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Role Of Image Guided Fine Needle Aspiration Cytology In Diagnosis Of Abdominal And Pelvic Masses

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ABSTRACT
Introduction: Image guided fine needle aspiration cytology (FNAC) is a safe, straightforward, speedy, cost-effective, and accurate method for evaluating deep-seated abdominal and pelvic massesthat are difficult to reach with blind FNAC. The efficacy of image guided FNAC in deep seated and otherwise inaccessible mass lesions was critically examined in this study.
Aim: (1) To assess the efficacy of image-guided FNAC as a quick, painless, and minimally invasive diagnostic procedure. (2) To assess the diagnostic accuracy of image guided FNAC in surgical instances by comparing histopathological findings.
Materials and Methods: This prospective study was carried out in the Pathology Department of Rajindra Hospital Patiala in collaboration with the Radiodiagnosis Department. After obtaining written informed consent from 75 patients with abdominal and pelvic masses, fine needle aspiration was performed on them.Following the patient's agreement, FNAC of the mass was performed using aseptic measures and the shortest route possible under ultrasound or CT guidance. A disposable plastic syringe with a 10 mL capacity and a 22 gauge needle wasutilised. A 20-22 gauge spinal needle with a 9cm length was used for deep-seated lesions.
Results- Of the 23 instances those were histologically confirmed, 21 were compatible and two were incompatible. The sensitivity, specificity, and diagnostic accuracy of image guided FNAC for diagnosing abdominal and pelvic masses were 100 percent, 66.7 percent, and 91.3 percent, respectively, according to statistical analysis.
Conclusion-Diagnostic accuracy of FNAC for deep-seated lesions improves with radiological guidance, allowing for quick diagnosis with minimal surgical intervention.
Keywords: FNAC, Cytological, Histological, Atypia

INTRODUCTION

In surgical practice, intra-abdominal and pelvic masses are a widespread concern for diagnosis and treatment. [1] Deep, abdomino-pelvic masses or localised lesions involving these sites are difficult to evaluate and remain a mystery in surgical treatment. For patient's management, distinguishing between malignant and non-malignant lesions, particularly inflammatory lesions, is critical. Although imaging techniques are frequently used to distinguish between malignant and non-malignant lesions, the growing sensitivity of image guided Fine needle aspiration cytology (FNAC) has led to the detection of relatively small lesions. [2]Early detection is crucial for successful therapy and a good prognosis. The goal is to make a diagnosis in a short amount of time with the least amount of tests, money, and patient suffering. [3] The study of cells collected using suction is known as FNAC. It is a procedure that involves inserting a fine needle into a bulk. A cytological diagnosis is made after aspirating cellular material. Thin needles (22 gauge and above) with an exterior diameter of 0.6 mm or less were popularised by European doctors. Fine needle aspiration (FNAC) cytology is the technique that is now used. [4]

MATERIALS AND METHODS

This prospective study was carried out at Rajindra Hospital Patiala's Pathology Department in cooperation with the Radiodiagnosis Department. Fine needle aspiration was performed on 75 patients with abdominal and pelvic masses after they signed a written informed permission form. Following the patient's agreement, FNAC of the mass was performed using aseptic measures and the shortest route possible under ultrasound or CT guidance. A disposable plastic syringe with a 10 mL capacity and a 22 gauge needle wasutilised.A 20-22 gauge spinal needle with a 9cm

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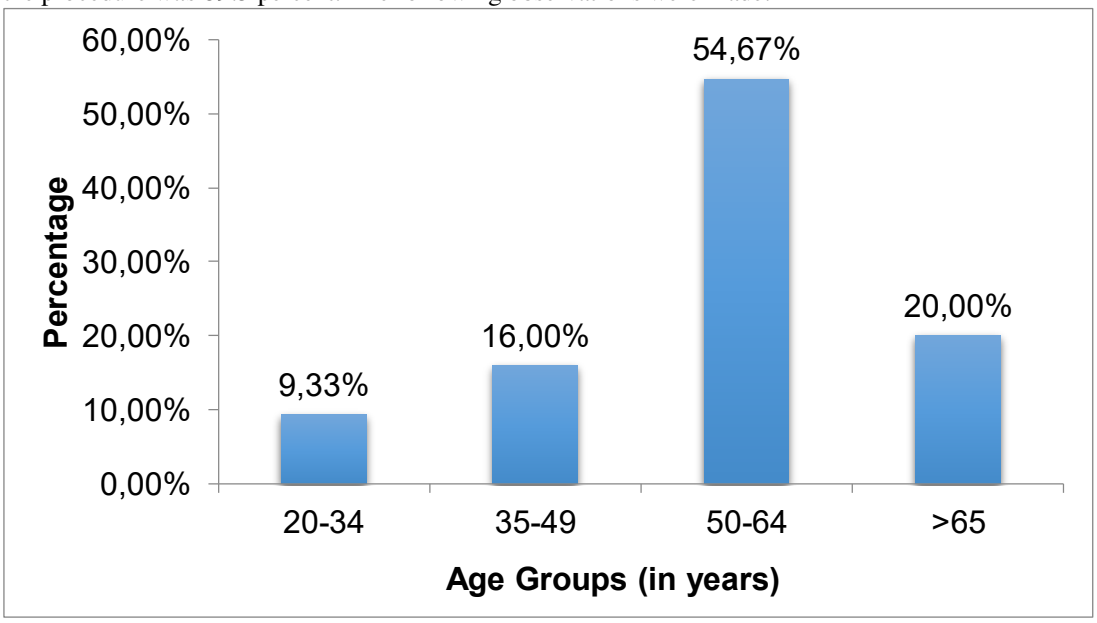
length was used for deep-seated lesions. The needle was inserted into the bulk under radiological guidance and checked over the screen before aspirating. Multiple brief quick reciprocating movements were used to apply suction. After the substance was seen in the hub and the needle was removed, the suction was released. The aspirate was transferred on clean glass slides and spread out. In the pathology department, the smears were fixed with cytofix (50 percent ethyl alcohol + 50 percent diethyl ether) and stained with MGG stain before being studied under the microscope.The cytological characteristics of intra abdominal and pelvic masses were investigated. Papanicolaou, H&E and mucicarminedye's were used whenever necessary. Inconclusive, inflammatory, benign tumours, suspected for malignancy, and malignancy were the distinct classifications of lesions.

STATISTICAL ANALYSIS AND RESULTS

The research was carried out at the Pathology Department, Government Medical College Patiala. Out of the 75 cases, 54 were USG guided, 13 were CT guided, and eight aspirates were insufficient. As a result, the overall success rate of the procedure was 89.3 percent. The following observations were made:



[Table/Fig -1]: AGE DISTRIBUTION

In the present study, patients were divided into 4 groups according to age. Highest number of aspiration was noted in 50-64 age groupie 5th and 6th decade (54.67%). Whereas, lowest number was found in 20-34 age group ie 2nd and 3rd decade**[Table/Fig -1]**.

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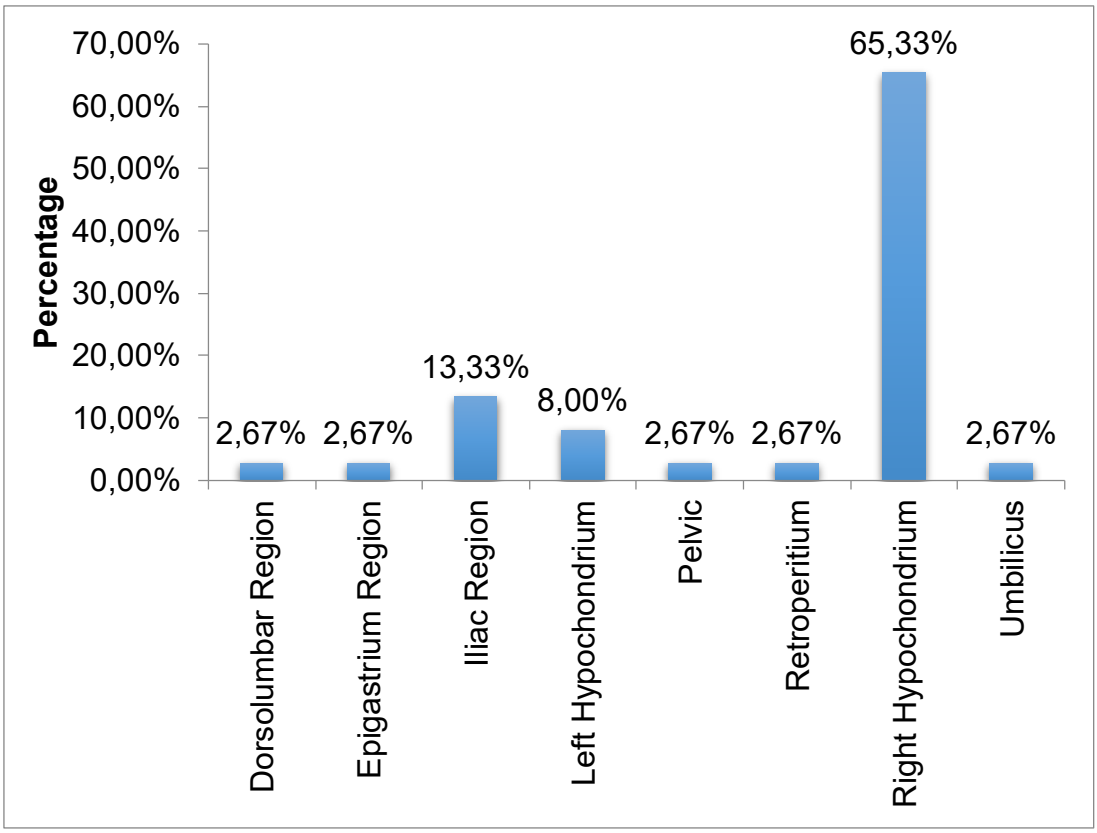

[Table/Fig-2]:SPECIFIC SITE DISTRIBUTION

In the present study, sites of occurrence of various abdominal and pelvic tumors were studied. Out of total 75 cases, right hypochondrium (65.33%) was the most frequent site of aspiration followed by iliac region (13.33%), left hypochondrium (8%), dorsolumbar, epigastrium, pelvic, retropertonium, umbilicuswith same frequency of 2.67% [**Table/Fig-2**].

Site	No. of Patients	%age
Caecum	5	6.67%
Dorsolumbar Region	2	2.67%
Epigastrium Mass	2	2.67%
Gall Bladder	17	22.67%
Iliac region	3	4.00%
Liver	31	41.33%
Lymph Node	3	4.00%
Omentum	1	1.33%
Ovary	2	2.67%
Pancreas	6	8.00%
Retroperitonium	1	1.33%
Small Bowel	2	2.67%

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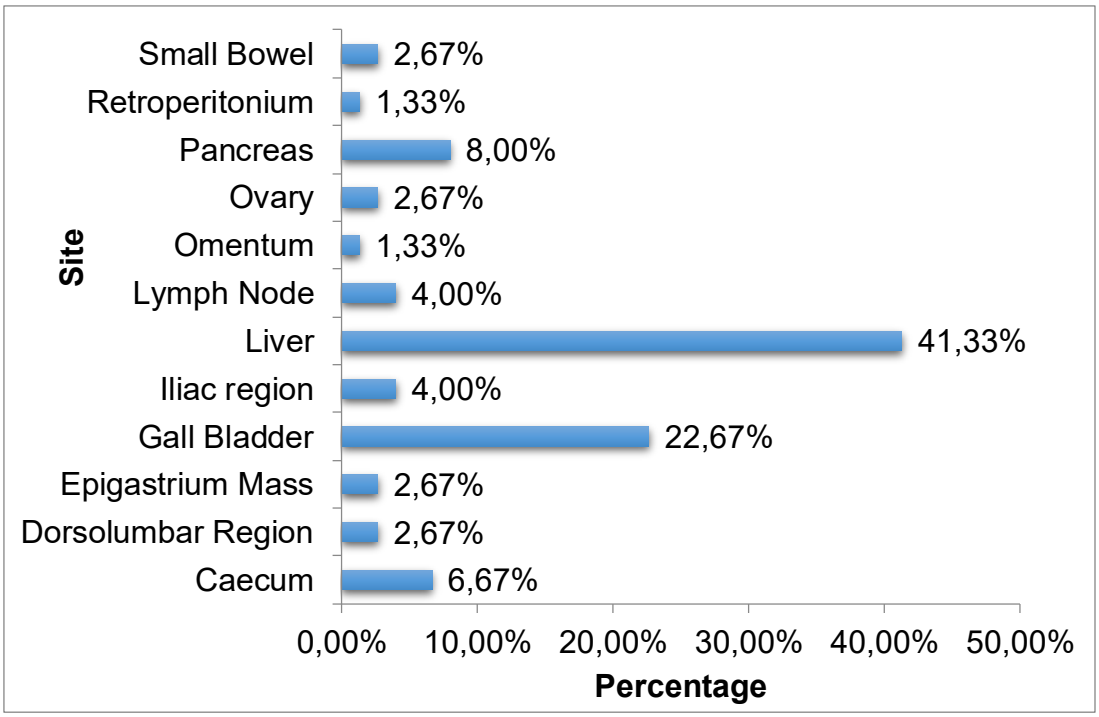
Total	**75**	**100%**

[Table/Fig-3a]:ORGAN WISE DISTRIBUTION



[Table/Fig-3b]: ORGAN WISE DISTRIBUTION(SHOWN AS HISTOGRAM)

In the present study out of 75 cases, maximium cases were noted in liver i.e.31(41.33%) and minimum cases were found in omentum and retroperitoneum with same frequency i.e. 1(1.33%)**[Table/Fig-3a,3b]**.

Cytomorphological Diagnosis		**No Of Cases**	**Percentage**
Benign	Inflammatory	12	17.91%
	Granulomatous Pathology	2	2.99%
	Pseudocyst Pancreas	1	1.49%
Suspicious For Malignancy		1	1.49%
Malignant	Adenocarcinoma	11	16.42%
	DesmoidTumour	1	1.49%
	Hcc	4	5.97%
	Lymphoma	3	4.48%
	Malignancy Of Epithelial Origin	3	4.48%
	Metastasis	24	35.82%
	Mucinous Neoplasm	1	1.49%

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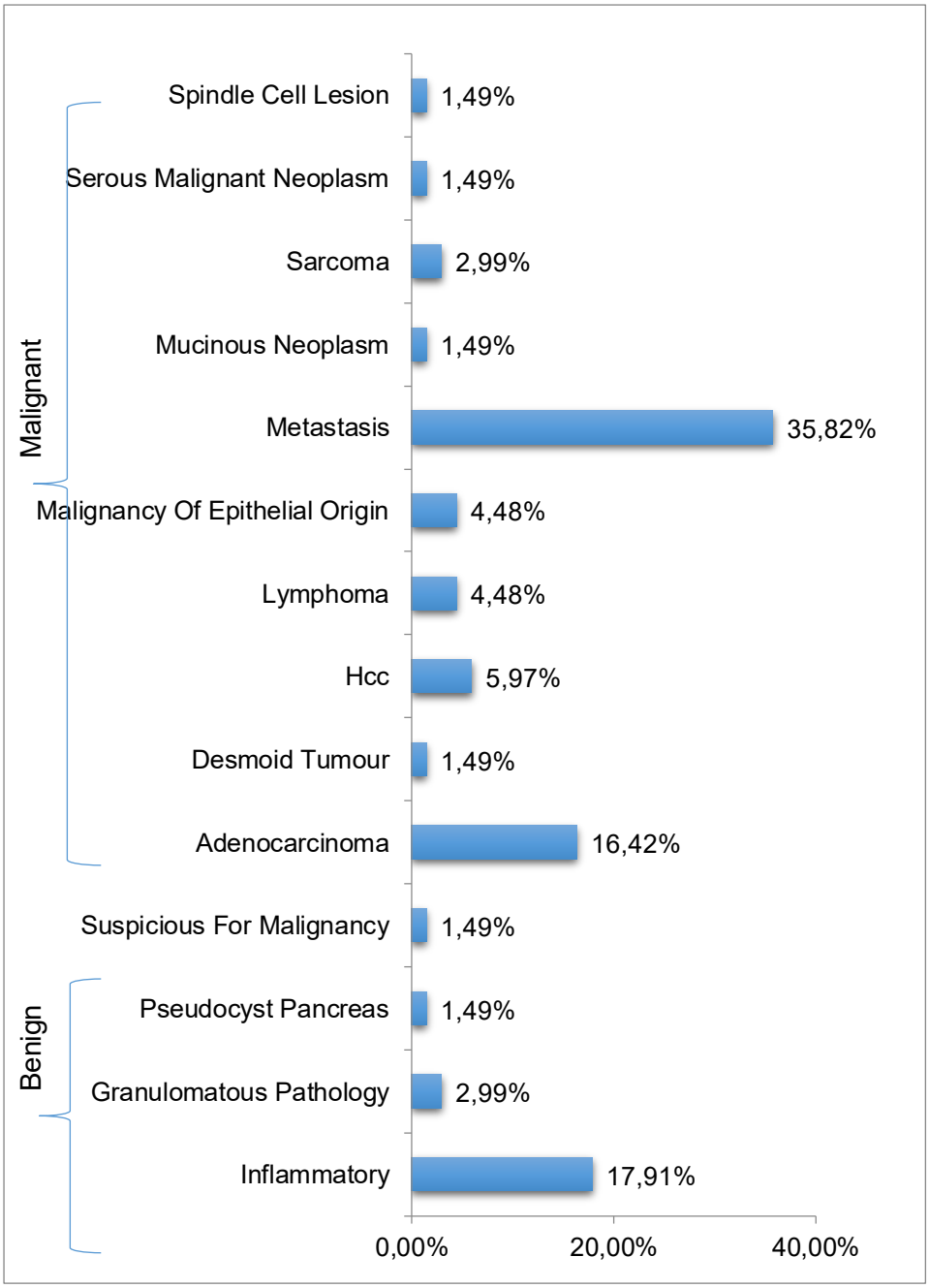
	Sarcoma	2	2.99%
	Serous Malignant Neoplasm	1	1.49%
	Spindle Cell Lesion	1	1.49%
Total		67	100%

[Table/Fig-4a]:TYPE AND DISTRIBUTION OF LESIONS BASED ON CYTOMORPHOLOGICAL BASIS



[Table/Fig-4b]: TYPE OF LESIONS BASED ON CYTOMORPHOLOGICAL BASIS(SHOWN AS HISTOGRAM)

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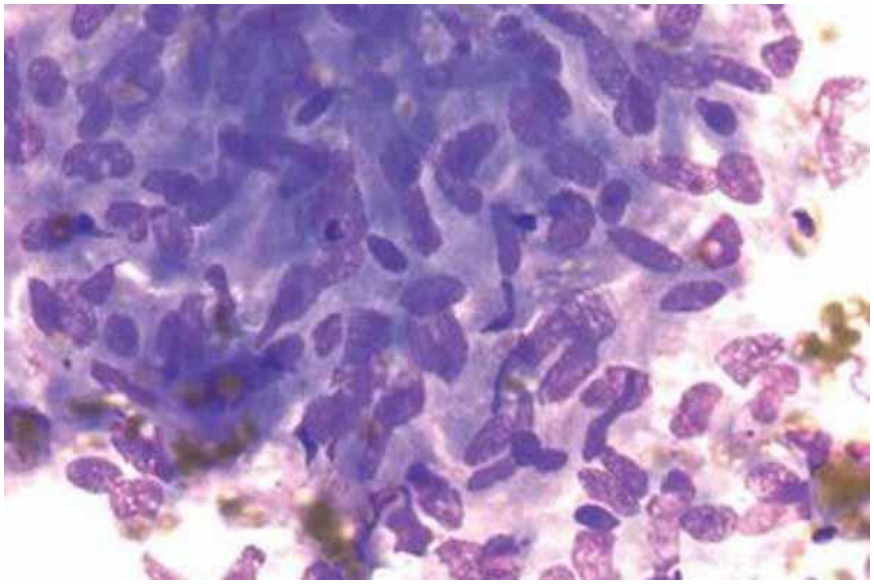
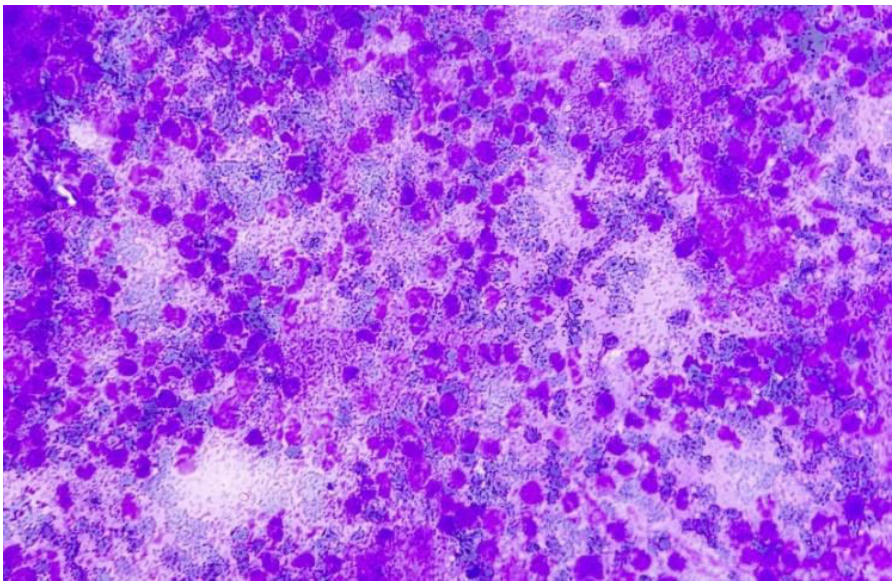
In the present study out of 15 benign lesions 12 cases of inflammatory pathology, 2 cases of granulomatous and 1 case of pseudocyst of pancreas were encountered.

Among 52 malignant tumors 24 were metastatic deposits, 11 were adenocarcinoma, 4 of hepatocellular carcinoma 3 of lymphoma, 3 of malignancy of epithelial origin, 2 of sarcoma and 1 each of desmoid tumor, mucinous neoplasm, serous neoplasm, spindle cell lesion and suspicion of malignancy**[Table/Fig-4a,4b]**.



[Table/Fig-5] : CYTOLOGICAL SMEAR FROM THE EPIGASTRIC MASS SHOWING WELL FORMED GRANULOMA COMPRISING OF EPITHELOID CELLS AND LYMPHOCYTES (MGG X400)



[Table/Fig-6] : CYTOLOGICAL SMEAR FROM GALL BLADDER SHOWING INFLAMMATORY CELLS COMPRISING OF NEUTROPHILS, LYMPHOCYTES IN DIRTY NECROTIC BACKGROUND - INFLAMMATORY PATHOLOGY (MGG X400)

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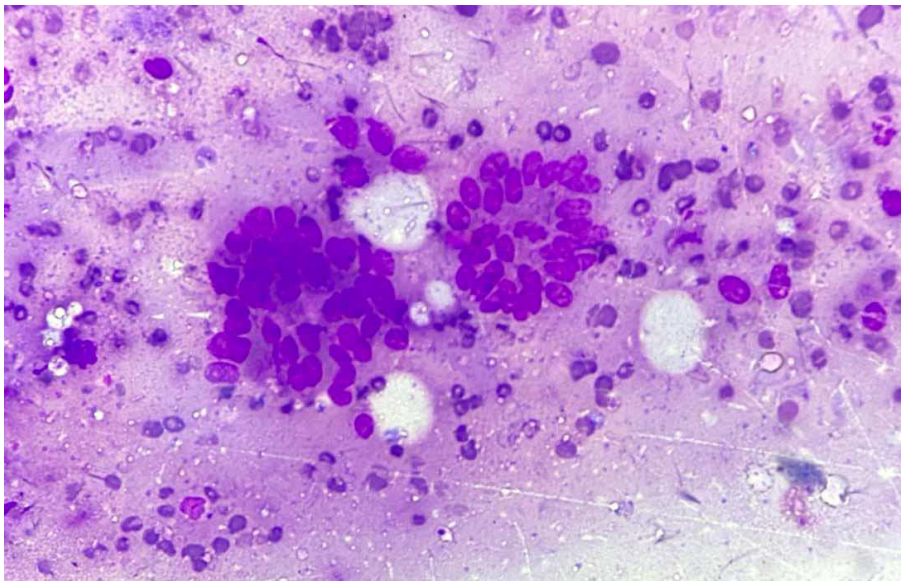
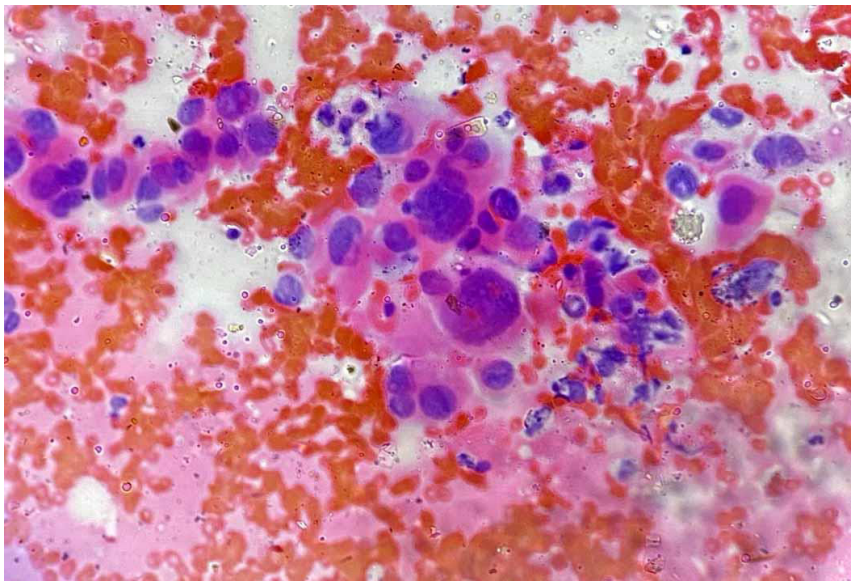


[Table/Fig-7] : CYTOLOGICAL SMEAR FROM GALL BLADDER SHOWING MALIGNANT CELLS FORMING ACINI -ADENOCARCINOMA OF GALL BLADDER (MGG X400)



[Table/Fig-8]: CYTOLOGICAL SMEAR FROM GALL BLADDER SHOWING MALIGNANT CELLS WITH HIGH NUCLEO-CYTOPLASMIC RATIO, HYPERCHROMATIC NUCLEI AND ABUNDANT CYTOPLASM -ADENOCARCINOMA OF GALL BLADDER (H&E X400)

NO OF CASES BASED ON CYTOLOGY FINDING		NO OF CASES BASED ON HISTOLOGICAL FINDING	COORELATION	FINAL HISTOPATHOLOGICAL DIAGNOSIS
ADENOCARCINOMA	9	9	COMPATIBLE	
ATYPIA	1	0	INCOMPATIBLE	LIPOSARCOMA
INFLAMMATORY	7	6	COMPATIBLE FOR 6 CASES AND INCOMPATIBLE FOR 1	ADENOCARCINOMA
METASTATIC DEPOSIT	5	5	COMPATIBLE	

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UNDIFFERENTIATED PLEOMORPHIC SARCOME	1	1	COMPATIBLE	
TOTAL	23	21	2 INCOMPATIBLE	
CHI - SQUARE	86.742			
Df	16			
P VALUE	0.0001			

[Table/Fig-9]:CORRELATION BETWEEN CYTOLOGICAL AND HISTOLOGICAL FINDINGS

A cytological diagnosis of adenocarcinoma was in 9 cases, which on histopathological examination were also confirmed as adenocarcinoma.

A cytological diagnosis of inflammatory was made in 7 case which on histopathological examination was confirmed as inflammatory in 6 cases and adenocarcinoma in 1 case.

A cytological diagnosis of metastatic deposit was made in 5 cases which on histopathological examination was confirmed as metastatic deposits.

A cytological diagnosis of atypia was made in 1 case which on histopathological examination was confirmed as Liposarcoma.

A cytological diagnosis of sarcoma was made in 1 which on histopathological examination was confirmed as undifferentiated pleomorphic sarcoma.

Therefore a significant correlation was found between cytological and histological findings with p value < 0.05 i.e 0.0001**[Table/Fig-9]**.

DISCUSSION

Image guided FNAC is a fast, accurate, cost-effective, and safe diagnostic method that can be used to diagnose a variety of cancers and non-cancerous disorders. Because FNAC provides a quick diagnosis, relevant medical or surgical treatments can be initiated sooner, avoiding needless, costly, and often invasive diagnostic procedures. Surgical morbidity and mortality, as well as pressure on the health-care system, are reduced or eliminated as a result of the aforementioned causes.

The present study was conducted on total 75 cases in department of pathology in GMC Patiala. Out of the total 75 cases, 15 (20%) were benign and 52 (69.33%) were malignant.

Authors and year of study	**Age Distribution**
Chetal et al[5] (2016)	5 th decade
Dosi et al[6] (2016)	5thnd 6th decade
Madhav et al[1] (2019)	8th decade
Present study	5th and 6th decade

[Table/Fig-10]:COMPARISON OF AGE DISTRIBUTION

In this study tumors were more common in 5th and 6th decade which closely resemble with the study conducted by Dosi et al[6] (2016)**[Table/Fig-10]**.

This study showed that frequency of neoplasms increases with increasing age of the patient.

Authors and year of study	**Males**	**Females**
Ahmad et al[7] (2006)	36%	74%
Vasilj et al[3] (2016)	54%	46%
Chetal et al[5] (2016)	47%	53%
Present study	56%	44%

[Table/Fig-11]:COMPARISON OF GENDER DISTRIBUTION

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The present study showed that males (56%) outnumbered females (44%) and the results were comparable with the study conducted by Vasilj et al[3] (2016)**[Table/Fig-11]**.

COMPARISON OF MALE : FEMALE RATIO

The present study showed slight male preponderance with male to female ratio being 1.27:1. The results of present study closely resemble with studies conducted by Reyaz et al[7] (2016) and Madhav et al[1] (2019) in which the ratio was 1.2:1 and 1.05:1 respectively.

Authors and year of study	Percentage of lesions	
	Benign	malignant
Vasilj et al[3] (2016)	23%	52%
Reyaz et al[7] (2016)	12.26%	78.30%
Chetal et al[5] (2016)	11%	86%
Present study	22.39%	77.61%

[Table/Fig-12]:COMPARITIVE ANALYSIS OF NATURE OF LESION

In the present study, frequency of distribution of benign and malignant tumors were 22.39% and 77.61% respectively. 12.26% and 78.30%, 11% and 86% were the frequency of distribution of benign and malignant tumours in the study done by Reyaz et al[7] (2016) and Chetal et al[5] (2016) respectively. Thus our findings are comparable to these studies**[Table/Fig-12]**.

COMPARISON OF MALIGNANCY DISTRIBUTION

In the present study most common nature of lesion was malignant in which most frequent were secondary malignancy. Other studies like Stewart et al[2] (2002), Ahmad et al[8] (2006) and Chetal et al[5] (2016) also showed malignancy as most common lesion.

COMPARISON OF SITE AND ORGAN WISE DISTRIBUTION

In present study, right hypochondrium (65.33%) was the most common site and liver (41.3%) was the commonest organ of aspiration followed by gall bladder (22.6%). Findings of present study were consistent with the studies of Dosi et al[6] (2015), Singh et al[9] (2018), Madhav et al[1] (2019). These studies also showed that right hypochondrium was the most common site and liver was the commonest organ of aspiration.

COMPARISON OF LESION WISE DISTRIBUTION

Inflammatory lesions were most common benign lesion followed by granulomatous and pseudocyst pancreas.

In the present study, adenocarcinomas (16.42%), were the most common malignant cell type, followed by hepatocellular carcinoma (5.97%), This was in accordance with the observations which were made by Ahmad et al[8] (2006) and Reyaz et al[7] (2016). In the liver, most common malignant lesion was metastatic carcinoma followed by hepatocellular carcinoma, a finding in accordance to that reported by Ahmad et al[8] (2006) and Vasilj et al[3] (2016). In the present study, we observed 10.67% inconclusive smears, which were higher than the observations made by Ahmad et al[8] (2006) and Reyaz et al[7] (2016) who observed 6.5% and 9.43% unsatisfactory smears, which could be attributed to many reasons and depends on many factors like location, size, accessibility, vascularity, necrotic component, consistency, nature and histologic type of the lesion.

Although few studies have reported complications like mild local pain, bleeding and tumor seeding of the needle tract, a vast amount of literature supports the safety of FNAC. Therefore, an attempt was made by us to minimize interpretative error by developing good understanding with the radiologists and clinicians. Presence of pathologist during the procedure is an added advantage for both in terms of sharing history, image findings and differential diagnosis. In the present study, no major discomfort was observed following FNAC procedure, except for minimal discomfort at the time of needle puncture.

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Cytohistological correlation was done in 23 cases out of 75 cases. Out of 23 cases 21 cases were compatible 2 were incompatible. One case showed Chronic Inflammatory Pathology in Cytological Diagnosis and Adenocarcinoma in Histological Diagnosis.Second case showed Atypia in Cytological Diagnosis and Liposarcoma Histological Diagnosis.

ACCURACY RATE

Of the total 75 cases, histological confirmation was available in 23 cases. Diagnostic accuracy was calculated and found to be 91.3 %. Closely resembling readings were found in studies of Ahmad et al[8] (2006) – 95.70% ; Sidhalingeddy et al[10] (2011) – 96.50% ; Chetal et al[5] (2016) – 93.75%.

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