Original Research Article

Endoscopic Ultra Sound Guided Fine Needle Aspiration Cytology and Biopsy in Pancreatic Malignancy – Our Experience

M. Umadevi[1*], Abdul Samad Peshimam[2], P Abhinay Rao M[2], Anirudh[2], Sriram[2], NSVM Krishna[2], Swapnika[2], Sai Krishna[3], Issac Abhilash[3], P. Shravan Kumar[4]

[1]Associate Professor, [2]Post Graduate, [3]Assistant Professor, [4]Professor
Department of Gastroenterology, Gandhi Medical College, Secunderabad, Telangana, India
[*]Corresponding author email: **umadevimalladi_66@yahoo.co.in**

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Abstract

Background: Early, accurate, detection and confirmation of neoplasm at the same time, avoidance of surgery is crucial. Endoscopic Ultra sound -EUS is considered as the most reliable and accurate test in the detection and diagnosis of Pancreatic Masses including Pancreatic Cancer. This study aimed to evaluate the diagnostic spectrum of pancreatic lesions to analyze the cytology, and of EUS-FNA cytology for pancreatic solid and cystic lesions.

Materials and methods: We had conducted a prospective study of EUS and FNA in patients with pancreatic malignancy for confirmation of lesions between October 2008 and January 2020 at Gandhi Hospital a tertiary government hospital in state of Telangana. Clinical data, laboratory tests, and cytopathological and imaging reports were collected. The final diagnosis was based on surgical findings, EUS-FNA or computed tomography (CT)-guided biopsy. EUS performed under conscious sedation at the time of EUS. Size, echo characteristics of lesions, vascularity, lymph nodes were noted. FNA was done with linear echo endoscopic tip procore needles. Smears were prepared in endoscopy units. Then smears and sections of the cell block were evaluated by an expert pathologist for determining the adequacy of specimen.

Results: We had analyzed 48 patients in this study out of 64 patients. Out of that, 46 (95%) were males and 2 (5%) were females with mean age group of 61 (58-76 years). The site of pancreatic

adenocarcinoma was the head and neck in 78%, body 8% and tail in 6%, isthmus 8%. Most common symptom was pain abdomen noted in 100%, mass per abdomen - 8%, Jaundice - 34%, vomiting - 8%, hypoglycemic attacks - 8%. Of patients, majority of cases were Adenocarcinomas. Of 48 patients, FNA revealed Adenocarcinomas 37 (77.08%), NET in 3 (6%), serous Cystadenoma in 2 (4%), Mucinous Cystadenoma in 2 (4%), IPMN in 1 (2%), Atypical cells obtained in 3 (6%). Minor hemorrhage noted in 8%, abdominal pain in 12%, we had not encountered pancreatitis or mortality all cases with atypical cells were also subjected to surgery.

Conclusion: EUS is safe, reliable method in diagnosis of pancreatic malignancy. It not only provides accurate cytological diagnosis but also allows exact location of small lesions.

Key words

Diagnosis, Endoscopic ultrasound-guided fine-needle aspiration, Pancreatic neoplasms.

Introduction

Evaluation of patients with a pancreatic malignancy involves a battery of noninvasive and Invasive tests, In view of its retroperitoneal nature and sensitivity and specificity of tests are low. Early and accurate diagnosis is paramount for improving the therapeutic efficacy of pancreatic cancers. Diagnosis of benign and malignant neoplasms of the pancreas is increasing rapidly Pancreatic cancer is the fourth leading cause of death from cancer [1, 2].

Imaging Modalities: Prior to the introduction of the EUS-FNA technique in the early 1990's, pancreatic malignancies were diagnosed using ERCP and percutaneous biopsy techniques ERCP, an invasive test used before the Invention of EUS, is limited by a sensitivity of 49%-66% with pancreatic duct brushing, and a reported complication rate of pancreatitis up to 6%, CT or US guided biopsy of the pancreatic tumors is more difficult to undertake due to the retroperitoneal situation of the pancreas. In addition, the risk of tumor seeding into the peritoneum or along the percutaneous needle tract has led to avoidance of the percutaneous approach to tissue diagnosis, and studies have suggested a significantly lower risk of peritoneal carcinomatosis using EUS-FNA.

Endoscopic ultrasound (EUS) is one of the most sensitive and accurate modality for detecting and evaluating pancreatic mass and staging of pancreatic cancer. EUS gives us high resolution images of the entire pancreas; such as, fine parenchymal details and pancreatic ductal changes. Usually pancreatic tumors are hypoechoic or inhomogeneous masses or areas with irregular borders within the normal echotexture of the pancreas in EUS views [3]. EUS has been shown to be superior to computed tomography (CT), ultrasound (US), Endoscopic retrograde cholangiopancreatography (ERCP), or angiography in detecting tumors smaller than 3 cm in size [4].

EUS-guided fine-needle aspiration (EUS-FNA) is the best way for obtaining a histological diagnosis, especially even if the mass is poorly visualized by other imaging modalities [5]. However, differential diagnosis of pancreatic mass remains a clinical challenge. The aim of this study was to assess the diagnostic capability of the EUS-FNA in the differentiation of pancreatic mass lesions.

This study aimed to evaluate the diagnostic spectrum of pancreatic lesions to analyze the cytology, and of EUS-FNA cytology for pancreatic solid and cystic lesions.

Materials and methods

We had conducted a prospective study of EUS and FNA in patients with pancreatic mass lesions between October 2008 and January 2020 at Gandhi Hospital a tertiary government hospital

in state of Telangana. For each patient; clinical data, laboratory tests, and cytopathological and imaging reports were collected. Patient characteristics such as age, gender, clinical history, and physical findings were recorded. Imaging reports including EUS, sonography, CT, and magnetic resonance cholangiopancreatography (MRCP) were reviewed to assess location, size, and characteristics of the pancreatic lesions. All patients were kept on antibiotics in view of associated jaundice and other conditions.

Clinical data, laboratory tests, and Cytopathological and imaging reports were collected. The final diagnosis was based on surgical findings, EUS-FNA or computed tomography (CT)-guided biopsy. EUS performed under conscious sedation at the time of EUS size, echo characteristics of lesions, vascularity, lymph nodes were noted. FNA of peripancreatic lesions, lymph nodes, or bileduct mass lesions were excluded.

All the patients provided informed consent before the procedure. EUS for guided puncture of the lesion was carried using FUZINON equipment EG 530 UT with SU 7000 Ultra sound processor. The puncture technique was the fanning one (FNA in multiple planes) with an internal stylet, reinserting it before each FNA pass and negative pressure from the beginning till the end of the procedure. Five passes were made for every mass lesion. FNA was done transgastric (body and tail lesions) or transduodenal (head and uncinate process) [6]. Onsite cytologist evaluation was not available in these cases. Using pull back method while removing stylet and fanning technique. Suction used in hard masses. At the time of EUS size, echo characteristics of lesions, vascularity, lymph nodes were noted. Aspiration needle was further washed in 70% ethanol in labeled test tubes for cell block preparation. An expert pathologist evaluated the smears and sections of the cell block rendering the final diagnosis.

EUS performed under conscious sedation with linear echo endoscopic tip procore needle PTS 22G used in 46 (95%) and 25G in 2 (5%), EUS-FNA of cystic lesions was done for aspiration of fluid and solid nodules were not seen in these cysts. Limitations in approaching a pancreatic mass include difficult location, small size, necrosis and vascularity. Ideally the mass should be located in the six o' clock position with the ultrasound transducer firmly applied to the luminal wall with suction.

The final diagnosis was based on EUS-FNA cell block and/or pathology in surgical specimens, with immunohistochemistry support. Out of 64 patients, total 16 patients, 8 patients with inconclusive samples, 4 with vascular involvement, 2 patients in whom FNA not done are insulinoma, 2 patients who lost follow up after EUS procedure were excluded from the study.

All positive cases treated accordingly; all cases with atypical cells were subjected to surgery (**Figure – 1 to 6**).

Figure – 1: FNA of Adenocarcinoma.

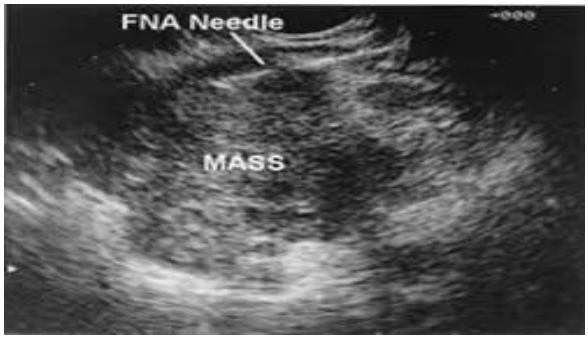


Figure – 2: FNA of NET.

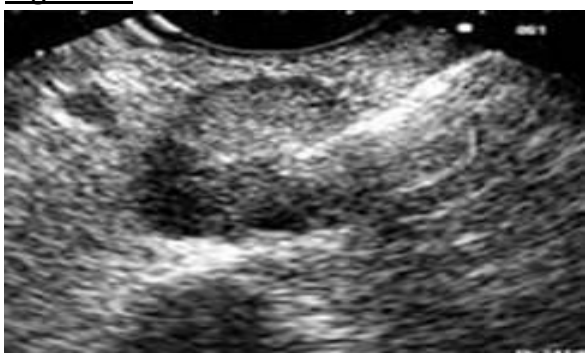


Figure – 3: Adenocarcinoma.

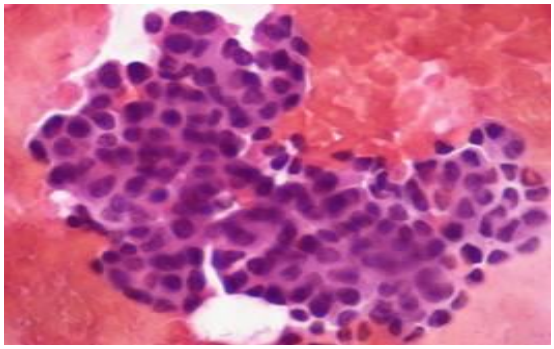


Figure – 4: Neuroendocrine tumor NET.

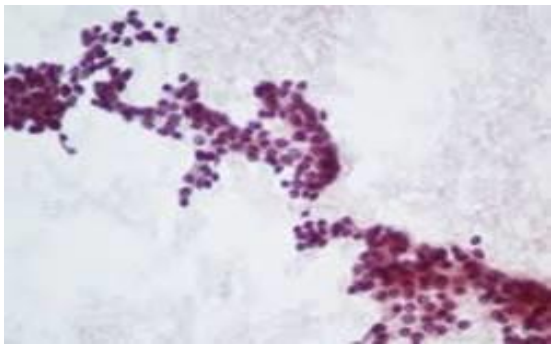


Figure – 5: Mucinous cystadenocarcinoma.

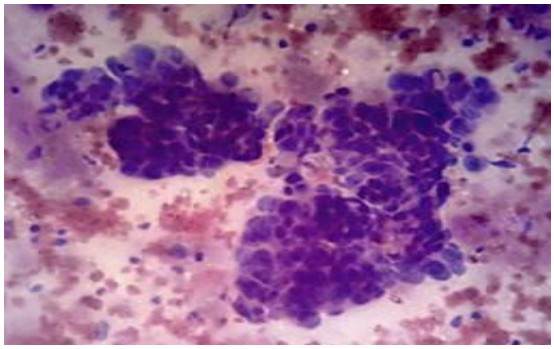
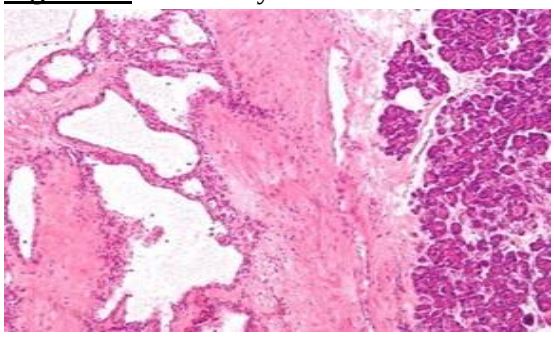


Figure – 6: Serious cystadenocarcinoma.



Results

Out of 48 patients who underwent EUS -FNA were in mean age group of 61 (58-76 years). Of 48 patients, 46 (95%) were males and 2 (5%) were females and the mean size of the lesion was 3.8 ± 1.8 cm. 68% lesions were located in the pancreatic head, 5% in neck 10% in body, 5% in tail, and 8% in Isthmus. Solid tumors and cystic lesions accounted for 74% and 7% of the cases, respectively. The clinical characteristics of the pancreatic lesions were summarized and compared with other studies [7, 8] as per **Table - 1**.

Symptoms: Out of 48 patients, pain abdomen noted in 48 (100%), Jaundice – 16 (34%), mass per abdomen – 7 (14%), vomiting – 7 (14%), hypoglycemic attacks – 3 (6%) and weight loss in 22 (45.8%).

Abdominal pain and Jaundice were the most common symptoms of these patients. We had noted hypoglycemic attacks in 3 patients.

Out of 48 patients, 46 (95%) were males and 2 (5%) were females similar to other studies [7, 8] as per **Table – 2**.

Majority of lesions located in Head and Neck (82%), in 8% lesions were present in Isthmus. We had not encountered diffuse lesions like that of Nigam N, et al. [7] and compared with other study [8] as per **Table – 3**.

Solid, cystic lesions, and solid lesions with cystic component was seen in 70%, 12%, 18% respectively and compared with other studies [7, 8] as per **Table – 4**.

Complications: Minor hemorrhage noted in (8%), abdominal pain (12%), we had not encountered pancreatitis or mortality. All patients were kept on antibiotics in view of associated jaundice and other conditions. All positive cases treated accordingly all cases with atypical cells were also subjected to surgery.

Out of 48 patients, FNA revealed Adenocarcinomas in 37 (77.08%), NET in 3 (6%), serous Cystadenoma in 2 (4%), Mucinous

Cystadenoma in2 (4%), IPMN in 1 (2%) and Atypical cells obtained in 3(6%) which were compared with other studies [7, 8, 14] as per **Table – 5**.

Table – 1: Symptom analysis and comparison with other groups.

Symptoms	Nigam N, et al. (n-178) [7]	Alizadeh, et al. (n-100) [8]	Present (n-48)
Abdominal pain	73.6%	42%	48 (100%)
Jaundice	21.8%	31%	16(34%)
Pruritus	14.5%	18%	16(34%)
Weight Loss	-	33%	22(45.8%)
Vomiting	-	-	7(14%)
Mass per abdomen	-	-	7(14%)
Hypoglycemic attacks	-		3(4.6%)

Table – 2: Gender analysis.

Gender	Nigam N, et al. (n-178) [7]	Alizadeh, et al. (n-100) [8]	Present (n-48)
Males	75.4%	56%	95%
Females	24.6%	44%	5%

Table – 3: Location of lesion.

Location of lesion	Nigam N, et al. (n-178) [7]	Alizadeh, et al. (n-100) [8]	Present (n-48)
Pancreatic head	62%	79%	72%
Uncinate process	7.6%	-	8%
Body	14.4%	15%	8%
Neck	3.2%	-	10%
Tail	10.4%	6%	5%
Diffuse	2.4%	-	-

Table – 4: Morphology of lesion.

Morphology of lesion	Nigam N, et al. (n-178) [7]	Alizadeh, et al. (n-100) [8]	Present (n-48)
Solid	62.8%	75%	70%
Cystic	23.2%	7%	12%
Solid lesions with cystic component	14.0%	16%	1 8%

Table – 5: Histopathology.

Histology	Alizadeh, et al. (n-100) [8]	Nigam N, et al. (n-178) [7]	Bang JY (n-46) [14]	Present (n=48)
Adenocarcinoma	61%	71.6%	80.4%	37(70.8%)
Cholangiocarcinoma	6%	-	-	-
Lymphoma	3%	2.2%	2%	-
NET	6%	10.5%	4%	3(6%)
IPMN	1%	3.4%	2%	1(2%)
Serous cystadenoma	-		-	2(4.1%)
MCN	2%	5.6%	-	2(4.1%)
Atypical cells	-	-		3(6%)

Discussion

Endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) has become increasingly widespread as a sampling technique for extracting tissue or cell samples from lesions for definitive pathology diagnosis. US-FNA is a safe, effective and efficient diagnostic tool in the evaluation of pancreatic mass lesions, Cytopathological specimens, and more recently core biopsies, may be obtained with high sensitivity (75%-98%), specificity (71%-100%), positive predictive value (96%-100%), negative predictive value (33%-85%) and accuracy (79%-98%) in the diagnosis of pancreatic cancer as compared to other modalities [8].

Cytological analysis of aspiration cytology material can readily differentiate between adenocarcinoma, islet cell malignancies, metastasis, inflammatory lesions, and cystadenomas. Duct adenocarcinoma presents with high cellularity, crowded sheets of disordered ductal cells with irregular nuclear contours, anisonucleosis, vesicular chromatin, and a variable amount of cytoplasm [9]. NET will show cellular aspirate, isolated cells, bare nuclei, pseudo rosettes, uniform, round or oval nuclei, eccentric nuclei, finely stippled chromatin, and moderate-to -abundant cytoplasm [10]. Among the cystic lesions, serous cystadenoma smears display sparse cellularity, clean background, flat sheets, and loose clusters of cuboidal cells, clear or granular cytoplasm with indistinct borders, bare nuclei, small round nucleus, fine chromatin, and inconspicuous nucleolus [11]. Mucinous neoplasm of pancreas consists of IPMN and mucinous cystic neoplasm (MCN). Their distinction, based solely on cytologic features, may not be possible. Diagnostic clue toward IPMN is mucin extrusion through ampulla and cyst-by-cyst appearance in EUS. Cytomorphology of MCN and IPMN consists of the hypocellular specimen, thick mucin, columnar mucinous cells (sheets, papillae, or isolated cells), and nuclear and architectural atypia [12].

EUS imaging and cell block preparation along with an integration of immunohistochemistry can yield a better diagnosis and enhance the accuracy of diagnosing cystic lesions [12, 13]. EUS-FNA has high sensitivity, specificity, PPV, and NPV for solid and cystic pancreatic tumors [8] allowing inadvertent surgery in non-neoplastic lesions and inappropriate delay in surgical planning of malignant cases. Inadequacy rates are reported to be as low as 1.5–2% for pancreatic EUS-FNA [8], and we have not included them in analysis. This is usually due to the difficulty in obtaining an adequate specimen because of technical problems in accessing the mass with FNA needle, exuberant inflammation, or fibrotic reaction described in the pancreatic tumors. There is a consensus opinion that onsite cytopathology with the real-time interpretation of samples is the best for optimal patient care [10].

Conclusion

EUS is safe, reliable method in diagnosis of pancreatic malignancy. It not only provides accurate cytological diagnosis but also allows exact location of small lesions. We have not encountered reporting of tumor seedling.

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