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**Original Article**

# Experience of Endoscopic Ultrasound Guided Fine Needle Aspiration and Fine Needle Biopsy: Data from Tertiary Care Hospital in Pakistan

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## ABSTRACT

Endoscopic ultrasound guided fine needle aspiration and biopsy (EUS-FNA/FNB) are minimally invasive and yet very effective techniques for tissue acquisition and diagnosis of sub-epithelial or other lesions in close premises of gastrointestinal tract. **Objective:** To evaluate the diagnostic accuracy and safety of the EUS-FNA FNA/FNB in various lesions. **Methods:** This was a single center study of consecutive 189 patients who presented to Gastroenterology department of Lahore General Hospital, Lahore for EUS FNA/FNB during October 2019 to March 2023. **Results:** 189 patients undergoing EUS-FNA/FNB, 60% were males, 40% females. Mean age was 48.84±15.96 years. EUS-FNA and FNB was done in 28 (14.8%) and 161 (85.2%) patients respectively. Median number of passes was 3 (IQR: 1-4). Most of the lesions were of pancreatic origin (n=110, 58.2%) pancreatic adenocarcinoma was found in 69.3 % solid pancreatic lesions. Other lesions were abdominal/mediastinal lymphadenopathy (n=37, 19.5%), gastric (n=26, 13.8%) and liver (n=10, 5.3%). Malignant lesions were found in 105 (55.6%) cases, benign diseases (n=34, 18%) and normal tissue (n=12, 6.3%).The overall diagnostic yield was 151/179(79.9%) with comparable yield of EUS-FNA and FNB, 21/28(75%) and 130/161 (80.7%) respectively (p=0.06).Complications rate was 2.1%. **Conclusions:** EUS FNA/FNB is effective and safe technique for evaluation of suspicious lesions in or around the gastrointestinal tract especially pancreatic lesions and further studies are needed to establish the best technique to improve tissue acquisition.

## INTRODUCTION

Endoscopic Ultrasound (EUS) is a newer highly efficient, cost effective diagnostic modality that gives high-resolution, real-time snapshot of the gastrointestinal tract and adjacent structures. It is widely used to assess a wide spectrum of benign and malignant gut diseases. In past it has played an important role as an adjunct to traditional surgical therapies [1]. Recently EUS guided sampling has been widely used for the diagnostic management of thoracic and abdominal structures specially lymph nodes and solid structures and is being preferred over invasive modalities such as mediastinoscopy and laparotomy [2]. Among the two widely used diagnostic management sampling tools are Fine Needle Aspiration (FNA) and Fine Needle Biopsy (FNB) [3]. Despite improvement in imaging modalities like Computed Tomography (CT) scan, Positron Emission Tomography (PET) and use of tumor markers, diagnosis of pancreatic lesion, other sub epithelial lesions of gastrointestinal lesions or nodal masses remained problematic before the evolution of EUS as diagnostic tool [4]. There are number of lesions where these techniques

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have been used. These include esophageal, gastric, hepatic, pancreatic and lymph nodes of mediastinum and abdomen. It was reported in a study that EUS FNB resulted in a change of clinical management in about every tenth patient of pancreatic cysts; however, the associated adverse event risk was more and careful patient selection is mandatory [5]. EUS FNA/FNB provides histopathological confirmation of diseases. These are safe with comparable diagnostic accuracy in pancreatic and non-pancreatic lesions. FNB improved the histopathological quality of specimens with little blood contamination. In diagnosing pancreatic lesions, FNB had more sensitivity and diagnostic accuracy than FNA. The diagnostic accuracy of EUS-FNA in solid pancreatic lesion is from 78% to 95% with sensitivity ranging from 64% to 95% and specificity ranging from 75% to 100%. However, diagnostic accuracy lower in mediastinal lesions and gastrointestinal stromal tumors [6]. Diagnostic accuracy is affected by factors like location of lesion, scope position, type and size of EUS needle, use of additional methods like suction. In a study it has been concluded that keeping in view these factors, EUS-FNA/FNB are accurate diagnostic procedure for the evaluation of intra-abdominal masses [7]. With the improvement of FNA/FNB needles and methodologies; studies have confirmed the improvement of diagnostic accuracy. In other studies FNB was found with superior diagnostic accuracy without compromising safety when compared to FNA [8]. The worldwide survey of EUS-FNA and FNB practice patterns showed wide variations in practice patterns. There is a need of randomized studies to establish the best approach for optimizing the FNA/FNB procedures [9]. As both techniques are considered accurate and safe for tissue sampling of intramural and extramural gastrointestinal lesions but data from our country are lacking [10].

Therefore, the objective of this study was to evaluate the diagnostic accuracy of EUS-FNA/FNB in our settings.

## METHODS

It was a descriptive cross sectional study conducted at Department of Gastroenterology and Hepatology, Lahore General Hospital Lahore from October 2019 to March 2023 after taking institutional review board approval vide letter No. AMC/PGMI/LGH/Article/Research No/190/19. After informed consent, all the patients above 18 years with mass lesion of pancreas, sub-epithelial lesions of stomach, abdominal or mediastinal lymph nodes on Magnetic Resonance Imaging (MRI), CT scan or trans abdominal ultrasound of size > 1cm who underwent endoscopic ultrasound guided fine needle aspiration or biopsy were included in the study by non-probability consecutive sampling technique. The major exclusions were pregnant females, patients having Hb < 8 g/dl, patients with uncorrectable coagulopathy or anticoagulant drugs use within 14 days of EUS-FNA, patients with cardio-respiratory dysfunction or any other co-morbid illness that could not tolerate anesthesia and who were unable to give informed consent. Patient demographics (gender, age, location of lesion), procedure details (number of passes, tumor characteristics), complications (bleeding, pneumothorax, perforation, pancreatitis), impression of endoscopist/ EUS diagnosis and histological diagnosis recorded through a predesigned proforma. EUS-FNA/FNB was performed by two Endo- sonographers who have more than 4 years of EUS experience. Procedures were performed at endoscopy suite of the Lahore General Hospital Lahore under propofol induced sedation. There was no on-site cytopathologist present. The number of passes and needle actuations were not standardized and was at the discretion of the Endo-sonographer after assessment on adequate specimen made by visual assessment of the material expressed from the needle. Further, cytological or histopathological analysis was done by the same histopathologist at the Department of Pathology, Lahore General Hospital Lahore. All patients satisfying the inclusion criteria were included in the study after informed consent. The protocol of study was approved by institutional review board. Patient demographics (gender, age, location of lesion), procedure details (number of needle passes, tumor characteristics), complications (bleeding, pneumothorax, perforation, pancreatitis) and final diagnosis recorded through a predesigned proforma. EUS-FNA/FNB was performed by two Endo sonographers who have more than 4 years of EUS experience. Procedures were performed at endoscopy suite of the Lahore General Hospital, Lahore under propofol induced sedation. On-site cytopathologist (ROSE) was not there. Procedures were done with EU-ME2 processor and GUC-UCT 180 curvilinear EUS gastrovideoscope. Rapid onsite evaluation, meaning by availability of onsite cytopathologist in the room, was not available. Fanning technique was used in all cases to improve EUS tissue acquisition. The number of needles passes and needle throws, type of additional measures like type and amount of suction when needed, slow pull technique was at the discretion of the Endo- sonographer after assessment on adequate specimen made by visual assessment of the material expressed from the needle and subsequent examination under microscope by a gastroenterologist to access tissue adequacy. Further, cytological or histopathological analysis was done by the same histopathologist at the Department of Pathology, Lahore General Hospital Lahore. The data were entered and analyzed using SPSS version 23.0. Descriptive statistics calculated for all the variables. Qualitative variables including gender and positive cases presented as frequency and percentage. Quantitative variables like age presented as mean and standard deviation.

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## RESULTS

The mean age was 48.84 ± 15.96 years (Range 16-81years). There were 113 (59.8%) males and 76 (40.2%) females. EUS-FNA and FNB was done in 28 (14.8%) and 161 (85.2%) patients respectively. Median number of passes was 3 (IQR: 1-4). Most of the lesions were of pancreatic origin 110 (58.2%) followed by abdominal and mediastinal lymphadenopathy 37 (19.5%), gastric 26 (13.8%), liver 10 (5.3%) ampulla (n=4) and esophageal (n=2) as shown in table 1.

**Table 1:** Site, Eus Diagnosis and Histopathology/Cytology of the Lesions

| Site | Types | Category | n |
|---|---|---|---|
| Pancreas | Solid Pancreatic Mass | Adenocarcinoma of Pancreas | 68 |
| | | Focal Pancreatitis | 6 |
| | | Autoimmune Pancreatitis | 4 |
| | | Neuroendocrine Tumor | 3 |
| | | Normal Tissue | 2 |
| | | Epitheloid Neoplas | 1 |
| | | Inconclusive | 14 |
| | Cystic Lesion | Serous Cystadenoma | 3 |
| | | Intrapapillary Mucinous Neoplasm (IPMN) | 3 |
| | | Mucinous Cystic Neoplasm (MCN) | 2 |
| | | Solid Pseudopapillary Neoplasm | 1 |
| | | Inconclusive | 3 |
| Abdominal Lymphadenopathy | Benign Looking LN | Benign Tissue | 8 |
| | | Chronic Granulomatous Inflammation | 3 |
| | | Adenocarcinoma | 1 |
| | | Inconclusive | 2 |
| | Malignant Looking LN | Inconclusive | 3 |
| | | Malignant Neoplasm | 1 |
| | | Reactive Tissue | 1 |
| Mediastinal Lymphadenopathy | Benign Looking LN | Benign Tissue | 2 |
| | | Chronic Granulomatous Inflammation | 3 |
| | | Normal Tissue | 5 |
| | TB/Lymphoma | Chronic Granulomatous Inflammation | 1 |
| | | Inconclusive | 4 |
| Esophagus | CA Esophagus | CA Esophagus | 1 |
| Esophageal SEL | Esophageal Sub Epithelial Lesion (SEL) | Leiomyoma | 1 |
| Gastric | Gastric Sub Epithelial Lesions (SEL) | Gastrointestinal Stromal Tumor (GIST) | 21 |
| | | Neuroendocrine Tumor | 1 |
| | | Inconclusive | 1 |
| | Linitis Plastica | Adenocarcinoma | 3 |
| Ampulla | Ampullary Tumor | Inconclusive | 4 |
| Liver | Autoimmune Hepatitis | Autoimmune Hepatitis | 1 |
| | Primary Sclerosing Cholangitis | Inconclusive | 1 |
| | SOL Liver | Inconclusive | 4 |
| | | Malignant Neoplasm | 4 |

Malignant lesions were found in 105 (55.6%) cases followed by inconclusive results 38 (20.1%), benign diseases 34 (18%) and normal tissue 12 (6.3%). The overall diagnostic yield was 151/179 (79.9%) with comparable yield of EUS-FNA and FNB, 21/28 (75%) and 130/161 (80.7%) respectively (p=0.06).

**Table 2:** Categories of Lesions Based On Histological/Cytological Characteristics

| Procedure | Histological/Cytological Characteristics | | | | Diagnostic Yield | p-Value |
|---|---|---|---|---|---|---|
| Cases | Normal | Inconclusive | Benign | Malignant | | |
| FNA | 6 | 7 | 6 | 9 | 75% | 0.06 |
| FNB | 6 | 31 | 28 | 96 | 80.7% | |
| Total | 12 | 38 | 34 | 105 | 79.9% | |

Complications rate was 2.3%. P-value was 0.06

## DISCUSSION

Experience from this single center study confirms the utility of EUS- FNA/FNB to characterize and diagnose different hepatopancreatico-biliary, sub-epithelial and nodal lesions with good diagnostic yield ~ 80 %, similar diagnostic accuracy was found in previous studies [11, 12]. EUS has been shown to be the most efficacious for detecting and establishing a diagnosis for smaller lung cancer lesions [13]. The present study found that overall diagnostic accuracy was better with EUS-FNB, 130/161 (80.7%) as with compared with EUS-FNA, 21/28(75%) but was not statically significant (p=0.06). EUS-FNB has been shown to outperform EUS-FNAC with respect to diagnostic accuracy (89.8% vs. 79.1%; P value = 0.013) and tissue adequacy (95.9% vs. 86.1%; p value < 0.001) [14]. Fewer passes are required with EUS-FNB technique and there is no need for rapid on site evaluation (ROSE), so has great practical implications [15]. Most common lesions in present study were pancreatic in origin (58.2%) Most of there were solid lesions and pancreatic adenocarcinoma was the diagnosis in 69.3% cases. Other diagnosis was focal pancreatitis [16]. Similarly distinguishing pancreatic adenocarcinoma from focal pancreatitis has practical implications for treatment and prognosis. In cystic lesions of pancreas serous cystadenoma and Intrapapillary Mucinous Neoplasm (IPMN), Mucinous Cystic Neoplasm (MCN) were most common diagnosis and one cystic lesion in a young lady with was diagnosed as Solid pseudo-papillary neoplasm. Similar result were shown by Jabłońska B *et al.*, were IPMN, MCN and Serous cystadenoma were commonest pancreatic cystic neoplasms in patients presenting with pancreatic cystic lesions [17]. Most of the patients with nodal biopsy 16/34 (47.1) had reactive/normal tissue, tuberculosis found in 7/34 (20.5%) cases. Tuberculosis is endemic in our area so should be considered in any patient with nodal enlargement. Junare PR *et al.*, from India on EUS-FNA/ FNB found tuberculosis in 62.5% patients with mediastinal lymphadenopathy, a number much higher than we found [18]. In a study on esophageal lesions esophageal

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carcinoma and Leiomyoma were found. In Gastric Sub Epithelial Lesions (SELs) GIST was commonest diagnosis, found in 21/23 (91.3%) cases followed by Neuroendocrine Tumor (NET). While evaluating SELs, Leiomyoma is most common diagnosis in esophagus and GIST in stomach [19]. In another study on liver focal lesions, all were malignant, mostly metastatic, with high inconclusive results in 5/10 (50%) cases which is higher than reported previously [20]. In a study on pancreatitis 184 patients it was found that the recent acute pancreatitis with high echo component within the tumor were independently associated with false-negative EUS-TA results. Meanwhile, using Fine-Needle Biopsy (FNB) needles, more needle passes, large tumor size, and high CA-19-9 level were independently associated with true-positive EUS-TA outcomes. Three needle passes are needed to achieve optimal EUS-TA outcomes. Tumor location in the body/tail passes ≥3 and using the FNB needle was independently related to sample adequacy [20]. In another study on lymph nodes sampling, the diagnostic accuracy of FNB was found more as compared to FNA [20, 21]. In a meta-analysis the databases of PubMed, Cochrane and Google Scholar were used, including studies published between 2011–2021 comparing the diagnostic yield (diagnostic accuracy or probability of positivity, sensitivity, specificity, predictive value) of EUS-FNA and EUS-FNB for the diagnosis of pancreatic cancer. Among these, five studies found no statistically significant difference between the EUS-FNA and EUS-FNB, whereas the other four did. The meta-analysis found EUS-FNB accuracy superior to EUS-FNA for the diagnosis of pancreatic cancer [21]. A further prospective study with a larger number of patients is required to see more concise results.

## CONCLUSIONS

It was concluded that EUS-FNA/FNB has emerged a powerful modality for investigating various lesions in or around the gastrointestinal tract especially pancreatic lesions and is able to diagnose neoplastic lesions with good sensitivity/ specificity and with excellent safety.

## Authors Contribution

Conceptualization: HIM
Methodology: FS, SR, GUH, SJ, FJ, SR, AD, GUNT
Formal analysis: FS, SR, GUH, SJ, FJ, SR, AD, GUNT
Writing, review and editing: HIM, FS, SR, GUH, SJ, FJ, SR, AD, GUNT

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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