Role of ultrasound guided fine needle aspiration cytology in the diagnosis of abdominal-pelvic lumps

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ABSTRACT

Background: Aspiration cytology is the study of cells, obtained by a fine needle puncture of the mass.The basic principles of fine needle aspiration can be applied to almost any site in the body.Masses arising in the abdominal cavity are often deep seated and non-palpable. Because of the undetailed margins of these lesions it is difficult to assess their size and shape. Ultrasound (US) guided fine needle aspiration is a readily accepted, rapidly growing and an important diagnostic technique which is an accurate, safe, simple, rapid, and an efficacious method which can be used for rendering a cyto-histologic diagnosis in space occupying lesions of the abdomen and also for the confirmation of the suspected malignant masses in various intra-abdominal and pelvic locations.

Materials & Methods : We have performed 204 ultrasound guided FNACs and 102 percutaneous FNACs without any radiological guidance, from various abdominal and pelvic lesions. Patients with large and easily palpable lumps were selected for percutaneous FNACs without any radiological guidance. Patients with small, deep seated and non-palpable lesions were selected for ultrasound guided FNACs.

Results : Majority of the patients (59.8%) were in the 40 to 60years age group with mean age 48.4 years and male to female ratio was 1.28:1.Maximum cases were from liver followed by intestine, ovary, kidney, stomach, lymph node, retroperitonium, and pancreas.Satisfactory aspiration rate with ultrasound guided FNACs (96.08%) is significantly greater than FNACs without ultrasound guidance (58.82%) and positivity (87.25%) in FNACs with ultrasound guidance done by pathologist was significantly high as compared to FNACs without ultrasound guidance (46.07%).

Conclusion: Ultrasound guided FNAC is easy, safe, less time consuming procedure with high success rate.We have seen in our study that FNAC done by pathologist, under ultrasound guidance in the presence of radiologist increased the diagnostic accuracy and satisfactory aspiration rate.

Keywords: Ultrasound Guided FNAC, abdominal-pelvic masses, Liver

INTRODUCTION

Aspiration cytology is the study of cells, obtained by a fine needle puncture of the mass. The credit of first description of tumor sampling by use of narrow gauge needle goes to Martin and Ellis in 1930.[1] However, the technique was ignored for several decades though it was being assessed in Scandinavia.[2] Prominent reasons for delay in acceptance of fine needle aspiration cytology(FNAC) as diagnostic tool in our countrywould have been the presence of only few pathologists skilled in cytologic interpretations, while most believed that diagnosis could be made only from plentiful tissue samples which permit the pathologists to determine intercellular relationships.[3]

The basic principles of fine needle aspiration can be applied to almost any site in the body, with subtle differences in technique depending on the organ being investigated. While excisional biopsy is still appropriate in certain cases, including diagnosis of breast and brain tumors, percutaneous FNAC has become the standard of care in the diagnosis of most tumors throughout the body.

Masses arising in the abdominal cavity are often deep seated and non-palpable. Because of the undetailed margins of these lesions it is difficult to assess their size and shape.Ultrasound (US) guided fine needle aspiration is a readily accepted, rapidly growing and an important diagnostic technique which is an accurate, safe, simple, rapid, and an efficacious method which can be used for rendering a cyto-histologic diagnosis in space occupying lesions of the abdomen and also for the confirmation of the suspected malignant masses in various intra-abdominal and pelvic locations.[4] The greatest advantages of ultrasound guided FNAC are, it allows real time visualization of needle tip as it moves across the tissue planes, guide the needle into the lesions as small as 1cm and in critical anatomical areas. Precise targeting of the lesion increases the success rate of the procedure.

Ultrasound guided FNAC can be applied to patients who are too ill to undergo surgery or who wish to avoid convalescence from large diagnostic laparotomy procedures. Thus, not only it avoids the major procedure merely for obtaining a biopsy specimen from relatively inaccessible sites, it also obviate the need for any type of surgery in all others.

Percutaneous FNAC also is beneficial in the staging of patients with cancer, particularly when another treatment method may be more appropriate than surgical resection.

Cytological samples can be swiftly stained and examined, thereby providing on- spot assessment of adequacy and in many cases a provisional diagnosis can be made while the patient remains in the Radiology department. Advantages of percutaneous FNAC over surgical biopsy are uncomplicated procedure, time and cost savings, and if patient is co-operative, the procedure can be repeated in case smears are inadequate. Furthermore, involvement by pathologists on site optimizes clinical correlation and ensures that specimens are adequate, optimally handled and that appropriate samples are taken as required for ancillary investigations, such as immunocytochemistry, microbiology or molecular studies. The technique is relatively painless, speedy and cheap. Hence,there are clear advantages of ultrasound-guided FNAC to patients and doctors alike. We did this study to prove the efficacy of US guided FNAC over direct percutaneous FNAC in abdomino-pelvic masses.

MATERIALS AND METHODS

We have performed 204 ultrasound guided FNACs and 102 percutaneous FNACs without any radiological guidance, from various abdominal and pelvic lesions in pathology department. Patients with large and easily palpable lumps were selected for percutaneous FNACs without any radiological guidance. Patients with small, deep seated and non-palpable lesions were selected for ultrasound guided FNACs.

Detailed history was taken and clinical examination was done of all the patients. Ultrasound guided FNACs were done using Sonslisa-32 and a 3.5 MHz convex probe. FNACs were routinely performed on outpatients also.

The reason for the FNAC, the procedure itself and the absence of any significant risks were explained to the patient before starting the procedure. No special pre-procedural preparation was required. Fine needle aspirations from the intra-abdominal lumps were performed. Smears were prepared and stained with Papanicolaou stain. Some smears were also stained with Giemsa stain. Smears studied under microscope and diagnosis was given.

The surgical specimens from the patients who had undergone surgery were studied by taking 5 micron sections and staining it with haematoxylin & eosin, in these cases cytological diagnosis was compared with histopathologic diagnosis to know the accuracy of ultraound guided FNACs in our setup. Results of ultrasound guided FNACs and percutaneous FNACs without any radiological guidance are also compared.

RESULTS

In the present study we have performed the FNAC in 306 patients with abdomino-pelvic masses to make preoperative diagnosis. Out of which 204 were selected for ultrasoundguided FNAC and 102 FNACs were done without ultrasound guidance.

Majority of the patients (59.8%) were in the 40 to 60years age group with mean age 48.4 years and male to female ratio was 1.28:1.

Maximum cases were from liver followed by intestine, ovary, kidney, stomach, lymph node, retroperitonium, and pancreas (Table no 1/fig. 1-5). However adrenal, mesentery, gall bladder, urinary bladder, testes, klatskin tumor, illiac bone contributed minimally. This minimal contribution in above organs was due to relative low incidence of the malignancy in those organs.

The table no 2. shows satisfactory aspiration with ultrasound guided FNACs (96.08%) is significantly greater than FNACs without ultrasound guidance (58.82%) and positivity (87.25%) in FNACs with ultrasound guidance done by pathologist was significantly high as compared to FNACs without ultrasound guidance (46.07%). Typing was easily possible in 72.05 % cases of ultrasound guided FNACs as compared to 29.41 % of FNACs without ultrasound guidance. The number of suspicious (1.47%), and cases where opinion was not possible (2.45%), was very low in guided FNACs. The better results were obtained in FNAC done under ultrasound guidance due to precise hitting of target lesion, on spot presence of pathologist and availability of clinical details.

Out of 306 cases, we were fortunate to correlate and confirm our cytological findings with histopathology in 70 cases which included various organs as shown in fig. no. 6. Tumors of colon, ovary, stomach and kidney constituted most of cases.

In present study, sensitivity was 97.01%, specificity 100%, positive predictive value 100%, negative predictive value 60%, false positivity zero and false negativity 7.7%. Diagnostic accuracy of total 204 cases of ultrasound guided FNACs was 96.08% and that of FNAC without guidance was 59.73%. Overall accuracy in cyto-histopathlogic correlated cases was 97.14% in the present study.

DISCUSSION

Ultrasound guided FNAC allows for targeted sampling of non-palpable lesion with additional advantage to see patient face-to-face,perform history/examination, identifying suspicious lesion, adequate and representative sampling of mass/lesion. FNAC done with this relatively new technique decreases sampling error and gives the pathologist a chance to correlate between physical exam, ultrasound imaging and cytology findings, which in return helps the patient reaching a final decision on treatment modality.

During a period of 3 years we have done 306 FNACs in patients with abdominal and pelvic masses. Out of these 204 were ultrasound guided FNACs and 102 percutaneous FNACs without any radiological guidance.These included lesions of liver, gall bladder, pancreas, kidneys, bowel, lymph nodes, ovaries and miscellaneous other regions (soft tissue masses, retroperitoneal masses, mesenteric tumors and adrenal pathologies). In current series, FNACs were avoided in known cases of uncontrollable bleeding diathesis and suspected hydatid cysts and in suspected case of pheochromocytoma.

Similar to all the studies, percentage of male patient was higher than female.[5,7,8,9] The reason might be male patients seek more medical attention than females. In our study majority of the patients (59.80%) were in the age group of 40-60 years which correlate with the study done by Zawar MP et al [5] and Shamshadet al.[6] The male to female ratio in the present study was 1.28:1 which correlate with the studies done by Zawar MP et al[5] Govind Krishna SR et al[7],Aftab Khan A et al[8] and Mary Ennis Get al[9].

A high diagnostic accuracy (96.08 %) of ultrasound guided FNAC with no false positive diagnosis of malignancy was observed in this study which is comparable to most of the studies done in the past [Table No 3].These studies showed diagnostic accuracy ranging from 77.5 % to 100%.The credit of the result goes to the co-work of pathologist and radiologist in sonography suit through guidance for targeting the lesions, and proper aspiration, spreading and fixation technique.

The sensitivity and specificity of radiologically guided FNAC for abdominal malignancies in the current study is comparable to that reported by Aftab A Khan et al,[8] Shamshad et al,[6] Ahsan MK et al,[10] Sidhalingreddy[11] . Adequacy of obtaining satisfactory material by US guided FNACs was 96.08% and that of FNAC without radiological guidance was 58.82%. In a study done by Nautiyal S et al diagnostic yield was 64.81% and 93.06 % respectively for non-guided and guided FNAC of abdominal lumps.[12] Sumana BS and Muniyappa B reported a diagnostic yield of 96.77% with US guided FNAC in abdominal masses.[13] Sidhlingareddy and Andola SK observed a diagnostic yield of 92.7% with guided FNAC and 95% with direct aspiration.[11] More diagnostic yield in non-guided FNAC as compared to guided FNAC may be due to proper selection of superficial and palpable lesions for direct aspiration.[11]

Most common site of FNAC in the present study was liver (35.29%) followed by intestine(13.72%) similar to the studies done by Nobrega J et al[14], Sheikh M et al[15], Adhikari RC et al[16] and Tuladhar AS[17]. Cytological typing of malignancy was possible in 52 cases out of total 108 cases of liver FNACs.Thirty two cases represented secondaries to liver, most of which were from adenocarcinoma and one from melanoma and spindle cell neoplasm each. Hepatocellular carcinoma was diagnosed in 19 aspirates, four out of those were HBsAg positive. Interestingly one FNAC represented lymphoma infiltration in liver which is a rarity. Out of 11 negative cases9 cases were diagnosed as liver abscess and 2 were non-representative.In our study the youngest patient of liver lesions was 25 yr old, diagnosed as liver abscess and oldest patient was of 85 yr old, however maximum patients were between age group of 41 to 50 yrs which is similar to the age range observed by Hemlatha et al.[18]

Complication rate in current study was negligible and was in the form of mild pain at site of aspiration persisting for 6-24 hrs except in one case of infected ovarian cystadenoma the pain was moderate and persisted for 3-4 days.

Fornari F et al[19] in his study stated that complications following ultrasonically guided fine-needle biopsies performed in abdominal lesions is very low and confirms that abdominal biopsy with fine needle is safe & reliable. No needle track seedling was noted in current study. The frequency of needle-tract seeding, using fine needles (21, 22 or 23 gauge X 36 mm disposable needles and 21, 22, 23G X 89mm disposable spinal needles), is between 0.003–0.009%. Studies have not shown any difference in survival of patients with malignancy who were aspirated compared with those who were not.[20]

Considering advantages of fine needle aspiration i.e. easy, safe, less time consuming and high success rate, the minor complications can be overlooked. Overall, in the present study, contribution of: guidance by radiologist, support of clinician and co-operation by patients was very important.

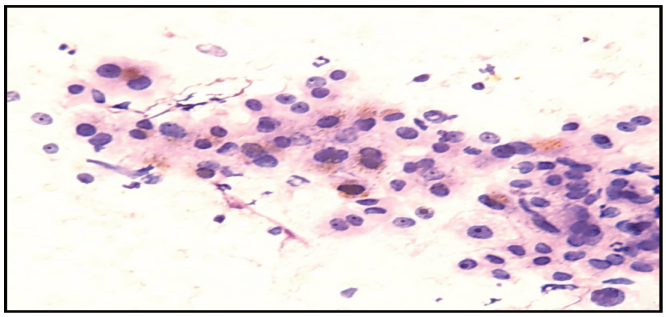

Figure 1: Hepatocellular carcinoma composed of poorly cohesive hepatocytic cells with anisokaryosis and large prominent nucleoli. Bile pigment within the cell proves Hepatocellular origin of the tumor (PAP stain, 400X).

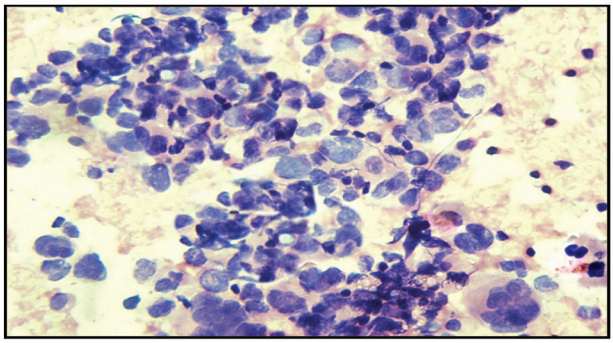

Figure 2: Moderately differentiated pleomorphic Hepatocellular carcinoma showing giant cell (PAP stain, 400X)

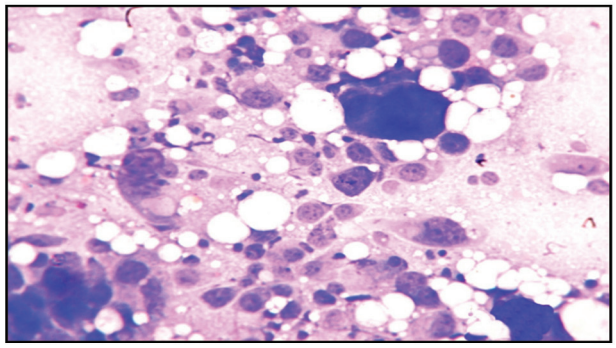

Figure 3: Anaplastic carcinoma of Pancreas showing highly pleomorphic,dispersed mononuclear tumor cells (Giemsa stain, 400X).

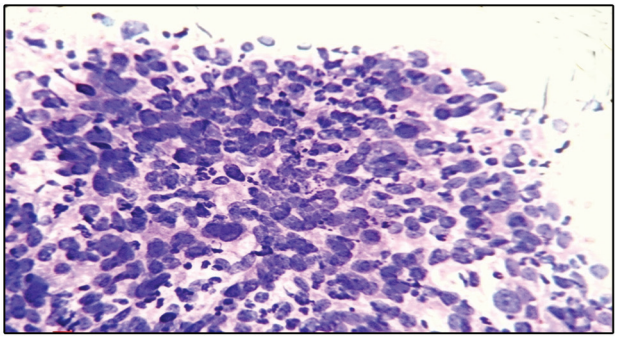

Figure 4: Moderately differentiated carcinoma of Pancreas showing poorly cohesive clusters of tumor cells (PAP stain, 400X).

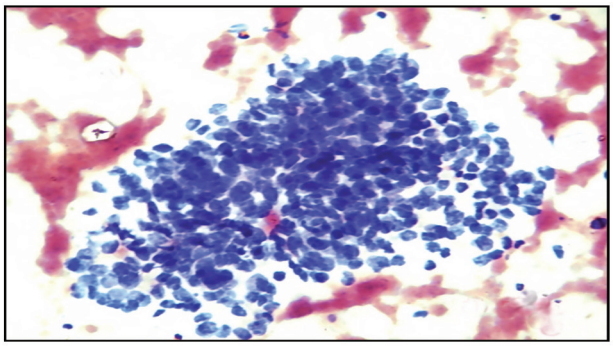

Figure 5: Carcinoma stomach showing tumor cells arranged in acinar pattern and in cluster. (PAP,400X)

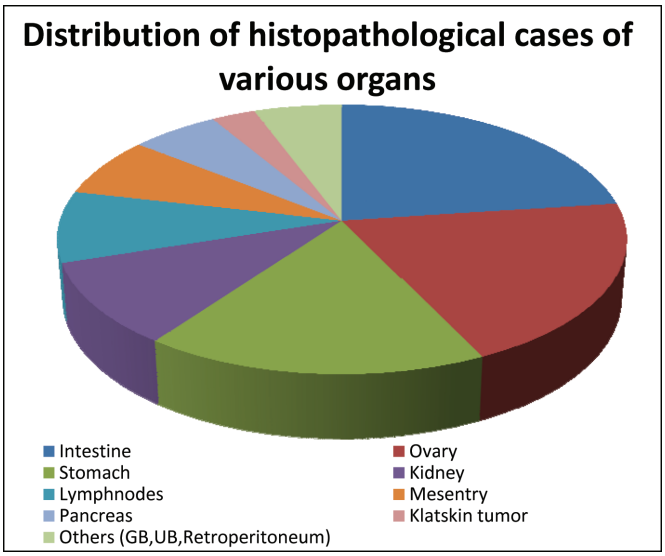

Figure 6: Distribution of histopathological cases of various organs.

Table no 1: Organ wise and US guidance wise distribution.

Sr. No.	Organs	No of cases			
		US guided FNAC's	% (out of 204)	FNAC's without US Guidance	% (out of 102)
1.	Liver	82	40.20	26	25.49
2.	Intestine	24	11.76	18	17.65
3.	Ovary	18	8.82	14	13.73
4.	Kidney	18	8.82	10	9.80
5	Stomach	11	5.39	10	9.80
6	Lymphnodes	12	5.88	5	4.90
7	Pancreas	8	3.92	7	6.86
8	Retroperitoneum	10	4.90	6	5.88
9	Adrenal	8	3.92	-	-
10	Mesentry	4	1.96	4	3.92
11	Others [Gall bladder, Urinarybladder, Iliacbone, Testes]	9	4.41	2	1.96
	Total	204		102	

Table no 2: Distribution of cytology results on the basis of use of US guidance.

Cytological diagnosis	FNAC with US guidance (204)		FNAC without US guidance (102)		Total (306)	
	Number	%	Number	%	Number	%
Satisfactory aspiration	196	96.08	60	58.82	256	83.66
Positive Typing possible	178	87.25	47	46.07	228	74.51
Typing not possible	147	72.05	30	29.41	180	58.82
	31	15.20	17	16.67	48	15.68
Suspicious	03	1.47	24	23.52	27	8.82
Negative	18	8.82	13	13.74	28	9.15
No opinion	05	2.45	18	17.64	23	7.52
Total	204		102		306	

Table no 3: Comparative analysis of statistical results.

Sr. No.	Study	No. of FNACs	Sensitivity %	Specificity %	Diagnostic Accuracy %
1	Zawar MP et al[5]	40	-	-	90
2	Shamshad et al[6]	200	94.11	100	95.7
3	Govind Krishna *et al*[7]	500	71.4	55.6	77.5
4	Aftab A. Khan et al[8]	50	94	100	94
5	Sidhalingreddy[11]	245	94.1	100	96.5
6	Nautiyal S et al[12]	72	-	-	87.5
7	Nobrega J et al[14]	236	87	100	100
8	Present study	306	97.01	100	96.08

CONCLUSION

Ultrasound guided FNAC is easy, safe, less time consuming procedure with high success rate.However,the cytopathologist who performs the procedure need acquire certain manual skill before taking up the diagnostic procedure. He also has to keep in mind weather what he/she is looking under the microscope match with clinical picture or not. We have seen in our study that FNAC done by pathologist, under ultrasound guidance in the presence of radiologist increased the diagnostic accuracy and satisfactory aspiration rate.

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