Original Research Article

Diagnostic utility of Fine needle aspiration cytology in hepatobiliary and pancreatic mass lesions

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Abstract

Background: Lesions of liver, gall bladder and pancreas are quite common. After radiological assessment, FNAC under imaging guidance is an important tool in achieving early and accurate diagnosis, which is important in management of hepatobiliary and pancreatic lesions. The purpose of the study was to know the pathological spectrum of hepatobiliary and pancreatic mass lesions and usefulness of USG guided FNAC in diagnosis. **Methods:** A retrospective study was conducted in the Department of Pathology at Geetanjali Medical College and Hospital,Udaipur. A total of 173 FNA specimens from 171 cases over a period of three years from 1st January 2018 to 31st December 2020, with hepatic, biliary or pancreatic lesions were included in the study. Cytomorphological features were studied in detail and FNA specimens were categorized into categories including malignant, inflammatory, benign, suspicious for malignancy and inadequate. **Results:** FNA cytology was studied from 171 patients, aged 11 to 91 years, with mean age 54.5yrs. Out of 173 FNA specimens, most common were from liver (115,66.5%), followed by gall bladder (37,21.4%), pancreas (19,11.0%) and common bile duct (2,1.2%). Malignant lesions were the commonest (135, 78.0%). In liver metastatic tumors (64, 55.6%) were most frequent diagnoses followed by hepatocellular carcinoma (13, 11.3%). In biliary tract and pancreas, adenocarcinoma was the most commonly diagnosed lesion. **Conclusion:** FNA cytology is a useful tool in diagnosis of hepatobiliary and pancreatic mass lesions. It is safe, cost effective and rapid method which can be used after radiological investigation, especially in cases where biopsy cannot be performed.

Keywords: Fine needle aspiration (FNA), cytology, liver, gall bladder, pancreas.

Introduction

The liver, biliary tract and pancreas are frequently involved site for malignancy. Liver can be involved by metastases, primary benign or malignant neoplasms and other nonneoplastic diseases. Use of minimally invasive techniques under radiological guidance with pathological correlation is gaining popularity as a means of diagnosing hepatic lesions. Radiology does not always give exact characterization of the lesions, therefore a cytological diagnosis is often required to guide subsequent management. [1] Biopsy for pancreatic mass involves risk of haemorrhage and infection and its differentiation from pancreatitis is difficult. [2]Tumor markers like alpha-fetoprotein (AFP) can be helpful, but they may not be increased in all cases at presentation. Hence, the diagnosis depends on tissue diagnosis in most cases. [3] Fine needle aspiration cytology (FNAC) under image guidance is rapid and inexpensive method and can be used for diagnosis of mass lesions in hepatobiliary tract and pancreas. Due to low rate of complications and good sensitivity, FNAC is gaining popularity as a diagnostic method. [3,4] The purpose of the study was to know the pathological spectrum of hepatobiliary and pancreatic masses and importance of USG guided FNAC in the diagnosis of these lesions.

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Materials and methods

A retrospective study was conducted in the Department of Pathology at Geetanjali Medical College and Hospital, Udaipur. A total of 171 patients over a period of three years from 1st January 2018 to 31st December 2020, which were clinically or radiologically diagnosed to have hepatic, biliary or pancreatic space occupying lesions were included in the study. All those who had undergone Ultrasound (USG) guided FNAC for hepatic, biliary and pancreatic mass lesions were included. Cases other than hepatobilary and pancreas were excluded from this study.

Image guided FNAC was taken under aseptic precautions and smears were prepared. Air dried smears were stained with May GrunwaldGiemsa (MGG) and smears that were wet fixed using 95% ethanol were stained with Papanicolaoustain (PAP).[5,6] The slides were then examined under microscope. Histopathological correlation along with tumor markers was done wherever possible.

Observations and results

The present study consisted of 171 cases, with patients ranging between age 11 to 91 years (Table 1), with mean age 54.5yrs. There were 87 males (50.9%) and 84 females (49.1%), with male to female ratio 1.03:1. Most common age group involved was between 51-60 years (52 cases).A total of 173 aspirates were studied from 171 patients.

Table 1: Age distribution of patients

Age in years	M	F	TotalPercentage)
<20	1	0	1 (0.6%)
21-30	4	5	9 (5.3%)
31-40	6	9	15 (8.8%)
41-50	13	30	43 (25.1%)
51-60	31	22	53 (31.0%)
61-70	19	12	31 (18.1%)
71-80	9	5	14 (8.2%)
81-90	3	1	4 (2.3%)
≥91	1	0	1 (0.6%)
	87	84	171

Out of 173 cases, most common USG guided FNACs were taken from liver lesions 115 (66.5%), followed by gall bladder 37 (21.4%), pancreas 19 (11.0%) and common bile duct 2 (1.2%). 2 of the patients had undergone FNA from 2 sites liver and gall bladder.

FNA specimens were categorized into benign lesions, malignant lesion, inflammatory pathology, inadequate, few atypical cells suspicious for malignancy and negative for malignancy (Table 2).

Table 2 : Diagnostic categories in FNA samples from hepatobiliary and pancreatic mass lesions.

	Liver	Biliary Tract	Pancreas	Total (Percentage)
Malignant Lesions	91	31	13	135 (78.0%)
Inflammatory	9	2	3	14 (8.1%)
Benign	4	-	-	4 (2.3%)
Suspicious For Malignancy	2	3	2	7 (4.0%)
Negative For Malignancy	2	1		3 (1.7%)
Inadequate	7	2	1	10 (5.8%)
Total	115	39	19	173

Malignant lesions were the most frequent category in hepatic, pancreatic and biliary lesions. FNAC from hepatic mass lesions constituted the maximum number of cases (115 cases, 66.4%). The most common diagnosis amongst liver lesions was metastatic malignancy (64 cases, 55.6%) followed by primary hepatic neoplasms (14 cases, 12.2%) (Table 3) . Primary hepatic tumors included hepatocellular carcinoma (HCC) (13 cases,11.3%) and hepatoblastoma (1 case, 0.9%). Among metastatic tumors, most frequent diagnosis given on FNA smears were metastatic adenocarcinoma (36 cases, 31.3%), followed by metastatic poorly differentiated carcinoma(PDCA) (19 cases,16.5%), metastatic squamous cell carcinoma(SCC) (7 cases, 6.1%), metastatic renal cell carcinoma(RCC) (1 case, 0.9%) and differential diagnosis of metastatic carcinoma vs gastrointestinal stromal tumor(GIST) was given in 1 case (0.9%). In 8 cases (7.0%) both possibility of HCC and metastatic carcinoma were kept in differential diagnosis. In 2 cases (1.7%) metastatic adenocarcinoma and cholangiocarcinoma and were the differentials on FNA cytology and 3 cases (2.6%) were diagnosed as poorly differentiated malignant tumors. Overall diagnosis of malignancy was given in 91 cases (79.1%).

Table 3 : FNA cytology diagnoses of hepatobiliary and pancreatic malignant lesions

	N (Percentage)
LIVER	
Primary Tumors	14 (15.4%)
Hepatocellular carcinoma	13 (14.3%)
Hepatoblastoma	1 (1.1%)
Metastases	64 (70.3%)
Metastatic adenocarcinoma	36 (39.6%)
Metastatic PDCA	19 (20.9%)
Metastatic SCC	7 (7.7%)
Metastatic RCC	1 (1.1%)
HCC/Mets Ca	8 (8.8%)
Poorly differentiated malignant tumor	3 (3.3%)
Adenoca/cholangiocarcinoma	2 (2.2%)
Metastatic carcinoma/GIST	1 (1.1%)
Total	91
BILIARY TRACT	
Adenocarcinoma	26 (83.8%)
Poorly differentiated carcinoma	5 (16.1%)
Total	31
PANCREAS	
Adenocarcinoma	12 (92.3%)
Poorly differentiated carcinoma	1 (7.7%)
Total	13

Out of 9 cases with inflammatory lesions on cytology, out of which 5 cases (4.3%) showed acute on chronic inflammation, 2 cases (1.7%) showed acute suppurative lesion and 2 cases (1.7%) showed granulomatous inflammation. There were 4 (3.5%) cases in benign category including hyperplastic nodule (2 cases, 1.7%), regenerative nodule (1 case, 0.9%) and cirrhosis (1 case, 0.9%). 7 cases (6.08%) showed mainly haemorrhagic smears and were categorized as inadequate, and FNA smears from 2 cases, (1.7%) were negative for malignant cells. 2 cases (1.7%) showed few atypical cells and were categorized as suspicious for malignancy. Categorization into benign,

malignant or inflammatory lesions could be done on 104 cases, and diagnostic yield of FNA cytology for diagnosis of liver masses was 90.4%. Biopsy was available in 8 Cases (7%). Out of 5 cases reported as malignant lesions on histopathology, FNA diagnosis of malignancy was given in 4 cases (80%), three cases showed metastatic adenocarcinoma (1 case), hepatoblastoma (1 case) and HCC (1 case) respectively in both FNA and histopathology. 1 case categorized as metastatic PDCA was diagnosed as metastatic adenocarcinoma on histopathological examination. 1 case was categorized as inflammatory lesion on both FNA and biopsy. In 2 cases, where FNA smears were haemorrhagic, one biopsy showed metastatic adenocarcinoma and other case showed hemangioma on histopathology. In another case FNA smears showed haemorrhage with hepatocytes and few macrophages, histopathological examination revealed hepatic hemangioendothelioma. FNAC from pancreatic mass lesions was done in 19 cases (11.0%). 13 out of 19 pancreatic FNA specimens were categorized as malignant (68.4%). Adenocarcinoma was detected in 12 cases (63.2%), a diagnosis of poorly differentiated carcinoma was made in 1 case (5.3%), inflammatory lesions in 3 cases (15.8%) and 1 case was inadequate (5.3%), 2 cases (10.5%) were suspicious for epithelial malignancy. Thus, proper categorization was done in pancreatic mass lesions in 16 cases on FNA cytology with a diagnostic yield of 84.2%. Biopsy histopathology was available in 9 cases. All 8 cases diagnosed as malignant on FNAC were diagnosed as malignant on histopathological examination (100%). 1 case categorized as inflammatory lesion showed gall bladder necrosis on histopathology. Regarding subtyping of malignant lesions, out of 7 cases reported as adenocarcinoma on FNA smears, 6 were diagnosed as adenocarcinoma and 1 as poorly differentiated carcinoma. 1 case diagnosed as poorly differentiated carcinoma was diagnosed as poorly differentiated carcinoma with neuroendocrine features. In Gall bladder masses (37 cases, 21.4%), there were 29 (78.4%) malignant lesions diagnosed on FNA cytology. The most common diagnosis was adenocarcinoma (24 cases, 64.7%), followed by poorly differentiated carcinoma (5 cases,13.5%), inflammatory lesions (2 cases, 2.7%). 2 cases showed mainly hemorrhage and were categorized as inadequate (5.4%). 1 case showed adequate cellularity, however no malignant cells were seen, therefore smears were reported as negative for malignant cells (2.7%). Out of 3 cases, that were suspicious for malignancy (8.1%), in 2 cases FNA smears showed low cellularity with presence of atypical cells (5.4%) and in 1 case (2.7%) there were inflammatory cells seen in FNA smears with presence of few atypical cells. Histopathology was available only in 5 cases. 1 case was diagnosed as adenocarcinoma with spindle cell component (FNA categorized as adenocarcinoma). 1 case showed acute on chronic inflammation (inflammatory lesion on cytology). 1 case of inadequate FNA cytology showed dysplasia on histopathology. Among 2 cases categorized as suspicious for malignancy, 1 case showed adenocarcinoma (cytology showed few atypical cells) and another showed fat necrosis on biopsy examination (cytology showed inflammatory cells with few atypical cells. FNAC from common bile duct (CBD) lesions (2 cases, 1.2%), were diagnosed as adenocarcinoma (100%). Diagnostic yield of FNA for lesions of biliary tract including gall bladder and CBD was calculated as 84.6%.Overall diagnostic yield for FNA cytology in categorization of hepatobiliary and pancreatic lesions was 88.4%.

Discussion

Mass lesions in liver, gall bladder and pancreas can have varied etiology including inflammatory conditions, benign conditions or malignant neoplasms. Malignant neoplasms in liver include primary hepatocellular malignancy and metastatic tumors, whereas in gall bladder and pancreas, they are usually primary adenocarcinomas. [7-10] Appropriate clinical manangement requires a timely and accurate diagnosis. FNAC can help diagnose the nature of the mass lesion hence guide the clinician in taking decision about the management. Due to minimally invasive nature of the procedure and low rate of complications, after basic set of laboratory tests and radiological assessment that helps to determine the site and extent of mass lesion, FNAC is usually the first line of investigation. [8,11,12] Since the advent of image guided FNAC, the diagnostic yield and accuracy have improved further. We studied the cytology of mass lesions occurring in liver, gall bladder and pancreas over a period of 3 years in a tertiary health care centre in southern Rajasthan.The overall sensitivity and specificity of FNAC in liver lesions has been reported in previous studies between 84%-96% and 96-100% respectively. [11-14] Most frequently encountered malignant lesions in the liver are metastases followed by hepatocellular carcinoma. Lymphomas may uncommonly present as hepatic mass lesion. [7,11] In children, hepatoblastoma is an important diagnostic consideration.[7]Among liver lesions, there were 13 cases (11.3%) of Hepatocellular carcinoma (HCC). Previous studies have reported the frequency of hepatocellular carcinoma ranging from 8.6-30.4%. [7,9,11] Hepatocellular carcinoma is the most common primary malignant tumor of liver in adults. Underlying viral hepatitis or liver cirrhosis may be present in some cases. Serum alpha feto protein levels are typically high and may be useful indicator for diagnosis HCC in presence of typical cytological findings. [8] The FNA smears from cases (Fig 1A-1B) diagnosed as HCC displayed cells arranged in cohesive clusters and trabecular pattern with traversing endothelial capillary channels. The cells showed prominent nucleoli, binucleation and high nucleocytoplasmic ratio with nuclear pleomorphism. Background showed haemorrhage with scattered malignant nuclei. In some cases cytoplasmic bile pigment was also noted. These findings are similar to previous studies.[3,8,9,11] Poorly differentiated Hepatocellular carcinomas may show marked nuclear pleomorphism and sometimes bizarre nuclei. Such cases may be difficult to differentiate from metastatic carcinoma, as the cells may not show much differentiation towards hepatocytes. [1,3] In some cases (7.0%) that showed poorly differentiated carcinoma, a differential diagnosis of hepatocellular carcinoma was kept along with metastatic carcinoma. Well differentiated HCC, on the other hand may be difficult to differentiate from benign lesions such as regenerative nodule, focal nodular hyperplasia or adenoma.[2,3] Sometimes reactive hepatocytes may show considerable nuclear enlargement and binucleation, but the absence of mitotic activity, regular nuclear contour and preserved nucleocytoplasmic ratio can help in cytologic diagnosis. [8] Clinical history of underlying liver disease, steroid hormone intake and radiological appearance play an important role in diagnosing such lesions. [2] Cytological features that favor a diagnosis of HCC include endothelial wrapping around hepatocyte groups and trabeculae or endothelial lined capillaries intersecting through clusters of neoplastic hepatocytes, acinar pattern of cell arrangement, prominent macronucleoli, increased nucleocytoplasmic ratio and scattered bare nuclei. [2,11]

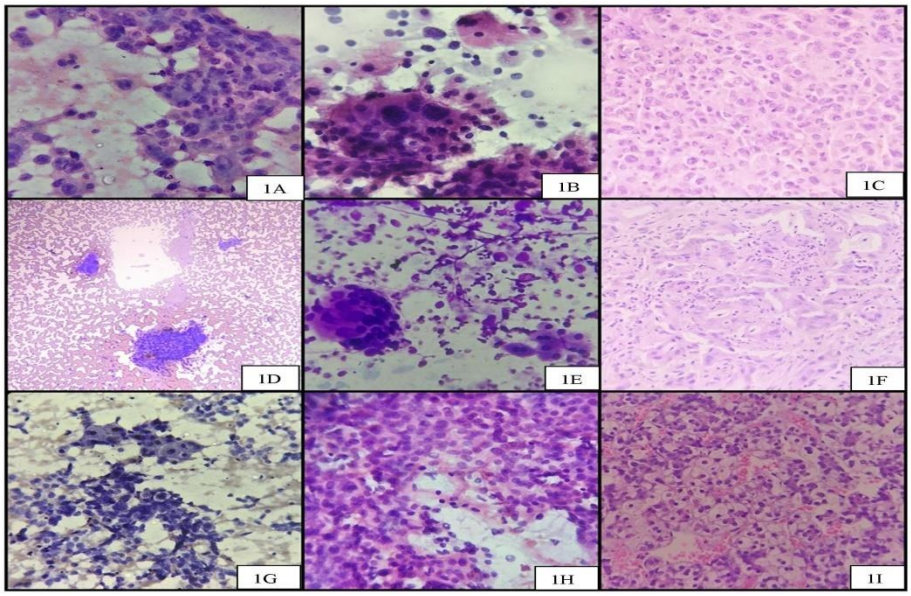

Fig 1; 1A: HCC: cellular smear of liver FNAC showing large fragments and dispersed cells with macronucleoli and abundant eosinophilic granular cytoplasm (x100, PAP stain)
1B: Hepatocellular carcinoma: FNAC , high power showing cells with high N:C ratio, central round pleomorphic nuclei (x400, PAP Stain)
1C: HCC: Liver biopsy showing tumor cells arranged in trabeculae, cord and pseudoglandular pattern with marked nuclear pleomorphism and mitotic figures (x400, H&E stain)
1D: Metastatic adenocarcinoma liver: FNAC showing cohesive clusters and singly scattered malignant cells. (x100, MGG stain)
1E: Metastatic adenocarcinoma liver: FNAC with cohesive clusters of cells having high N:C ratio, moderate pleomorphism and moderate amount of cytoplasm, few scattered hepatocytes also seen. (x400, MGG stain)
1F: Metastatic adenocarcinoma : Liver biopsy, showing infiltration of tumor with irregular glands lined by cells showing moderately pleomorphic nuclei (x400, H&E stain)
1G: metastatic SCC liver: FNAC showing sheets and clusters of cells with nuclear pleomorphism, hyperchromasia and moderate amount of cytoplasm (x400, PAP stain)
1H: Hepatoblastoma: FNAC with cellular smear, with cells in trabecular pattern and sheets of cells with round to oval nuclei. Focal transgressing capillaries seen (x400, PAP stain)
1I: Hepatoblastoma : Liver Biopsy showing small nests of cells resembling hepatocytes, having clear to eosinophilic cytoplasm, round nucleus with indistinct nucleoli (x400, H&E stain).

During our study, an 11 year old child presented with abdominal mass and raised serum AFP. FNA smears (Fig 1H) were cellular and showed uniform appearing cells, with round to oval nuclei, fine chromatin and moderate cytoplasm, somewhat resembling hepatocytes but with smaller cell size. Trucut biopsy showed characteristic morphology (Fig 1I) of hepatoblastoma. Hepatoblastomas are rare malignant liver tumors that present in infancy and paediatric age group. [7] It is frequently associated with elevated AFP levels and has a potential to metastasize. [2] Epithelial cells may show fetal, embryonal , macrotrabecular pattern with resemblance to hepatocytes or anaplastic subtype which shows more nuclear pleomoprhism. Admixed primitive mesenchymal component and extramedullary hematopoeisis may be present, but are seldom seen in FNA smears. [2,8] Differential diagnoses includes hepatocellular carcinoma or small round cell tumors occurring in childhood such as rhabdomyosarcoma, neuroblastoma, nephroblastoma and lymphoma. [2,8]

Metastastic carcinoma was the most frequently rendered diagnosis (64 cases, 55.6%) among hepatic lesions. Most frequent primary site for liver metastases were gastrointestinal tract, followed by gall bladder, pancreas, lung, breast, oral cavity, cervix, kidney and penis. FNA cytology from metastatic adenocarcinoma (Fig 1D-1E) shows cohesive clusters and acinar pattern of cells showing nuclear pleomorphism, increased nucleocytoplasmic ratio and in some cases mucin containg vacuoles in the cytoplasm. Metastatic breast carcinoma shows clusters and isolated cells with hyperchomatic, pleomorphic nuclei. Metastatic squamous cell carcinoma (SCC) showed angulated, hyperchromatic nuclei and dense cytoplasm (Fig 1G). Metastatic renal cell carcinoma showed cells with granular to vacuolated cytoplasm and round to oval nuclei present scattered and in clusters.

Metastatic carcinoma is diagnosed in majority of malignant mass lesions in liver. [1,7,9,11]. Liver is frequently involved in carcinomas arising in gastrointestinal tract due to drainage through portal circulation. [8] Gall bladder malignancy may involve liver by local infiltration or hematogenous spread. Other primary sites include carcinoma arising in lung, breast and prostate. Uncommonly liver may be a site of secondaries from squamous cell carcinoma, round cell tumors, germ cell tumors, small cell carcinoma lung or renal cell carcinoma. [7,8]

On FNAC, scattered hepatocyes in between clusters of neoplastic cells may be useful in assessing the morphological features. Cytomorphological features such as cellular arrangement, nuclear and cytoplasmic features may give a hint to the primary site of origin. [8,9] Absence of biliary pigment in neoplastic cells is an additional feature, though not entirely specific. Poorly differentiated metastatic tumors may be difficult to differentiate from high grade hepatocellular carcinomas.

Cholangiocarcinomas may be difficult to differentiate from metastatic adenocarcinoma as the cytological features overlap between the two entities. Immunocytochemistry may or may not be helpful. Therefore, clinical and radiological findings may form the

basis of diagnosis and treatment in equivocal cases.[3] In our study there were 2 such cases where both these conditions were kept in the differential diagnosis. Clinical history and previous investigations are important in diagnosing the primary site of origin, as are the ultrasonography or CT/MRI findings. Carcinoembryonic antigen (CEA) and CA19-9 levels in serum may be additional helpful indicators.[15]Benign mass lesions in the liver including focal nodular hyperplasia and hepatocellular adenoma may be difficult to differentiate from well differentiated hepatocellular adenoma. Clusters of hepatocytes accompanied by stromal fragments and bile duct epithelial cells are typically seen in focal nodular hyperplasia, whereas liver cell adenoma shows monomorphic appearing population of hepatocytes. AFP levels do not show elevation in most cases unlike HCC. [3] FNA smears from cirrhotic liver nodule may show clusters of normal hepatocytes with endothelial cells. [9] Dysplastic hepatocytes in cirrhotic liver can be difficult to differentiate from HCC arising in the setting of cirrhosis, and histopathology may be required to establish a diagnosis on the basis of architectural pattern details. [3]

Cytological smears from hemangioma (1 case) yielded haemorrhagic smears and histopathology showed typical hemangioma (Fig 2B). In one case, FNA smears showed few clusters of benign hepatocytes and scattered macrophages in a haemorrhagic background. Histopathologic examination of trucut biopsy (Fig 2C) showed proliferation of endothelial lined blood vessels, cords and nests of epithelioid cells, some containing intracytoplasmic lumina with occasional RBCs. Intervening collagenised stroma was present. A diagnosis of Hepatic epithelioid hemangioendothelioma was given. In vascular tumors, cytological findings may be inconclusive [8], as in our study. Though in some cases, typical findings such as characteristic cellular pattern of endothelial cells and presence of stromal fragments, may provide a clue to the diagnosis. [2,16] FNAC in these cases, if done using fine needle under radiological guidance and optimal route during procedure, is devoid of complications. Rarely, haemorrhage within the tumor may occur. [16]

There were 9 cases with inflammatory pathology including granulomatous inflammation (2 cases), acute suppurative lesion (2 cases) and acute on chronic inflammation (5 cases). Inflammatory conditions including abscess showed inflammatory background and necrotic debris with scattered hepatocytes (Fig 2A). We did not find any microorganisms on FNA smears. Tuberculosis needs to be ruled out with further investigations if epithelioid granulomata are present on FNA smears (Fig 2D). Abscess in liver can occur due to bacterial infections such as Klebsiella etc. Aspirated from amebic liver abscess are thick reddish brown, showing necrosis with inflammatory cells. Trophozoites of Entamoeba histolytica may be demonstrable if viable area has been sampled in FNAC. [2]

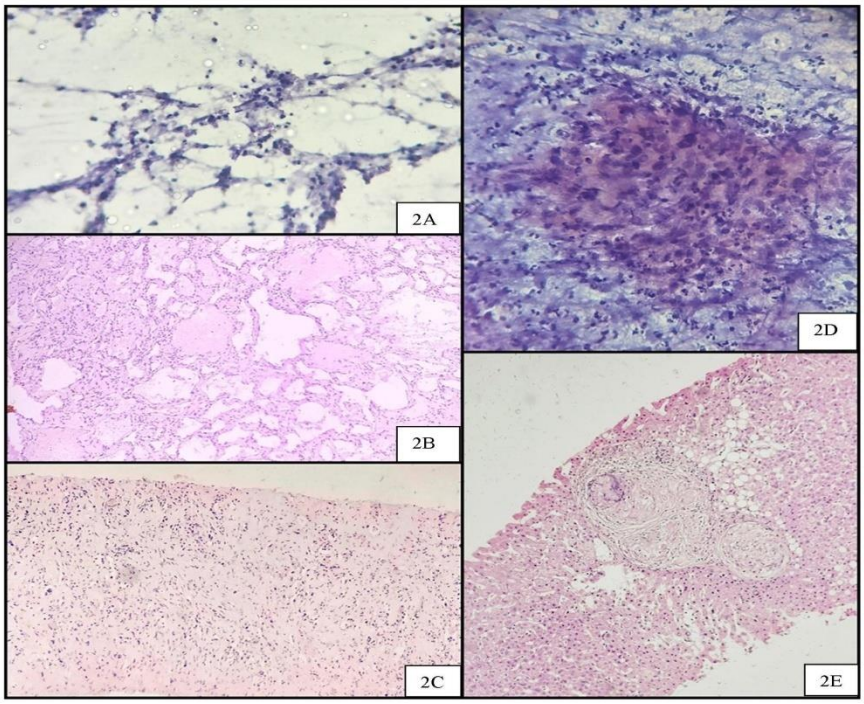

Fig 2; 2A: FNAC liver : acute on chronic inflammation (x400, PAP stain)
2B: Hemangioma: Liver biopsy with proliferation of dilated thin walled blood vessels, lined by flat endothelial cells. (x100, H&E stain)
2C: Hepatic Epitheloid Hemangioendothelioma: Liver biopsy of showing sinusoidal obliteration with atrophic hepatocyte plates and increased sclerioc stroma. Stroma shows few epitheloid to spindle shaped cells with focal intracytoplasmic vacuoles containing occasional RBCs. Few tumor cells show sinusoidal growth pattern with intervening collagenous fibrosis (x100, H&E stain)
2D: Granulomatous inflammation liver: FNAC with well formed granuloma comprising of epitheloid histiocytes and lymphocytes, occasional multinucleated giant cells and necrosis (x400, PAP stain)
2E: Granulomatous hepatitis : liver biopsy showing well defined granuloma consisting of epitheloid histiocytes with multinucleated giant cells, surrounding inflammation and part of normal liver parenchyma (x100, H&E stain)

Gall bladder masses are often diagnosed late due to nonspecific clinical presentation. Differential diagnosis includes benign conditions such as adenomyomatosis and inflammatory conditions such as xanthogranulomatous cholecystitis, apart from carcinoma gall bladder which accounts for majority of gall bladder masses. [10] Gall bladder carcinoma is an aggressive malignancy and a delayed

diagnosis and management worsens the outcome further. [10] FNAC is a fairly safe and accurate technique with high sensitivity to detect malignant lesions. [17]FNA smears from adenocarcinoma gall bladder showed a haemorrhagic backgroung with cohesive clusters and acinar pattern, sheets and singly scattered cells with pleomorphic hyperchromatic to vesicular nuclei, prominent nucleoli and high nucleocytoplasmic ratio (Fig 3D,3E) . Cytoplasm was dense to focally vacuolated. Poorly differentiated carcinomas showed marked variation in nuclear size and shape with hyperchromasia and tumor giant cells.2 of the cases were paucicellular with presence of few atypical cells and 2 cases showed mainly haemorrhage.

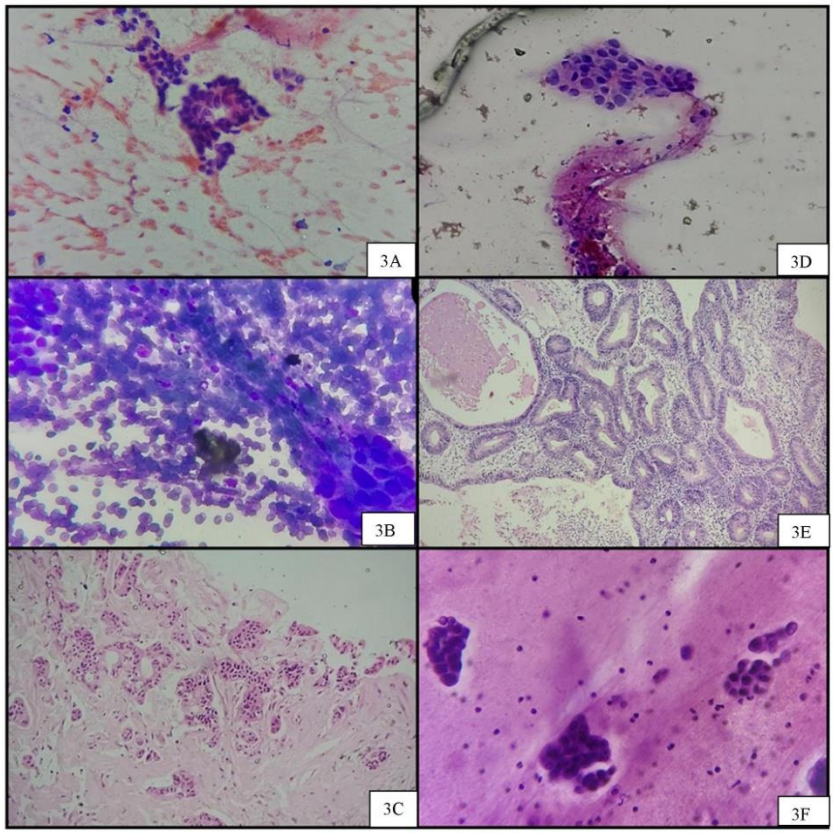

Fig. 3; 3A: Pancreatic adenocarcinoma: FNAC showing clusters of atypical cells.(x100, PAP stain)
3B: Pancreatic adenocarcinoma : FNAC, high power view showing cells with nuclear pleomorphism, granular nuclear chromatin and moderate cytoplasm (x400, MGG stain)
3C: Pancreatic Adenocarcinoma : histopathology of trucut biopsy with irregular glands lined by malignant cells (x100, H&E stain)
3D: Gall bladder adenocarcinoma : FNAC showing cohesive clusters of malignant cells with high N:C ratio, pleomorphic nuclei, prominent nucleoli with amphophilic cytoplasm (x400, PAP stain)
3E: Gall bladder Adenocarcinoma: Biopsy showing irregular and crowded glands lined by cells with hyperchromatic nuclei and mitotic activity. (x100, H&E stain)
3F: CBD adenocarcinoma: FNAC showing malignant epithelial cells arranged in clusters and sheets, having high N:C ratio, moderate amount of cytoplasm and pleomorphic nuclei. (x400, PAP stain)

Pancreatic masses often present with non specific symptoms such as jaundice, nausea, vomiting, abdominal and back pain. A high index of suspicion accompanied with radiological and lab investigations can help to find out the underlying cause. The nature of pancreatic lesions can be neoplastic or inflammatory and correct diagnosis is imperative as it guides the therapeautic management.

Majority of the lesions diagnosed on FNAC were adenocarcinoma, followed by poorly differentiated malignant neoplasm. FNA smears of adenocarcinoma pancreas (Fig 3A,3B) showed clusters of cells with pleomorphic, hyperchromatic to vesicular nuclei, some with prominent nucleoli. As they show nonspecific clinical symptoms, considerable proportion of pancreatic carcinomas have already metastatised or infiltrated the adjacent organs by the time they are diagnosed, and palliative management may be the only option. Methodical evaluation by radiology and cytological investigation may help in early diagnosis and optimal management . [15] In smears with inflammatory component, chronic pancreatitis and autoimmune pancreatitis may be diagnostic considerations. Cystic mucinous neoplasms and Inflammatory lesions of pancreas can be differentiated with the help of tumor markers such as CA19.9, CEA and other tests such as amylase. [15]

FNA cytology showed adequate aspirates and good diagnostic yield (88.4%) in most cases in our study. FNA has been found to be conclusive for diagnosis of majority of hepatobiliary and pancreatic lesions (72% - 90.4%) in previous studies. [1,7,9,15,17]

FNAC has several advantages including high sensitivity, specificity, low rate of complications and less turnaround time. The passage of needle during guided procedure allows sample to be taken at multiple

planes from mass lesion. [4,8] Washings from needle aspirates, imprint smears and cell block preparations may be used as ancillary techniques in addition to conventional cytology to improve diagnostic yield. [8,18] Systematic approach to FNA smear examination is of vital importance. FNA smears should be viewed first in low power for cellularity, background, cellular pattern and type, followed by examination under high power for cytoplasmic and nuclear details. [18] Low cellularity of epithelial cells may pose a challenge in cytological diagnosis of hepatobiliary and pancreatic mass lesions. Presence of inflammatory cells and necrotic debris may obscure the true nature of mass. Clinical history and radiological investigations are of vital importance in determining the nature of lesion, whether primary or secondary, and the site of origin in case of metastatic tumors. Tumor marker levels may prove to be a useful adjunct in ascertaining the site of origin.

Conclusion

Majority of hepaticobiliary and pancreatic lesions can be diagnosed accurately on FNA cytology examination. FNA is a safe technique with good diagnostic yield when used under radiologic guidance and it can help to achieve diagnosis at an early stage to facilitate optimal therapeutic management. Radiologic features and tumor markers provide useful contribution in reaching a conclusive diagnosis.

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