

**Pancreatic Pseudocyst Dilemma;  
Cumulative Multicenter experience  
in Management using Endoscopy,  
Laparoscopy, and open surgery**

By

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A localized fluid collection that is rich in amylase and other pancreatic enzymes and is surrounded by a wall of fibrous tissue that is not lined by epithelium, connected with the pancreatic duct system, either direct communication or indirectly *via* the pancreatic parenchyma. They are caused by ductal disruption following increased ductal pressure, either due to stenosis, calculi or protein plugs obstructing the main duct, or as a result of necrosis following pancreatitis.

*Habash& Draganov; World J Gastroenterol 2009*

Pancreatic pseudocysts are complications of acute or chronic pancreatitis in 30-40 % of cases. Initial diagnosis is accomplished most often by cross-sectional imaging. EUS with fine needle aspiration has become the preferred test to help distinguish pseudocysts from other cystic lesions. Most pseudocysts resolve spontaneously with supportive care.

**Pancreatic fluid collections**  
According to the revised Atlanta classification

Type of pancreatitis	Collections < 4 weeks	Collections > 4 weeks
Interstitial (80%)	APFC (acute pancreatic fluid collection) Cystic Localized	Pseudocyst (also abscess) non-epithelial wall
Necrotizing (10%)	ANC (acute necrotic collection) Lent epithelial pancreatic duct pancreatic necrosis abscess/abscess	WOPC (wall of pancreatic necrosis) Abscess, organized necrosis abscess/abscess with epithelial cystic fluid pancreatic pseudocyst/abscess from pancreas

Source: PR # 4. URL: 2013.02.130.111

Type I : normal duct/no cyst communication.  
Type II : normal duct with duct-cyst communication.  
Type III: otherwise normal duct with stricture and no duct-cyst communication.  
Type IV : otherwise normal duct with stricture and duct-cyst communication.  
Type V : otherwise normal duct with complete cut-off.  
Type VI: chronic pancreatitis, no duct-cyst communication.  
Type VII: chronic pancreatitis with duct-cyst communication *Nealon, Walser, Ann. Surg.; 2002*

The size of the pseudocyst and the length of time the cyst has been present are poor predictors for the potential of pseudocyst resolution or complications, but in general, larger cysts are more likely to be symptomatic or cause complications. The indications for drainage procedure are persistent symptoms or complications (infection, gastric outlet or biliary obstruction, bleeding).



Three strategies for pseudocysts drainage are available: endoscopic (transpapillary or transmural), percutaneous, or open surgery. As a result, the management varies based on local expertise, but in general, endoscopic drainage is becoming the preferred approach because it is less invasive than surgery, avoids the need for external drain, and has a high long-term success rate.

A tailored therapeutic approach taking into consideration patient preferences and involving multi-disciplinary team of therapeutic endoscopist, interventional radiologist and pancreatic surgeon should be considered in all cases.

Habashi & Draganov, *World J Gastroenterol* 2009

### Indications for Intervention

#### ■ Absolute indications

- Symptomatic
- Chronic pseudocysts\*
- In a phase of growth
- Complications
- Malignancy ?

### Indications for Intervention

#### ■ Relative indications

- Duration: more than 6 weeks
- Size: greater than 6 cm
- Pancreatic duct abnormalities (stricture, stone, rupture)
- Multiple cysts\*

Table 2 Differential diagnosis of cystic pancreatic lesions

	SCA	MCN	IPN	SPN	Pseudocyst
Prevalent age	Middle age	Middle age	Elderly	Young	Variable
Sex	Male/female	Male/female	Male > female	Male/female	Male > female
Presentation	Mass/pain	Mass/pain	Pancreatitis	Mass/pain	Pain
Location	Distal	Body/tail	Head	Distal	Distal
Malignant potential	Very low	Mild/moderate/high	Low to high	Low	None

SCA: Serous cystadenoma; MCN: Mucinous cystic neoplasm; IPN: Intraductal papillary mucinous neoplasm; SPN: Solid/pseudopapillary neoplasm.

### Beware of a Cystic Tumor !

*Cystic tumor erroneously drained by 'cystogastrostomy'*



*Cystic tumour misinterpreted as pseudocyst*



*Enhancing walls, solid content, evidence of neoplasm*

### Pseudocyst vs. Cystic Tumor

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>■ Previous pancreatitis/trauma</li> <li>■ Imaging (CT, US):                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Single, non-loculated</li> <li><input type="checkbox"/> No septae or solid components</li> <li><input type="checkbox"/> Thin wall (&lt;4mm)</li> </ul> </li> <li>■ MRCP/ERCP<br/><small>Duct-cyst connection in 20%</small></li> </ul> | <ul style="list-style-type: none"> <li>■ No history of pancreatitis</li> <li>■ Imaging:                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Often multilocular</li> <li><input type="checkbox"/> Septae or solid components</li> <li><input type="checkbox"/> Thick walled</li> </ul> </li> <li>■ MRCP/EUS ± FNA<br/><small>No duct-cyst connection</small></li> </ul> |
|---|--|

### Pseudocyst vs. Cystic Tumor

Imaging is indefinit !

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

Table 3 Cystic fluid analysis in cystic pancreatic diseases

	SCA	MCN	MCAC	Pseudocyst
CEA	Low	High	High	Low
CA125	Variable	Variable	High	Low
CA19-9	Variable	Variable-high	Variable-high	Variable
Amylase	Low-high	Low-high	Low-high	High
Lipase	Low	Low	Low	High

SCA: Serous cystadenoma; MCN: Mucinous cystic neoplasm; MCAC: Mucinous cystadenocarcinoma

The Cyst fluid was obtained by FNA for tumor marker values were measured. The results showed that **carbohydrate antigen 19-9 levels of >50,000 U/mL had 75% sensitivity and 90% specificity** for distinguishing mucinous tumors from other cystic lesions. **CEA levels of <5 ng/mL had 100% sensitivity and an 86% specificity** for distinguishing serous cystadenomas from other cystic lesions. **Amylase levels of >5000 U/mL had 94% sensitivity and 74% specificity** to pseudocysts from other cystic lesions. So high Ca 19-9, low CEA, and high amylase in cyst fluid are very indicative of mucinous tumors, serous cystadenomas, and pseudocysts, respectively.


Habashi & Draganov, *World J Gastroenterol* 2009

▼ Age and sex ▶	Males		Females		Total	
	No.	%	No.	%	No.	%
▼ 20	1	1.7	1	1.7	2	3.4
20-30	8	13.6	6	10.2	14	23.8
30-40	10	17	12	20	22	37.3
40-50	9	12.3	8	13.6	17	28.9
▲ 50	3	5.1	1	1.7	4	6.8
Total	31	52.5	28	47.5	59	100%



Group ▶	Group I Endo. ttt		Group II Lap. ttt		Group III Surg. ttt		Total	
	No.	%	No.	%	No.	%	No.	%
▼ Sex								
Males	20	33.9	1	1.7	10	17	31	52.5
Females	15	25.4	1	1.7	12	20	28	47.5
Total	35	59.3	2	3.4	22	37.3	59	100

### Uncomplicated Cyst

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



Pseudocyst entered

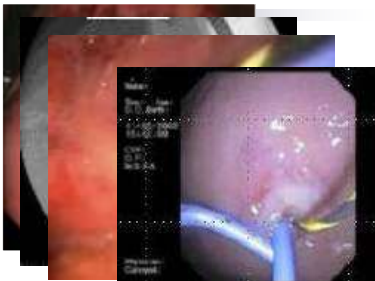
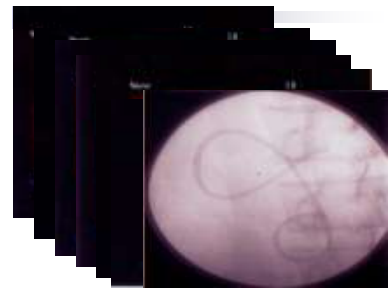
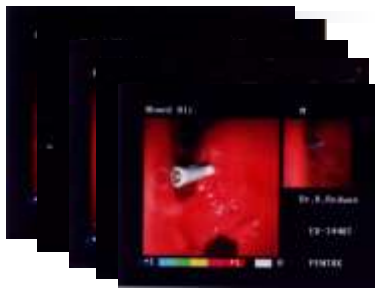



Tract dilated Drain placed

Endoscopic drainage




[5] Kahaleh M, et al. Endoscopy 2006; 38:305-9.  
[6] Sanchez-Cotias E, et al. Gastrointest Endosc 2002; 56:380-6.  
[7] Shiram P, et al. Endoscopy 2005; 37:231-5.

Endoscopic drainage of pseudocysts is becoming the preferred therapeutic approach because it is less invasive than surgery, avoids the need for external drain and has a high long-term success rate. Drainage is accomplished with either a transpapillary approach with ERCP or direct drainage across the stomach or duodenal wall. A transpapillary approach is used when the pseudocyst communicates with the main pancreatic duct, usually in the genu of the pancreatic duct. This approach is also successful for patients with pancreatic duct disruption. A transgastric or transduodenal approach is used when the pseudocyst is directly adjacent to the gastroduodenal wall.

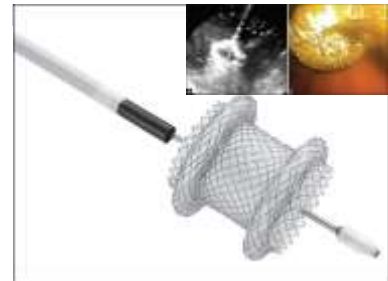


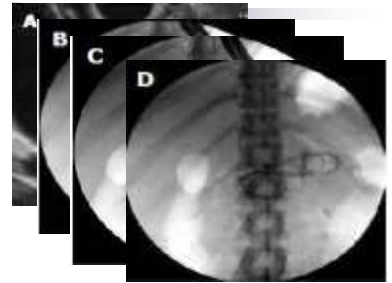
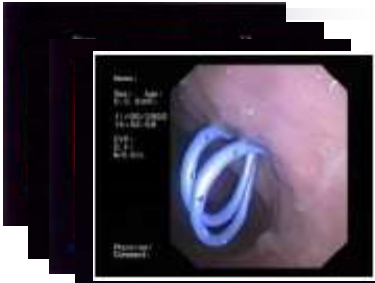
### Role of stent type

- At least two double pigtail
- 7 F sufficient ? or 10 Fr. ?
- Pigtail or straight ?
- Metal stent ?

Barthelemy M et al. Gastroenterol Clin Biol 2009  
Giovannini et al. GI Clin N Am 2012; Seiwald S et al. Dig Endosc 2009; Arsenakis et al. GIE 2007





The procedure done	Number of cases	Percentage
Cysto-gastrostomy with single pigtailed stent drainage.	3	5.1
Cysto-gastrostomy with double pigtailed stent drainage.	11	18.6
Cysto-gastrostomy with a single pigtailed stent and catheter drainage.	14	23.7
Cysto-gastrostomy with a covered self expandable metal stent.	2	3.4
Cysto-duodenostomy with single pigtail stent.	3	5.1
Trans-ampullary drainage with adouble stent.	2	3.4
<b>Total</b>	<b>35</b>	<b>59.3%</b>

### Surgical Strategy

> Symptomatic mature pseudocyst bulging into posterior gastric wall

↓

**Cystogastrostomy\***



Cystogastrostomy-intraoperative view

■ Symptomatic mature pseudocyst with infracolic bulging or giant

↓

**Cystojejunostomy**

Symptomatic mature pseudocyst + dilated main pancreatic duct with evident communication

↓

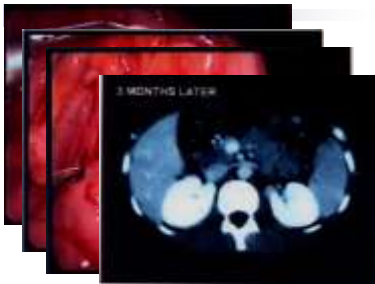
**Partington-Rochelle**



**Partington-Rochelle (shunt op.)**

Lap. surgery has been recommended as a safe, reliable, and minimally invasive treatment for pancreatic pseudocyst as advances in lap. technique and instrumentation have furthered our ability to perform more complex lap. procedures. The minimally invasive approach to gastro-pseudocystostomy allows for wide drainage of the pancreatic pseudocysts and might avoid the greater morbidity and longer recovery from an open surgical procedure. Reports to date have consisted of case series, often with limited follow-up.

*Sandberg et al; Scandinavian Journal of Surgery, 2005*



The Procedure	Group I Endoscopic treatment (Minimally invasive)	Group II Laparoscopic treatment (Minimally invasive)	Group III Surgical Treatment (Invasive)
The mean time of the procedure	30 min	110 min	90 minutes
Mortality (%)	0	0	0
Post-operative morbidity (%)	14	22	40
Mean hospital stay	2	3	7

In conclusion, treatment of pancreatic pseudocyst is in an era of re-evaluation. Relatively new and minimally invasive techniques have been introduced as alternatives to the standard conventional open surgical management. Endoscopic procedures have been increasingly used with excellent results. Laparoscopic approach, although difficult, appears to be promising. However, large-scale comparative studies of the three different therapeutic modalities are highly recommended.



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