Section: Pathology

Original Research Article

COMPARISON OF DIAGNOSTIC YIELD IN SINGLE VS MULTIPLE NEEDLE PASSES IN ENDOSCOPIC ULTRASOUND GUIDED FINE NEEDLE ASPIRATION CYTOLOGY IN ABDOMINAL SOLID LESIONS AND ABDOMINAL LYMPHNODES AT TERTIARY CARE CENTRE

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Abstract

Background: Endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) is the accurate diagnostic method for abdominal solid masses, mediastinal masses and lymph nodes. Endoscopic ultrasound has proven to be a highly sensitive tool for diagnostic lesions in and adjacent to the gastrointestinal tract. EUS-FNA is not a difficult technique, but it requires adequate experience. The present study was done to compare the diagnostic yield of single needle pass v/s multiple needle passes. **Material & Methods:** It was an observational hospital-based study. There were two groups made with 30 samples each. Duration of study was 6 months. Consecutive samples were taken with inclusion criteria of age more than 15 years and solid masses. Fine needle aspiration by done using endoscopic ultrasound in department of gastroenterology. **Results:** Two groups were made which were single needle and multiple needle passes. The mean number of passes in pancreatic masses and lymph node were 3.1 and 2 respectively. Cellularity was significantly different in the two groups having higher cellularity in group II. There was no significant difference in the definitive diagnosis between the two groups. **Conclusion:** Higher cellularity observed in group of patients with multiple needle passes was statistically significant, but the higher diagnostic yield observed in this group was not statistically significant due to limited sample size.

INTRODUCTION

Endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) is the accurate diagnostic method for abdominal solid masses and mediastinal masses and lymph node, and its accuracy is affected by various FNA methods and EUS equipment.

Endoscopic ultrasound (EUS)-guided fine needle aspiration (FNA) has been used for diagnosis of pancreatic solid masses. EUS-FNA has a reported sensitivity of 54% to 95%, a specificity of 71% to 100%, and an accuracy of 85% to 90%. The foundation for the diagnostic accuracy of EUS-FNA is obtaining adequate tissue, and it could be influenced by several variables, including the size of the lesion, location of the lesion, needle gauge, needle type, use of a stylet and suction, number of needle passes, the endo sonographer's skill and experience, and on-site cytopathology evaluation.

Endoscopic ultrasound has proven to be a highly sensitive tool for diagnostic lesions in and adjacent to the gastrointestinal tract. EUS-FNA is not a difficult technique, but it requires adequate experience. Interestingly, some of the easiest cases provide information that can have a tremendous impact on patient management.[1,2]

The goal of performing FNA is to obtain a positive diagnosis in the quickest possible time with the least number of passes. The number of passes to be made depends on the presence or absence of on-site cytopathologist for assessment of specimen adequacy, establishment of onsite diagnosis and to guide the need for further sampling. In the absence of an on-site pathologist, adequate passes should be performed to avoid the need for repeat procedure.[3]

EUS-FNAC helps us to get diagnostic material which gives us information to guide disease specific therapeutic intervention. This technique causes

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prevention of unnecessary operative procedure. The usefulness of EUS-FNA depends on several factors. In addition to the experience of the endoscopist, adequate sampling, adequate sample processing, better communication between the cytopathologist and the endoscopist, accurate interpretation by the cytopathologist, and the ability to determine the need for additional samples required for ancillary studies are needed for effective diagnosis.[4]

Several studies in the last year focused on the technical aspects of EUS-FNA like optimal needle choices, variety of sampling method and different techniques of specimen.[5,6] Although there is wide use of EUS-FNA, there still exists a wide variation in the number of samples required to ensure acquisition of diagnostic material from different kind of lesions.[7]

In the presence of an onsite pathologist, the smears are quickly processed and examined by light microscopy in the endoscopic suit and immediate feedback is given to endo sonographer. This information can be used in guiding the number of EUS-FNA passes required to obtain a final diagnosis. It evaluates whether the aspirate is diagnostic or non-diagnostic.[8] When on-site cytological evaluation is unavailable, ESGE suggests performing of three to four needle passes with an FNA needle or two to three passes with a fine needle biopsy needle.[9]

The present study was conceived to assess and compare the diagnostic yield of sample obtained from EUS-FNA from abdominal solid lesions and lymph node in a single needle pass v/s multiple needle pass.

MATERIALS AND METHODS

A hospital based descriptive observational study done on 60 patients in Gastroenterology Department of Medical College and attached hospitals, Jaipur during July 2019 to Jan 2020.

Inclusion Criteria

1. Age ≥15 years,
2. Abdominal solid masses including lymph nodes identified by the investigational modalities.

Exclusion Criteria

1. Coagulopathy (international normalized ratio of >1.5 or platelet count of <50,000/mm3).
2. Presence of intervening blood vessels and altered gastrointestinal anatomy.
3. Cystic Masses.

Methods

EUS Guided FNAC done in one needle pass (N=30) and multiple needle pass (N=30) in Gastroenterology Department of Medical College and attached hospitals, Jaipur. Fine Needle Aspiration (FNA) done by endoscopic ultrasound in Gastroenterology Department in the patient who had G.I. solid lesions and/or lymph nodes.

EUS-FNA Procedures

EUS-FNA procedures were performed using a standardized method in patients who were under conscious sedation with intravenous midazolam and propofol. All procedures were carried out using a linear array echoendoscope (GF UCT180; Olympus Medical Systems, Tokyo, Japan) in conjunction with EVIS EXTRA CLV-180 light source.

The needle size was chosen to fit the situation randomly by endosonographer. A standard 19-, 22-, or 25-G FNA device (EchoTip; Cook Medical, Bloomington, IN) was employed for EUS-FNA. The capillary (slow pull) technique was employed for EUS-FNA mostly. In some cases, we applied suction techniques during EUS-FNA in order to increase the quantity of the FNA sample. Pancreatic head masses were approached from the duodenum, whereas pancreatic body and tail masses were accessed from the stomach. The adequacy of obtained specimens was judged by the presence of macroscopic material without cytopathologist, and the puncture is repeated until adequate specimens are obtained. After the masses were punctured by the needle, the stylet was withdrawn, and the needle moved backward and forward within the masses 10 to 15 times per pass. The needle was then removed. The aspirated specimen was expressed onto slides by reinsertion of the stylet within the needle and air flushing, if needed.

Statistical Analysis

The statistical tests used in the study are unpaired Student's t-test for continuous variables and Chi-square test for categorical variables. Data were expressed as mean ± standard deviation. Value of $P< 0.05$ is considered significant.

RESULTS

Patients in group I were slightly younger than group II with a mean age of 47.4 years in group I as compared to group II (49.6years). [Table 1] In both groups males were predominant with overall affected male to female ratio 3:1. Including both groups (single pass and multiple passes) pancreas was the most common site (28.5%) followed by abdominal lymph nodes (26.6%). [Table 2]

In the second group of multiple passes more no. of passes was three (43.3%) followed by two passes (26.6%) and 4 passes (16.6%) (Figure 1). The mean number of needle passes used in pancreas were 3.1 needle passes for diagnosis. While in 25 cases of lymph nodes the mean number of needle passes was 2.

In 30 cases where single needle was passed using EUS guided FNA, there was cellularity in 22 cases (73.3%) and 8 cases were non cellular (26.6%). In EUS-FNA using multiple passes (≥2 passes), the frequent number of passes used were 3 in which cellularity was found in 8 cases and 1 case was non cellular. Cellularity was 26/30 in Group and it was significantly different from Group I (p=0.0013).

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The final cytopathological diagnosis was reported (malignant or benign cases) in14 cases (46.6%) out of 30 cases in Group I as compared with 15 cases out of 30 cases (50%) in group II. Other categories included were inconclusive diagnosis and non-diagnostic cases. [Table 4]

On statistical analysis, there was no significant difference in the definitive diagnosis between single pass and multiple pass needle. [Table 5]

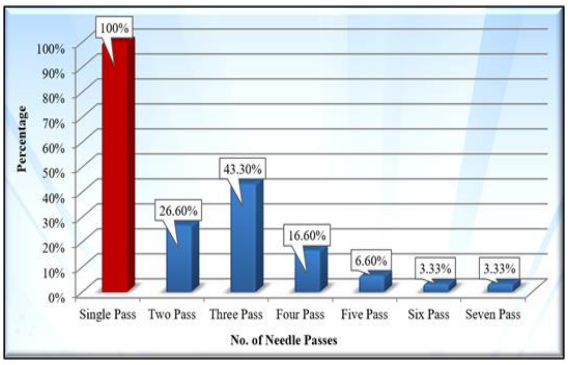

Figure 1: Distribution of patients according to no. of needle passes

PHOTOGRAPHS

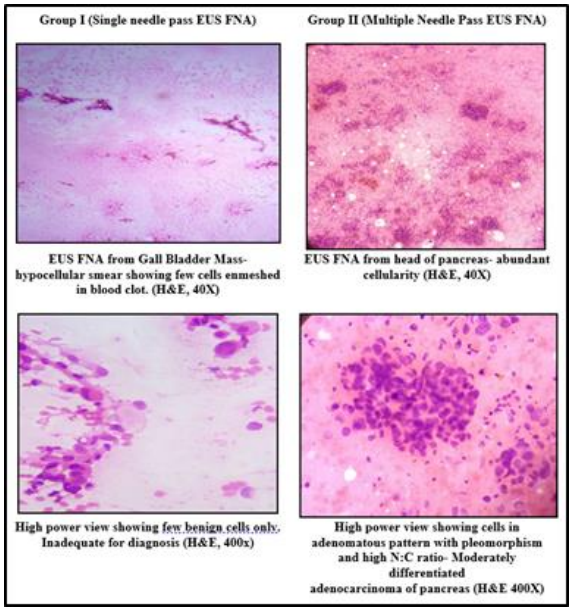

Table 1: Baseline characteristics of EUS-FNA according to number of the needle passes used in abdominal organs and lymph nodes Cause of death

Variables	Single needle pass (Group I)	Multiple needle passes (Group II)
Age in years(range)	47.4±15.36 (15-75)	49.6±15.36 (30-70)
Sex (Males/Females)	22:8	23:7
Size of Tumour	24.7±13.3 (10-70)	29.97±19.37 (10-80)
Cellularity	18/30	26/30
Definitive Diagnosis	25/30	27/30

Table 2: Distribution of patients according to target regions

EUS-FNA Site	No. of Cases (60)	% of Cases (Out of 100)
Pancreas	17	28.5%
Abdominal Lymph Node	16	26.6%
Mediastinal Lymph Node	9	15%
Liver	8	13.5%
Common Bile Duct	4	6.6%
Spleen	3	5%
Duodenum	1	1.6%
Gastric Mass	1	1.6%
Gall Bladder	1	1.6%

Table 3: Distribution of patients according to number of pass and Cellularity (Group II)

No. of the Needle Passes	Cellularity (No. of Cases)	Non-Cellular (No. of Cases)
2 Passes	7	2
3 Passes	8	1
4 Passes	6	1
5 Passes	2	0
6 Passes	1	0
7 Passes	1	0

Table 4: Distribution of cases according to number of needle passes and cytopathological diagnosis

	Diagnosis	Group I (Single Pass)	Group II (Multiple Pass)
Malignant cases	Pancreatic Carcinoma	4 (13.3%)	4 (13.3%)
	Lymphoma	3 (10%)	1 (3.4%)
	Hepatocellular Carcinoma	2 (6.6%)	4 (13.3%)
	Metastatic lymph node	4 (13.3%)	4 (13.3%)
Benign cases	GIST	1 (3.4%)	0
	Granulomatous lesion	1 (3.4%)	0
	Pseudocyst of pancreas	0	1 (3.4%)
	Tubercular lymphadenopathy	4 (13.3%)	3 (10.1%)
	Reactive hyperplasia	4 (13.3%)	4 (13.3%)

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	Inconclusive Diagnosis	2 (6.7%)	5 (16.6%)
	Non-Diagnostic Cases	5 (16.6%)	4 (13.3%)

Table 5: Association between number of passes and cellularity

	Single pass (%)	Multiple pass (%)	Total	p-value
Cellularity present	18 (40.9)	26 (59.1)	44 (100)	0.013
Non-cellular	12 (75)	4 (25)	16(100)	
Total	30(50)	30(50)	60 (100)	

*Fisher exact test

DISCUSSION

In the present study there were two groups including single needle pass and multiple needle passes in EUS – FNA cases. The number of needles passes and diagnostic yield were not significantly affected with the age of the patients. As Iglesias et al. conducted a studied 182 cases and found no association with age, sex, location and size of lesions.[11] In the present study, more common target sites for EUS-FNA were pancreas (17 out of 60 cases) and lymph nodes (16 out of 60 cases).Similarly, Bang et al conducted a prospective study of 95 consecutive patients who underwent EUS FNA, for diagnosis or staging, of 95 sites: pancreas (33), Lymph node (43), and miscellaneous (19).[10]

In group II (multiple number of needle passes) frequently used number of needle passes were three (13 out of 30 cases) with mean number of needles passes in current study as 3.26. Itoi et al found that even without ROSE, mean 2.88 needle passes were adequate for diagnosis with 93.3% accuracy.[12] When ROSE is not available there is more number of needle passes needed, which is in concordance in our findings in multiple needle passes. There were 30 cases of single needle passes, diagnosis was possible in 22 cases out of 33 (cellularity 73.3%). Lim et al described that single pass can also be used for definitive diagnosis which varies according to target sites.[13]

There was more cellularity in cases of group II. 26 cases out of 30 cases (86%) were cellular for diagnosis and p-value for this association was 0.013 which is significant. Cellularity was affected by the number of needle passes. For pancreas and lymph nodes the mean number of passes required were 3.1 and 2 respectively. In our study greater cellularity yield was observed in multiple needles passes as compared to single pass (statistically significant, p-value=0.013). This is in concordance with the various studies. Erickson et al. showed that 5 to 6 passes were required for pancreatic masses, meant that multiple passes were needed to obtain accurate diagnosis.[14] Also, Le Blanc et al. illustrated in a study that increase in sensitivity from 17% to 87% when more than 7 passes were made with a 22 G needle into pancreatic masses.[15]

Turner et al. demonstrated in their study that 3 to 4 passes were necessary to achieve a diagnostic accuracy of 80%.[16] Suzuki et al. described in a study involving 25 G needle, 4 passes were found to be sufficient for EUS FNA of solid pancreatic lesions.[17] Bluen et al. stated in an article that several factors can be responsible for diminished accuracy of abdominal and mediastinal area. More number of needle passes need to make out diagnosis.[18]

Per-pass analyses of data from some studies in patients with pancreatic masses showed that three to four passes with an FNA needle to achieve high rates of diagnostic samples and high sensitivity for malignancy, which is more than 90% 19-24. A lower number of passes was associated with suboptimal performance. On the other hand, increasing the number of needles passes more than four (FNA) or three marginally improved the results.[20,23,24] However, also for the smaller tumors, increasing the number of passes beyond four only marginally improved the sensitivity. Per-pass analysis in patients with lymphadenopathy found that sensitivity for malignancy reaches 100% after three passes with an FNA needle.24Binmoeller attributed that cellularity and adequacy differ when there is on site cytopathologist was not available.[25] Even ESGE criteria recommend multiple passes for various organs as was observed in our study.[26]

The diagnostic yield in the multiple pass groups was 51% and this was higher than the diagnostic yield in single needle pass group (49%). Although this result is not statistically significant due to limited sample size (limitation of study) but this has also been shown in several studies mentioned previously involving larger number of patients that multiple needle passes associated with high diagnostic adequacy.

CONCLUSION

In this study greater cellularity and diagnostic yield were observed in a group of patients subjected to multiple needle passes. The higher cellularity observed in group of patients with multiple needle passes was statistically significant, but the higher diagnostic yield observed in this group was not statistically significant due to limited sample size.

REFERENCES

1. O'Toole D, Palazzo L, Arotçarena R, Dancour A, Aubert A, Hammel P, et al. Assessment of complications of EUS-guided fine-needle aspiration. Gastrointest Endosc, 2001: 53 (4): 470–4.
2. Klapman JB, Logrono R, Dye CE, Waxman I. Clinical Impact of on-site cytopathology interpretation on endoscopic

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ultrasound – guided fine needle aspiration. Am J Gastroenterol. 2003; 98(6):1289-94.
3. Vilmann P, Saftoiu A. Endoscopic ultrasound guided fine needle aspiration biopsy: equipment and technique. J Gastroenterol Hepatol; 2006; 21(11):1646-55.
4. Bhutani MS, Logrono R, Manoop S. Endoscopic ultrasound-guided fine-needle aspiration cytology for diagnosis above and below the diaphragm. J Clin Ultrasound; 2005; 33(8):401-11.
5. Tharian B, Tsiopoulos F, George N, Pietro SD, Attili F, Larghi A, et al. Endoscopic ultrasound-guided fine needle aspiration technique and application in clinical practice. World J Gastrointest Endosc. 2012: 4(12):532–44.
6. Lachter J, Rubin A, Shiller M, Lavy A, Yasin K, SuissaA,et al,. Linear EUS for bile duct stones. GastrointestEndosc; 2000:51(1):51–54.
7. Lachter J, Zelikovsky S.EUS changes diagnosis from pancreatic to gallbladder carcinoma. Intern J Gastrointest Cancer. 2002;32(2-3);161–4.
8. Hirdes MMC, Vleggaar FP. Performance of EUS-FNA for mediastinal lymphadenopathy: impact on patient management and costs in low-volume EUS centers. Surg Endosco. 2010; 25(9), 3124-5.
9. Petrone MC, Arcidiacono PG. Basic technique in endoscopic ultrasound-guided fine needle aspiration for solid lesions: How many passes? Endosc Ultrasound. 2014 ;3(1);22-7.
10. Bang JY, Ramesh J, Trevino J, Eloubeidi MA, Varadarajulu S. Objective assessment of an algorithmic approach to EUS-guided FNA and interventions. Gastrointest Endosc. 2013;77 (5):739–44.
11. Iglesias-Garcia J, Dominguez-Munoz E, Lozano-Leon A, Abdulkader I, Larino-Noia J, Antunez J, et al. Impact of endoscopic ultrasound-guided fine needle biopsy for diagnosis of pancreatic masses. World J Gastroenterol. 2007;13(2);289-93.
12. Itoi T, Tsuchiya T, Itokawa F, Sofuni A, Kurihara T, Tsuji S, et al. Histological diagnosis by EUS-guided fine-needle aspiration biopsy in pancreatic solid masses without on-site cytopathologist: a single-center experience. Dig Endosc. 2011;23 Suppl 1:34-8.
13. Lim LG, Lakhtakia S, Ang TL, Vu CK, Dy F, Chong VU, et al. Factors determining diagnostic yield of endoscopic ultrasound guided fine-needle aspiration for pancreatic cystic lesions: A multicentre Asian study. Dig Dis Sci. 2013:58(6);1751-7.
14. Erickson RA, Sayage Rabie L, Beissner RS. Factors predicting the number of EUS guided fine needle passes for diagnosis of pancreatic malignancies. Gastrointest Endosc. 2000;51(2):184-90.
15. LeBlanc JK, Ciaccia D, Al-Assi MT, Mc Granth K, Imperiale T, Tao LC, et al. Optimal number of EUS-guided fine needle passes needed to obtain a correct diagnosis. Gastrointest Endosc. 2004;59 (4); 475–81.
16. Turner BG, Cizginer S, Agarwal D, Yang J, Pitman MB, Brugge WR, et al. Diagnosis of pancreatic neoplasia with EUS and FNA; A report of accuracy. Gastrointest Endosc. 2010;71(1);91-8.
17. Suzuki R, Irisawa A, Bhutani MS, Hikichi T, Takagi T, Sato A, et al. Prospective evaluation of the optimal number of 25-gauge needle passes for endoscopic ultrasound guided fine needle aspiration biopsy of solid pancreatic lesions in the absence of an onsite cytopathologist. Dig Endosc. 2012;24(6);452-6.
18. BluenBE, Lachter J, Khamaysi I, Kamal Y, Malkin L, Keren R, et al. Accuracy and Quality Assessment of EUS-FNA: A Single-Center Large Cohort of Biopsies. Diag. Ther Endosc., 2012: 139563.
19. Lee YN, Moon JH, Kim HK, Choi HJ, Choi MH, Kim DC, et al. Core biopsy needle versus standard aspiration needle for endoscopic ultrasound-guided sampling of solid pancreatic masses: a randomized parallel-group study. Endosc 2014; 46(12): 1056 – 62.
20. Bang JY, Hebert-Magee S, Trevino J, Ramesh J, Varadarajulu S. Randomized trial comparing the 22-gauge aspiration and 22-gauge biopsy needles for EUS-guided sampling of solid pancreatic mass lesions. Gastrointest Endosc. 2012; 76(2): 321 –7.
21. Sugimoto M, Takagi T, Hikichi T, Suzuki R, Watanabe K, Nakamura J, et al. Conventional versus contrast enhanced harmonic endoscopic ultrasonography-guided fine-needle aspiration for diagnosis of solid pancreatic lesions. A prospective randomized trial. Pancreatology. 2015; 15(5): 538 –4.
22. Rastogi A, Wani S, Gupta N, Singh V, Gaddam S, Reddymaso S, et al. A prospective, single-blind, randomized, controlled trial of EUS-guided FNA with and without a stylet. Gastrointest Endosc. 2011; 74(1): 58-64.
23. Mohamadnejad M, Mullady D, Early DS, Collins B, Marshall C, Sams S, et al. Increasing number of passes beyond 4 does not increase sensitivity of detection of pancreatic malignancy by endoscopic ultrasound-guided fine-needle aspiration. Clin Gastroenterol Hepatol. 2017; 15(7): 1071 –78.
24. Chen VK, Eloubeidi MA.EUS guided FNA is superior to lymph node echo features: a prospective evaluation of mediastinal and peri intestinal lymphadenopathy: Am J Gastroenterol. 2004:99(4):628-33.
25. Binmoeller KF, Rathod VD. Difficult pancreatic mass FNA: tips for success. Gastrointest Endosc. 2002;56: S86-91.
26. Polkowski M, Larghi A, Weynand B, Boustière C, Giovannini M, Pujol B, et al, Learning, techniques, and complications of endoscopic ultrasound (EUS)-guided sampling in gastroenterology: European Society of Gastrointestinal Endoscopy (ESGE) Technical Guideline. Endosc. 2012:44(2);190-206.

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