Pancreatic Cystic Lesions

A semi-interactive tutorial

Running time approx: 15 mins

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Radiology Core Rotation
BIDMC
Match the patient with their presentation:

A. 45 y.o M c/ hx of ETOH abuse and recent episode of 10/10 epigastic abdominal pain.
B. Asymptomatic 67 y.o M c/ abnormality detected incidentally on CT abdomen
C. 76 y.o F c/ 2 wk hx of n/v, 12 lb wt loss, abnormality detected on CXR.
Quiz 1

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Coronal C+ CT. PACS, BIDMC
Courtesy C. Vollmer
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We will go over the characteristic features that may help distinguish these lesions in the slides to come.

It's important to note however that in real life we are presented with clinical histories in conjunction with imaging.

Indeed, this clinical history and followup is often key as the appearance of cystic lesions can confuse even trained professionals.
Goals

- To review the differential diagnosis of cystic lesions of the pancreas.
- To review the menu of tests available to aide in diagnosis.
- To review the characteristic findings of these lesions (especially on CT).
- To present an algorithm for workup of lesions.
Rationale

- Cystic lesions are increasingly being picked up incidentally.
- 30% of pancreatic resections at MGH are now for cystic lesions.\(^1\)
- Imaging plays an evolving role in the workup and management of these lesions.

\(^1\) Brugge et al
Ddx of cystic lesions

- Non-neoplastic cystic lesions
  - Pseudocyst (~90% of all cystic masses in panc)\(^1\)
  - Congenital cysts (AKPD, VHL, CF, true cyst)
- Cystic Neoplasms (10-15% of cystic masses)\(^2\)
  - Serous cystadenoma/adenocarcinoma (32-39% of CNs)\(^2\)
  - Mucinous cystadenoma/adenocarcinoma (10-45% of CNs)
  - Intraductal papillary mucinous neoplasm (21-33% of CNs)
    - Main duct vs. side-branch
  - Cystic degeneration of solid tumor including endocrine tumors (<10% of CNs).
- Non-pancreatic lesions

\(^1\) Figueriras
\(^2\) Brugge
Definitions: Pseudocyst

- Complication of acute pancreatitis
- Organization of fluid collection c/ cyst-like wall (no true epithelium).
- May be hemorrhagic, walls may calcify, more often shrinks over time.
- Some semi-characteristic radiological features, but emphasis is on clinical hx.
## Characteristics of Cystic Neoplasms

<table>
<thead>
<tr>
<th></th>
<th>Demographics</th>
<th>Pathology</th>
<th>Fluid</th>
<th>Location</th>
<th>1. Malignancy</th>
<th>2. Prognosis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SCA</strong></td>
<td>Middle aged female &gt; male. No h/o pancreatitis</td>
<td>Cuboidal glycogen rich</td>
<td>Thin, serous</td>
<td>Evenly distributed No reln to PD</td>
<td>1. Rarely</td>
<td>2. Resection curative</td>
</tr>
<tr>
<td><strong>MCN</strong></td>
<td>Middle aged, mostly female. No h/o pancreatitis</td>
<td>Columnar, ovarian-like stroma</td>
<td>Thick, mucin</td>
<td>Body/ Tail No reln to PD</td>
<td>1. Moderate</td>
<td>2. Resection curative as long as no invasion</td>
</tr>
<tr>
<td><strong>IPMN</strong></td>
<td>Elderly male. Occ h/o pancreatitis. Cytologically similar to MCN, no ovarian-like stroma</td>
<td>Thick, mucin Head Growing within/out of PD</td>
<td>Head Growing within/out of PD</td>
<td>1. High (main duct), Low (side-branch)</td>
<td>2. Resection curative for (\leq) borderline atypia</td>
<td></td>
</tr>
</tbody>
</table>

SCA = serous cystadenoma; MCN = mucinous cystic neoplasm; IPMN = intraductal papillary mucinous neoplasm.

Adapted from Brugge, Oh
The Big Picture

1. Is lesion in pancreas?
2. Pseudocyst vs. neoplasm?
3. SCA vs MCN/IPMN
   1. If IPMN, location?
4. Evidence of malignancy, invasion, metastatic disease

Adapted from Oh et al
Menu of Radiologic Test

- CT
- MRI/MRCP
- EUS/ EUS + FNA
- ERCP
CT Imaging

- Indications: Core modality for Dx, surgical planning, followup of some lesions. Often seen first as incidentals on CT.
- Can describe cysts
  - Location, size
  - Locularity (unilobar vs. oligolobar vs. multilobar)
  - Size of cysts (microcysts <2mm, macrocysts, “honeycomb”)
  - Wall thickness
- Some findings are characteristic. However these are seen in minority of exams.
  - Accuracy of CT ranges from 20-90% depending on study!! (Oh)
Other modalities

- **ERCP:**
  - Gold-standard for determining communication c/ PD (for diagnosing IPMNs)

- **MRI/MRCP**
  - Communication c/ PD (as ERCP), while simultaneously imaging parenchyma and cyst

- **EUS**
  - Better delineation of internal structures (septation, mural nodules, wall), parenchymal changes
  - Variable claims re: accuracy

- **EUS + FNA**
  - Cytology is most accurate method of dx, though limited by ability to get cells (sens <50%) (Oh et al)
  - Amylase (elev in IPMN, pseudocyst) and tumor markers (CEA)
  - Indicated where will change management (more later)
Our Pt #1: Pseudocyst on CT

- Characteristic unilocular cyst (C) c/ thick wall in tail of pancreas
- Evidence of pancreatitis is key: edematous pancreas(*), fat stranding (#):
- Other features:
  - Septations unusual
  - May mimic MCNs

Axial C+ CT. PACS, BIDMC
Our Pt #1: Development
Of Pseudocyst on CT

Organization of fluid collection. Axial C+ CT images, 1 month apart. PACS, BIDMC.
Serous Cystadenoma

Classically:
- Microcystic or “honey-combed”
- Central calcifications, scar
- Thin septae

Actually:
- 20% macrocystic
- Borders b/w microcysts indistinct on CT
- Above features relative rare
Axial C+ CT. Finding: # microcystic, multilocular lesion c/ central enhancing scar.
PACS, BIDMC. Courtesy of Mara Barth
Another Companion Patient: Serous Cystadenoma on CT

Central scar and calcification in SCA. Figueiras Curr Probl Diagn Radiol, Sept 2007
Companion Patient: Serous Cystadenoma on EUS

EUS c/ doppler: Multiloculated microcystic lesion abutting aorta (A). PACS, BIDMC. Courtesy of Mara Barth.
Coronal HASTE MRI: Clustered microcystic lesion in uncinate process.
PACS, BIDMC. Courtesy of Mara Barth
Mucinous Cystadenoma

- Macrocystic
- Peripheral calcifications
- Malignant lesions often c/ thick walls/septations
- Mural nodule or solid components suggestive of malignant degeneration
- Hi signal on T1 or T2 MRI
Our Pt #2: MCN on CT

Coronal C+ CT:
- Large thick walled, macrocystic lesion in tail of pancreas (C).
- Solid components, mural nodules indicating potential malignancy
Our Pt #2: MCN on EUS

EUS: Cyst c/ mural nodule (N). GI Care Endoscopy, BIDMC
Patient 2: Outcome

- FNA of lesion non-diagnostic.
- Preoperative high suspicion for mucinous adenocarcinoma given imaging appearance. No evidence of metastatic disease. Distal pancreatectomy planned.
- At surgery, lesion was grossly invasive of colon. Several areas suspicious for metastatic disease. \(\Rightarrow\) distal pancreatectomy, cholecystectomy, splenectomy and partial colectomy.
- Pathology: mucinous cystadenocarcinoma.
- Post-op course: developed mets to peritoneum and lung which progressed despite 6 cycles chemotherapy. At 6 months post-op, the patient elected for hospice care.
Companion Pt:
Main Duct IPMN
On CT

- Seen growing off/out of main PD (C).
- Associated c/ dilation of PD (seen here) and filling defects (not seen) 2/2 mural nodules.
- Mucin at ampulla on endoscopy is diagnostic.

Axial C+ CTs.
PACS, BIDMC. Courtesy C. Vollmer
EUS: Dilated PD (top); intramural filling defect (#) (right). PACS, BIDMC Courtesy C. Vollmer
Companion to Pt #3: Side-branch IPMNs

- “Grape-like multilocular” lesion at panc head c/ communication
- Counter-clockwise--Axial C+ CT: cluster of cysts; ERCP: contrast-filling cystic lesion in communication c/ PD; MRCP: enhancing cystic lesion in communication c/ PD.

Images: Oh et al.
Management Algorithms
Figure 5. Differential diagnosis and management strategy for cystic lesions of the pancreas. \(^1\)Cyst <2 cm without septum and mural nodule. \(^2\)Favorable prognosis suggested by size less than 30 mm, absence of mural nodule. \(^3\)Risk-benefit analysis based on age, location, and comorbidity. Sx = symptom; SCA = serous cystadenoma; BD IPMN = branch-duct intraductal papillary mucinous neoplasm; Px = prognosis.
FIG 38. Schematic illustrates an algorithm for the management of cystic pancreatic masses.
Thanks

- Sadhna Nandwana
- Mara Barth
- Charles Vollmer
- Gillian Lieberman
References


- Demos, TC. Pictorial Review: Cystic Lesions of the Pancreas. AJR 2001; 179: 1375-1388
