Pancreatic Masses: What about Neuroendocrine Tumors?

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Agenda

- Epidemiology of Pancreatic Cancer
- Review Anatomy
- Case Presentation
- Differential Diagnosis
- Menu of Tests
- Management
- Conclusions
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Pancreatic Cancer

- 42,470 cases diagnosed 2009
- 4\textsuperscript{th} leading cause of cancer death
- 20\% survival at 1 year, 5\% at 5 years
- 90\% adenocarcinoma
- 2\% neuroendocrine

<table>
<thead>
<tr>
<th>Stage</th>
<th>5 Year Survival Rate$^1$</th>
</tr>
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<tbody>
<tr>
<td>Stage IA</td>
<td>37%</td>
</tr>
<tr>
<td>Stage IB</td>
<td>21%</td>
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<tr>
<td>Stage IIA</td>
<td>12%</td>
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<tr>
<td>Stage IIB</td>
<td>6%</td>
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<tr>
<td>Stage III</td>
<td>2%</td>
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<tr>
<td>Stage IV</td>
<td>1%</td>
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</tbody>
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http://www.cancer.org/docroot/CRI/content/CRI_2_2_4x_Survival_Rates_for_Pancreatic_Cancer.asp?rnav=cri
Pancreatic Cancer

• Includes: pancreatic, duodenal, ampullary, and bile duct carcinomas

• Risk Factors: age, obesity, smoking, family history, abdominal radiation, and chronic pancreatitis (alcohol, gallstones etc)

• 15-20% resectable at diagnosis\(^2\), based on CT
  – No involvement of the SMA or celiac axis
  – Patent superior mesenteric-portal venous confluence
  – No evidence of distant metastatic disease (liver, lymph)

Neuroendocrine

• Presentation depends on tumor function
  – Most have octreotide (somatostatin) receptors
  – Insulinoma, non-fxn, gastrinoma, VIPoma, glucagononia, Somatostatinoma

• Associated with MEN 1, von Hippel-Lindau disease, and neurofibromatosis 1

• 5-year survival in localized dz: 62-91%, regional dz: 49-73%\(^3\)

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Pancreatic Anatomy
Pancreatic Arterial Supply

Hepatic artery proper
Common hepatic artery
Abdominal aorta
Celiac trunk
Spleenic artery
Spleen
Gastroduodenal artery
Anterior superior pancreaticoduodenal artery
Posterior superior pancreaticoduodenal artery
Duodenum
Anterior inferior pancreaticoduodenal artery
Posterior inferior pancreaticoduodenal artery
Aorta
Great pancreatic artery
Dorsal pancreatic artery
Inferior pancreatic artery
Superior mesenteric artery

Arteries: pancreaticoduodenal
Veins: pancreaticoduodenal
Node: ileocolic
Veins: right gastroepiploic
Pancreatic Venous Supply
Pancreatic Lymph Nodes

Hepatic Lymph Node = Node of Importance
Normal appearance of Pancreas

Important surrounding structures – Gall Bladder (GB), Superior Mesenteric Artery (SMA), portal vein, liver, spleen (S)
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Patient History

• AB is a 57F who presents with 25-lb weight loss and jaundice
• No abdominal masses, pain or tenderness
• No history of gall stones, liver disease, pancreatitis or family history

What’s the next step?

Image based on Differential Diagnosis
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- Epidemiology of Pancreatic Cancer
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- **Differential Diagnosis**
- Menu of Tests
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Differential Diagnosis

- Pancreatic Cancer
- Pancreatic pseudocyst or cystic neoplasm
- Lymphoma or metastasis
- Choledocholithiasis
- Biliary stricture
- Hepatocellular carcinoma
- Primary sclerosing cholangitis
- Primary biliary cirrhosis
Now we will review different types of pancreatic cancer and their typical appearance on CT.
Companion Patient 2: Pancreatic Adenocarcinoma on CT
Companion Patient 3: Ampullary Carcinoma on CT
Companion Patient 4: Duodenal Adenocarcinoma

Axial, c+, abdomen CT
BIDMC PACS
Companion Patient 5: Cholangiocarcinoma on CT
Be careful not to forget other possible, but less likely diagnoses on the differential

Let’s review a case of choledocolithiasis that presented similarly to pancreatic cancer
Companion Patient 6: Choledocolithiasis on CT
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Menu of Tests

- CT – with and without contrast
- MRI – if CT contraindicated
- U/S – abdominal, if suspect other dx
- EUS – biopsy or localization
- MRCP – study biliary/pancreatic ducts
- ERCP – if intervention expected
- Octreotide scan – localize endocrine tumor
Menu of Tests

• **CT +/- contrast initial test of choice**
  • MRI – if CT contraindicated
  • U/S – abdominal, if suspect other dx
  • EUS – biopsy or localization
  • MRCP – study biliary/pancreatic ducts
  • ERCP – if intervention expected
  • Octreotide scan – localize endocrine tumor
Let’s review a normal Octreotide scan as many people are not familiar with the normal appearance.
Companion Patient 7: Normal Octreotide Scan

Normally enhancing kidneys, bladder, spleen, and liver

Correlate with CT for better localization
Our Patient AB: CT findings

Enlarged Gall Bladder, dilated biliary ducts

Pancreatic mass: soft tissue density mass on c- CT, enhancing on c+ CT
Neuroendocrine Tumors
Appearance on CT

Our Patient AB

Companion Patient 8

AB – index patient hyperenhancing lesion, typical for neuroendocrine tumors
Companion Patient 8 - Neuroendocrine hypoenhancing lesion
Pancreatic Adenocarcinoma
Appearance on CT

Companion Patient 9

Axial, c+, abdomen CT

Companion Patient 10

Axial, c+, abdomen CT

Companion 2: Enhancing adenocarcinoma
Companion 3: Typical hypoattenuation adenocarcinoma
Management Algorithm

Abd CT +/- contrast with vascular recons

- Resectable
  - confined to pancreas
    - +/- ERCP stent
      - Surgery - Whipple

- Unresectable
  - vessel, organ, lymph involvement
    - ERCP stent + bx
      - Pathology based rx And Palliation

Pathology based rx And Palliation
- Tumor thrombus SMV
- Likely liver met

Axial, c+, abdomen CT
Coronal, c+, abdomen CT
Vascular reconstruction, c+, abdomen CT
Our Patient AB: Algorithm

Abd CT +/- contrast with vascular recons

Resectable
- confined to pancreas

Unresectable
- vessel, organ, lymph involvement

+/- ERCP stent

Surgery - Whipple

ERCP stent + bx

Pathology based rx
And Palliation
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AB Course

- Sent from the office for ERCP stent and biopsy
- See dilated biliary ducts
- Stent placed through soft tissue mass (M)
Biopsy Results

• x3 ERCP biopsies were insufficient for diagnosis
• Laproscopic staging done for diagnosis of presumed pancreatic adenocarcinoma

But why was it so vascular?

Should we cut into that mass?
1. Hypervascular pancreatic tumor
2. Tumor thrombus in SMV
Final Diagnosis

- Biopsy of liver lesions (as seen on previous CT)
- Pathology confirmed non-functioning neuroendocrine tumor
- EH received somatostatin chemo
Our Patient AB: Octreotide Scan

Increased signal in head of the pancreas
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Conclusion

• Based on improved prognosis, AB successfully underwent definitive surgical bypass

• She was doing well on octreotide analog chemotherapy

Our patient AB: 8 months later

- Increased to 10x5cm from 7x5cm
- Large liver metastasis
- Pneumobilia
Summary

- Abdominal CT with and without contrast is the study of choice for suspected pancreatic masses
- Tumor pathology can drastically change patient’s treatment and prognosis
- Typical features of different tumors should be recognizable on CT
  - Non-enhancing adenocarcinoma
  - Enhancing neuroendocrine
Future Considerations

• Research indicates that surgical removal of neuroendocrine tumors that are unresectable based on regional or distal metastasis provides statistical and clinical survival benefit\(^4\)

• Potential change in radiologic criteria for resectablity

Acknowledgements

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References

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