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RELEVANCE OF ULTRASOUND-GUIDED FINE NEEDLE ASPIRATION IN SOLID AND CYSTIC PANCREATIC LESIONS

Pathology

Dr. Ram Nawal Rao * Additional Professor, Pathology Department, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, UP, India *Corresponding Author

Dr. Paramita Paul Senior Resident, Pathology Department,Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, UP, India

Dr. Pallavi Prasad Senior Resident, Pathology Department, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, UP, India

Dr. Varnika Rai Senior Resident, Pathology Department, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, UP, India

ABSTRACT

Background: Ultrasound guided - FNA in adequate samples is an efficient, applicable and accurate modality in the diagnosis of pancreatic solid and cystic lesions in developing countries where Endoscopic FNA is lacking or not standardized.

Aims and Objectives : A 7-year retrospective study of FNA samples of 240 pancreatic lesions was performed to evaluate the diagnostic utility and safety of ultrasound-guided fine needle aspiration (US-FNA) cytology in solid and cystic pancreatic lesions.

Materials and Methods: The entire cases were diagnosed with US-FNA using 22 gauge spinal needles via a percutaneous transabdominal approach alongwith highly diagnostic accuracy leading to early management and better survival of the patients.The aspirated material was quickly smeared into glass slides, air dried, wet fixed in 95% ethyl alcohol for subsequent Papanicolaou staining.

Results The study included 240 cases (142 men and 98 women).Five cases yielded insufficient material for diagnosis. The aspirates were classified as benign (n=70) and malignant lesions (n=165). Of the 70 benign aspirates, the cytological diagnosis was acute/chronic inflammation in 16 patients including granulomatous inflammation in 12 patients and microfilariasis in one. Miscellaneous lesions included serous cystadenoma in 5, mucinous cystic neoplasms in 4, pancreatic pseudocysts in 6 and benign aspirates (not otherwise specified) which composed of some anisomorphic benign ductal and acinar cells in 20 patients. Of the 165 malignant aspirates, the cytological diagnosis was adenocarcinoma in 116 cases, malignant lymphoma in 11, neuroendocrine/carcinoid tumor in 7, solid pseudopapillary tumors (SPTs) in 6, mucinous adenocarcinoma in 5, adenosquamous carcinoma in 5, mesenchymal neoplasia in 2, and acinar cell carcinoma, squamous cell carcinoma, and undifferentiated carcinoma in one patient each, and metastatic adenocarcinoma in 10 patient. Cytohistologic correlation was available in 65 (28 benign and 37malignant lesions) and in the benign category, six false negative diagnoses were rendered on FNA. 4 lesions were diagnosed as adenocarcinoma and 2 as neuroendocrine carcinoma on histology. Conclusions: US-FNA is still relevant in both solid and cystic pancreatic lesions. Further, to obtain high diagnostic accuracy, a multimodal approach with good clinical, radiologic and cytologic correlation is recommended.

KEYWORDS

Fine-needle aspiration, cytology, pathology, ultrasonography, pancreatic neoplasms.

INTRODUCTION

Ultrasound–guided fine-needle aspiration by the percutaneous transabdominal approach is a minimally invasive technique and an excellent modality for obtaining early tissue diagnosis from pancreatic cystic and solid masses. The interpretation of cytologic material obtained from the pancreas is difficult because of the different types of reactive processes, and benign and malignant neoplasms arising within the pancreas. The cytological morphology of a majority of pancreatic neoplasms is characteristic, allowing precise recognition of the type of neoplasia present. Whereas division of neuroendocrine, acinar, and ductal neoplasms is usually clear cut,the greatest diagnostic challenge in pancreatic US-FNA is the separation of atypical epithelium secondary to chronic pancreatitis from well-differentiated ductal adenocarcinoma.[**1**] In recent times, a number of pancretic in-situ lesions have been identified, emphasizing the importance of cytological diagnosis of pancreatic neoplasia.These noninvasive lesions include pancreatic intraepithelial neoplasia and intraductal papillary mucinous neoplasms.

The accuracy of the results of FNA has greatly improved using various imaging techniques to localize the suspicious lesion. Currently, the use of endoscopic ultrasound(EUS) is the preferred modality for localizing a pancreatic lesion for aspiration cytology. However, The technique of US-FNA is simpler and cost effective, associated with low complications and high diagnostic accuracy.[**2**] A positive cytologic diagnosis allows administration of neoadjuvant therapy in patients with a resectable mass and also helps to avoid unnecessary surgery in patients with locally advanced or metastatic carcinomas. We performed a 7-year retrospective study of FNA samples of 240 pancreatic lesions.to evaluate the diagnostic utility and safety of ultrasound-guided fine needle aspiration cytology in solid and cystic pancreatic lesions.

MATERALS AND METHODS

The records of 240 patients who underwent ultrasound-guided fine needle aspiration (US- FNA) of the pancreas over a 7-year period (2003-2009) were retrieved for analysis of various pancreatic lesions from the records of the Pathology department of Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, UP, India.

Procedure

All the patients had undergone US-FNA, which was performed by a team comprising the clinician, radiologist and the cytopathologist. After cleaning the site of aspiration, a 23-gauge needle, 9 cm in length, was inserted into the lesion by the radiologist under ultrasound guidance. A 10/20 ml. syringe fitted to a syringe holder was used by the cytopathologist to make a minimum of 2-3 FNA passes and the slides were immediately checked for adequacy of representative material under a light microscope. The entire procedure generally took 6-10 minutes. A written consent was obtained from each patient after explanation of the risks and benefits involved before performing the procedure. All patients were clinically observed tomonitor for post-procedural complications related to the FNA. Both air-dried and ethanol alcohol-fixed smears were made (5 to 8 smears per patient) from the aspirated material in each case. May-Grünwald-Giemsa (MGG), hematoxylin-eosin (H-E), Papanicolaou stain and cellblocks (if any) were evaluated.

The specimen was considered as satisfactory if any malignant cells were identified. If the smears contained only blood and/or normal gastrointestinal mucosal elements, the specimen was considered to be unsatisfactory. For satisfactory and negative specimens, multiple groups of epithelial cells (5–10 groups), 10 cells or more in each, were required to be available on at least one slide. The cytologic diagnoses offered were reviewed and classified into 3 groups – benign lesions, malignant lesions and inadequate for diagnosis. The cytologic

diagnosis was also correlated with histopathologic findings whenever available.

RESULTS

Of the 240 patients who underwent the procedure, 142 were men and 98 were women (M:F ratio, 1.7:1). Their ages ranged from 13 to 79 years (mean, 45 years). The lesions could be classified into 3 groups, with 70 cases (27.6%) falling in the benign group and 165 cases(70.4%) in malignant group and 5 cases (2%) in the inadequate material group. All the pancreatic lesions encountered in the benign and malignant groups are shown in **Tables 1a and 1b.** In the benign group (70 cases), in 12 cases, in which radiological findings revealed a mass lesion involving the body, head of the pancreas and peripancreatic lymphnodes with heterogeneous echotexture and focal necrosis, the smears showed epithelioid cell granulomas and inflammatory cells comprising of lymphocytes and neutrophilic polymorphs along with few clusters of pancreatic ducts and acini. Two of these twelve cases yielded pus and smears displayed mainly acute inflammatory cells in a background of necrotic debris. Ziehl Neelsen staining for acid-fast bacilli was positive in 7 cases. All these patients showed good response to antituberculous therapy.

Pancreatitis was documented in 16 cases in which the smears showed a mixed population of inflammatory cells along with pancreatic ductal epithelial/acinar cells. One case showed microfilaria associated with the pancreatic acini **(Figure 1Aa).** In 6 patients, aspiration yielded pale to clear fluid and the smears prepared from the sediment showed abundant foamy macrophages and occasional epithelial cells, consistent with a diagnosis of pancreatic pseudocyst. Serous cystadenoma was diagnosed in 5 cases and mucinous cystic neoplasms in 4 cases **(Figure 1b)**. 20 benign aspirates- were not otherwise specified (NOS), showing some mildly anisomorphic benign ductal and acinar cells. Among 165 malignant lesions (70.3%), the cytological diagnosis was adenocarcinoma in 116 cases with 62 being classified as well-differentiated **(Figure 1c)**,48 as moderately differentiated and 6 as poorly differentiated, based on nuclear/cellular pleomorphism and level of ductular differentiation.

In the 5 cases diagnosed as mucinous cystadenocarcinoma, radiologic examination revealed a bulky cystic mass with complex septae. The aspirated fluid was thick and mucoid in nature, and the smears showed abundant extracellular mucinous material with malignant cells lying singly or in small clusters and having pleomorphic hyperchromatic nuclei, irregular nuclear membrane, prominent nucleoli and moderate amount of cytoplasm **(Figure 1d)**.

One patient of undifferentiated carcinoma was also encountered **(Figure 2a)**. In 7 cases, the cytologic features revealed high cellularity with monomorphic cells forming rosette-like structures, scattered bare nuclei and speckled nuclear chromatin, and were diagnosed as neuroendocrine tumors **(Figure 2b)**. These cases were confirmed with histopathology and immunohistochemistry by positivity of synaptophysin, chromogranin and non-specific enolase staining. Six cases with diagnosis of solid pseudopapillary tumours showed a solid and cystic lesion with a mural nodule on ultrasound. The cytologic examination in these cases revealed presence of papillary fronds lined by multilayered cuboidal cells having round to oval nuclei, fine chromatin and nuclear grooves along with abundant eosinophilic hyaline globules **(Figure 2c)**.

Immunohistochemistry in these cases showed positivity for Chromogranin, NSE, CK, CD10. Beta-catenin and Progesterone receptors. Ten cases of metastatic adenocarcinoma were diagnosed with primary lesions found in lungs, gallbladder and stomach **(Figure 2d)**.

Eleven cases of were diagnosed as malignant lymphoma with smears showing dispersed population of atypical lymphoid cells of variable size, round to convoluted nuclei and mild to moderate amount of cytoplasm on a background of lymphoglandular bodies **(Figure 3a)**.One case was diagnosed as acinar cell carcinoma. The smears showed high cellularity and maintained acinar arrangement of cells with nucleomegaly, mildly pleomorphic hyperchromatic nuclei, nuclear overlapping, prominent nucleoli, conspicuous nuclear folding and membrane irregularity **(Figure 3b)**. There were five cases of adenosquamous carcinoma and one of squamous cell carcinoma . Two cases of mesenchymal neoplasms were diagnosed and with smears showing clusters of atypical spindle shaped cells having oval to elongated hyperchromatic nuclei on a background of pink myxoid material, later confirmed by histopathology and immunohistochemistry. Cytohistologic correlation was obtained in 65 (28 benign and 37 malignant lesions **(Tables 1a and 1b)**. There were six false negative diagnoses on fine needle aspiration; 4 lesions were diagnosed as adenocarcinoma and 2 as neuroendocrine carcinoma on histology.12 cases showed focal necrosis, epithelioid cell granulomas **(Figure 3c)** and inflammatory cells, Ziehl Neelsen staining for acid-fast bacilli was positive in 7 cases **(Figure 3d).** There were no false positives.

Complications following procedure

No serious or fatal complication were encountered following the procedure. There were no reported instances of major bleeding, peritonitis, perforation or severe pain following the procedure. The only complaint by some of the patients was mild pain at the aspiration site. There was no evidence of exacerbation of pancreatitis. In the patients of pancreatic neoplasia who later underwent Whipple's procedure, histopathologic examination of the specimen did not show any evidence of needle-tract tumor seeding.

DISCUSSION

Pancreatic adenocarcinoma is a neoplasm in need of more effective diagnostic and therapeutic strategies. Ultrasound guided fine needle aspiration plays an important role in the diagnosis and management of patients with pancreatic adenocarcinoma and other solid and cystic lesions of the pancreas. The diagnostic accuracy of FNA of pancreatic lesions has been evaluated in earlier reports.[3-6] The role of US-FNA of pancreatic lesions seems to be declining in some centers due to increasing use of endoscopic ultrasound (EUS) guided FNA, particlularly for detection of smaller lesions. However, US-FNA still remains relevant in many parts of the world.

In this study we reviewed the results of use of US-FNA of pancreatic lesions over a 7-year period, revealing a wide spectrum of diagnosed lesions highlighting the utility of obtaining a tissue diagnosis by US-FNA. Adenocarcinoma of pancreas remains the most common mass lesion of the pancreas encountered on cytology. The diagnosis of adenocarcinoma accounted for 70.3% of all cases (116 of 165) in the malignant category, which is comparable to the frequency described in the literature.[7] The malignant lesions diagnosed accurately on FNA based on cytomorphology included adenocarcinoma, malignant lymphoma, neuroendocrine tumor, solid pseudopapillary tumor, adenosquamous and squamous cell carcinoma, mucinous cystadenocarcinoma, mesenchymal neoplasms, acinar cell carcinoma, undifferentiated carcinoma and metastatic adenocarcinoma. We found five cases of adenosquamous carcinoma on cytology. Adenosquamous carcinoma of pancreas is an unusual ductal carcinoma made up of both squamous and glandular components.The reported incidence of this neoplasm ranges from 0.4 to 11.1% in the different series.[8-9]

Primary pancreatic lymphoma (PPL) is an extremely uncommon neoplastic lesion which involves pancreas with or without involvement of peripancreatic lymph nodes. PPL accounts for fewer than 2% of extra-nodal malignant lymphomas and 0.5% of cases of pancreatic masses.[10-11] The cytomorphological distinction of a well-differentiated adenocarcinoma from a neuroendocrine neoplasm requires careful attention by a cytopathologist. The diagnosis of pancreatic well-differentiated adenocarcinoma can be made in ultrasound guided fine needle aspiration cytology (US-FNAC) smears by finding of anisonucleosis, microacinar pattern, nuclear membrane irregularity, nuclear crowding/overlapping, nuclear enlargement and necrotic background.[12]

Chromogranin, NSE and synaptophysin immunostaining may be useful in this situation for discrimination. The cytomorphologic features such as nucleomegaly, nuclear overlapping, conspicuous nuclear folding and membrane irregularity, together with proper radiologic correlation, is needed to differentiate acinar cell neoplasm from a benign pancreatic aspirate having normal acinar clusters.[13] Histopathologic confirmation was available in our study in thirty seven cases in the malignant group. This is possibly due to the fact that most of the patients presenting to this centre were poor candidates for surgery as they usually present in advanced stages (stage III/IV) of disease or have disseminated malignancy requiring chemotherapy or palliative care.

US-FNA revealed a cytodiagnosis of acute/chronic pancreatitis in 16

cases. FNA is usually not performed in these cases when the clinical and biochemical profile is clearly suggestive of pancreatitis. Radiologically, pancreatitis, may sometimes present as a hypoechoic mass, mimicking a malignant lesion. Further, a circumscribed enlargement of the head of the pancreas may be seen both in pancreatitis and in pancreatic carcinoma.[14-16] US-FNA is helpful in solving this diagnostic problem and help in avoiding an unnecessary laparotomy. 12 cases in the inflammatory benign group revealed granulomatous inflammation consistent with pancreatic tuberculosis with 7 cases displaying acid fast bacilli on Ziehl Neelsen staining. This is a very uncommon finding, even in a country like India where tuberculosis is widespread.[17] Xia et al have reported tuberculous involvement of the pancreas and peripancreatic lymph nodes where granulomas were seen in the majority (75%) of the cases.[18-19]

US-FNA is also useful in pre-operative evaluation of cystic lesions of the pancreas including serous and mucinous cystic neoplasms and solid pseudopapillary tumor, etc. Delatour et al reported 4 cases of pancreatic cystic neoplasm and highlight the cytologic findings and diagnostic pitfalls that may help in the accurate diagnosis of pancreatic cystic neoplasms like mucinous cystic neoplasm (MCN), intraductal papillary mucinous neoplasm (IPMN), serous cystadenoma (SCA) and ductal adenocarcinoma (DAC).[20] In this series, cytology smears from SCA showed few cluster of cuboidal cells with bland nuclei on serous background. MCN showed clusters of benign columnar cells with basally located nuclei, fine chromatin and thin intracytoplasmic mucin. At times, the SCN can be mistaken for MCN, because of the presence of columnar cells and extracellular mucin due to presence of upper gastrointestinal tract contamination. In IPMN, the smears showed tumor cells displaying a papillary architecture with true fibrovascular cores, nuclear crowding, overlapping and abundant extracellular mucin.

Dodd et al found significant overlap between the features of MCN and those of IPMN.[21] Whang et al have shown that it is very difficult, and sometimes impossible, to differentiate IPMN from MCN or even ductal adenocarcinoma.[22]

FNA in solid pseudopapillary tumor is characterized by papillary, vascular and perivascular components along with presence of nuclear grooves and inclusions. Cystic lesions may sometimes yield blood mixed fluid on FNA, which may show diagnostic features on examination of cytocentrifuged deposit. [23] The failure rate in our series was ~2% with only 5 of 240 cases yielding inadequate material. This possibly reflects difficulties in sampling in these cases. No false positive diagnoses were observed in our study; however, the presence of malignancy in 6 of 35 cases of benign aspirate material revealed a false negative rate of ~2.5%. A comparison of the present study with previously described series of pancreatic FNAC is made in **Table 1c.** [7,17,24-30] The present series compares favorably with the other reports. Although false positive diagnoses are very uncommon, they have been reported by some workers.[7]

Complications subsequent to the FNA of pancreatic lesions are rare.[31-40] Tumor seeding metastasis at the puncture site has been reported in an earlier study using needle gauge larger than 21 gauge and may not qualify as 'fine-needle aspiration.[24,33,37-40] Bhatia et al have reported that no patients with neoplastic lesions developed tumor seeding metastasis at the puncture site when FNA was performed with a 22- or 23-gauge needle. In addition to the needle gauge, minimal time taken in performing the procedure is important to minimize complications.[17]

Transperitoneal spread of the tumor is a concern with the use of US-FNA in transabdominal approach. However, intraoperative peritoneal washings were negative for malignant cells in the cases of pancreatic adenocarcinoma that consequently underwent Whipple's procedure. Earlier studies had shown that even when peritoneal fluid positivity did occur, there was no survival disadvantage in these patients.[41-42] In our study, none of the patients developed any other serious complications following the procedure, except for mild pain. This highlights the fact that US-FNA of the pancreas is a safe procedure if carried out in a proper hospital-based setting with close monitoring of the patient.

The use of endoscopic fine needle aspiration (EUS-FNA) of the pancreas is increasingly becoming the diagnostic modality of choice for pancreatic lesions. However, EUS-FNA is a challenging technique to learn. It is very important to understand the limitations and advantages of this endoscopic approach. The sensitivity, specificity and accuracy of previous EUS-FNA has been found to be 74, 100 and 86% respectively.[43] The aspirates are bloody, resulting in a larger number of smears made and significantly increasing the screening time.[44] The material obtained from EUS-FNA may include epithelia from stomach, duodenum and normal pancreas, often leading to false diagnosis and over interpretation of adequacy.[30] EUS-FNA is expensive, more time-consuming (average time taken for being ~1–2 hours in comparison to ~10 minutes using the percutaneous approach) because of number of passes varies from 1 to 11 in order to obtain adequate aspirates, which is far higher than the average of 3 passes performed using the percutaneous approach.[44-46] On the other hand, the sensitivity, specificity and overall diagnostic accuracy of the endoscopic approach compared to those of the percutaneous approach are comparable.[17,43,47-49] A retrospective study of the accuracy of EUS-FNA, percutaneous FNA, and intraoperative FNA has shown that the techniques are equivalent, although lesions sampled by EUS-FNA were often smaller.[50] EUS provides detailed, high-resolution images of the pancreas. However, whether a lesion is malignant or benign cannot be diagnosed solely from its imaging features on EUS. The beginning of EUS-guided fine needle aspiration (EUS-FNA) offers the possibility to obtain a cytological or histological diagnosis of pancreatic lesions with a high sensitivity and specificity. Although the clinical utility of EUS-FNA for pancreatic diseases is widely accepted, the indication for preoperative tissue diagnosis of pancreatic lesions suspected to be malignant is still controversial.[51]

In summary, percutaneous transabdominal US-FNAC is a good modality for obtaining early tissue preoperative diagnosis of pancreatic lesions, aiding in distinction of clinical / radiological benign vs. malignant lesions and to help the surgeon in planning an operative strategy.[52] A spectrum of pancreatic lesions can be diagnosed by the technique, with reported sensitivity of 86% and specificity of 100% in our study. The false negative rate may be reduced by proper positioning of the needle under imaging guidance, adequate sampling and an experienced team in a hospital setting with a good turnover of patients.US-FNA is still relevant in both solid and cystic pancreatic lesions. Further, to obtain high diagnostic accuracy, a multimodal approach with good clinical, radiologic and cytologic correlation is recommended.

Table -1a US-FNAC of Pancreatic benign and inflammatory lesions (n= 70 Cases)

Cytological diagnosis	No. of cases (%)	Correlation with histopathology (N=28)
Acute/Chronic inflammation (Pancreatitis)	16 (23.0)	5
Granulomatous inflammation (Tuberculosis)	12 (17.2)	2
Microfilariasis	01 (1.4)	-
Pancreatic pseudocysts	6 (8.5)	6
Benign serous cystadenoma	5 (7.1	1
Mucinous cystic neoplasms	4 (5.7)	3
Benign other wise not specified	20 (28.6)	5
False negative cases of benign lesions*	6 (8.5)	6

***Six false negative cases of benign lesion on US-FNA; 4 lesions were diagnosed as adenocarcinoma and 2 as neuroendocrine carcinoma on histology.**

Table -1b US- FNAC of Pancreatic Malignant Lesions (N =165 Cases)

Cytological diagnosis	No. of cases (%)	Correlation with histopathology (N=37)
Adenocarcinoma	116 (3.7)	10
Mucinous adenocarcinoma	6 5 (3.0)	2
Malignant lymphoma	11 (6.5)	5
Neuroendocrine / carcinoid tumor	7 (4.3)	6
Papillary solid epithelial neoplasms	6 (3.7)	6
Adenosquamous carcinoma	5 (3.0)	2
Squamous cell carcinoma	1 (0.6)	-
Mesenchymal neoplasms	2 (1.2)	2
Acinar cell carcinoma	1 (0.6)	1
Undifferentiated Carcinoma	1 (0.6)	1
Metastatic adenocarcinoma	10 (6.0)	2

Table-1c Comparision of different studies of US/EUS*- FNAC of Pancreas

Studies	No. of Cases	FP (%)	FN (%)	Sensitivity (%)	Specificity (%)
Hancke et al [2]	103	2.6	28.6	71.4	97.4
Yamanaka and Kimura [25]	28	0	10.7	86.4	100
Hovedenak er al [26]	55	0	52.1	72.7	100
Schwerk et al [27]	70	0	10.4	90.5	100
Martinez et al [28]	45	0	15.6	79.4	100
Hall-Craggs et al[29]	203	0	28.2	66.7	100
Ekberg et al [24]	79	0	12.6	85.5	100
Bhatia et al [17]	267	0	1.7	81	100
Emad Raddaoui[43*]	43	0	0.14	74(DA*86%)	100
Present study 2017(R N Rao et al)	240	0	2.5	86	100

FP = False Positive, FN = False Negative, DA* = EUS Diagnostic Accuracy

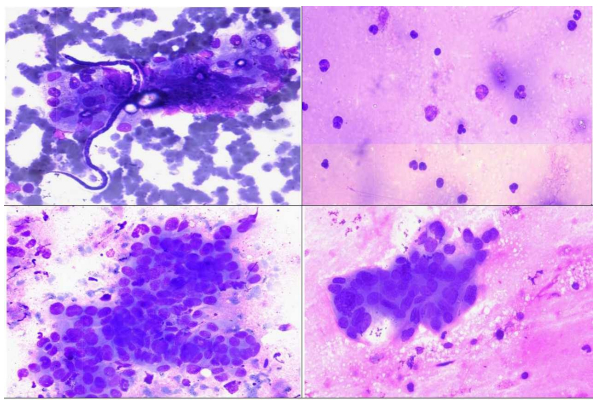

Fig1a. Pancreatic Microfilariasis : showing microfilaria along with clusters of benign ductal epithelial cells (MGG, 200 magnification), **1b.** Mucinous cyst adenoma: showing occasional scattered benign columnar epithelial cells on a mucinous background (MGG, 200 magnification), **1c.** Well-differentiated adenocarcinoma: showing clusters of atypical cells with mild nuclear pleomorphism, nuclear overlapping and gland formation (MGG, 200 magnification),**1d.** Mucinous cystadenocarcinoma: showing clusters of malignant cells on a background of abundant extracellular pool of mucinous material (MGG, 400 magnification)

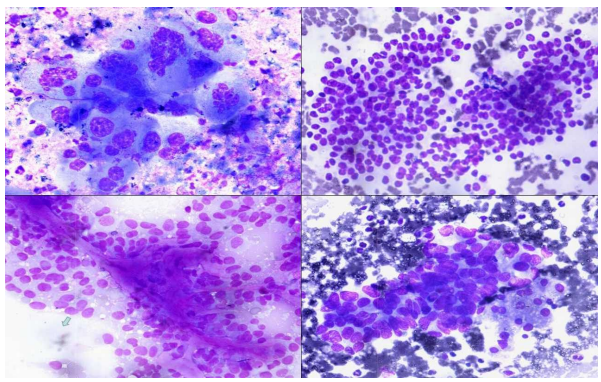

Fig 2a. Undifferentiated carcinoma: showing singly lying atypical cells with marked nuclear pleomorphism, prominent nucleoli and moderate to abundant cytoplasm with occasional multinucleate tumor cells (MGG, 400 magnification), **2b.** Neuroendocrine tumor: showing monomorphic round to oval tumor cells having stippled chromatin, scant cytoplasm and rosette-like structures (MGG, 200 magnification). **2c.** Solid pseudopapillary tumor: showing tumor cells arranged in large papillary fronds having multilayered round to oval cells displaying mildly pleomorphic hyperchromatic nuclei, fine chromatin, scant to moderate cytoplasm and nuclear grooves (MGG, 200 magnification. **2d.** Metastatic adenocarcinoma: showing clusters of malignant cells and normal pancreatic acini on a hemorrhagic background (MGG, 200 magnification)

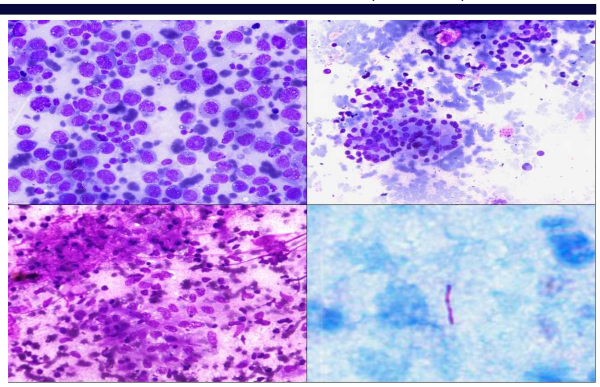

Fig3a. Non-Hodgkin lymphoma: showing dispersed population of atypical lymphoid cells along with clusters of normal pancreatic acini (MGG, 400 magnification),**3b.** Acinar cell carcinoma: showing tumor cells arranged in acinar pattern with mild nuclear atypia (MGG, 200 magnification),**3c.** Pancreatic Tuberculosis **:** Smear showing several epithelioid histiocytes, , lymphocytes and necrosis. Z N Stain shows Acid fast bacilli (MGG, 400 magnification), **3d.** Z N Stain on the smears shows few Acid fast bacilli on smears (ZN Stain x 400 magnification)

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