Endoscopic Ultrasound-Guided Fine Needle Aspiration (EUS-FNA) Biopsy of Solid Pancreatic Lesions: Review of 681 Cases

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INTRODUCTION

Solid lesions in the pancreas comprises a variety of entities ranging from non-neoplastic to neoplastic processes and from benign to malignant neoplasms. The most common malignancy is ductal adenocarcinoma, which accounts for more than 85% of all malignancies and is associated with poor prognosis. Commonly encountered benign or less aggressive neoplasms include pancreatic endocrine neoplasm, solid pseudopapillary tumor and intraductal mucinous papillary neoplasm. In addition metastatic neoplasms and hematopoietic malignancies may also secondarily involve the pancreas. Due to their diverse clinical characteristics, preoperative distinction of of these entities are crucial for appropriate clinical management.

Endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) biopsy has been increasingly used in the preoperative evaluation of pancreatic lesions, which allows an accurate diagnosis of pancreatic tumors with minimal complications. The success of EUS-FNA in diagnosing pancreatic lesions in general or individual types of pancreatic tumors are well documented in the cytology literature. It appears that EUS-FNA has high specificity or positive predictive valve in diagnosing pancreatic malignancies. However, there are variation in the sensitivity and indeterminate diagnosis rate. In addition the reported non-diagnostic rate is varied.

FNA diagnosis of most pancreatic lesions, particularly ductal adenocarcinoma, is often straightforward and requires only cytological evaluation. Ancillary studies such as immunocytochemistry and flow cytometry may be required for the work-ups of other pancreatic neoplasms as well as secondary malignancies. In these circumstances, procurement of additional aspirate material is crucial. On-site evaluation allows rapid evaluation of aspirate material at the endoscopy suite and thus help ensure adequate sampling and appropriate specimen triage. In this regard, rapid on-site evaluation improves diagnostic performance of EUS-FNA by reducing non-diagnostic and indeterminate rates.

In this study we retrospectively reviewed 681 cases of solid pancreatic lesions that were evaluated by EUS-FNA at our institution. The diagnostic performance of EUS-FNA and the correlation of cytological diagnoses with surgical follow-ups were analyzed.

MATERIALS AND METHODS

The institutional database was search for all cases with a diagnosis of pancreatic lesions by EUS-FNA biopsy at Yale-New Haven Hospital between January 2005 and June 2011. A total of 1143 cases were retrieved from cytopathology archives, of which 681 cases (59.6%) were solid or partially cystic lesions defined by imaging studies. Histopathologic follow-up was available in 151 cases (22%). Patient's clinical information including imaging study findings, cytopathologic and surgical pathology diagnoses were retrospectively reviewed.

FNA biopsy was performed under endoscopic ultrasound (EUS) guidance using 25-gauge needles. The aspirates were smeared and air-dried or fixed in 95% of alcohol and stained with Diff-Quik or Papanicolaou techniques. Rapid on-site evaluation of Diff-Quik stained slides was performed by a cytopathologist in almost all cases to ensure adequate sampling, appropriate specimen triage, and preliminary diagnosis. Additional aspirates were saved and processed for a cell block for potential immunocytochemical studies. In cases that were suspected for lymphoproliferative disorders, part of the aspirates was also saved in RPMI and sent for flow cytometry studies.

Final cytologic diagnoses were rendered by cytomorphologic features and in some cases ancillary study results (immunocytochemical or flow cytometric studies), which included non-diagnostic, negative, atypical, suspicious, neoplasm, and malignant. Surgical pathology diagnoses included negative for malignancy, benign neoplasm and malignant.

RESULTS

1. Clinicopathologic Features (Table 1)

The patients were 347 male and 334 female with ages raging from 13 to 90 years old. The pancreatic lesions were solid and partially cystic in 621 and 60 cases, respectively. The majority of the lesions (69%) were located in the head/neck of the pancreas. Other locations included the body (14%), tail (14%) and uncinate process (4%). The lesions ranged from 0.7 to 12 cm, with a mean of 3.2 cm.

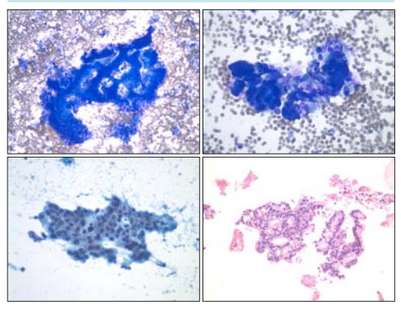
2. Cytological Diagnoses (Table 2)

A cytological diagnosis was rendered in 638 of 681 cases (97%). Non-diagnostic biopsies were seen in the remaining 23 cases (3%). The cytological diagnoses included negative (17%), atypical (7%), suspicious for malignancy (2%), neoplasm (9%) and malignant neoplasm (63%). The most common neoplasm diagnosed cytologically was pancreatic endocrine neoplasm. Adenocarcinoma accounted for the vast majority of malignant neoplasms. Malignant neoplasms also included 20 cases of metastatic neoplasms and non-Hodgkin lymphoma.

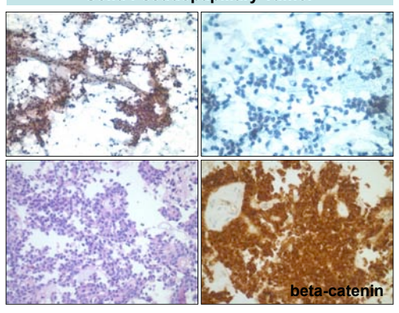
3. Correlation of Cytological Diagnoses with Surgical Follow-ups (Table 3)

The cytological diagnosis of malignancy correlated well with surgical follow-ups. All 92 cases with a malignant cytological diagnosis were confirmed on surgical follow-ups. Malignancy was identified in the majority of cases with either atypical or suspicious cytological diagnoses (76% and 72%, respectively). Cytological diagnosis of neoplasm showed benign (86%) or malignant (14%) neoplasms. About half of the cases with negative cytological diagnosis had either benign (18%) or malignant (36%) neoplasms in the follow-ups.

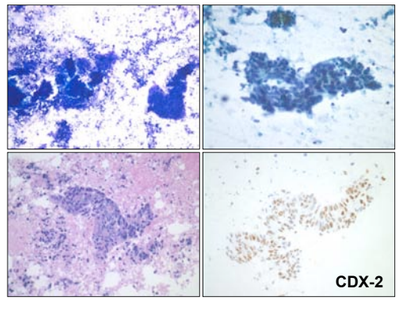
Ductal Adenocarcinoma of the Pancreas



Solid Pseudopapillary Tumor



Metastatic Adenocarcinoma of the Colon



Autoimmune Pancreatitis

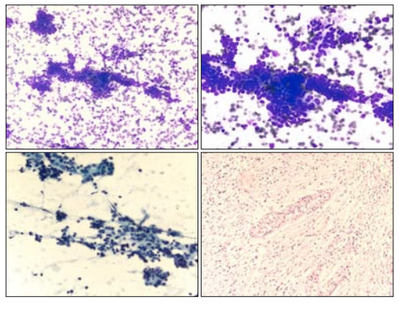


Table 1. Clinicopathologic Features

Patient's Gender		
Total	681	
Male	347	51%
Female	334	49%
Patient's Age		
Range	13 ~ 90	
Mean	66	
Location of the lesion		
Total	286	
Head/neck	196	69%
Uncinate	11	4%
Body	39	14%
Tail	40	14%
Size of the lesion		
Total	261	
Range	0.7 ~ 12 CM	
Mean	3.2 CM	
Appearance of the lesion		
Total	681	
Solid mass	621	91%
Partially cystic mass	60	9%

Table 2. Cytological Diagnoses

Non-diagnostic		
Total	23	3%
Negative		
Total	115	17%
Atypical		
Total	47	7%
Suspicious for malignancy		
Total	12	2%
Neoplasm		
Total	58	9%
Endocrine neoplasm	46	
Solid pseudopapillary tumor	5	
Mucinous cystic neoplasm	4	
Neoplasm, NOS	3	
Malignant neoplasm		
Total	426	63%
Adenocarcinoma	388	
Carcinoma, NOS	18	
Metastatic carcinoma	18	
Non-Hodgkin lymphoma	2	

Table 3. Correlation Between Cytologic Diagnosis and Surgical Follow-up.

	CASES	SURGICAL FOLLOW-UP		
CYTOLOGIC DIAGNOSIS	n	Negative	Benign Neoplasm	Malignant Neoplasm
Non-diagnostic	2	2 (100%)	0	0
Negative	11	5 (46%)	2 (18%)	4 (36%)
Atypical	17	3 (18%)	1 (6%)	13 (76%)
Suspicious for malignancy	7	1 (14%)	1 (14%)	5 (72%)
Neoplasm	22	0	19 (86%)	3 (14%)
Malignant neoplasm	92	0	0	92 (100%)
Total	151	11 (7%)	23 (15%)	117 (78%)

CONCLUSIONS

- Solid pancreatic lesions can be accurately diagnosed by EUS-FNA with 3% of non-diagnostic and 9% of indeterminate diagnostic rates.
- EUS-FNA diagnoses of solid pancreatic lesions correlate well with surgical follow-ups with a high positive predictive value in cytological diagnosis of malignancy.
- Adequate sampling, adjunct ancillary studies and awareness of diagnostic pitfalls may help avoid false positive and false negative diagnoses.

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