

Original Research**Utility Of Ultrasound Guided FNAC In Diagnosis Of Abdominal Lesions, A Two-Year Study****Kirti Pardeshi¹, Sameer Arun Kadam², Leena Naik³**

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) is a simple, inexpensive method for obtaining a diagnosis of subcutaneous as well as deep seated tumors. USG guided fine needle aspiration cytology is a useful tool for diagnosis of superficial as well as deep-seated lesions of abdomen. Present study was aimed to study utility of ultrasound guided FNAC in diagnosis of abdominal lesions. **Material and Methods:** Present study was retrospective study, of cases of USG guided FNAC of intra- abdominal masses. The cases were analyzed, based on the cytological features. The diagnosis was made by correlating cytological findings with the clinical and the radiological features. **Results:** Maximum number of FNAC were seen in 21-40 years (28.09 %), followed by 41-60 years group (27.38 %). Male to female ratio was 1.18. Maximum number of lesions were observed in liver (33.4%), next in the order of frequency were lymph node (23.4%), gastrointestinal (8.5%), pancreas (7.6 %), gall bladder (6.9%), miscellaneous (6.9%), omentum & peritoneum (5.6%), spleen (3.5%), kidney (3.5%) & adrenal (0.7%). In present study out of 29 cases, that underwent HPE, 10 were malignant cases- & 10 nonmalignant cases, the sensitivity to detect malignancy was 90%, the specificity 100%, the positive predictive value was 100%, the negative predictive value was 81.81% and the efficacy was 93.1%. **Conclusion:** USG guided FNAC for intra-abdominal masses, is highly reliable and replaces invasive procedures, obviates surgical exploration especially in the high risk patients facilitating initiation of appropriate therapy.

Keywords: intra-abdominal masses, FNAC, cytopathology, USG guided FNAC.

INTRODUCTION

Fine needle aspiration cytology (FNAC) is a simple, inexpensive method for obtaining a diagnosis of subcutaneous as well as deep seated tumors. In a majority of cases, the diagnosis which is obtained by FNAC, is the substitute for surgical procedures like diagnostic laparotomy.^{1,2}

Most of 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 fluoroscopy, CT and USG are used as a guide for fine needle aspiration.² The

FNA cytology has been shown to be 100% specific for the diagnosis of malignancy.^{3,4} USG guided fine needle aspiration cytology is a useful tool for diagnosis of superficial as well as deep-seated lesions of abdomen. It is rapid, safe, and inexpensive and without risk of radiation or injection of contrast medium.⁴ It can be repeated easily if required, as compared to CT guided FNAC. Present study was aimed to study utility of ultrasound guided FNAC in diagnosis of abdominal lesions.

MATERIAL AND METHODS

Present study was retrospective study, conducted in Department of Pathology, KEM hospital, Parel, Mumbai, India. Study duration was of 2 years (July 2011 to June 2013). Study approval was obtained from institutional ethical committee.

Inclusion criteria

- Cases of USG guided FNAC of intra- abdominal masses arising from organs such as liver, spleen, pancreas, stomach, gallbladder, the small and large intestines, the omentum, mesentery, the retro peritoneum, kidney, adrenals & lymph nodes

Exclusion criteria

- Parietal swellings arising from the skin and abdominal wall, the uterus, the cervix, the ovary, the prostate and the bone

Demographic details, history, clinical examination findings, various laboratory & radiological investigations were noted in case record proforma. FNAC was conducted under ultrasound guidance (by radiologist) after judging the size, depth of lesion and the best path for guided FNAC, under local anesthesia, under all aseptic precautions, with 22-23 G needle for superficial lumps and a lumbar puncture needle of the same gauge for deep- seated lumps. Slides were made from aspirate, air-dried and stained with Giemsa. Also, slides were wet fixed in 95% alcohol solution in Koplins' jar and stained with Papanicolaou's stain. Special stains were carried out whenever required. The cases were analyzed, based on the cytological features. The diagnosis was made by correlating cytological findings with the clinical and the radiological features.

The smears were classified as inflammatory, benign, malignant, suspicious of malignancy and unsatisfactory for interpretation. If no cellular material was identified the sample was regarded as unsatisfactory. Cases, which were non- representative of the lesion, were also included into unsatisfactory category. Normal cellular material, infective or inflammatory changes were assigned to inflammatory category. Cytological feature suggestive of benign neoplasm and definite malignancy, were assigned to benign and malignant categories respectively. The cases showing very few malignant or atypical cells were categorised as suspicious of malignancy.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

During study period out of total 6506 FNAC procedures, 146 were USG guided intra-abdominal FNAC, which formed 2.24% of total FNAC performed. Out of 146 cases, 126 were adequate in cellularity whereas five cases were non-representative of the lesion. 20 cases were paucicellular hence were unsatisfactory for diagnostic opinion. Following the procedure, no complications were noted, all the patients tolerated the procedure well. In present study, very few malignant or atypical cells were obtained & were categorized.

Maximum number of FNAC were seen in 21-40 years (28.09 %), followed by 41-60 years group (27.38 %). 37 cases were of older age patients i.e.>60 years which formed 25.35 % of total cases. The case were more in males (54.11 %) as compared to female (45.89 %). Male to female ratio was 1.18.

Table 1: General characteristics

Characteristics	No. of patients	Percentage
Age groups (in years)		
≤12	14	9.59%
13-20	14	9.59%
21-40	41	28.08%
41-60	44	30.14%
≥60	33	22.60%
Gender		
Male	79	54.11%
Female	67	45.89%

Maximum number of lesions were observed in liver (33.4%), next in the order of frequency were lymph node (23.4%), gastrointestinal (8.5%), pancreas (7.6 %), gall bladder (6.9%), miscellaneous (6.9%), omentum & peritoneum (5.6%), spleen (3.5%), kidney (3.5%) & adrenal glands (0.7%). Miscellaneous category includes retroperitoneal masses and abdominal lump of unknown site of origin.

Table 2: Organ wise distribution

Organ	No. of patients	Percentage
Liver	50	33.40%
Lymph node	34	23.40%
Gastrointestinal	12	8.50%
Pancreas	11	7.60%
Gall bladder	10	6.90%
Miscellaneous	10	6.90%
Omentum & peritoneum	8	5.60%
Spleen	5	3.50%
Kidney	5	3.50%
Adrenal	1	0.70%

In liver FNAC, maximum lesions were malignant (56%), followed by inflammatory cases (22%), unsatisfactory (12%) & benign (10%). There was no cases belonging to 'suspicious of malignancy' category. There were only five cases of spleen FNAC. Three were malignant (1 case each of non-Hodgkin's lymphoma, Hodgkin's lymphoma & low-grade lymphoma), one was inflammatory (Necrotizing granulomatous lesion) and one was unsatisfactory.

Table 3: Broad organwise cytological diagnosis

Category → Organ ↓	Malignant	Benign	Inflammatory	Suspicious of Malignancy	Unsatisfactory
Liver	28	05	11	-	06
Gall bladder	05	-	02	-	03
Pancras	08	1	01	-	01
Gastrointestinal	07	03	1	01	-
Omentum & peritoneum	04		02	01	01
Spleen	03	-	-	01	01
Lymph node	07	02	18	01	06
Kidney	05	-	-	-	-
Adrenal	01	-	-	-	-
Miscellaneous	05	03	-	-	02
Total	73	14	35	4	20

Percentage	50%	9.8%	23.9%	2.6%	13.7%
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Among 28 malignant cases of liver, Adenocarcinoma of Gall bladder was the most common primary malignancy metastasizing to liver, followed by adenocarcinoma of pancreas, stomach and colon. Primary site of malignancy correlated on clinical and radiological findings.

The primary malignant lesions were of four types as hepatocellular carcinoma (2 cases), cholangiocarcinoma (1 case), hepatoblastoma in 7 month child (1 case) & neuroendocrine tumors (2 cases). There were three high-grade malignancies where it was difficult to differentiate between primary and secondary malignancy.

Inflammatory lesions included 6 cases of liver abscess, 3 cases of necrotizing lesions, 1 case was of necrotizing granulomatous lesion and 1 case was of xanthogranulomatous inflammation. Among 6 unsatisfactory cases, one case was nonrepresentative, in two cases the lesion could not be negotiated by the needle probably due to dense fibrosis. Two lesions were found to be difficult to aspirate by the radiologists as they were very close to porta hepatis. One case had inadequate cellularity, which on biopsy showed metastatic squamous cell carcinoma. All the cases had clinical and radiological correlation. Histopathology diagnosis obtained in only one case, which was concordant with FNAC diagnosis.

Table 4: Spectrum of cases on Liver FNAC

Category	Subcategory	No of cases
Metastatic malignancy		19
	Gall bladder primary	08
	Pancreas primary	04
	Gastrointestinal primary	05
	Unknown primary	02
Primary	Total	06
	Hepatocellular carcinoma	02
	Cholangiocarcinoma	01
	Hepatoblastoma	01
	Neuroendocrine carcinoma	02
High grade malignancy	Total	03
	? Cholangiocarcinoma ? adenocarcinoma	01
	? Poorly differentiated carcinoma	01
	Sarcoma	01
Benign		05
Inflammatory		11
	Liver abscess	06
	Xanthogranulomatous inflammation	01
	Necrotizing lesion	03
	Necrotizing granulomatous lesion	01
Unsatisfactory		06

There were total 10 cases of gall bladder FNAC, 5 cases were malignant (adenocarcinoma), two were inflammatory (xanthogranulomatous inflammation & chronic inflammation 1 case each), while 3 cases were unsatisfactory. Histopathology was obtained in 1 case.

Table 5: Spectrum of cases in gall bladder FNAC

Category	Subcategory	No of cases
Malignant	Adenocarcinoma	05
Inflammatory		
	Xanthogranulomatous inflammation	01
	Chronic inflammation	01

Unsatisfactory		03
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72.73% of pancreatic lesions were malignant (all were adenocarcinoma). Benign and inflammatory category had one case each. There was single unsatisfactory case.

Table 6: Spectrum of cases in pancreatic FNAC

Category	Subcategory	No of cases
Malignant	Adenocarcinoma	8
Benign	? endocrine neoplasm	1
Inflammatory	Chronic inflammation	1
Unsatisfactory		1

Out of total 34 cases of lymph node FNAC, maximum cases were of inflammatory pathology. 7 were malignancy cases, 2 were benign and 6 cases were unsatisfactory. Primary malignancy of lymph node was more frequent than metastatic malignancy. Out of five primary cases, two cases were classical Hodgkin's lymphoma & 3 cases of non-hodgkin's lymphoma (NHL) (Burkitt's lymphoma 1 case & 2 cases of B cell lymphoma). Both cases of Benign pathology were of reactive lymphadenopathy. Inflammatory pathology was present in 18 cases, all of them had infective etiology.

Table 7: Spectrum of cases in lymph node FNAC

Cytological Category	Cytological Subcategory	No of cases	Histopathological diagnosis
Malignant		07	
Primary malignancy		05	
	Hodgkin's lymphoma	02	Classical Hodgkin's lymphoma
	Non Hodgkin's lymphoma	03	Burkitt's lymphoma- 1 case B cell lymphoma – 2 cases
Secondary malignancy	Metastatic adenocarcinoma	02	
Suspicious of malignancy	Non Germ cell tumor	01	Sertoli – Leydig cell tumor metastasis
Benign	Reactive lymphadenitis	02	
Inflammatory		18	
	Necrotizing granulomatous lymphadenitis	06	
	Granulomatous lymphadenitis	03	
	Necrotizing lymphadenitis	07	
	Histoplasmosis	01	
	HIV lymphadenopathy	01	
Unsatisfactory		06	

There were total 12 cases of gastrointestinal FNAC. Malignant lesions were 7 (four adenocarcinoma of colon, 1 case of gastrointestinal stromal tumor (GIST) from lesser curvature of stomach, two non Hodgkin's lymphoma cases), 3 cases were benign (1 case of GIST & 2 cases of neuroendocrine tumour), 1 case was suspicious of malignancy. There were no inflammatory and unsatisfactory cases.

Table 8: Spectrum of cases in gastrointestinal FNAC

Category	Subcategory	Site	No of cases	Histopathologic diagnosis
Malignancy			07	
	Adenocarcinoma	Colon	04	
	Gastrointestinal stromal tumor with low malignant potential	Stomach	01	Gastrointestinal stromal tumor with high malignant potential
	Non-Hodgkin's lymphoma probably Burkitt's lymphoma	Small intestine	01	
	Non-Hodgkin's high grade	Small intestine	01	Diffuse large cell lymphoma
Benign			03	
	Gastrointestinal stromal tumor	Stomach	01	Gastrointestinal stromal tumor
	Neuroendocrine tumor	Ileum	02	Neuroendocrine tumor
Inflammatory	Necrotizing granulomatous inflammation	Ileum	01	
Suspicious of malignancy	-	Ileum	01	

There were total 6 cases from FNAC of omentum and 1 case of peritoneum. Metastatic malignancy to omentum was most frequent (4 cases).

Table 9: Spectrum of cases in omentum and peritoneum FNAC

Category	Subcategory	Site	No of cases
Malignancy	Adenocarcinoma metastasis	Omentum	4
Inflammatory	Granulomatous inflammation	Peritoneum	2
Suspicious of malignancy		Omentum	1
Unsatisfactory		Omentum	1

There were total five cases of kidney FNAC. All were malignant. there were no case in other categories. 4 cases of renal cell carcinoma (3 cases of conventional renal cell carcinoma & 1 case of XP 11.2 translocation renal cell carcinoma, which was confirmed by histopathology & molecular studies) & 1 case of rhabdoid tumor of kidney.

Table 10: Spectrum of cases in renal FNAC

Category	Subcategory	No of cases	Histopathology diagnosis
Malignancy			
	Renal cell carcinoma (RCC)	4	Conventional RCC - 03 cases Translocation associated RCC- 01 case
	Rhabdoid tumor	1	Rhabdoid tumor

Retroperitoneum masses were five and abdominal masses were five. Malignant lesions were five. (2 cases of retroperitoneal mass- high-grade non-Hodgkin's lymphoma, 1 case of malignant germ cell tumor, 1 case of malignant neuroendocrine neoplasm and 1 case of highgrade malignant tumor? Sarcoma). Out of 3 benign cases, 2 were of benign spindle cell

lesions & 1 case of Castleman's disease. There were two unsatisfactory cases one from retroperitoneum and one from abdominal mass.

Table 11: Spectrum of cases in FNAC of retroperitoneal masses and abdominal masses from unknown origin

Category	Subcategory	Cytology diagnosis	No of cases	Histopathology diagnosis
Malignancy	Retro peritoneum	High grade NHL	02	Anaplastic large cell lymphoma - 1 case
	Abdominal mass	Malignant germ cell tumor	01	-
		Neuroendocrine tumor	01	-
		High grade malignancy ? sarcoma	01	-
Benign	Retro peritoneum	Benign spindle cell tumor	01	-
	Abdominal mass	Benign spindle cell tumor	01	-
	Retro peritoneum	Castleman's disease	01	Castleman's disease
Unsatisfactory	-	-	02	-

Thus in present study out of 29 cases, that underwent HPE, 10 were malignant cases- & 10 nonmalignant cases, the sensitivity to detect malignancy was 90%, the specificity 100%, the positive predictive value was 100%, the negative predictive value was 81.81% and the efficacy was 93.1%.

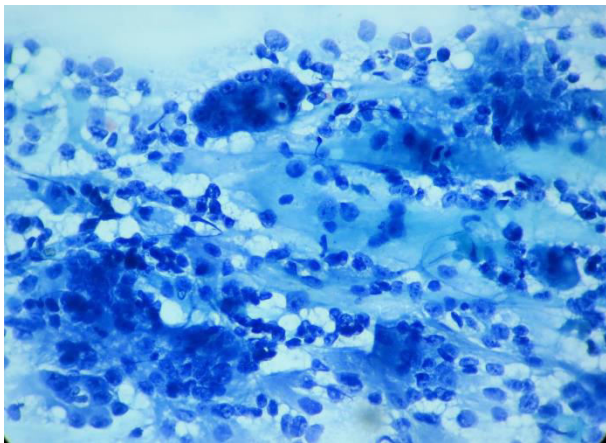


Figure 1: Carcinoma Gall bladder

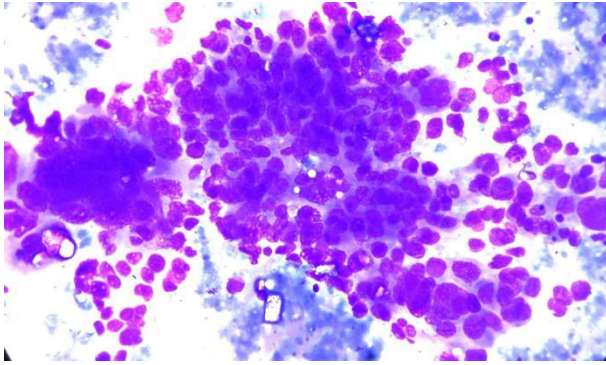


Figure 2: Hepatocellular Carcinoma

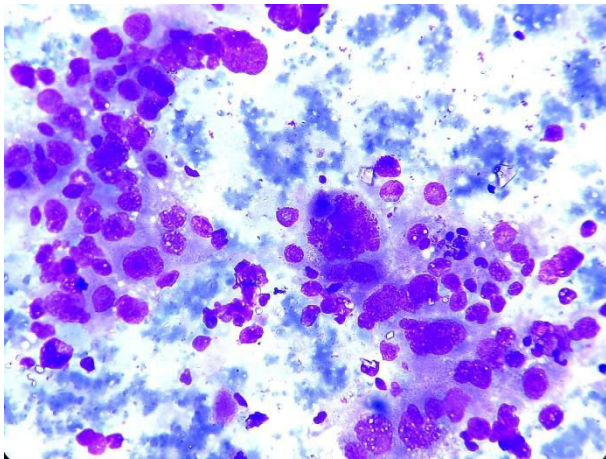


Figure 3: Hepatocellular Carcinoma

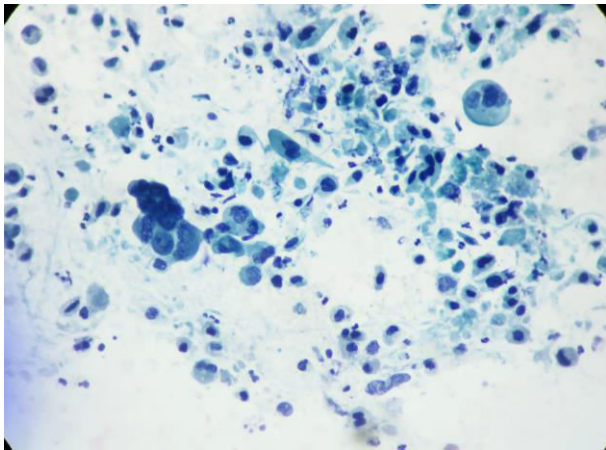


Figure 4: Pancreatic Carcinoma

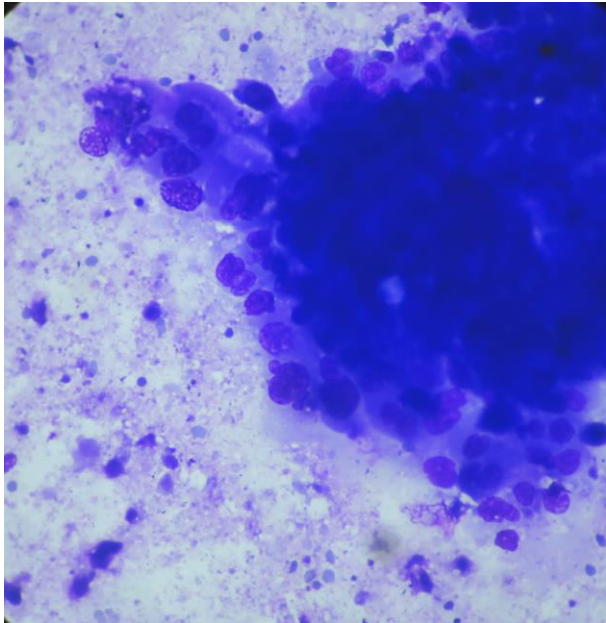


Figure 5: Pancreatic Carcinoma

DISCUSSION

The non-availability of CT, coupled with the higher incidence of advanced malignancy, requires the USG-guided FNAC procedure for cancer management in developing countries like India.⁵ Also in selected cases, FNAC is superior to core needle or open biopsy in terms of cost, procedure associated morbidity and timeliness of diagnosis. More time consuming and costly diagnostic procedures such as surgical exploration can be avoided.⁶

Major indications for FNAC in the abdomen include,⁷ Focal lesions in liver, Suspected carcinoma in the body or tail of the pancreas, presumed carcinoma in the head of the pancreas, large obviously unresectable abdominal masses, documentation of suspected intra abdominal metastases, lymph node metastases, to confirm Koch's etiology in mesenteric node, liver, spleen, etc

In our study, maximum numbers of FNAC were seen in 21-40 years followed by 41-60 years group (28.09%, 27.38 % respectively). The youngest patient was of 7 months female child, which was a case of hepatoblastoma. & oldest patient was a 85 years male who had carcinoma stomach metastatic to liver. In the study of Sidhaling Reddy et al.⁸ youngest case was of a 20 days neonate and oldest case was 88 years old patient.

In our study out of 146 cases, we had 50% malignant cases, 9.8% benign, 23.9% inflammatory, 2.6% suspicious of malignancy, 13.7% unsatisfactory cases. Sidhaling Reddy et al.⁸ got 60.3% malignant, 22.4% benign, 10.2% inflammatory 0.6% suspicious of malignancy, 6.5% unsatisfactory cases out of 245 cases.

We had less cases in benign category and more cases in unsatisfactory category. The unsatisfactory cases were maximum in liver. The causes of unsatisfactory cases in our study was, lesions were near portal structures of liver, lesions had thickened fibrotic wall, mesenteric lymphadenopathy of size ≤ 1 cm, non-representative cases, & diluted aspirate smear.

In the present study, out of 50 cases of liver, 28 cases were malignant, 5 cases were benign, 11 cases were inflammatory, 6 cases were unsatisfactory. In the study done by Mallikarjuna CM Swamy et al.,⁹ and Rasaniam A et al.,¹⁰ included only hepatic lesions. They concluded that metastatic malignancies was the most common malignancy, in which adenocarcinoma from gastrointestinal origin were highest in number. In our study, metastatic lesions from gall bladder were more in number. The female patients were more in our study as compared to

other studies. The study done by Sidhalingreddy et al.⁸ and Hemalatha A L et al.,¹¹ mentioned hepatocellular carcinoma as the most common malignancy.

Among the primary malignancies, hepatocellular carcinoma (HCC) was highest in number. There were 2 cases of hepatocellular carcinoma, one case was of moderately differentiated HCC and other case was of poorly differentiated HCC. The poorly differentiated HCC case was HbsAg positive. Smears showed cells with very high N:C ratio with prominent nucleoli, bare nuclei in background, absence of normal hepatocytes and scanty necrosis. These features were important to differentiate HCC from other poorly differentiated carcinomas. Clinical history and radiological findings were supportive. Rasania A et al.,¹⁰ also mentioned similar cytological findings in their study.

A total of 10 cases of gall bladder FNAC were included in our study. Half of these i.e. 5 cases were malignant all of them were adenocarcinoma gall bladder, two were inflammatory, while 3 were unsatisfactory cases. We had one case of xanthogranulomatous cholecystitis. On radiological studies, gall bladder wall was thickened and adherent to bowel loops. Hence, radiologists thought of carcinoma gall bladder. As per literature, xanthogranulomatous cholecystitis mimicks for invasive carcinoma of gall bladder on radiology.¹¹ FNAC helped to differentiate between malignancy and xanthogranulomatous inflammation.¹²

Out of 11 cases of pancreas, 72.73% cases were malignant. Female prepondence was noted with pancreatic lesion. This result was discordant with study made by Ahmed A et al.,¹³ in which male preponderance was noted for pancreatic tumors. Adenocarcinoma was commonest lesion noted in our study, which was comparable with results of Das DK et al study.¹⁴ The most common site of pancreatic masses was in head region (75%) in our study. Ahmed A et al.,¹³ also showed similar results with 72% masses in head region of pancreas.

Out of total 34 cases of lymph node FNAC, maximum cases were of inflammatory pathology. 7 were malignancy cases, 2 were benign and 6 cases were unsatisfactory. In the study made by Sidhalingreddy et al al.⁸, out of total 9 cases of lymphnode five cases were tubercular lymphadenitis and 3 were reactive lymph nodes and one was abscess while there were no malignant cases noted.

In our study, primary malignancy of lymph node was more common than secondary malignancy. But in the study made by Hemalatha A L et al.,¹¹ there were two cases of intra-abdominal lymph node and both were metastatic malignancies while there were no primary malignancy of lymph node detected. Presence of RS cells made us to differentiate between Hodgkin's and non-Hodgkin's lymphoma.

Out of five cases of spleen, three were malignant, two Non Hodgkin's lymphoma and one Hodgkin's lymphoma. Hence, 60 % of splenic lesions were malignant in our study. The study made by UMA Handa et al.,¹⁵ showed inflammatory lesions as a commonest splenic lesions. Out of 10 malignant lesions of their study, 8 were NHL.

Out of 12 cases of gastrointestinal lesions, 7 cases (58.34%) cases were of malignancy, followed by benign and inflammatory cases. This result was comparable with study made by Ahmed SS et al.,¹⁶ in which, 48.8 % cases were malignant followed by benign and inflammatory cases. There were two cases of gastrointestinal stromal tumor. One of the cases showed nuclear atypia in spindle cells without any mitosis or necrosis still possibility of low malignant potential was considered cytologically. This case was proven to be GIST with high malignant potential on histology. Differentiation of benign and malignant GIST is difficult in absence of mitosis and necrosis. As per Maria DL et al.,¹⁷ presence of necrosis and mitosis is indicative of malignancy but its absence did not rule out malignancy.¹⁷

The FNAC was 100 % sensitive and 100% specific in detection of renal pathology. The study made by Zardawi IM¹⁸ showed the sensitivity of 92.5%, specificity of 91.9%. Renal FNA provided an accurate diagnosis in most instances.

Sensitivity of our study was 90 %, while other studies had 90 % or above it. The efficacy of

our study was 93.1 % which was slightly less as compared to other studies, however it was significant. Similar findings were noted by S Shamshad A et al.,¹⁹ Sinhaling Reddy et al.⁸ Sobha Rani G et al.,²⁰ & Hemalatha A L et al.,¹¹ Our institute is teaching institute hence radiologists carrying out USG are not always an expert person. Hence, the false negative cases were more as compared to other studies, which has reduced the cytological diagnostic accuracy.

Table 12: Comparison of results of our study with other studies-

Study	No of FNACs	Sensitivity	Specificity	Efficacy
S Shamshad A et al., ¹⁹	200	94.11%	100%	95.7%
Sinhaling Reddy et al. ⁸	245	94.1%	100%	96.5%
Sobha Rani G et al., ²⁰	100	90%	100%	-
Hemalatha A L et al., ¹¹	100	96%	-	96.3%
Our study	146	90%	100%	93.1%

CONCLUSION

The FNAC is highly reliable and replaces invasive procedures, obviates surgical exploration especially in the high risk patients facilitating initiation of appropriate therapy. An expert team of cytopathologists, radiologists and clinicians will increase the accuracy of USG guided FNAC.

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