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Original Article

The Application of EUS-guided FNA in the Diagnosis of Pancreatic Neoplasms in the Elderly☆

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SUMMARY

Background: Endoscopic ultrasound guided fine needle aspiration has become a standard procedure in diagnosis of pancreatic neoplasms with a high diagnosis yield. However, the clinical application focusing on the elderly population is scanty.
Methods: Consecutive procedures for EUS-FNA diagnosis of pancreatic neoplasms at a tertiary referral center from March 2014 to December 2015 were analyzed retrospectively. The procedures were divided into two groups according to their age, the control group consisted of patients ≤60 years old and the elderly groups consisted of patients >60 years old. The primary outcome is the accuracy of the diagnosis in the two groups. The secondary outcome is the safety during the procedure.
Results: A total of 28 EUS-FNA procedures were performed. The mean age of the control group was 48.7 years (n = 14) versus 70.2 years (n = 14) for the elderly cohort. Diagnostic accuracy of the EUS-FNA procedure in detecting malignant (true positive) and benign (true negative) lesions were higher in the control group (nonelderly: 85.7% vs. elderly: 50%; P = 0.046). There were two mild acute pancreatitis associated to the EUS-FNA procedures in the control group.
Conclusion: Although EUS-FNA is safe and well tolerated in the elderly patients, our study showed a lower EUS-FNA diagnosis accuracy in this group. Focal fibrotic changes in the pancreas associated with the elderly patients resembled that of chronic pancreatitis microscopically.

1. Introduction

Pancreatic cancer is a disaster cancer disease with a poor prognosis and mainly occurs after 60 years of age. The 5-year survival rate for the pancreatic cancer is only at about 8% and the current progression in treatment modality have been relatively slow in comparison to most other cancers. A major reason for the poor prognosis is because of more than half of the pancreatic cancer patients were diagnosed in the advanced stage[1]. Pancreatic cancer is the fourth leading cause of cancer death in United States and the eighth in Taiwan. There is an increased trend of death caused by pancreatic cancer in Taiwan, tallying mortality rate 8.3 persons per one hundred thousand of the population in 2015[2].

Preoperative diagnosis of pancreatic lesions remains a challenge despite current advancement in imaging technologies. Endoscopic ultrasound (EUS) allows for excellent imaging and analysis of the pancreas and EUS-guided fine needle aspiration (EUS-FNA) permit needle advanced into the lesion precisely and obtain the tissue under real-time guidance. The tissue obtained from the FNA can provide for cytopathologic analysis. EUS has the benefit of being a relative less invasive, well-tolerated procedure.

☆ Conflicts of interest statement: I certify that all my affiliations with or financial involvement in, within the past 5 years and foreseeable future, any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript are completely disclosed (e.g., employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, royalties). All authors have no financial interests related to the material in the manuscript.

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Studies suggest that the yield of EUS-FNA is high in patients with pancreatic cancer. The pooled sensitivity and specificity of EUS-FNA were 92% (95% CI = 91–93%) and 96% (95% CI = 93–98%), respectively[3]. For the most part, EUS-FNA were generally both safe and effective when elderly patients are chosen appropriately. EUS-FNA has become a standard procedure in diagnosis of pancreatic neoplasms with a high diagnosis yield. However, clinical application focusing on the elderly population is scanty.

2. Patients and methods

All patients with suspected pancreatic neoplasms that were identified on a Computed Tomography (CT) scan or a Magnetic Resonance Imaging (MRI) scan referred for EUS-FNA were eligible to participate in this study. A total of twenty-eight EUS-FNA procedures were performed between March 2014 and December 2015 at a tertiary referral center. Procedures were performed on an inpatient basis. The patients were divided into two groups according their age, the control group consisted of patients ≤60 years old and the elderly groups consisted of patients >60 years old. The demographics, EUS indications, procedural information (instruments, passes, size, tumor location, interventions), cytopathological result, accuracy and complications, followed-up period were analyzed. The cytology samples were reported as positive, suspicious for malignancy, atypical, or negative on the official pathology report. The criteria for final diagnosis of benign and malignant lesions are defined as follow. Diagnosis was malignancy if meeting one or more of the following criteria: (1). Malignant cells in the surgical specimen of the lesion or metastases. (2). Unresectable during operation. (3). Progression of disease or development of metastases upon follow-up imaging. (4). Clinical evidence of pancreatic cancer or confirmed cancer-related death when follow-up with patient's primary care physician. Classified as benign if meeting one or more of the following criteria: (1). No malignancy in surgical pathology and/or exploration. (2). Follow-up CT or ultrasound after five months showed a normal pancreas, stable mass or no metastases. The primary outcome is the accuracy of diagnosis in the two groups. The secondary outcome is the safety during the procedure. The Institutional Review Board at Mackay Memorial Hospital approved this retrospective study (16MMHIS131e).

3. Equipment and procedure

Standard EUS was performed by using a curvilinear echoendoscope (Olympus GF-UCT260). A 22- gauge FNA needle (Olympus EZ Shot 2 Aspiration Needles; Olympus or Expect™; Boston Scientific) was used to obtain tissue. Prior to the procedure, in all cases, written informed consent was obtained from the patient. Procedures were performed with patients in the left lateral decubitus position. Midazolam 5 mg and Fentanyl 0.1 mg or meperidine 50 mg were used for moderate conscious sedation in most of the procedures. Sedation was administered by the endoscopist who performing EUS-FNA. The type of sedation was chosen based on comorbidities and previous experience with sedation. Monitoring of patients during the procedures was included continuous pulse oximetry and blood pressure assessment every 5 minutes.

All of the EUS related procedures were performed by an endosonographer (HHL). Prior to the EUS-FNA, color Doppler examinations were performed to exclude interposed vascular structures. All pancreatic head and uncinate neoplasms were accessed via the duodenum, while pancreatic body and tail neoplasms were accessed via the stomach. During individual EUS-FNA passes, by using the “up-down” dial of the echoendoscope, the needle was moved back and forth, four times at four different areas within the lesion, described in previous studies as fanning technique[4]. Immediate cytopathologic evaluation (ICE) was not available and the samples were prepared by endosonographer himself. The stylet was introduced into the needle, and the extruded material was placed either onto glass slides for primary inspection; if one or more small-core biopsy cylinders were acquired, these were collected by catheter needle and placed into formalin for histologic analysis (Figure 1A–D). The remaining partially liquid material was either placed in saline solution or smeared onto glass slides for cell block or cytologic analysis.

3.1. Statistical analysis

Demographic data (including age, gender), EUS indications, procedural information (instruments, passes, size, tumor location, interventions), cytopathological result, accuracy and complications, followed-up period were retrospectively analyzed. Statistical analysis was performed between two cohorts using the Statistical Package for the Social Science, version 18.0. Tests were two-tailed with significance level of 0.05. Descriptive statistics for continuous were calculated and were reported as mean ± standard deviation (SD). For categorical variables were described using frequency distributions and were reported as n (%). P values were based on Chi-Square test for categorical variables and Mann-Whitney *U* test for quantitative variables.

4. Results

4.1. Demography and clinical characteristics of patients

A total of twenty-eight EUS-FNA procedures were performed in twenty-eight patients. The mean age of the control group was 48.7 years (range 32–60 years); 64.2% of male, n = 14 versus 70.2 years (range 63–87 years; 50% of male, n = 14) for the elderly cohort. The final diagnosis classifying as malignancy was 24 of 28 patients (85.71%), whereas as benign disease was in 4 patients (14.28%). The overall accuracy was 71.4%. No statistically significant differences among the two groups with regard to gender, location, passes or size of the masses were found (Table 1).

4.2. Endoscopic finding and outcomes measures

Indications for EUS-FNA were to evaluate solid pancreatic neoplasms (n = 24) or pancreatic cystic lesion (n = 4). A neoplasm with a suspicious, atypical or malignant FNA reading with the final diagnosis of benign neoplasm was considered “false positive”. Meanwhile, a neoplasm with a negative FNA reading for malignancy but with a final diagnosis of malignant neoplasm was classified as “false negative”. Patients with atypical or suspicious cytology were considered true positive if the final diagnosis was malignancy.

Among 24 patients with malignancy diagnosis, cytopathological evaluation revealed positive of malignancy (n = 8), suspicious of malignancy (n = 4), atypical (n = 3), negative of malignancy (n = 9). Among 4 patients with benign diagnosis, cytopathological evaluation revealed all negative of malignancy. The cytologic classifications of FNA results are outlined in Table 2. The overall accuracy was 71.4%.

For the primary outcome, diagnostic accuracy of the EUS-FNA procedure in detecting malignant (true positive) and benign (true negative) lesions were higher in the nonelderly cohorts (nonelderly: 85.7%; elderly: 50%; P = 0.046) (Table 1). For the secondary outcome, complications related to the EUS-FNA procedure were defined as pancreatitis, moderate or severe bleeding, perforation, infection, abdominal pain, hemodynamic or respiratory compromise during or after the procedure and any event leading to post

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