Ultrasound-Guided Percutaneous Needle Biopsy for Solid Pancreatic Lesions : Comparison with Endoscopic Ultrasound-Guided Fine-Needle Aspiration

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Introduction

Recent advances in imaging technique with widely used cross-sectional imaging such as CT and MRI has resulted in increased detection of small pancreatic lesions. Widely variable prognosis for benign cyst to pancreatic cancer, misdiagnosis of pancreatic lesions causes serious result, so accurate diagnosis of pancreatic lesion is very important.

Ultrasound(US)-guided percutaneous needle biopsy (PNB) for pancreas is not recommended in patients with resectable pancreatic tumors before surgery. However, biopsy is required for a definitive diagnosis for chemoradiotherapy in patients with unresectable tumors, and in conditions that require different treatment protocols such as primary lymphoma, metastasis to the pancreas, and pancreatitis mimicking neoplastic disease.

Endoscopic ultrasound (EUS)-guided fine needle aspiration (FNA) is the current standard method for obtaining tissue for the diagnosis of pancreatic masses. The reported results of pancreatic EUS-FNA vary in the range of 64–95 % for sensitivity, 75–100 % for specificity, and 78–95 % for diagnostic accuracy.

However, there is little data on comparative studies concerning the diagnostic performance of US-guided PNB and EUS-guided FNA of solid pancreatic lesions. The aim of the present study was to compare the diagnostic performance of US-guided PNB and EUS-guided FNA for diagnosis of solid pancreatic lesions.

Materials and Methods

We conducted a retrospective cohort study of all EUS-guided FNA, US-guided PNB, or both for solid pancreatic lesions performed between January 2006 and December 2011 at our institution. The medical records of the patients were reviewed using a standardized data-entry form that included patient demographics, clinical findings, procedural complications, follow-up, and pathological findings. The results of EUS-guided FNA or US-guided PNB were confirmed using the following criteria: surgical histopathology, clinical follow-up for a minimum of 6 months, and/or the results of other diagnostic tests.

EUS-guided sampling was performed using a linear array echoendoscope in hospitalized patients. Each patient was sedated with standard doses of midazolam, propofol, and meperidine. After the optimal puncture site was determined, a puncture was made using a 22G FNA needle (Echotip Ultra; Cook Ireland Ltd., Limerick, Ireland) under EUS image guidance. All pancreatic head and uncinate process masses were approached via the duodenum, and all pancreatic body and tail masses were approached via the stomach. After the lesion was punctured, the stylet was removed, and suction was applied using a 10-mL syringe. On every pass, the needle was moved to and fro within the lesion 10–15 times in a fanning manner.

There were no definite criteria for selection of the biopsy modality, and the decision was made by the clinician. The patients fasted (both food and water) for at least 8 hours. The US-guided PNBs were all performed by experienced radiologists. After the probe was pressed firmly against the abdominal wall, the needle insertion site was determined according to the location of the mass, and the shortest needle insertion route was selected to minimize the risk of injury to adjacent organs. Whenever possible, penetration of abdominal hollow viscera was avoided, and a trans peritoneal approach was preferred, but a transhepatic approach was also used in cases of pancreatic head lesions. If the transhepatic or transperitoneal approach was not possible, the biopsy attempt was aborted and counted as a technical failure. An 18-gauge core needle with a 22-mm throw length (Acecut; TSK Laboratory, Tochigi-shi, Japan) was percutaneously inserted under the assistance of a needle guidance system attached to the curved probe.

Statistical analysis was performed using the chi-square test or Fisher's exact test for categorical parameters and Student's t-test for continuous variables. All statistical analyses were performed using the software MedCalc (version 16.2.1.0, MedCalcSoftware, Mariakerke, Belgium). Statistical significance was set at a P value of < 0.05.

Results

Demographic data for the 104 study patients are shown in Table 1. There was no significant difference between the EUS-guided FNA group and the US-guided PNB group with regard to the male-to-female ratio, age, mass location, or final diagnosis. The mean ages of patients who underwent EUS-guided FNA and US-guided PNB were 57.3 years (range, 24–81years) and 61.7 years (range, 35–80 years), respectively, without a significant difference (P= 0.07). The sizes of the lesions on each modality ranged from 1 to 6.2 cm for EUS-guided FNA and 1 to 10.2 cm for US-guided PNB, with mean values of 2.9 and 3.7 cm, respectively. There was significant difference in lesion size between the modalities (P= 0.01).

There were no complications in all EUS-guided FNAs and US-guided PNBs. One patient had transient abdominal pain after US-guided PNB.

A total of 103 biopsy attempts were undertaken in 88 patients (EUS-guided FNA, n = 51; US-guided PNB, n = 53). Biopsy specimens were successfully obtained from 45 of 51 patients who underwent EUS-guided FNA attempts. Biopsy attempts using US-guided PNB were successful in 50 of 53 patients. There was no statistically significant difference in the technical failure rate between EUS-guided FNA (3 of 53 [5.7%]) and US-guided PNB (6 of 53 [11.8%]; P= 0.27). A correct histologic diagnosis by EUS-guided FNA was made in 19 of 30 malignancies (sensitivity, 63.3%) and 15 of 21 benign pancreatitis lesions (specificity, 71.4%). A correct histologic diagnosis by US-guided PNB was made in 32 of 38 malignancies (sensitivity, 84.2%) and 14 of 15 benign pancreatitis lesions (specificity, 93.3%). There was statistical differences between correct diagnostic accuracy for benign versus malignancy (P= 0.02). There were no statistical differences between technical success group and failure group in both US-guided PNB and EUS-guided FNA according to the size, location and pathologic result of the lesion in the pancreas.

Table 1. Baseline patient and tumor characteristics

	US-guided PNB (n=53)	EUS-FNA (n=51)	P value
Age (mean)	61.7	57.3	0.07
Sex (M/F)	34 / 19	26 / 25	0.23
Size(cm)	3.6±1.5	2.9±1.3	0.01
Location			
Head	35	30	
Neck	4	5	0.51
Body	13	12	
Tail	1	4	
Adenocarcinoma	36	29	
Other malignancy	2	1	
SPT	2	4	0.69
NET	3	2	
Pancreatitis	8	10	
Other Benign	2	5	

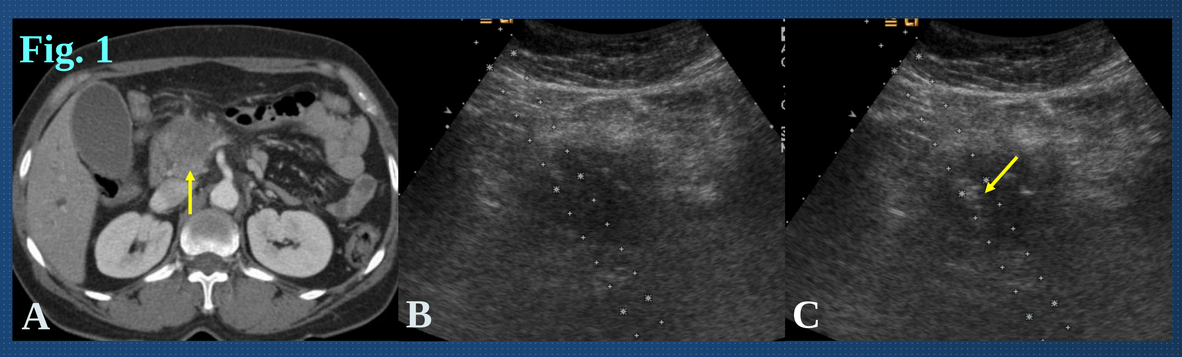

Figure 1. A 66-year-old female patient with pancreas cancer (A) CT image shows hypovascular mass in pancreas head. Transverse sonogram shows a hypoechoic mass in the head of the pancreas. Pre-firing(B) and post-firing(C) sonogram shows the echogenic needle in the mass (yellow arrow).

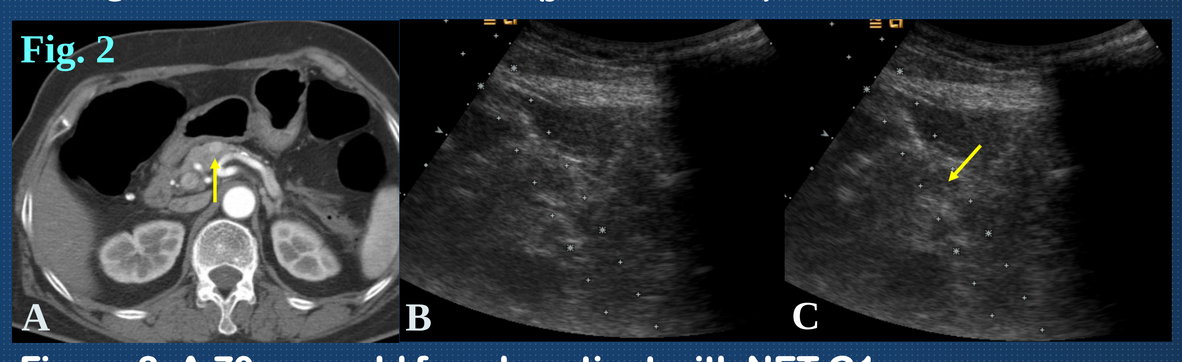

Figure 2. A 70-year-old female patient with NET G1 (A) CT image shows small hypervascular mass in pancreas head. Transverse sonogram shows a small hypoechoic mass in the head of the pancreas. Pre-firing(B) and post-firing(C) sonogram shows the echogenic needle in the mass (yellow arrow). Pathology confirmed an NET G1.

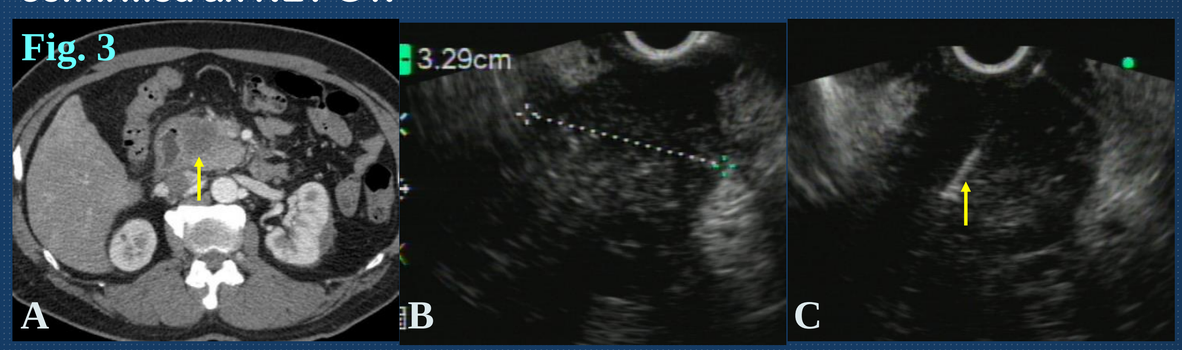

Figure 3. A 51-year-old male patient with pancreas head cancer (A) CT image shows hypovascular mass in pancreas head. (B) EUS showed a well-defined round shaped and slightly hypoechoic solid tumor in pancreas head. (C). The lesion was punctured with a 22-gauge aspiration needle(yellow arrow).

Conclusion

Use of US-guided PNB was technically feasible, efficient and comparable to EUS-guided FNA for diagnosis of solid pancreatic lesions. And diagnostic accuracy for specific tumor discrimination of US-guided PNB was superior than that of EUS-guided FNA.