



Original Article

Ultrasound Guided Fine Needle Aspiration Cytology for Diagnosis of Abdominal Lumps

Authors

Dr Neeraj Verma, Dr Yogesh Gupta*, Dr Manish Kumar Singhal, Dr Mukesh Kumar Khinchi, Dr Navita Gupta, Dr Shilpa Jalan, Dr Sapna Gandhi, Radhika Soni

*Corresponding Author

Dr Yogesh Gupta*

Abstract

Background: *Considering Indian setup of medical facilities, FNAC has proven itself as a boon for Indian Medical Personnel. Ultrasound guided FNAC of intra-abdominal masses is widely accepted as safe and effective method of diagnosing malignant lesion*

Material and Method: *FNAC of 88 randomly selected cases of abdominal lumps was performed under ultrasonography guidance. The results were correlated with available histopathology in 34 cases*

Result: *The sensitivity of FNAC for abdominal lumps in the present study 91.18% and diagnostic accuracy is 100%. Most commonly involved organ was liver (37.50%) while spleen was least involved (1.14%). Present study shows that incidence of malignancy in abdominal lumps is 80.68 % rest were either acute (6.82%) or chronic inflammation (4.55%) or benign tumors (7.95%).*

Introduction

Intra-abdominal mass is an enigma in surgical practice. Most of these are inoperable at the time of diagnosis and each pretends an ominous prognosis. Under these circumstances a diagnostic modality, Like FNAC offers accuracy without complications and requires minimal intervention at lowest cost and warrants consideration early in the investigation sequence.

Ultrasound guided FNAC of intra-abdominal masses is widely accepted as safe and effective method of diagnosing malignant lesion. FNA has now replaced conventional large needle core biopsy (Vim Silverman tru cut needle) of intra-abdominal masses as it carries several advantages over these thick needle biopsies.

The Sensitivity of guided FNA for a diagnosis of abdominal malignancy ranges in most series from 80 % to 96 % with a specificity of 90 % to 100 %. However the accuracy of large core needle biopsy as reported in various literature from 60 % to 82 % only. The diagnostic yield of FNA smears can be maximized by preparation of cell blocks which can be obtained in 70-85 % cases. Cell block increases yield by 10 – 20 % the sensitivity of malignant diagnosis based on smears alone; as well as allow the pathologist to perform special stains and immunohistochemical analysis, thereby increasing his ability to classify the tumor precisely and also provide trimness to his cytopathological diagnosis. The combined use of FNA smears and cell block not only increases the

accuracy to an average of 95 % but supersedes the large core needle biopsies in nearly all aspects.

Material & Methods

This study was done at SMS Medical college jaipur in Department of Patholgy. This study was carried in various intra-abdominal lesion.

Cytology smear is immediately fixed in 95 % ethyl alcohol for a minimum period of 15 minutes and stained by rapid papanicoloau techniques, hematoxylin and eosin, and may grunwald giemsa stains.

For histopathology Routine Hematoxylin and Eosin staining was done

Present Study is Aimed

1. To evaluate usefulness of ultrasound guided fine needle aspiration cytology as a diagnostic aid in abdominal lumps and
2. To compare the results of FNAC with corresponding Histopathological diagnosis.

Observation

The present study was carried out on patients presenting with abdominal lump in ultrasonography, attending the outdoor or admitted in wards of medicine and surgery at SMS, Medical College & Attached group of hospitals, Jaipur Eighty Eight cases of abdominal lumps were selected for fine needle aspiration cytology (Ultrasound guided). These lumps originated mainly from liver, gall bladder, kidney, spleen, pancreas and intestine. Lesion involved were malignant, acute and chronic inflammatory and benign tumors.

The present study was carried out on 88 randomly selected cases of abdominal lumps. Ultrasound guided FNAC. Findings of cases are summarized in following tables

Table 1 Sex Distribution Of Cases

SEX	NO. OF PATIENTS	%
Male	48	54.55 %
Female	40	45.45 %
Total	88	100 %

This data show that number of cases of abdominal lumps in male were 48 (54.55%), female 40 (45.45 %)

The male and the female ratio is almost equal with slight predominance.

Table 2 Age Distribution of Cases

Age Group	No. of Patients	%
0-10	5	5.68
11-20	6	6.82
21-30	3	3.41
31-40	13	14.77
41-50	16	18.18
51-60	23	26.14
61-70	15	17.05
>71	7	7.95
Total	88	100 %

The table shows that maximum no. of cases i.e. 23 cases (26.14%) were in age group 51-60 years , followed by 16 cases (18.18%) in 5th decade ; 15 cases(17.05%) in 7th decades ; 13 cases (14.77%) in 4th decade ; 7 cases (7.95%) in 8th decade ; 6 cases (6.82%) in 2nd decades , 5 cases (5.68%) in 1st decade ; at least 3 cases (3.41%) in 3rd decade . The youngest patient was 2 years old and the oldest was 80 years

Table 3 Distribution of Cases According to Anatomical Location of Lesion

Anatomical Location	No. of Patients	%
Liver	33	37.50
Gall baldder	6	6.82
Kidney	5	5.68
Spleen	1	1.14
Pancreas	3	3.41
Intestine	4	4.45
Ovaries	6	6.82
Retroperitoneal soft tissue	25	28.41
Other soft tissue	5	5.68
Total	88	

This table show the anatomical location of different space occupying lesion of abdomen. It indicates that liver was the most commonly involved organ as seen in 33 out of 88 (37.5%) Liver was followed by retroperitoneal soft tissue in 25 cases i.e 28.41 %.There were 6 cases (6.82%) each of gall bladder and ovaries ; 5 cases (5.68%) each of kidney and abdominal soft tissue ; 4 cases (4.45%) of intestine ; 3 cases (3.41%) of pancreas and 1 case (1.14%) of spleen.

Table 4 Distribution of Cases According to Suspected Clinical Diagnosis

Clinical Diagnosis	No. of Patients	Percentage
Benign Inflammatory		
Acute	6	6.82%
Chronic	3	3.41 %
(inc. granulomatous lesion)	8	9.09%
Tumors & tumor like lesion		
Malignancy	71	80.68 %
Total	88	

Most of the cases of abdominal lumps, were suspected for malignancy (80.68%) The benign lesions included mainly acute and chronic inflammatory lesion. There were 17 benign lesions. Among these three were chronic inflammatory lesion, all were constituted by tuberculosis.

There were 8 cases, diagnosed in FNAC as benign tumors or tumor like lesion in our study. These included 2 cases of lipoma, 1 case of fibromatosis, 1 case of leiomyoma, 1 case of pseudopancreatic cyst, 1 case of inflammatory pseudotumor of liver and 2 cases of regenerative nodule of

Table 5 Classification of Malignant Abdominal Lumps

Classification	No. of Cases
1. Liver	
a) Primary HCC	9
b) Metastasis liver lesion	21
2. Kidney	
a) RCC	3
b) Wilms	2
3. Panncreatic adenocarcinoma	2
4. Spleen Leukemic infiltrates	1
5. Gall bladder carcinoma	6
6. Adenocarcinoma of gut	4
7. Small Round cell tumors of reteroperitoneum	
a) NHL	8
b) Seminoma	4
c) PNET	1
d) Neuroblastoma	1
8. Ovarian adenocarcinoma	6
9. Reteroperitoneal soft tissue tumors	
a) Leiomyosarcoma	1
b) MFH	2
Total	71

This table shows that liver was the most common abdominal organ involved in malignancy and deserves special attention. As it is well known that liver is the most common site of secondaries from tumors of nearly every origin especially those of gastrointestinal tract. In gastrointestinal tumors, liver secondaries are present at the time of initial diagnosis. In this study a search for primary site was done after the initial diagnosis of liver secondaries given by us in cytology of liver aspirants. In case of malignant abdominal lumps; 21 out of 30 cases were of metastatic liver tumor.

Among the primary liver tumor were 9 cases of hepatocellular carcinoma. The HCC were classified into 2 grades. In grade I (2 cases) there were trabecular groups or clusters of uniform tumor cells resembling hepatocytes; surrounding most of the time by endothelial cells. The clusters showed monotonous cell population, with atypical bare nuclei. The N:C ratio was relatively increased. The nuclei showed fine to focally coarse chromatin condensation with 1-2 macronucleoli.

Grade II HCC (7 cases / 9 cases) showed cells with high N:C ratio round to oval nuclei and prominent nucleoli along with anucleated cells. Nucleoli showed moderate variation in size.

There were 21 cases of metastatic liver lesions presenting as focal or multiple nodules in USG with weight loss and jaundice. The age range was 25 years to 80 years with male predominance. Every effort was made to look for primary. In 14 cases, primary site of malignancy was identified and biopsy from primary was taken

Table 7 Comparison of Cytodiagnosis with Histological Diagnosis

Site	No. of cases	Cytodiagnosis	Number		Histodiagnosis	No.
			(+)	(-)		
Liver mass	14	Primary (HCC) metastasis	9 14	0 0	Not available from primary	14
Renal Mass	5	RCC wilm's tumor	3 2	0 0	RCC Wilm's tumor	3 2
Soft Tissue	2	Acute inflammation	2	0	Acute inflammation	2
Gall Blader Mass	6	G.B adenocarcinoma	6	0	Not available	
Intestinal mass	2	Adenocarcinoma Intestine	2	0	Adenocarcinoma	2
Retroperitoneal mass	5	Fibromatosis	0	1	Undifferentiated Carcinoma	1
		Leiomyoma	1	0	Leiomyoma	1
		Lipoma	2	0	Lipoma	2
		Acute Inflammation	0	1	Diffuse NHL	1
Ovarian mass	4	Malignancy Borderline	3 0	0 1	Malignancy	4
Spleen	1	Leukemic infiltrate	1	0	CML(L. nide biopsy)	1
Pancreatic mass	1	Benign lesion pancreas	1	0	Pseudopancreatic cyst	1

This table gives correlation of cytological diagnosis with histological diagnosis in 34 cases. In 31 cases the cytological diagnosis was at par with histological diagnosis. discrepancy was found in 3 cases . In one case with cytodiagnosis of acute inflamsmation, histopathology showed diffuse NHL. This was probably because the aspirants consisted mainly of necrotic material and the pyknotic lymphoid series cells which were mistaken for degenerating polymorphs in a necrotic background giving an overall appearance of acute inflammation.

For the largest group of liver neoplasm in this study; histopathology in cases of HCC was not available. The diagnosis was established on basis of clinical features presence of solitary large nodule in ultrasonography and the morphological features of tumor cells resembling polygonal hepatocytes forming trabecular groups or clusters surrounded most of the times by endothelial cells. The clusters showed atypia with increased N:C ratio and prominent nucleoli. A thorough search was done for intracytoplasmic and nuclear vacuoles, diagnostic nuclear inclusion, bile pigment in cytoplasm and glycogen positively. The presence of bile duct epithelium in the aspirate ruled out of possibility of metastasis.

For Metastatic liver lesion, a thorough search was done for primary and in 14 cases we were

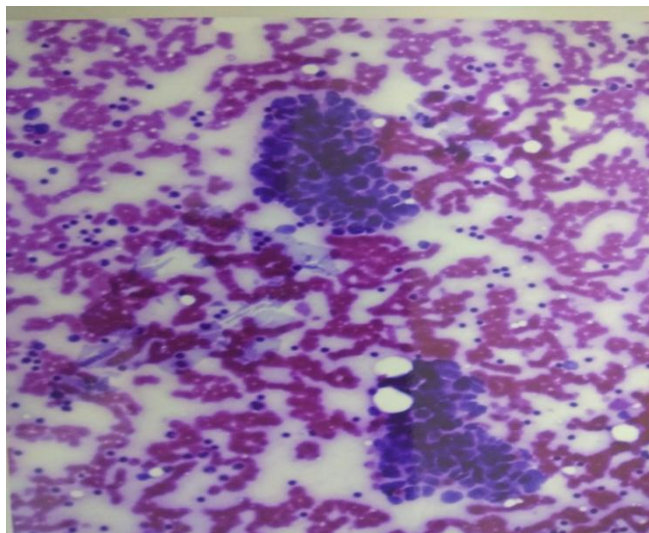
successful in finding the primary. Biopsy from the primary lesion in these cases supported our diagnosis of meta static liver neoplasm.

In remaining 7 cases of metastatic liver masses where biopsy was not available, the diagnosis was based on similar morphological appearances as that of FNAC cases where biopsy was available. In this study there was one case of enlarged spleen, in which the aspirant showed infiltration of myeloid series of cells. Our diagnosis was confirmed by peripheral blood film and bone marrow biopsy and biopsy from lymphnode which also showed myeloid leukemia infiltrate.

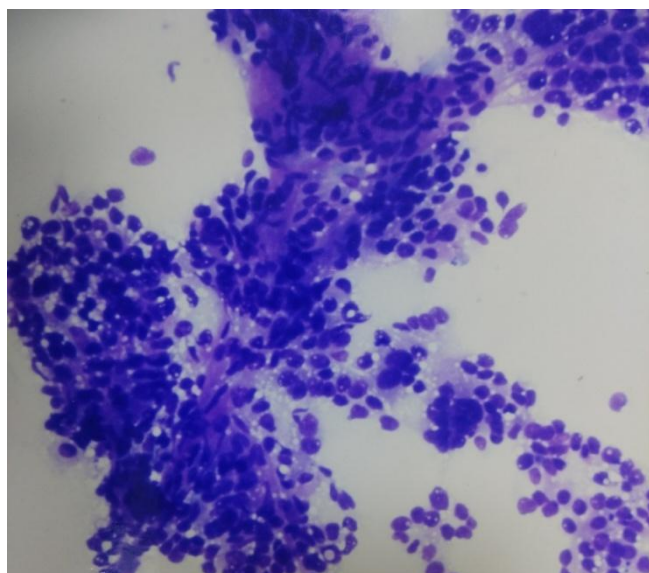
Table 8

No. of cases	True		False	
	Positive	Negative	Positive	Negative
Total – 34	31	0	0	3
% - 100	91.18	0	0	8.82

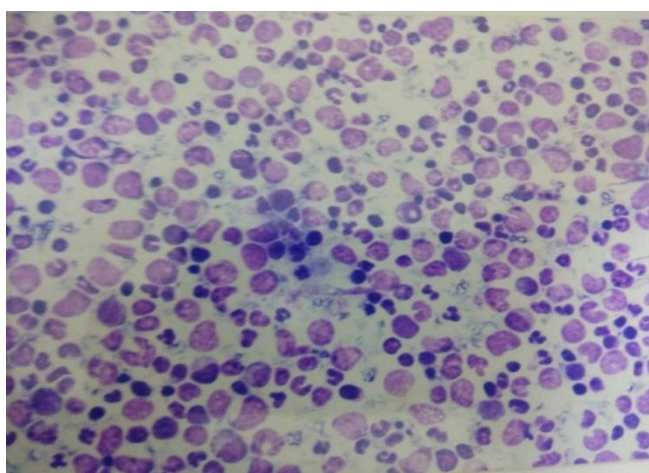
This table show that for abdominal; lumps, the sensitivity of guided FNAC is 91.18%. There was no false positive results in our study, so the productive value for positive result is 100 %. In this study there were no true negative cases, hence the specificity is 100 %



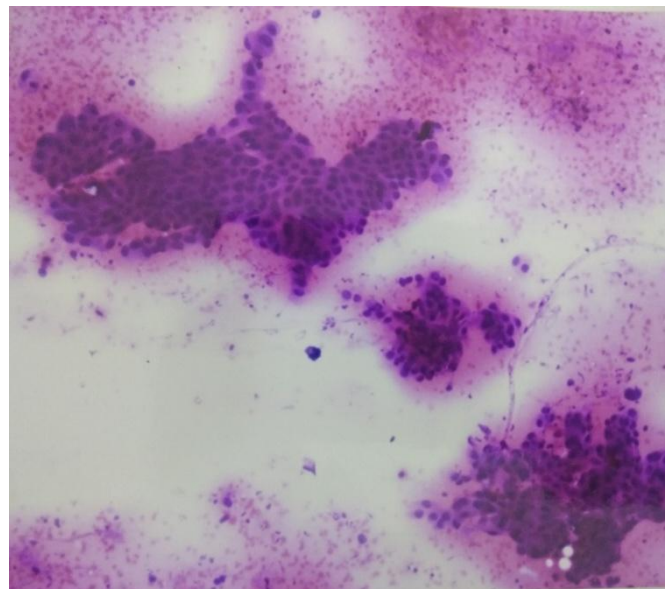
Smear from a case of liver secondary with a known primary in prostate (giemsa,200X)



Smear from well differentiated hepatocellular carcinoma (giemsa, 200X)



Smear from splenic aspirate showing infiltration by myeloid cells (giemsa,400x)



Smear from papillary adenocarcinoma of gall bladder (HE,100x)

Discussion

This study has proven that FNAC is no longer confined to superficial organs. It carries a high diagnostic accuracy for deep seated intra abdominal masses. Even for large organ like liver where lesions are not well demarcated, FNAC under ultrasonography guidance is highly diagnostic with greater than 90 % sensitivity and 100 % specificity.

Maximum number of cases were in the age group of 51-60 years (26.14%). The youngest patients was 2 years of age and eldest Patient was 80 years old. Sex distribution was almost equal with slight male predominance.

Abdominal lumps which were aspirated had their origin from liver., kidney , gall bladder, intestine, Spleen, pancreas, ovaries and retroperitoneal soft tissue including lymphnodes.

Liver was found to be most commonly involved organ. Among 33 cases, there were 30 cases of liver neoplasm and 3 cases of benign liver lesion. of the 30 liver neoplasm., 9 were primary liver tumor and 21 were metastatic. Among the metastatic tumors, biopsy of primary site was available in 14 cases and this supported our diagnosis. In the remaining cases of metastatic liver neoplasm; apart from similarity of morphological of aspirants; USG finding of

multiple liver nodule, cliclinal history and response to treatment supported diagnosis

For hepatocellular carcinoma, biopsy was not attempted. The morphological features were highly suggestive for HCC. We were even successful in HCC in FNAC. Based on our FNAC diagnosis and USG finding patients were taken for treatment and a good cliclinal response was obseved

When compared with available histopathology, the sensitivity of FNAC liver in this study was 100 % and the diagnostic accuracy is also 100%

A comparative study of ultrasound guided FNAC of liver is given in following table

Table 9

Workers	Years	Sensitivity
Ho et al.(1)	1981	96 %
Isin Soyerer at al.(2)	2003	99.5 %
Fang Ying Kuo et al.(3)	2004	85.1 %
Present Study	2008	100 %

The present study indicates a very high sensitivity of 100 % with ultrasound guided FNAC of liver neoplasm. The results are almost similar to above studies , rather on higher side

Kidney

About renal lumps, the sensitivity and diagnostic accuracy in the study is very high i.e. 100 %. Although we encountered only 5 cases of renal lumps – 3 of which were diagnosed as hypernephroma and 2 as Wilm's tumor, we were very lucky to get excisional biopsy of all cases . In all 5 cases our FNA diagnosis was at par with histopathology giving a sensitivity and diagnostic accuracy of 100 %

Table 10

Workers	Year	Sensitivity
Andrew A. Renshaw et al(4)	1997	96 %
Scott R. Granter et al.(5)	1998	96 %
Ibrahim M. Zardawi et al(6)	1999	92.5 %
Present study	2008	100 %

Present study indicates 100 % sensitivity of US guided FNAC of renal malignancy which is well within range with other workers, rather on higher side

In the present study we aspirated gall bladder, pancreas and caecal masses under US guidance. There were six cases of gall bladder masses in

which malignancy was confirmed in FNAC. All were cases of adenocarcinoma presenting in USG as either polypoid mass or irregular thickening of wall, with majority in body and or fundus. All the cases were in advanced stages spreading into adjoining liver and other tissues. Due to advanced stage in radiology, GB resection was not performed and our FNAC diagnosis was taken as final confirmation to clinical and radiology diagnosis for subsequent treatment. This suggest that FNAC of gall bladder in cases of malignancy carries 100 % diagnostic accuracy.

The results of present study are comparable with that of other workers. We can say that US guided FNAC of gall bladder masses is safe, reliable and highly accurate in diagnosing gall bladder malignancy

We had 4 cases of colonic masses in which FNAC was done under USG guidance. The material aspirated in all 4 cases showed malignant cells of adenocarcinoma. In two cases we received the biopsy and our FNA diagnosis was confirmed by histopathology giving a sensitivity and diagnostic accuracy of 100 %

June H. Koizumi et al. (1997) analysed features of primary and metastatic colonic neoplasm in cytology on 50 patients(7), had a diagnostic accuracy of 90 % Sriprakash Mishra et al. (1999), performed FNAC on 32 patient with palpable colonic masses under US guidance had a sensitivity of 96.88 % and specificity of 100 % and concluded that FNAC is a rapid , excellent and safe method for diagnosing palpable colonic masses.

In the present study we had 3 cases of pancreatic masses in which US guided FNAC was done. One was reported as pseudopancreatic cyst which was confirmed by histopathology. The other two appeared malignant in cytology. One was a moderately differentiated adenocarcinoma and the other was a highly undifferentiated tumors of pancreas. The overall sensitivity of 91.18 % of the present study also applies to the FNAC of pancreatic masses.

Table 11 Comparative Fig. in Cytology of Pancreatic Masses by Different Workers

Workers	Year	Sensitivity
Barbera A. curtino et al.	1997	67 %
Maria D. Cozano et al.	1998	100 %
Keith E Volmer et al.(8)	2006	55.3 %
Present study	2008	91.18%

In the present study, reteroperitoneal masses constitute, the second largest group. There were total of 25 cases of reteroperitoneal soft tissue masses of which 17 were malignant and 7 benign in cytology

Table 12

Malignant	No.	Benign	No.
NHL	8	Tuberculosis LN	3
Seminoma	4	Lipoma	2
PNET	1	Abscess	1
Neuroblastoma	1	Leiomyoma	1
Leiomyosarcoma	1	Fibromatosis	1
MFH	2		

The most common primary tumor in this series was non Hodgkin's lymphoma followed by seminoma. The diagnostic morphological features in cytology i.e monotonous population of cleaved or non-cleaved lymphoid cells along with lymphoid globules; were supported by clinical and radiological findings; response to treatment and immunohistochemistry in 3 cases.

For seminoma, 3 patients out of 4 had a history of undescended testis and were of 15-35 years of age. All these 4 patients had a very good response to chemotherapy. There was one case of PNET and neuroblastoma; both were already diagnosed and treated cases with recurrence after 2 years and 4 years respectively . Similarly, the one of leiomyosarcoma was a follow up case of leiomyoma stomach who subsequently developed this malignancy. The two cases of MFH had characteristic morphology in cytology but were lost in follow up.

For the benign tumors, the cytological diagnosis of lipoma and leiomyoma were confirmed by histopathology. The three cases of tubercular lymphadenopathy showed a positive response to antitubercular treatment and lesion were shown to be regressed in USG & CT

The result of our study indicate that FNAC of retroperitoneal soft tissue masses carries a high diagnostic accuracy.

Madhuri S. Kate et al. (1998) has given a diagnostic accuracy of 91.42 % for FNAC of deep seated lesion under radiological guidance.

Raj. K. Gupta et al. (2003) studied 112 cases of retroperitoneal and pelvis masses in FNAC (9). They had no false positive diagnosis of malignancy, thus giving diagnostic accuracy of 100 %

The present study also had no false positive case in cytology. Except for two discrepancies- one where diffuse NHL was given as acute inflammatory due to marked necrosis and another where adequate material was not obtained from representative site as patients did not cooperate.

The reported sensitivity of guided FNAC for all abdominal malignancies varies from less than 70% to over 95 % in various literature published till date. Many workers have studied abdominal masses in FNAC but most of concentrated on specificity organs. the sensitivity is as high as 99.5 % to 100 % for liver (Isin soyerer 2003) and 96 % for kidney (Andrew 1997) to very low values of 55.3 % for pancreas (Keith E Volmer et al. 2006) Diagnostic accuracy tends to be lower for biliary tumors, (Orel et al. 1999) promoting a search for reliable endoscopic FNAC technique .

Conclusion

The majority of abdominal masses are malignant (80.68%) and most are adneocarcinomas (organ specific). Liver is the most commonly intra-abdominal organ involved in malignancy either primary or metastatic as seen in the present study. It is followed by retroperitoneal soft tissue masses including lymphonode. FNAC under US guidance, as first line investigation, not only useful in diagnosis of space occupying lesion of abdomen but can also help in choosing appropriate management. The inclusion of FNAC in the diagnostic protocol; can save patient from unnecessary radical surgery.

The diagnostic accuracy of FNAC has continued to improve, not only due to better training of cytopathologist but also due to the fact that in recent years there has been a trend towards a team approach with radiologist to formulate a diagnosis. The great strength of cytodiagnosis is the almost complete absence of false positive result; only a handful are recorded in word literature.

The predictive value for positive diagnosis is therefore 100 %. The predictive value of negative result are variable in every study.

Present study thus confirms that FNAC guided by ultra sound is a fairly safe procedure with very low morbidity and complications. Complications are also minor and easy to manage. In many cases it saves unnecessary laparotomy and repeated trauma to the patients; also it can help in proper planning of surgical management. In advanced inoperable disease, a cytological diagnosis is often a sufficient basis for palliative radiotherapy or chemotherapy, without the need for a formal surgical biopsy. In conclusion , FNAC as a first line investigation is helpful in diagnosis of space occupying lesions of abdomen in the view of simplicity, low cost, non-invasiveness and negligible complications rate. Also inclusion of FNAC in diagnostic protocol can save the patient from any unnecessary radical procedure.

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