagnosis of Intra-

Abdominal Masses. J ClinDiagn Res 2015;9:8-12.

14. Sanyal AJ, Yoon SK, Lencioni R. The etiology of hepatocellular carcinoma and consequences for treatment. Oncologist 2010;15 Suppl 4:14-22.

15. Huang GT, Sheu JC, Yang PM, Lee HS, Wang TH, Chen DS. Ultrasound guided cutting biopsy for the diagnosis of hepatocellular carcinoma-a study based on 420 patients. J Hepatol 1996;25:334–8.

16. Reddy CV, Goud YG, Poornima R, Deshmane V, Madhusudhana BA, Gayathridevi M. Role of FNAC in Hepatic lesions: Risk of track metastases. South Asian J Cancer 2015;4:35-7.

17. Sobha Rani G, Faheem N, Sai Prasad BV, Sudhakar Reddy E. Efficiency of ultrasound guided aspiration cytology in deep seated lesions - a diagnostic evaluation. Int J Med Health Sci 2012;1:1-12.

18. Pranab de, Subhar, Kalyan K Dhar. Fine Needle Aspiration Biopsy of Ovarian Neoplasms. Indian J PatholMicrobiol 2001;44:103-6.

19. Mangal N, Sharma VK, Verma N, Agarwal AK, Sharma SP, Aneja S. Ultrasound guided fine needle aspiration cytology in the diagnosis of retroperitoneal masses: A study of 85 cases. J Cytol 2009;26:97-101.

20. Chakrabarti I, Bhowmik S, Sinha MGM, Bera P. Ultrasound-guided aspiration cytology of retroperitoneal masses with histopathological corroboration: A study of 71 cases. J Cytol 2014;31:15-19.