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Original Research Article

Cytological evaluation of spectrum of Hepatobiliary and Pancreatic mass lesions

Junu Devi[1], **Ekaparna Hazarika**[1,*]

[1] *Dept. of Pathology, Gauhati Medical College & Hospital, Guwahati, Assam, India*

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ABSTRACT

Background: Hepatobiliary and Pancreatic mass lesions are commonly occurring intra-abdominal space occupying lesions. Image guided FNAC enables exact localization of the lesion, assessment of nature and invasion and is a useful tool in the diagnosis of such lesions.
The present study aims to evaluate the spectrum of hepatobiliary mass lesions diagnosed by Image guided FNAC.
Materials and Methods: We have conducted a retrospective study in Department of Pathology, Gauhati Medical College & Hospital, Guwahati, for a period of 5 years, including patients of all ages and both sexes presenting with clinical and radiological suspicion of hepatic, biliary or pancreatic mass lesion. Under aseptic conditions USG guidance FNAC was done from the appropriate site and smears were examined.
Results: Out of the total 135 patients, there were 70 cases of Hepatic lesions (51.8%), followed by 54 cases taken from Gall bladder (GB) (40%), 5 cases from Common Bile Duct (CBD) (3.7%) and 6 cases (4.44%) from Pancreatic lesions. There were 51 cases of hepatic malignancies, 36 GB malignancies, 4 cases each of CBD and pancreatic malignancies. The most common Hepatic malignancies were Metastases followed by Hepatocellular carcinoma. The most common GB malignancy was Adenocarcinoma, followed by Cholangiocarcinoma. There was 1 case each of Solid Pseudopapillary Neoplasm of Pancreas, Acinar Cell carcinoma, Mucinous Adenocarcinoma and HCC. These findings were in concordance with our reference studies.
Conclusion: Image guided FNAC has proved to be a versatile tool in provide an early and accurate diagnosis of hepatobiliary and pancreatic mass lesions.

1. Introduction

Hepatobiliary and Pancreatic mass lesions commonly occur as an intra-abdominal lump or space occupying lesion. Patients presenting with mass lesions of liver and gall bladder are common in a tertiary care hospital.[1] Tumors of the liver and biliary tract, mainly Hepatocellular carcinoma and Cholangiocarcinoma are the second leading cause of Cancer related death worldwide and the sixth leading cause of Cancer related death among men in developed countries.[2] India has high incidence of gallbladder cancer (GBC) and contributes to about 10% of the global GBC burden. Incidence of Gall bladder carcinoma in the North, East, North east and Central India is relatively high as compared to South and West India.[3] Pancreatic malignancies constitute 3.2% of all new cancer cases and 8.2% of cancer related deaths.[4] Gall bladder and pancreatic malignancies often follow an indolent course and are difficult to diagnose, so they often lead to detection at a later stage. Early diagnosis and prompt treatment measures are essential in the management of hepatobiliary tumors to ensure a favorable outcome and relatively longer disease-free survival.

* *Corresponding author*.
E-mail address: ekaparnahazarika@gmail.com (E. Hazarika).

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Image guided FNAC is a rapid, cost-effective and safe diagnostic procedure that can be used in various neoplastic and non-neoplastic diseases.[5] It enables exact localization of the lesion, assessment of nature and invasion, multifocality and vascularity of the lesion. The sensitivity and specificity of FNAC of liver in the diagnosis of malignancy is 95% and 100% respectively.[6] A quick FNAC diagnosis saves valuable time and enables the surgeon to plan treatment accordingly.

The present study aims to evaluate the spectrum of hepatobiliary and pancreatic mass lesions diagnosed by Image guided FNAC.

2. Materials and Methods

2.1. Study design

Retrospective.

2.2. Study duration

5 Years (August 2017 to July 2022).

2.3. Place of study

Department of Pathology, Gauhati Medical College & Hospital, Guwahati.

2.4. Sample size

135.

2.5. Inclusion criteria

Patients of both sexes and all ages with clinical and radiological suspicion of hepatic, biliary or pancreatic mass lesion attending the Medicine, Surgery and Gastroenterology OPDs of GMCH.

2.6. Exclusion criteria

All other intra-abdominal neoplasms.

2.7. Methodology

Under aseptic conditions a 22 Gauge needle was introduced in the appropriate site in right hypochondrium, during suspended respiration and under USG guidance. Upon hitting the target area, a 10mL syringe was attached on to the needle and was moved back and forth multiple times till the required sample was collected. The needle was withdrawn and the aspirated material was smeared on pre-cleaned glass slides and air-dried. The slides were stained with May-Grünwald-Giemsa stain (MGG) and Papanicolaou stain (Pap) and examined under the microscope. Diagnostic criteria laid down by Orell et al. were used while analyzing the smears.

3. Results

The present study includes a total of 135 patients, with patients ranging between 9 months to 76 years. Table 1 shows the distribution of the age groups of patients.

Table 1: Distribution of age groups of patients

Age range (in years)	Number of patients
0-20	3
21-40	27
41-60	85
61-80	20
Total	135

A total of 69 male patients and 66 female patients were included in this study. Male: female ratio was 1.04:1. Table 2 shows the sex wise distribution of the patients.

Table 2: Sex wise distribution of patients

FNAC Site	Number of Male patients	Number of Female patients
Liver	38	29
Gall bladder	25	32
Pancreas	4	2
CBD	2	3
Total	69	66

Out of the 135 cases, the most common USG Guided FNACs were taken from Liver lesions which constituted 70 cases (51.8%), followed by 54 cases taken from Gall bladder (GB) (40%), 5 cases from Common Bile Duct (CBD) (3.7%) and 6 cases (4.44%) from Pancreatic lesions. The distribution has been demonstrated in Table 3.

Table 3: Distribution of site of FNAC

FNAC Site	Number of cases	Percentage
Liver	70	51.8
Gall Bladder	54	40
CBD	5	3.7
Pancreas	6	4.44
Total	135	

The FNAC lesions were placed under five cytological categories.

This distribution has been shown in Table 4.

Table 4: Distribution ofcytological categories

Cytological Category	Number of cases
Inadequate for opinion	19
Infective/ Inflammatory	13
Benign	4
Suspicious of malignancy	4
Malignant	95
Total	135

The average size of both benign and malignant lesions of each site has been depicted in Table 5. The average size of the malignant lesions of Liver, Gall bladder, CBD and Pancreas are 5.2 cm, 3.35 cm, 2.8cm and 4.2 cm respectively.

Table 5: Distribution of average size of the malignant lesions

FNAC Site	Cytological category	Average diameter of lesion
Liver	Benign	3.6 cm
	Malignant	5.2 cm
Gall Bladder	Benign	1 cm
	Malignant	3.35 cm
Common Bile Duct	Malignant	2.8 cm
Pancreas	Benign	4.6 cm
	Malignant	4.2 cm

3.1. Hepatic lesions

Out of the 70 cases of Hepatic lesions, 5 cases were inadequate for opinion and 9 cases had infective and inflammatory picture. There were 3 benign cases constituting 1 (one) case of Hepatocellular Adenoma, 1 case of Hemangioma and 1 case of Hepatic Nodule. There were 3 cases which showed Suspicion of malignancy.

Out of the 51 malignant cases, the occurrence of Metastasis was found to be more common than Primary hepatic malignancy. The most frequent cases were that of Metastatic Adenocarcinoma, which constituted 26 cases. Out of these 26 cases, there were 20 cases with a known and 3 cases with a possible Gall bladder primary, 1 case of Metastatic Mucinous Adenocarcinoma, 1 case with known Pancreatic primary and 1 case with known Lung primary. The other types of metastases detected were 1 case each of Metastatic GIST, Metastatic Neuroendocrine Tumor and Metastatic Squamous Cell Carcinoma with a known Lung primary.

The next common malignancy which was observed in our study was that of Hepatocellular carcinoma which included 17 cases. There were also 2 cases each of Cholangiocarcinoma, Hepatoblastoma and 1 case of Hodgkin's Lymphoma.

The distribution of the frequency and percentage of Hepatic lesions has been depicted in Table 6.

3.2. Gall bladder lesions

There were 54 USG Guided FNACs taken from Gall bladder lesions. 13 cases were inadequate for opinion, 3 cases had inflammatory etiology and 2 cases were suspicious of malignancy.

Out of the 36 malignant cases, the most common diagnosis was that of Adenocarcinoma which constituted 33 cases, including 2 cases of Mucinous Adenocarcinoma. There were 3 cases reported as Cholangiocarcinoma.

The case wise distribution has been shown in Table 7.

3.3. Lesions of the common bile duct

Out of the 5 cases of USG guided FNAC taken from CBD lesions, 1 case was inadequate for diagnosis and 4 cases had malignant etiology. There were 2 cases of Cholangiocarcinoma, 1 case of Adenocarcinoma and 1 case of Hepatocellular carcinoma. Table 8 shows the frequency of CBD lesions.

3.4. Pancreatic lesions

There were a total of 6 cases of Pancreatic lesions which included 1 case of Inadequate category, 1 case of Pancreatic Pseudocyst and 4 cases of malignancy. The malignant cases included 1 case each of Solid Pseudopapillary Neoplasm, Acinar cell Neoplasm, Metastatic HCC and Pancreatic Mucinous Adenocarcinoma. These findings have been shown in Table 9.

The prevalence ratio of the malignant lesions of liver, gall bladder, common bile duct and pancreas are 0.72, 0.61, 0.8 and 0.66 respectively. The results have been depicted in Table 10.

4. Discussion

Image guided FNAC has become a popular modality for diagnosing intra-abdominal malignancies. FNAC has proved to be an efficient platform in terms of cost, procedure, associated morbidity and early diagnosis.[7] Single or multiple focal abnormalities detected by palpation, computed tomography (CT) scan or ultra-sonography constitute the main indications for FNAC of the liver, biliary and pancreatic neoplasms.[8]

4.1. Hepatic lesions

Majority of the patients in our study belonged to the age group of 41-60 years with a male predominance. The average age for primary hepatic malignancies in the US was 65-74 years as mentioned by Ananthakrishnan et al[9] and in India, 40-70years as found by Acharya et al.[10] These findings are similar to that of our study, where average age for Primary hepatic malignancy has come out to be 41-60 years. In a study by Ran Xu Zhu et al,[11] the incidence of these malignancies have been seen to be higher in men, which is in concordance to our study.

The most commonly encountered malignant Hepatic lesions were Metastases followed by Hepatocellular carcinoma, which was also seen in studies by Sobha Rani et al,[12] Bharti Jha et al.[13] Rasania A et al[14] Islam T et al.[15] In our study, the most common metastasis was found to be Metastatic Adenocarcinoma which constituted 26 cases. Majority of the patients had known primaries

Table 6: Distribution of different types and number of cases of Hepatic lesions

Cytological Category	FNAC Diagnosis	Number of cases	Percentage
Inadequate for opinion		5	7.14
Infective/ Inflammatory		9	12.85
Benign		3	4.28
	Hepatic Adenoma	1	
	Hemangioma	1	
	Hepatic Nodule	1	
Suspicious of malignancy		3	4.28
Malignant		51	72.85
	Metastatic AdenoCarcinoma	26	
	Hepatocellular Carcinoma	17	
	Cholangiocarcinoma	2	
	Hepatoblastoma	2	
	Metastatic GIST	1	
	Metastatic Neuroendocrine tumor	1	
	Metastatic Squamous Cell Carcinoma	1	
	Hodgkin's Lymphoma	1	
Total		70	

Table 7: Distribution of different types and number of cases of GB lesions

Cytological Category	FNAC Diagnosis	Number of cases	Percentage
Inadequate for opinion		13	24.07
Infective/ Inflammatory		3	5.55
Benign		0	
Suspicious of malignancy		2	3.7
Malignant		36	66.66
	Adeno Carcinoma	33	
	Cholangiocarcinoma	3	
Total		54	

Table 8: Distribution of different types and number of cases of CBD Lesions

Cytological Category	FNAC Diagnosis	Number of cases	Percentage
Inadequate for opinion		1	20
Infective/ Inflammatory		0	
Benign		0	
Suspicious of malignancy		0	
Malignant		4	80
	Cholangiocarcinoma	2	
	Adenocarcinoma	1	
	Hepatocellular carcinoma	1	
Total		5	

in Gall bladder, Pancreas and Lung. These findings were consistent with the studies by Sobha Rani et al[12] and R.C Adhikari et al.[16] Smears from these cases showed glandular arrangement of pleomorphic cells having high N:C ratio, irregular nuclear membrane, prominent nucleoli and scant to moderate , often vacuolated cytoplasm with occasional presence of tumour giant cells and haemorrhagic background.

Hepatocellular Carcinoma was diagnosed in 17 cases. USG guided FNA smears showed clusters and trabeculae of cells having high N:C ratio, nuclear pleomorphism and presence of macronucleoli and bare nuclei. The well differentiated type showed traversing endothelial channels among the tumour clusters. The diagnostic criteria laid down by Cohen et al[17] was used for these cases.

There were two cases of Hepatoblastoma, one was seen in a 9 month old and the other was seen in a 3 year old patient. Cellular smears showed both singly dispersed, clusters and trabeculae of small round cells having round to oval slightly eccentrically placed nuclei, inconspicuous

Table 9: Distribution of different types and number of cases of pancreatic lesions

Cytological Category	FNAC Diagnosis	Number of cases	Percentage
Inadequate for opinion		1	16.66
Infective/ Inflammatory		0	
Benign		1	16.66
	Pancreatic Pseudocyst	1	
Suspicious of malignancy		1	16.66
Malignant		4	66.66
	Solid Pseudopapillary Neoplasm	1	
	Acinar Cell Carcinoma	1	
	Mucinous Adenocarcinoma	1	
	Metastatic Hepatocellular Carcinoma	1	
Total		6	

Table 10: Distribution of prevalence ratio of malignancies according to site

Site	Number of malignancies	Prevalence ratio
Liver	51	0.72
Gall bladder	33	0.61
Common bile duct	4	0.8
Pancreas	4	0.66

nucleoli and scant to moderate cytoplasm. We followed the diagnostic criteria of Hepatoblastoma mentioned by Perez JS et al.[18]

In our study, we also diagnosed one case of Neuroendocrine metastasis. The smears revealed sheets and clusters of plasmacytoid cells having round to oval eccentric nuclei, stippled chromatin and moderate amount of cytoplasm. Shaheena Parveen et al have mentioned 5 such cases with similar cytological features in their study, all of which had a pancreatic primary and eventually underwent resection.[5]

There was 1 case of Metastatic GIST in our study. Cellular smears showed singly dispersed and loose clusters of epithelioid tumor cells which formed fascicles with nuclei arranged side-by-side. The nuclei were ovoid to elongated with fine chromatin. Areas of nuclear atypia and pleomorphism were also noted. The intervening stroma between these clusters had a loose fibrillary appearance which stained pink on MGG. These findings were consistent with a study by Vij M et al.[19] Approximately 30% of GISTs are malignant and liver is the most common site for metastasis.[19]

We also encountered a case of Hodgkin's Lymphoma with no known nodal primary or extra nodal primary of any other site. Smears showed sheets of mononuclear cells having high N:C ratio, irregular nuclear membrane and prominent nucleoli. Also present were binucleate cells showing characteristic Reed Sternberg morphology in a background of mixed inflammatory cells mostly lymphocytes and giant cells. A similar case was reported by Nasiri et al where they have mentioned that Primary Hepatic Lymphoma is rare in occurrence presenting with abdominal pain in an average 50 year age group.[20]

Five cases of hepatic lesions included in our study were categorized as Inadequate for opinion because the smears had poor cell yield. There were 9 cases of infective and inflammatory etiology, of which there was one case of Granulomatous inflammation. Tuberculosis needs to be ruled out in such cases.

Among the 3 benign lesions there was one case of Hepatocellular adenoma which revealed clusters of monomorphic hepatocytes in a background of absent bile pigment. Cytological smears from a case of Hemangioma showed clusters of benign hepatocytes and few macrophages in a hemorrhagic background. The findings of both these cases were consistent with a study by Ashumi Gupta et al.[21]

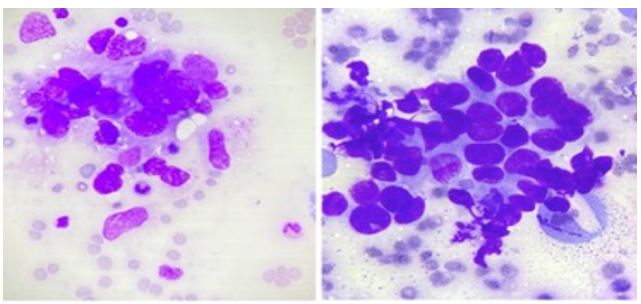

Fig. 1: A case of hepatocellular carcinoma

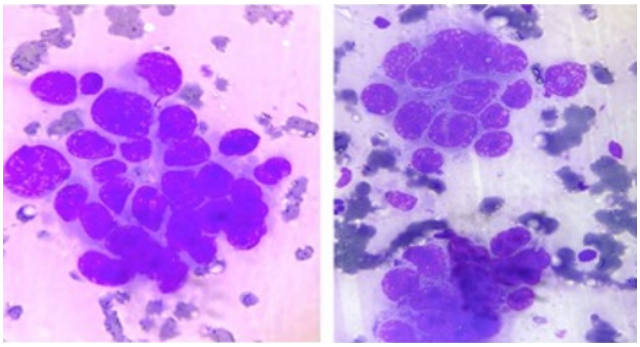

Fig. 2: A case of metastatic adenocarcinoma

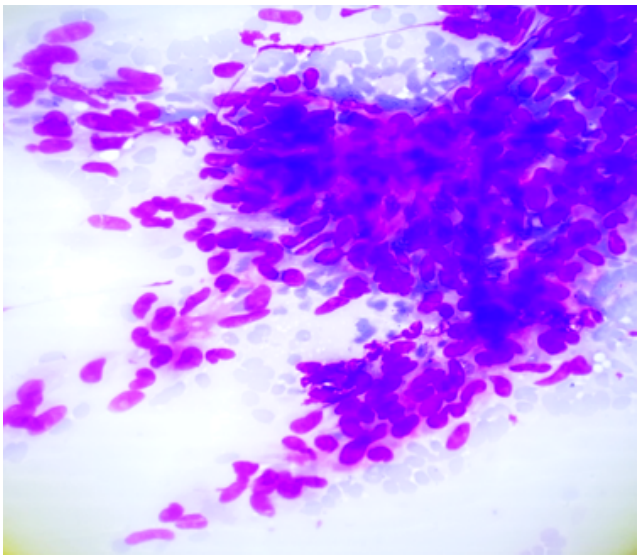

Fig. 3: A case of metastatic GIST in liver

4.2. Gall bladder lesions

Dutta et al have mentioned that the average age for Gall bladder malignancy was found to be 40-60 years, with a female predominance.[3] The results are in concordance with our study.

The most frequent GB lesions were the malignant cases which constituted 33 cases of Adenocarcinoma making it the most common, followed by 3 cases of Cholangiocarcinoma. Similar findings were also seen in studies by Selhi et al,[22] Rout et al[23] and Rahul Ranjan et al.[1] Among these, there were 2 cases of Mucinous Adneocarcinoma, the smears of which showed clusters and acini of tumor cells having high N:C ratio, enlarged hyperchromatic and pleomorphic nuclei and moderate to scant amount of cytoplasm along with abundance of extracellular mucin. These findings are in concordance with a study by Singh et al[24] where it was also mentioned that the mucinous adenocarcinoma account for 2.5% of all carcinoma in gall bladder meeting the criteria of more than 50% extracellular mucin (WHO).[25] One case of Papillary Adenocarcinoma of Gall bladder was also reported, cytological smears showing presence of true papillae with fibrovascular cores with cytological atypical and occasional mitotic figures. This subtype os associated with good prognosis as mentioned by Chandra et al and Rout et al.[23,26]

In our study, there were also 3 cases of Cholangiocarcinoma. Smears from these patients showed clusters of tumor cells having enlarged pleomorphic nuclei, prominent nucleoli and occasionally vacuolated cytoplasm. Ashumi Gupta et al have mentioned that clinical history and radiological investigations are important in determining the primary site of these tumors.[21]

13 cases of GB FNAC were inadequate for opinion and 3 cases were reported as Inflammatory lesions all of which were eventually diagnosed as Chronic Cholecystitis.

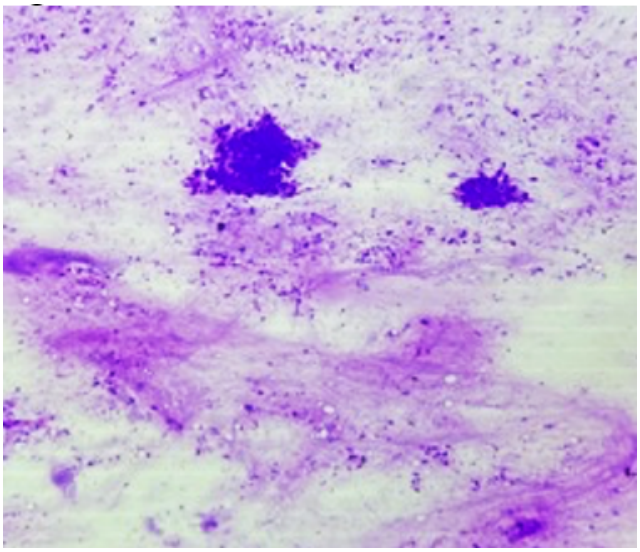

Fig. 4: A case of mucinous adenocarcinoma of GB

4.3. CBD lesions

Of the 5 cases of CBD lesions, there were 4 cases of malignancy, the most common being Cholangiocarcinoma (2 cases). Cholangiocarcinoma is also the second most common primary liver tumour and account for approximately 10-15% of all hepatobiliary malignancies.[27] The remaining two cases were one each of Adenocarcinoma and HCC.

4.4. Pancreatic lesions

In the present study, we encountered 4 cases of Pancreatic malignancy. 1 case was diagnosed as Solid Pseudopapillary Neoplasm of Pancreas, the smears of which showed both papillary structures and monotonous singly dispersed cells with round eccentric nuclei, fine chromatin and scant to moderate cytoplasm. Mehta et al reported six such cases

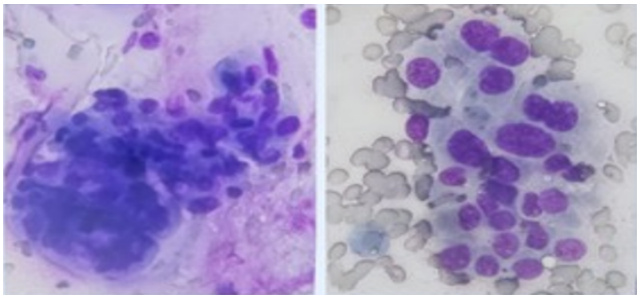

Fig. 7: A case of pancreatic mucinous adenocarcinoma

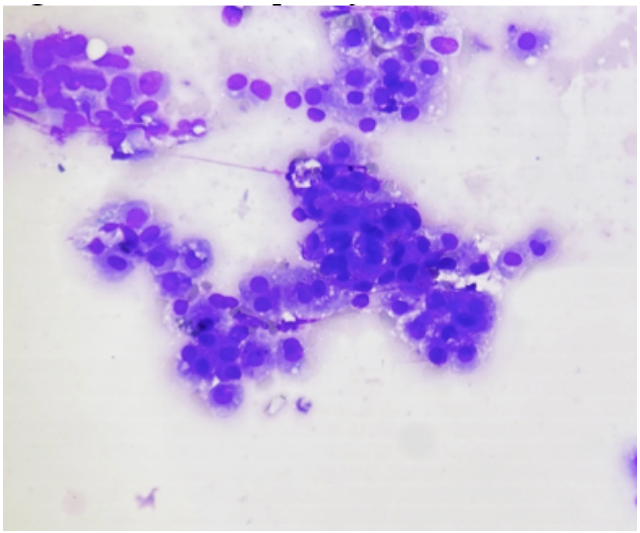

Fig. 5: A case of papillary adenocarcinoma of GB

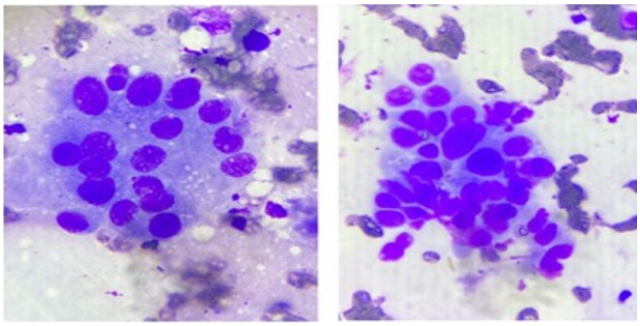

Fig. 6: A case of cholangiocarcinoma

which had similar cytomorphological findings.[28]

We also diagnosed one case of Acinar Cell carcinoma. The smears were highly cellular showing tumor cells arranged in acinar pattern with large round nuclei, prominent nucleoli and scant eosinophilic cytoplasm, in a background of inflammatory cells. These findings are in concordance with a study by Nandini et al.[29]

There was one case each of Pancreatic Mucinous Adenocarcinoma and HCC. In the study by Ashumi Gupta et al, the predominant Pancreatic FNAC finding was Adenocarcinoma, followed by poorly differentiated malignant neoplasm.babli.isspl@gmail.com[21]

One case of benign etiology was found in our study which was diagnosed as Pancreatic Pseudocyst. On FNA, clear fluid was aspirated and smears showed foamy macrophages, mixed inflammatory cells and spindle shaped fibroblasts.

The aforesaid findings were an attempt to evaluate the cytomorphology and spectrum of the hepatobiliary and pancreatic lesions in our tertiary care centre during our duration of study.

5. Conclusion

An integrated and multidisciplinary approach to evaluate Hepatobiliary and Pancreatic mass lesions is required to provide an accurate diagnosis and initiate the necessary treatment. Malignancies of the liver, gall bladder and pancreas often present with a silent clinical course and lead to poor outcome. So, an early diagnosis is very critical in such cases for the benefit of the patient.

Image guided FNAC has proved to be a versatile tool in carrying forward this approach, thus being a very useful, accurate and cost effective modality.

6. Conflicts of Interest

The authors declare no conflict of interest.

7. Source of Funding

None.

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Patients who have given consent to be included in the study.

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Author biography

Junu Devi, Associate Professor

Ekaparna Hazarika, Post Graduate Trainee https://orcid.org/0000-0003-3278-7111

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