



# Endoscopic Ultrasound-Guided Fine Needle Aspiration Diagnosis of Secondary Tumors Involving the Pancreas: Review of 102 Cases



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## ABSTRACT

**Introduction.** Pancreatic masses may seldom represent a metastasis or secondary involvement by lymphoproliferative disorders in patients with or without history of malignancy. These tumors may have overlapping cytomorphologic features with primary pancreatic neoplasms. Recognition of this uncommon occurrence may help render an accurate diagnosis and avoid diagnostic pitfalls during the endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) biopsy of the pancreatic lesions. In this study we review our experience in diagnosing non-pancreatic primary tumors involving the pancreas.

**Methods.** The electronic databases of cytopathology archives were searched for the cases of non-pancreatic primary tumors involving the pancreas in our institutions. A total of 102 cases were identified. Ancillary studies including immunostains and flow cytometry were performed in 75 cases. The corresponding cytopathology reports including the results of ancillary studies, clinical history, and follow-up, if available, were reviewed.

**Results.** The patients consisted of 55 male and 47 female, with ages ranging from 39 to 91 years old. Seventy-seven patients had prior history of malignancy. The tumors metastatic to the pancreas included metastatic carcinoma (74 cases), lymphoproliferative disorders (16 cases), metastatic melanoma (5 cases), metastatic sarcoma (3 cases), granular cell tumor (2 cases), gastrointestinal stromal tumor (1 case) and pheochromocytoma (1 case). The most common metastatic tumors were renal cell carcinoma (19 cases) and lung carcinoma (16 cases). Other primary sites included skin, breast, colon, ovary, head & neck, esophagus and urinary bladder.

**Conclusions.** Secondary tumors involving the pancreas are rare and can be accurately diagnosed by EUS-FNA. Knowing prior history of malignancy and performing ancillary studies are crucial for improving diagnostic performance.

## INTRODUCTION

Involvement of the pancreas by secondary tumors such as metastatic carcinoma and lymphoproliferative disorders is a well-documented, yet uncommon occurrence. Autopsy studies have shown that the incidence of pancreatic involvement by non-pancreatic primary malignancies is in the range of 10%-15%. The pancreatic involvement by secondary tumors can present as a solitary mass, multiple masses or a more diffuse process as seen on imaging modalities. Endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) has emerged as a safe and reliable method for evaluating pancreatic lesions. Recognition of non-pancreatic malignancies is important because the clinical management of these patients is significantly different from those with primary pancreatic malignancies. Although EUS-FNA has high sensitivity and specificity in diagnosing pancreatic ductal adenocarcinoma and its diagnostic performance in secondary pancreatic tumors varies in the literature. In this retrospective study, we reviewed our experience in the EUS-FNA diagnosis of non-pancreatic primary tumors in an attempt to assess diagnostic performance and evaluate the role of ancillary studies.

## METHODS

A computer based data search was conducted to identify all EUS-FNA of pancreatic masses performed at our institutions. All pancreatic masses with or without extrapancreatic extension were selected. Exclusive peripancreatic masses or masses that arose from nearby organs and locally invaded into the pancreas were excluded. Only the cases with the diagnosis of non-pancreatic primary tumors were included in the final analysis.

The biopsies were all performed in the endoscopy suite by an interventional gastroenterologist. Direct smears were prepared and stained with Diff-Quik after air-drying or with Papanicolaou stain after 95% alcohol fixation. The Diff-Quik stained slides were available for rapid on-site evaluation. The remaining material was collected in Cyto-Rich Red fixative for cell block. In cases suspicious for lymphoproliferative disorders, portion of the specimens was saved in RPMI solution for flow cytometry. Immunocytochemical studies were performed on the cell block sections. The cytomorphologic and immunophenotypic findings were recorded. In addition, the clinical data, ultrasound findings, and surgical follow-up, if available, were retrospectively evaluated.

## RESULTS

1. The patients consisted of 55 males (54%) and 47 females (46%). The age ranged from 39 to 91 years old. Seventy-seven patients (75%) had prior history of malignancy.
2. Immunocytochemical studies and flow cytometry were performed in 39 and 10 cases, respectively.
3. The final diagnosis included the following:
  - metastatic carcinoma (74 cases)
  - metastatic melanoma (5 cases)
  - metastatic sarcoma (3 cases)
  - granular cell tumor (2 cases)
  - gastrointestinal stromal tumor (1 case)
  - pheochromocytoma (1 case)
4. The most common primary sites were kidney (renal cell carcinoma) and lung (non-small cell carcinoma and small cell carcinoma).

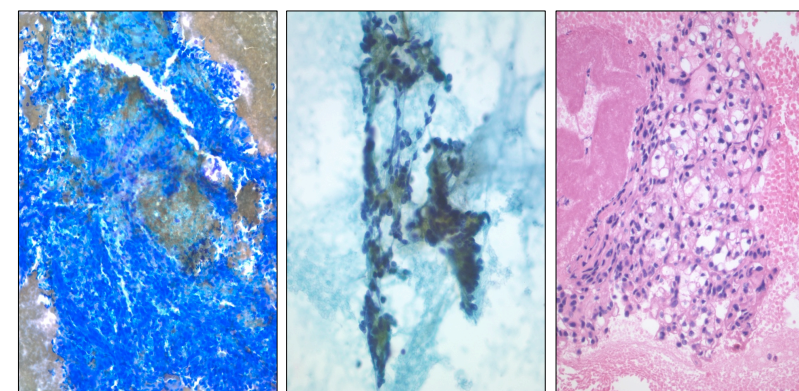


Figure 1. Metastatic renal cell carcinoma to the pancreas

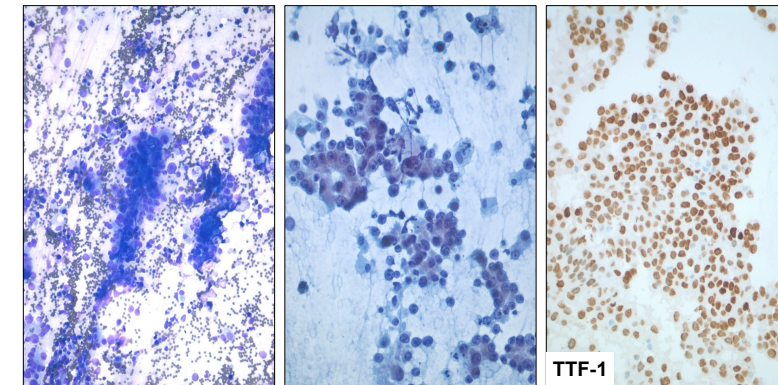


Figure 2. Metastatic adenocarcinoma of the lung to the pancreas

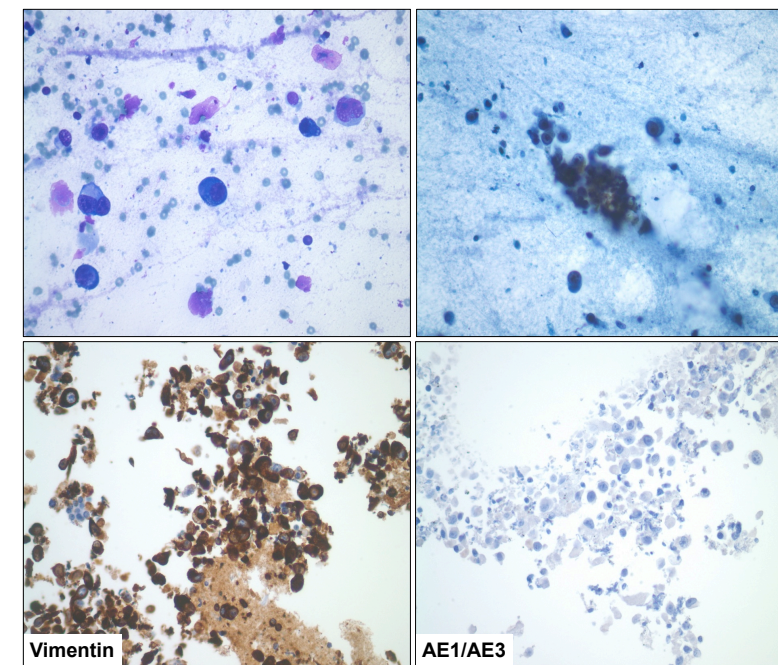


Figure 3. Metastatic sarcoma to the pancreas

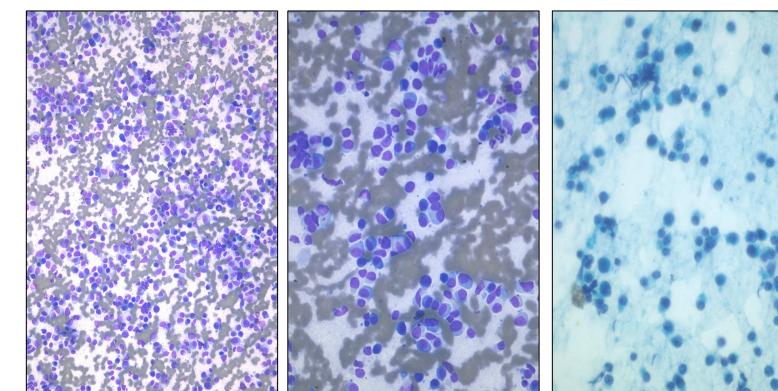


Figure 4. Plasmacytoma involving the pancreas

Table 1. Secondary Tumors Involving the Pancreas Diagnosed by Endoscopic Ultrasound-Guided Fine Needle Aspiration Biopsy

Diagnosis	Case (n)	Case (%)
Metastatic Carcinoma	74	73%
Kidney	19	
Lung	16	
Colon	7	
Breast	5	
Ovary	5	
Cervix	2	
Esophagus	2	
Head & Neck	1	
Prostate	1	
Urinary Bladder	1	
Unknown	15	
Lymphoproliferative Disorder	16	16%
Non-Hodgkin Lymphoma	14	
Plasmacytoma	2	
Metastatic Melanoma	5	5%
Metastatic Sarcoma	3	3%
Granular Cell Tumor	2	2%
Gastrointestinal Stromal Tumor	1	1%
Pheochromocytoma	1	1%

## CONCLUSIONS

- To our knowledge, this is the largest series of secondary tumors involving the pancreas diagnosed by EUS-FNA.
- Knowledge of prior history of malignancy, morphological comparison with prior specimens and application of ancillary studies such as immunocytochemistry and flow cytometry are crucial for rendering an accurate diagnosis.
- The most common secondary tumors involving the pancreas are metastatic carcinoma, with the kidney and lung being the two most common primary sites.

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