

Original Research Article

Utility of image guided fine needle aspiration cytology in the evaluation of intra-abdominal and retroperitoneal lesions at a tertiary health care center in Kashmir valley

Shaheena Parveen^{1*}, Kousar Sideeq Lone², Misbah Rashid³, Syed Besina Yasin⁴

¹Department of Pathology, Government Medical College, Srinagar, Jammu and Kashmir, India

²Department of Social and Preventive Medicine, Governmental Medical College, Baramulla, Jammu and Kashmir, India

³Department of Pathology, ASCOMS, Jammu, Jammu and Kashmir, India

⁴Department of Pathology, SKIMS, Srinagar, Jammu and Kashmir, India

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*Correspondence:

Dr. Shaheena Parveen,

E-mail: drshaheen.p@gmail.com

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ABSTRACT

Background: FNAC has become an established investigation in the diagnosis of accessible and palpable lesions. Most of the intra-abdominal masses are non-palpable and even if they are palpable, the idea of their size and shape and the extent of the lesion is not possible. Therefore, various imaging modalities like ultra-sonography, computed tomography and fluoroscopy are used as a guide for fine needle aspiration nowadays. Objectives of this study were to assess the utility of image guided fine needle aspiration cytology in the diagnosis of non-palpable intra-abdominal lesions. To study the cytomorphological features of these lesions. To evaluate the sensitivity, specificity and diagnostic accuracy of image guided fine needle aspiration cytology of these lesions.

Methods: A prospective study of percutaneous aspiration biopsy of intra-abdominal masses, to evaluate its utility was undertaken in the department of pathology, Sher-I-Kashmir Institute of Medical Sciences, Srinagar, Kashmir. FNA was performed in 183 patients.

Results: Adequate cell sample was obtained in majority of the cases (83.6%). Majority of the abdominal masses were arising from the liver (65%). Location of abdominal masses also included those arising from pancreas (12.02%), kidneys (7.65%), lymph nodes (7.65%), Gall bladder (6%) omental deposits (1.09%) and adrenal gland (0.54%). Majority of US guided FNA was done in liver masses. Overall sensitivity, specificity and diagnostic accuracy of image guided FNAC of intra-abdominal and retroperitoneal masses of the study was 100%, 100% and 93.54%, respectively.

Conclusions: There is lack of awareness regarding dog bite and its management among the rural population.

Keywords: Abdominal and retroperitoneal masses, Computed tomography, Fine needle aspiration cytology, Image guided, Ultrasound

INTRODUCTION

Fine needle aspiration cytology (FNAC) is the study of cells obtained by vacuum.¹ It is a technique in which a fine needle is introduced into a mass, cellular material is

aspirated, and a cytological diagnosis is rendered.² The European workers popularized the technique employing thin needles (22 gauge and higher) with an external diameter of 0.6 mm or less. This is the technique used today and is known as fine needle aspiration (FNA)

cytology.³ Blady had carried out aspiration cytology using imaging techniques as early as in 1939.¹ FNAC has become an established investigation in the diagnosis of accessible and palpable lesions.⁴ The technique is minimally invasive, produces a speedy result and is inexpensive. Intra-abdominal masses always remain as an enigma in surgical practice.⁵ Most of the intra-abdominal masses are non-palpable and even if they are palpable, the idea of their size and shape and the extent of the lesion is not possible.⁶ Image guidance permits planning and implementation of a biopsy approach that minimizes injury to adjacent organs or vessels, allowing for safe and effective sampling of these sites within a lesion, targeting areas most likely to contain viable tissue and avoiding areas of suspected necrosis, thus improving the reliability of cytological analysis. If FNAB is not adequate for diagnosis, conversion to core biopsy is possible in most instances. Finally, image guidance permits rapid identification and management of complications such as bleeding or pneumothorax, if they arise.⁴ Therefore, various imaging modalities like ultra-sonography (USG), computed tomography (CT) and fluoroscopy are used as a guide for fine needle aspiration nowadays. Ultrasonography offers several advantages as a biopsy guidance system. It is readily available, relatively inexpensive and portable; it uses no ionizing radiation and it can provide guidance in multiple planes such as transverse, longitudinal and oblique. The greatest advantage however, is that it allows real time visualization of the fine needle tip as it passes through the tissue planes into the target area. It has been demonstrated that ultrasound can precisely guide needle biopsies in lesions which are as small as 1 cm, in critical anatomical areas. This precision is necessary for a successful procedure and it often makes sonography the first choice in guiding interventional procedures.⁷ In addition to soft tissues, vascular structures may also be imaged in real time without the need for contrast administration through the use of color or power Doppler. A CT scan provides accurate localization and excellent needle visibility. It is a useful tool in sick patients who may not be candidates for surgery. It provides detailed cross-sectional of the body.⁶ CT guidance is particularly valuable in patients with lesions that are difficult to access or are in unusual or precarious locations, when the optimal route of biopsy requires avoidance or transgression of vital structures and in patients with unusual anatomy. CT is less operator dependent than US and is also preferred if an experienced US interventionalist is not available. However, CT is expensive, angled approaches are difficult and may result in significant radiation exposure.⁴ With CT guidance, most lesions are best approached by choosing a needle path that minimizes the skin to lesion distance. Intra-abdominal swellings may arise in liver, pancreas, gall bladder, gastrointestinal tract, kidneys, supra-renal masses, spleen, lymph nodes and retroperitoneum. The use of FNAC which is minimally invasive and safe procedure may eliminate the need for open surgical procedures for the sake of diagnosis alone, particularly in

high risk patients who are not good candidates for surgery.

METHODS

The present study was carried out in the department of pathology, (SKIMS), Srinagar, Kashmir with the aim to evaluate the utility of image guided FNAC in the diagnosis of non-palpable intra-abdominal and retroperitoneal masses. The study was a prospective study of two years from May 2012 to May 2014 and included 183 patients. All the superficial well-defined swellings, pulsatile swellings and swellings with surface ailments (ulceration, pigmentation etc.) and masses arising from the pelvic regions were excluded from the study. Only those patients with normal coagulation profiles were selected for the study. Relative contraindication included less severe coagulopathy and uncooperative or combative patient. The patients were subjected to an ultrasonographic or computed tomographic evaluation to assess the origin of the mass and its relationship with the adjacent organs. After mild sedation, sterile preparation, and topical anesthetic, the needle was inserted under USG/CT guidance and a sensation of tactile tumor resistance was often felt. Aspiration was performed using 18-22G aspirating needles (Chiba/spinal) or aspirating-cutting needles (Wescott/Franseen) of suitable length. Ultrasound guidance was obtained by using transducers of different frequency (3.5 MHz, 7-10 MHz) and was supplemented by Colour Doppler (to avoid any intervening vessels) whenever required. The aspirate was forcibly ejected onto a glass slide and stained by quick staining methods like Diff Quik in order to check for on-spot adequacy of the material aspirated. Whenever the material was found insufficient for definite diagnosis, the procedure was repeated. The slides were stained with May-Grünwald-Giemsa or fixed in 95% ethanol and stained by Papanicolaou's stain. Special stains like Gram stain/Ziehl-Neelson were done wherever required. Histopathological examination was done in those cases where feasible. Sensitivity and specificity were calculated by the appropriate formulas.

RESULTS

FNA was performed in 183 patients with the age range from 1-90 years having intra-abdominal and retroperitoneal masses. Maximum number of patients were in the age group of 51-70 years with the mean age of 50.4±5.3 years (Table 1). There were 92 males and 91 females (Table 1). FNA yielded adequate cell sample in 153 (83.60%) of aspirations (Table 1). There were 172 USG guided aspirations and 11 CT guided aspirations (Table 1). Commonest anatomical origin found out was hepatic masses in about more than half of cases followed by pancreas, Gall bladder, lymph node, and renal masses respectively (Table 2). In liver, majority of the lesions diagnosed were malignant and more than two third of them were secondaries (Table 3). Among 22 cases of

pancreatic FNACs, authors found 18 patients of adenocarcinoma (Table 4).

Table 1: Distribution of study population according to various variables.

Variables	Distribution (number)	
Age and sex distribution		
Age group	Male	Female
1-10	3	1
11-20	0	1
21-30	1	3
31-40	8	7
41-50	10	11
51-60	32	27
61-70	28	33
71-80	9	7
>80	1	1
Total	92	91
Type of FNAC		
USG guided	172	
CT guided	11	
Total	183	
Cellularity		
Adequate	153	
Inadequate	30	
Total	183	
Classification of lesion		
Benign	14	
Malignant	135	
Suspicious of malignancy	4	
Total	153	

Table 2: Site wise origin of abdominal masses.

Origin	Organ	Number (%)
Abdomen	Liver	119 (65.02%)
	Gall bladder	11 (6.01%)
	Omental deposit	2 (1.09%)
Retroperitoneum	Pancreas	22 (12.02%)
	Kidney	14 (7.65%)
	Adrenal gland	1 (0.54%)
	Lymph node	14 (7.65%)
Total		183 (100%)

Table 3: Cytological diagnosis of hepatic lesions on FNAC.

Cytological diagnosis	Males	Females
Mets adenocarcinoma	28	36
Hepatocellular carcinoma	5	3
Mets. neuroendocrine	5	0
Abscess	3	1
Mets. SCC	2	0
Suspicious of malignancy	2	0

Cytological diagnosis	Males	Females
Normal	0	2
Mets. adenoca/pleomorphic sarcoma	1	0
?HCC/mets. adenoca	1	0
Mets NHL	0	1
Mets. medullary ca. thyroid	1	0
Hepatoblastoma	0	1
Cirrhosis	1	0
Granulomatous	0	1

Table 4: Cytological categorization of various other lesions on FNAC.

Site and diagnosis	Males	Females
Pancreas		
Suspicious for malignancy	0	1
Adenocarcinoma	11	7
Solid pseudopapillary neoplasm	0	1
Node		
Mets. adenocarcinoma	1	2
NHL	2	3
Reactive lymphadenitis	0	1
Granulomatous	0	1
Abscess	1	0
Mets. RCC	1	0
Mets NEC	0	1
?NHL/small cell carcinoma	1	0
?NHL/adenocarcinoma	1	0
Gall bladder		
Suspicious for malignancy	0	1
Adenocarcinoma	2	8
Kidney		
Renal cell carcinoma	5	1
Wilm's tumor	0	3
Renal cyst	1	0

Table 5: Statistical analysis for evaluating diagnostic utility of percutaneous aspiration biopsy cytology on intra-abdominal masses in detecting neoplastic lesions.

Variables	Estimated value	95% confidence interval
Prevalence	0.93	0.77-0.98
Sensitivity	1 (100%)	0.85-1
Specificity	1 (100%)	0.19-1
Positive predictive value	1 (100%)	0.85-1
Negative predictive value	1 (100%)	0.19-1

Total number of benign lesions=2; Total no. of malignant lesions=29. (Total cases=31)

Similarly, in gall bladder masses the majority of the cases were of primary adenocarcinoma. NHL and metastatic deposits constituted the major proportion in case of nodal

masses. Renal cell carcinoma was the most common lesion among renal masses (Table 4).

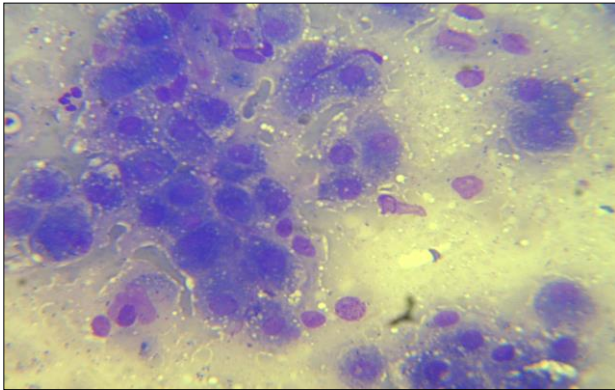


Figure 1: Cirrhosis: smears of poorly cohesive hepatocytes with degenerative/regenerative features.

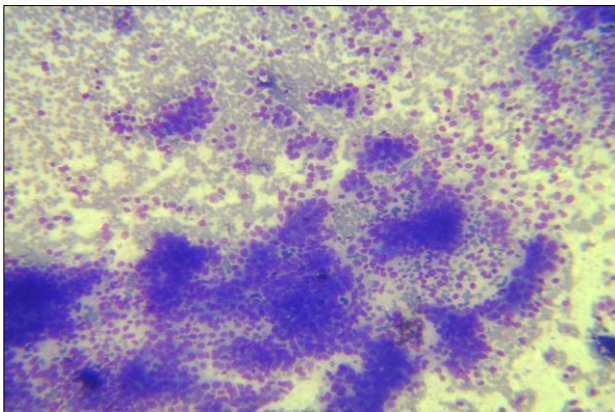


Figure 2: Hepatoblastoma: highly cellular smears and composed of a uniform population of small to intermediate round to oval cells arranged in clusters and rosettes along with individually scattered cells (MGG).

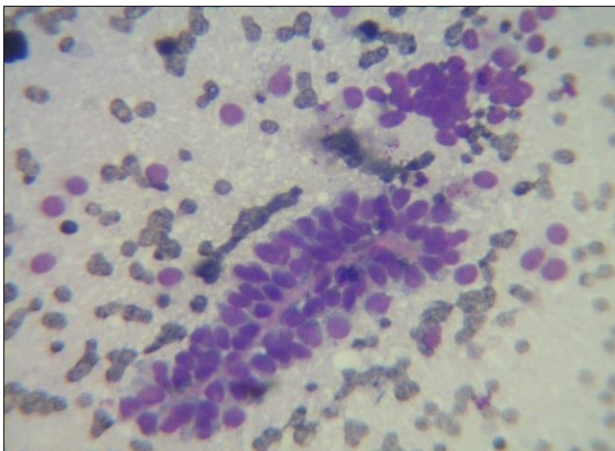


Figure 3: Solid pseudopapillary neoplasm: smears of branching papillary fronds comprising central slender fibrovascular cores of myxoid stroma (MGG).

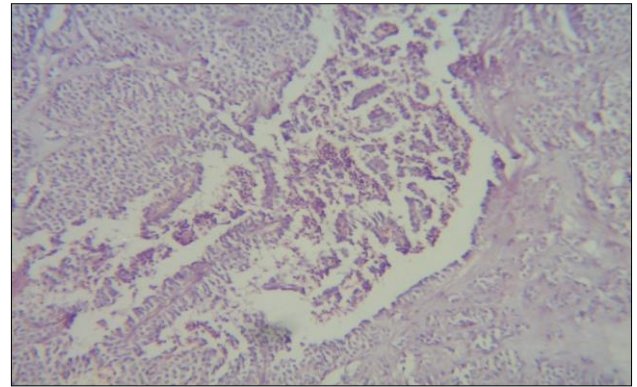


Figure 4: Solid pseudopapillary neoplasm (H and E).

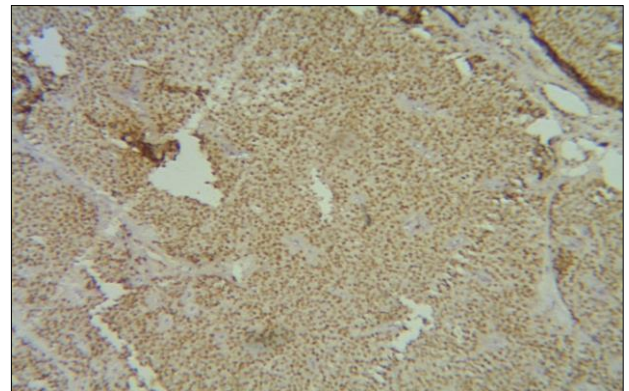


Figure 5: Solid pseudopapillary neoplasm: positive staining for progesterone receptors.

DISCUSSION

Image guided FNAC is a rapid, accurate, economical and a safe diagnostic procedure that can be used in various neoplastic and non-neoplastic diseases.

In this study, maximum number of patients were between 51-70 years of age. FNAC was also done in four children in the age group of 1-10 years. This age distribution observed in present study reflected that image guided FNAC of deep-seated lesions can be done in wide range of age group including children without major complications. Similar results regarding age distribution was found by many other Indian studies.⁸⁻¹¹ In this study, the most common cytological diagnosis was malignant neoplasm (88%) as also found by other studies.^{9,10}

Most of the intra-abdominal masses in this study, were arising from liver (61%), followed by pancreas. Liver was also the most common site of masses in studies conducted by Biradar et al, and many others.^{5,6,8,9,11-21} Furthermore, the commonest neoplastic lesions seen in liver were metastatic deposits (79.7%) followed by HCC (8.5%). In a similar study carried out by Rani S et al found metastatic deposits in liver in 46% of cases.¹ Bharti Jha et al, conducted a study in Gujarat, India and also found metastatic deposits of liver to be the commonest

lesion constituting (39.21%).¹⁰ In this study, USG guided FNA in one patient with ill-defined hypoechoic lesions yielded a few sheets of hepatocytes. These normal hepatocytes could be from the adjacent area which were present as “en route” structures by FNA sampling route and the actual lesion might have been missed by the needle. A wide range of neoplasms and tumorlike lesions occur in the liver. However, in this study, benign neoplasms and tumor like lesions-focal nodular hyperplasia and inflammatory pseudotumor were not encountered. Cytological diagnosis of metastatic adenocarcinoma in liver was made in 64 (68%) patients and it was the commonest lesion noted in this study. Similarly, metastatic adenocarcinoma was found to be in majority of the cases in other studies.^{1,8,9,11,22-26} The great majority of metastatic deposits of adenocarcinoma in liver can be explained by the fact that gastrointestinal malignancies are the commonest malignancies in Kashmir valley followed by lung cancer in males and breast cancer in females. In the study conducted by Rasool TM et al, and Wani MA et al, esophageal cancer is the most common cancer in Kashmir valley followed by cancers of lung, stomach, colorectal and breast.^{27,28} The metastatic deposits of adenocarcinoma in this study had already known primaries in some cases where as in other patients, primaries were detected on further clinical follow up. In this study liver aspirates were unsatisfactory for cytological evaluation in 23 patients due to excessive fibrosis in the lesion. Similar problems have been encountered in other studies.^{29,30} In this study, FNA of gall bladder masses was performed in 11 patients. Of them, 7 had definite features of adenocarcinoma. Positive findings in gall bladder aspirates, provided they are adequate for cytological analysis strongly support the diagnosis of malignant lesions, obviating the need for laparotomy in advanced cases and in patients who are poor surgical risks. FNAC of gall bladder masses showed a sensitivity, specificity and positive predictive value (PPV) of 72.91%, 100% and 100% respectively.

Histopathological correlation was established in thirty one cases only as majority of the cases had lesions in liver and among them maximum were metastatic deposits where diagnosis was established by histopathology of primary lesion. In still other cases, tumor being unresectable and patient subjected to chemoradiotherapy prevented us from obtaining the specimens for histopathological examination. While there was loss of follow-up in few other cases. For evaluating the neoplastic lesions (31 cases) both benign (2 cases) and malignant (29 cases) statistical analysis showed 100% sensitivity and 100% specificity. There were no false positive and no false negative cases. However, with regard to typing of malignant lesions diagnostic accuracy was 93.54%.

CONCLUSION

Present findings and those of others have indicated clearly that FNA is an excellent method of confirming

diagnosis of intra-abdominal and retroperitoneal masses. FNA is highly reliable and it takes place of invasive procedures, obviates surgical exploration especially in high risk patients facilitating initiation of appropriate therapy and thus saving time, manpower and cost of hospitalization. A multidisciplinary team of cytopathologists, radiologists and clinicians are most beneficial. Also, application of various techniques like advanced imaging techniques, immunocytochemistry, immunologic analysis and electron microscopic study can considerably broaden the diagnostic spectrum and increase the diagnostic accuracy.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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