Pancreatic Pseudocyst

Sophia L Fu, MD

Brooklyn VA Hospital
Brooklyn, NY

January 5, 2011
History

- 53 yo male presents with persistent pancreatic pseudocyst since 6/2011 after acute pancreatitis who currently is asymptomatic

- PMH: htn, CAD s/p NSTEMI, HLD, OA

- PSH/ FHx: open appy, R shoulder /knee surgery

- SocHx: 20ppy smoker; ex-ETOH 2002; + cannabis/cocaine
Pre-operative course

- 6/5-6/24/2011: Admitted to BVA for acute pancreatitis

- RUQ US (6/6) – biliary sludge, no gallstones

- CT A/P (6/6) – infiltration of peri-pancreatic soft tissues of body & tail, representing pancreatitis & small 1 cm pancreatic cyst
Pancreatic Pseudocyst

CT Abdomen (6/4/2011)

Impression – Pancreatitis w/small 1 cm cyst
Pre-operative course

- CT A/P (6/6) – acute pancreatitis w/interval evolution & continued formation of pseudocyst
- 6/16/2011 – repeat CT A/P revealed increase in pseudocyst size
  - 12.4x8.4x8.0 cm
CT Abdomen (6/6/2011)

Impression – Acute Pancreatitis w/ evolving pseudocyst
CT Abdomen (6/16/2011)

Impression – Pseudocyst 12.4 x 8.4 x 8.0cm
Pre-operative course

- 7/27-8/2/2011: Re-admitted for acute on chronic pancreatitis

- CT A/P (7/28) – interval decrease in pseudocyst size
  - 10.4 x 7.6 x 7.0 cm
Pancreatic Pseudocyst

CT Abdomen (7/28/2011)

Impression – Pseudocyst 10.4 x 7.6 x 7.0 cm
Further Imaging

- MRI (8/2) – complex cystic lesion with fluid level & debris
  - 9.1 x 6.2 x 7.3 cm
  - Communication with pancreatic duct
  - Short segmental discontinuation of PD in body medial to mass

- MRCP (8/2) – short segmental occlusion of the pancreatic duct in the body adjacent to pseudocyst
  - No ductal dilatation
Impression – short segmental occlusion of PD
Further Work-up

- 8/18/2011 – EUS: 5.1 x 5.93 cm pseudocyst with echogenic debris in body/tail, abutting gastric wall
  - No masses
  - Gallbladder sludge
  - Chronic pancreatitis

- Selected tests wnl:
  - Triglycerides, HIV, Hep A/B/C, CA 19-9
CT Abdomen (10/7/2011)

Impression – Interval decrease in Pseudocyst 8.9 x 8.4 cm
Operative Plan
Operative Plan

- 10/30/2011 – CT A/P interval decrease in pseudocyst
  - 7.1 x 4.9 cm
CT Abdomen (10/30/2011)

Impression – Pseudocyst 7.1x4.9cm
Physical Examination

- AVSS
- Gen: in NAD
- Cv: nl S1 S2, RRR, no m/r/g
- Chest: CTAB/L
- Abd: soft, nontender, nondistended, +BS
- Rectal: no masses, guiac neg
- Ext: no edema
Laboratory work-up

- PT 10.2
- INR 0.88
- PTT 23.4

Pancreatic Pseudocyst
Surgical Intervention 10/31/2011

- Bilateral subcostal incisions
- Longitudinal incision on anterior then posterior gastric wall
  - After aspiration of pseudocyst through post gastric wall
- Pseudocyst & posterior gastric wall sutured
- Gastroscopy closed & omental buttress

Total OR time: 4:45
- Operating time 4:00
- EBL 75 mL
Post-op Course

- POD#1-7 – Extubated in OR, admitted to SICU
  - BP ctrl w/labetalol drip
- POD#8 – started on diet
- POD#10 – D/C home
Pancreatic Pseudocyst
“A pancreatic pseudocyst is a collection of pancreatic juice enclosed by wall of fibrous or granulation tissue which arises as a consequence of acute pancreatitis, trauma, or chronic pancreatitis”
Pseudocyst vs Acute Fluid Collection

- Collection of nonenzymatic fluid that is a product of the acute inflammatory response
- Not 2° disrupted pancreatic duct
- Will resolve spontaneously
  - ∴ No treatment necessary
**Pathogenesis of Pseudocysts**

**Acute Pancreatitis (15%)**
- No previous injury
- Main pancreatic duct is normal
- Single point of disruption that may heal well

**Chronic Pancreatitis (35%)**
- Repetitive ETOH use causes loss of acinar cells & deposition of collagen
- Major changes to architecture
- Pancreatic duct
  - Structured
  - Dilated
  - Obliterated
- May be small & require NO treatment
Distinction from Cystic Neoplasms

- Cystic neoplasms constitute 15% of all pancreatic cysts
- Not associated with history of pancreatitis
- May contain septa
- Contain exuberant and calcium-containing wall growth
- Epithelial lining may undergo malignant transformation
- Histological assessment when radiographic distinction fails
When to operate?

- Symptomatic
  - Dependent on size: >6 cm
  - Nausea, vomiting, early satiety, biliary obstruction, abd pain, bloating

- Enlarging

- Complications
  - Venous congestion on mesenteric, or portal vein thrombosis
  - Hemosuccus pancreaticus – pseudoaneurysm from erosion into vessel
  - Splenic hemorrhage
  - Infection
Era of Minimal Management

- Risk of complication increased after 7 wks
- Bradley (1979)
  - Risk (46%) > risk of operation
  - Mortality (7%) & morbidity (>40%)  

- Risk of complication related to size of the lesion
- Vitas & Sarr (1992): 6 cm
  - expectant management of asymptomatic, small pseudocysts

- Percutaneous drainage of all collections
  - >30% required further operative therapy

“Root Cause” Management

- Identification of cause of pseudocyst
  - Acute vs chronic
- Symptom assessment

- Symptomatic in chronic pancreatitis
  - Imaging of pancreas
  - MRCP vs ERCP

- Location & duct status
  - Endoscopic vs surgical drainage
  - Not percutaneous drainage
Pancreatography

- Nealon & Walser (2002)
  - ERCP used to define pancreatic duct anatomy
  - Duct strictures, duct-cyst communication, duct cutoff
    - Surgical intervention

- MRCP as less invasive approach
  - Sensitivity poor; specificity & overall accuracy >90%
  - Does not delineate pancreatic duct side branch changes
  - Interpretation of heavily calcified gland is difficult

Endoscopic Management

Transmural

- Pseudocyst deforms gastric or duodenal wall
- Relies on Seldinger technique of dilating track between pseudocyst & alimentary tract lumen
- EUS detects wall thickness, varices, amount of pseudocyst debris

Transpapillary

- Moderate-sized pseudocysts with duct-cyst communication
- Contraindications:
  - Extensive necrosis
  - Intracystic debris
Pancreatic Pseudocyst

Transmural drainage
Transpapillary drainage
## Endoscopic Pseudocyst Drainage

<table>
<thead>
<tr>
<th>Authors</th>
<th>Transpapillary</th>
<th>Transmural</th>
<th>Success (%)</th>
<th>Complication</th>
<th>Long-Term F/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharma et al 2002 (n=38)</td>
<td>5</td>
<td>33</td>
<td>100</td>
<td>-</td>
<td>3 (8%) recurrence (44 months)</td>
</tr>
<tr>
<td>De Palma et al 2002 (n=49)</td>
<td>19</td>
<td>30</td>
<td>84.290</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Binmoeller et al 1995 (n=53)</td>
<td>33</td>
<td>20</td>
<td>94</td>
<td>11% Gallbladder puncture, 1 Bleeding, 2 Abscess, 2</td>
<td>23% (22 months)</td>
</tr>
<tr>
<td>Vita9le et al 1999 (n=36)</td>
<td>9</td>
<td>27</td>
<td>83</td>
<td>1/36 Nonadherent cyst</td>
<td>17% (16 months) recurrent -&gt; surgery</td>
</tr>
</tbody>
</table>
Guidelines for Endoscopic Drainage

- Well-developed cyst wall
- Nonacute pseudocyst
- Noninfected pseudocyst
- Pancreatic ductal disruption or stricture
- Pseudocyst wall <1cm
- Pseudocyst indenting gastrointestinal tract vs endoscopic ultrasonography location of cyst
Indications for Surgery

- Similar results with endoscopic drainage for simple cases
- Surgery reserved for most complex pseudocysts
  - Giant pseudocyst
  - Multiple pseudocysts
  - Multiple pancreatic duct abnormalities
    - Strictures, stones, & duct cut-offs
Surgical Options

- Cystgastrostomy/ cystduodenostomy
- Roux-en-Y cystjejunostomy
- Lateral pancreaticojejunostomy
- Duodenal-sparing pancreatic head resection w/pseudocyst incorporation w/ or w/o pancreatic duct drainage
- Pancreatic resection
Management Options for Pseudocyst

- Acute Pancreatitis
  - Endoscopic

- Chronic Pancreatitis
  - Cystenteric anastomosis
  - Pancreaticojejunostomy
  - Duodenal-sparing head rsxn

- Infected
  - Percutaneous
Pancreatic Pseudocyst

Management Scheme

- Asymptomatic <6 cm
  - Acute or chronic pancreatitis
    - Serial cross-sectional imaging
    - Resolution
    - Increased size or symptoms

- Asymptomatic >6 cm
  - Acute pancreatitis
    - ERCP/MRCP or endotherapy
  - Chronic pancreatitis
    - Failed endotherapy
    - Surgical management

- Symptomatic pseudocyst
  - Acute pancreatitis
  - Chronic pancreatitis
  - Diagnostic ERCP/MRCP

- Infected pseudocyst
  - Percutaneous drainage
Surgery

"The bad news is, someone just stole our surgical instruments. The good news is, I still have my Swiss army knife."
Open Technique

"It was a difficult operation but in the end, I won."
Cystogastrostomy

- Palpable through anterior wall of stomach
- Kocherize duodenum & HOP
- Stay sutures on anterior wall stomach
- Transverse gastrostomy
- Palpate cyst through posterior wall
- Aspirate cyst w/20G needle
- Transverse incision thru posterior wall stomach
- Ellipse of wall sent for frozen section
Cystogastrostomy (cont’d)

- Continuous locking 3-0 absorbable synthetic suture
  - Posterior wall stomach
  - Anterior wall cyst
  - Ensures good hemostasis

- Anterior gastrostomy closed
  - Inner continuous 3-0 absorbable synthetic suture in a Connell stitch
  - Outer interrupted 3-0 silk
Roux-en-Y Cyst jejunostomy

1 – Kocherize duodenum & HOP

2 – Palpate entire pancreas
   - Cyst should be palpable

3 – Aspirate cyst through transverse mesocolon
   - 60cm Roux-en-Y jejunal loop
   - End-to-side jejunojejunostomy
   - Side-to-side cystojejunostomy

No need to enter lesser sac
Roux-en-Y (cont’d)

- Outer interrupted 3-0 silk
  - Jejunal & Tr mesocolon
  - 2.5-5cm long
- Cystotomy & elliptical excision
  - Frozen section
- Parallel enterotomy
- Inner continuous 3-0 absorbable, locking
- Outer interrupted 3-0 silk
Laparoscopic Drainage

- Transgastric cystogastrostomy
  - Laparoscopic approach

- Intragastric cystogastrostomy
  - Laparoscopic & gastroscopic guidance

- Minilaparoscopic intragastric cystogastrostomy
  - 2mm intragastric ports on anterior gastric wall

- Cystogastrostomy via lesser sac approach

- Roux-en-Y cystojejunostomy
  - 30 cm limb
Minilaparoscopic approach

Pancreatic Pseudocyst

www.downstatesurgery.org
Cystogastrostomy via lesser sac

- Does not require anterior gastrostomy
- Not dependent on adherence of cyst to posterior gastric wall

- Window created in gastrocolic omentum
- Elevate stomach
- Cystotomy made adjacent to posterior gastric wall gastrostomy
- Cystogastrostomy created w/endoscopic stapler
- Suture opening
Laparoscopic lesser sac approach
# Indications for Surgical Treatment

**Options**

<table>
<thead>
<tr>
<th>External Drainage</th>
<th>Internal Drainage</th>
<th>Pancreatic Resection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Rupture</td>
<td>Mature cysts (&gt;1cm)</td>
<td>Cysts in body &amp; tail w/poss malignancy</td>
</tr>
<tr>
<td>Grossly infected</td>
<td>Pancreatic Duct stricture or leak</td>
<td>Complex cystic diseases of the head</td>
</tr>
<tr>
<td>Unstable patients w/bleeding</td>
<td>Benign cyst wall biopsy</td>
<td>Pancreatic pseudoaneurysm</td>
</tr>
<tr>
<td>Cyst wall not thick enough to allow an anasomosis</td>
<td>- Cystgastrostomy -- cystdudodenostomy</td>
<td>- Distal pancreatectomy to include cyst</td>
</tr>
<tr>
<td></td>
<td>- Roux-en-Y cystjejunostomy</td>
<td>- pancreaticoduodenectomy</td>
</tr>
</tbody>
</table>

---

**Pancreatic Pseudocyst**

Go to [www.downstatesurgery.org](http://www.downstatesurgery.org) for more information.
Guidelines for Open Surgical Intervention

- Cyst rupture or hemorrhage, or cyst adjacent to vascular structures
- Cysts w/potential to be cystic neoplasms
- Patients w/multiple or infected pseudocysts
- Cysts w/associated high-grade pancreatic duct stricture
- Cyst wall >1cm
- Pancreatic pseudoaneurysm
References

• Cameron JL. *Current Surgical Therapy*, 10th ed. 2010.


• Townsend CM. *Sabiston Textbook of Surgery*, 18th ed. 2007.


• Zinner MJ & Ashley SW. *Maingot’s Abdominal Operations*, 11th ed.