Issues in Management of Pancreatic Pseudocysts

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ABSTRACT
Pancreatic pseudocysts (PPs) comprise more than 80 % of the cystic lesions of the pancreas and cause complications in 7-25% of patients with pancreatitis or pancreatic trauma. The first step in the management of PPs is to exclude a cystic tumor. A history of pancreatitis, no septation, solid components or mural calcification on CT scan and high amylase content at aspiration favor a diagnosis of PP. Endoscopic ultrasound (EUS)-guided FNAC is a valuable diagnostic aid. Intervention is indicated for PPs which are symptomatic, in a phase of growth, complicated (infected, hemorrhage, biliary or bowel obstruction) or in those occurring together with chronic pancreatitis and when malignancy cannot be unequivocally excluded. The current options include percutaneous catheter drainage, endoscopy and surgery. The choice depends on the mode of presentation, the cystic morphology and available technical expertise. Percutaneous catheter drainage is recommended as a temporizing measure in poor surgical candidates with immature, complicated or infected PPs. The limitations include secondary infection and pancreatic fistula in 10-20% of patients which increase complications following eventual definitive surgery. Endoscopic therapy for PPs including cystic-enteric drainage (and transpapillary drainage), is an option for PPs which bulge into the enteric lumen which have a wall thickness of less than 1 cm and the absence of major vascular structures on EUS in the proposed tract or those which communicate with the pancreatic duct above a stricture. Surgical internal drainage remains the gold standard and is the procedure of choice for cysts which are symptomatic or complicated or those having a mature wall... Being more versatile, a cystojejunostomy is preferred for giant pseudocysts (>15cm) which are predominantly inframesocolic or are in an unusual location. In PPs with coexisting chronic pancreatitis and a dilated pancreatic duct, duct drainage procedures (such as longitudinal pancreaticojejunostomy) should be preferred to a cyst drainage procedure.
In the setting of chronic pancreatitis, pseudocysts are often thick-walled and associated with morphological changes (disruption, strictures, stones) in the pancreatic duct. Hence they are less likely to undergo spontaneous resolution which is a common occurrence in post-acute pancreatitis pseudocysts.

Intraductal papillary mucinous tumors (IPMT), which may mimic multiple pseudocysts, are seen as a cystic dilatation of the main or a branch of the pancreatic duct but they usually occur in elderly males, are located in the uncinate process, have septa, communicate with the duct with mural nodules and are characteristically associated with the fish mouth appearance of the papilla spewing mucus. The association of IPMT with pancreatitis is not well understood.

EUS-guided FNA is an adjunct for diagnosis when standard imaging techniques are unable to differentiate between tumor and pseudocyst. ERCP is performed when an
IPMT is suspected. Intraductal and/or intracystic biopsy is usually diagnostic.

### Pseudocyst vs. Cystic Tumor

**Pseudocyst**

**Cystic tumor**

### Cyst Fluid Analysis

<table>
<thead>
<tr>
<th></th>
<th>Viscosity</th>
<th>Amylase</th>
<th>Cytology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudocyst</td>
<td>Low</td>
<td>High</td>
<td>Inflam.</td>
</tr>
<tr>
<td>SCA</td>
<td>Low</td>
<td>Low</td>
<td>25% +</td>
</tr>
<tr>
<td>MCA</td>
<td>High</td>
<td>Low</td>
<td>40% +</td>
</tr>
<tr>
<td>MCAC</td>
<td>High</td>
<td>Low</td>
<td>67% +</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>CEA</th>
<th>CA 15-3</th>
<th>CA 72-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudocyst</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>SCA</td>
<td>Low</td>
<td>Low</td>
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</table>

MCA: mucinous cystadenoma; MCAC: mucinous cystadenocarcinoma; SCA: serous cystadenoma. [1, 2]

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**Pseudocyst vs. Cystic Tumor**

- Retrospective study of 21 cystic neoplasms; 8 diagnosed pseudocysts
  - Only one patient had a history of pancreatitis
  - 7/8 CT scans lacked features which were suspicious of neoplasm
  - 16/18 investigations (ERCP, cyst fluid analysis, angiography) unhelpful

- A mucinous cystic neoplasm is more likely to be misdiagnosed as a pseudocyst
  - 5/13 MCA misdiagnosed; 2 underwent cystenterostomy
  - At imaging, classical findings of neoplasm (tumor, wall calcification and papillary projections) were absent in 38% of cases

[3, 4]

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**Pseudocyst vs. Cystic Tumor**

No imaging is infallible!

It is better to resect a pseudocyst than to drain a tumor!

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**Uncomplicated Cyst**

- Bulge into stomach/duodenum*
- No solid tissue/vessels (EUS)*
- Wall thickness 0.5-1cm (EUS)
- Technical expertise available

Endoscopic drainage

Tract dilated

Drain placed

* EUS-guided drainage is an option for selected patients with non-bulging cysts or those with left portal hypertension or intervening vessels when performed by an expert. [5, 6, 7]

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**Surgical Strategy (I)**

- Symptomatic mature pseudocyst with bulging into the posterior gastric wall

Cystogastrostomy*

* Endoscopic cystogastrostomy may be safely performed for cysts which bulge into the stomach when surgical risk is unacceptable,
and whenever such endoscopic expertise is available.

**Surgical Strategy (II)**
- Symptomatic mature pseudocyst with infracolic bulging or giant pseudocyst
  - Giant pseudocyst
  - Large pseudocyst in infracolic position

**Cystojejunostomy**

**Surgical Strategy (III)**
- Symptomatic mature pseudocyst + dilated main pancreatic duct
  - Pseudocyst with dilated main pancreatic duct

**Partington-Rochelle**

**Surgical Strategy (IV)**
- Symptomatic mature multiple pseudocysts in unusual locations + dilated main pancreatic duct
  - Medistinal pseudocyst

**Partington-Rochelle**
- Duct-cyst communication (forcep)

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**Complications**
- Sepsis
- Biliary obstruction
- Hemorrhage
- Sinistral portal hypertension
- Duodenal obstruction

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**Sepsis**
- Infected pseudocyst (abscess) not amenable to image-guided drainage
  - Infected pseudocyst ‘Abscess’
  - Drained externally

External drainage (surgical or image-guided) is employed to stabilize patients with sepsis or complications when definitive surgery is not technically feasible (immature walls). The associated complications are pancreatic fistulas and drain tract infections. External drainage is best suited for patients with normal pancreatic duct without cyst-duct communication. In the setting of chronic pancreatitis, external drainage is more likely to fail and increase complications after subsequent definitive surgery [8, 9].

**Biliary Obstruction (I)**
- Complicated pseudocyst with immature wall
  - Pseudocyst with immature walls

**External drainage**
  - Risk of pancreatic fistula morbidity: 10-15%
  - Drained percutaneously through safe infracolic window

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**Biliary Obstruction (II)**
- Mature pseudocyst with biliary obstruction
  - Not amenable to ERC

**Internal drainage**
  - (Surgical/Endoscopic)
  - Obstruction relieved after cystogastrostomy
Endoscopic cystoduodenostomy can be performed for suitable cysts by expert endoscopists. In some patients with duodenal obstruction and cystic dystrophy of the duodenal wall due to head dominant pancreatitis, a pancreaticoduodenectomy may be considered.

**Key Points**

- **Rule out cystic tumor**
- **Endoscopic drainage in selected patients**
- **Surgery - gold standard for pseudocysts:**
  - Giant
  - Complicated
  - Associated with ductal abnormalities

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**Keywords** Cystadenoma; Cysts; Endosonography; Pancreas; Pancreatic Pseudocyst; Surgery

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