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Original article

Optimal number of needle passes in endoscopic ultrasound-guided fine needle aspiration for pancreatic lesions

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ABSTRACT

Objectives: Endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) is accurate in cytological diagnosis of pancreatic lesions. Our aim was to determine optimal number of needle passes in EUS-FNA for pancreatic lesions without onsite cytopathologist, who is not routinely available to participate in the procedure.

Methods: Results of all needle passes in EUS-FNAs for 117 pancreatic neoplasms in 115 patients were reviewed retrospectively. Factors that required 2 or more needle passes for correct diagnosis were identified by multivariate logistic regression analysis. In each lesion group defined by the factors that required 2 or more passes and were known at the time of EUS-FNA, number of needle passes was regarded as optimal when an increase in diagnostic sensitivity by an additional needle pass did not reach 10%.

Results: Size of 15 mm or less (OR 4.58, 95% CI 1.70–12.3, $P < 0.01$), location of head (OR 5.02, 95% CI 1.82–13.9, $P < 0.01$), and neuroendocrine tumor (NET) (OR 5.04, 95% CI 1.38–18.4, $P = 0.01$) independently required 2 or more needle passes. Optimal numbers of needle passes for lesions of 15 mm or less in the head, those of more than 15 mm in the head, those of 15 mm or less in the body or tail, and those of more than 15 mm in the body or tail were 3, 2, 2, and 1, respectively. When these numbers of needle passes were performed, 93% of pancreatic lesions were correctly diagnosed.

Conclusions: Optimal numbers of needle passes in EUS-FNA for pancreatic lesions without onsite cytopathologist were between 1 and 3.

Introduction

Endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) developed in 1992 [1] can provide a cytological diagnosis in 80%–90% or more of pancreatic neoplasms [2–6]. It was reported that cytological yield was less when an onsite cytopathologist was absent during the procedure [7–11]. However, in many institutions, it is difficult to have a cytopathologist routinely available to participate in EUS-FNA. In this setting, it has been recommended by early reports that 5 or more needle passes be performed of pancreatic masses to assure that an adequate sample is obtained [12,13]. However, recent studies reported that cytological diagnosis was established by the first needle pass in not a few cases of pancreatic malignancy [9,14,15]. This may have been brought by improved performance of endoscopic instrument, ultrasonographic system, and aspiration needles. Admitting low frequency of complications in EUS-FNA for pancreatic lesions [16–19], unnecessary additional needle passes should be avoided. In the present study, we attempted to identify factors that required 2 or more needle passes in EUS-FNA for pancreatic lesions

Abbreviations: EUS-FNA, endoscopic ultrasound-guided fine needle aspiration; NET, neuroendocrine tumor; FNA, fine needle aspiration.

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retrospectively by multivariate analysis and to determine optimal numbers of needle passes for lesion groups defined by these factors in the absence of onsite cytopathologist.

Patients and methods

Patients

Consecutive EUS-FNAs for 117 pancreatic neoplasms in 115 patients performed between October 2005 and May 2010 at Osaka Medical Center for Cancer and Cardiovascular Diseases were evaluated retrospectively. They were initially detected by ultrasound, computed tomography, or EUS. The study protocol was approved by institutional review board of Osaka Medical Center for Cancer and Cardiovascular Diseases. All patients provided written informed consent to undergo the procedure.

EUS-FNA procedure

EUS-FNA was performed with a curvilinear echoendoscope FG-3630U (Pentax, Tokyo, Japan), GF-UCT2000, or GF-UCT240 (Olympus, Tokyo, Japan), by 4 endosonographers. Lesions in the head of the pancreas were targeted by transduodenal approach and those in the body or the tail by transgastric approach. After excluding vascular structures and choosing a vessel-free tract, a 22-gauge or 25-gauge needle (Echotip Ultra, Wilson–Cook, NC) was inserted into the working channel of the echoendoscope. When the tip of the catheter sheath that contained the needle was visualized, needle was advanced from the sheath, through the wall of the bowel, and into the target lesion under ultrasonographic guidance. Once in the target lesion, the stylet was removed and aspiration was performed using a 10 ml syringe by moving the needle back and forth within the lesion 20 times. When aspiration was completed, suction was released, the needle was withdrawn into the sheath, and the catheter system was removed through the biopsy channel. An EUS-FNA for a lesion of 10 mm in the body of the pancreas through the stomach using a 22-gauge needle is shown in Fig. 1. All the endoscopic procedures were performed under conscious sedation utilizing midazolam.

Cytologic examination

Air-dried and alcohol-fixed smears were prepared by spraying the aspirated material onto glass slides. Air-dried smears were stained with modified Gill-Shorr method [20], reviewed immediately by an onsite cytopathologist, and a preliminary diagnosis was rendered. Additional material was obtained from each target lesion unless cytological evaluation performed by onsite cytopathologist confirmed the presence of neoplastic cells or a sufficient number of representative cells from the target lesion. Alcohol-fixed smears were later stained with Papanicolaou method and cytological results were decided for each needle pass. They were interpreted as insufficient, normal, atypical, suspicious, strongly suspicious, or malignant. Insufficient, normal, atypical, and suspicious were recorded as negative; strongly suspicious and malignant were recorded as positive. For the sake of convenience, also an interpretation of neuroendocrine tumor (NET) was recorded as positive. Number of needle passes required for the establishment of cytological diagnosis in each lesion was reviewed. For example, it was 3 when the results of the first and the second needle passes were negative and that of the third was positive. Also cytological diagnosis of each lesion, which was determined as positive unless all the results of needle passes were negative, was reviewed. Adenocarcinoma cells aspirated from the lesion (Fig. 1) by the first needle pass are shown in Fig. 2.

Final diagnosis

The final diagnosis of pancreatic lesion was determined by surgical resection in 50, and cytological features and imaging follow-up in 67.

Statistical analysis

Factors that prevented correct cytological diagnosis of pancreatic lesions by EUS-FNA, and those that required 2 or more needle passes were identified by univariate and multivariate logistic regression analysis using SPSS 11.0 software (SPSS, Chicago, IL). P values less than 0.05 were considered to be statistically significant.

Determination of optimal numbers of needle passes

Optimal numbers of needle passes were determined for lesion groups defined according to the significant factors that required 2 or more needle passes. Pancreatic lesions were grouped by the factors that had been known at the time of EUS-FNA, and not by those that had not been at the time of the procedure. Number of needle passes was regarded to be optimal when an increase in diagnostic sensitivity by an additional needle pass did not reach 10%.

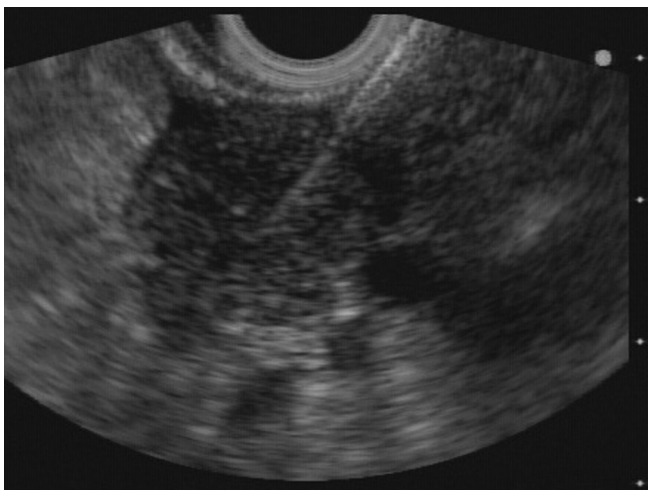

Fig. 1. EUS showed a lesion of 10 mm in the body of the pancreas, and EUS-FNA was performed through the stomach using a 22-gauge needle.

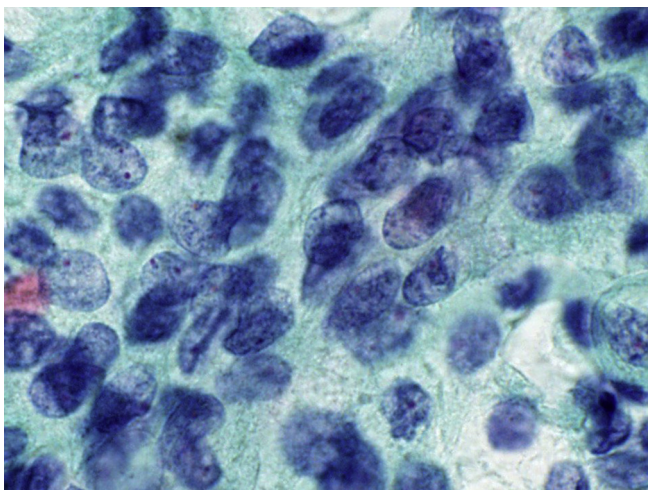

Fig. 2. Cytological examination of the aspirated material by the first needle pass of EUS-FNA confirmed adenocarcinoma (Papanicolaou, ×1000).

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