

# PERCUTANEOUS MANAGEMENT OF COMPLICATED PANCREATITIS



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# DISCLOSURES

- None

# INTRODUCTION

- Necrotizing Pancreatitis develops in approximately 20% of patients with acute pancreatitis.
  - 2/3 of patients with necrotic collections will remain sterile.
  - Patients with infected necrosis have increased risk of organ failure regardless of the extent of necrosis.
  - Mortality of infected pancreatic necrosis 22-40%.
  
  - Diagnosis of pancreatitis often clinical (H & P, labs).
  - Use of CT at presentation if other causes are being considered.
  - Necrosis may take up to 72 hours from onset of symptoms to be seen on contrast enhanced CT.
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# FLUID COLLECTIONS

- Lesser sac
- Anterior / Posterior pararenal space
- Transverse mesocolon
- Small bowel mesentery
  
- Release of activated pancreatic enzymes causes necrosis of surrounding tissue.

# CLASSIFICATION OF COLLECTIONS

- Revised Atlanta Criteria
- < 4 weeks since diagnosis
  - Acute Pancreatic Fluid Collection (APFC)
  - Acute Necrotic Collection (ANC)
- > 4 weeks since diagnosis
  - Pancreatic Pseudocyst
  - Walled Off Pancreatic Necrosis (WOPN)

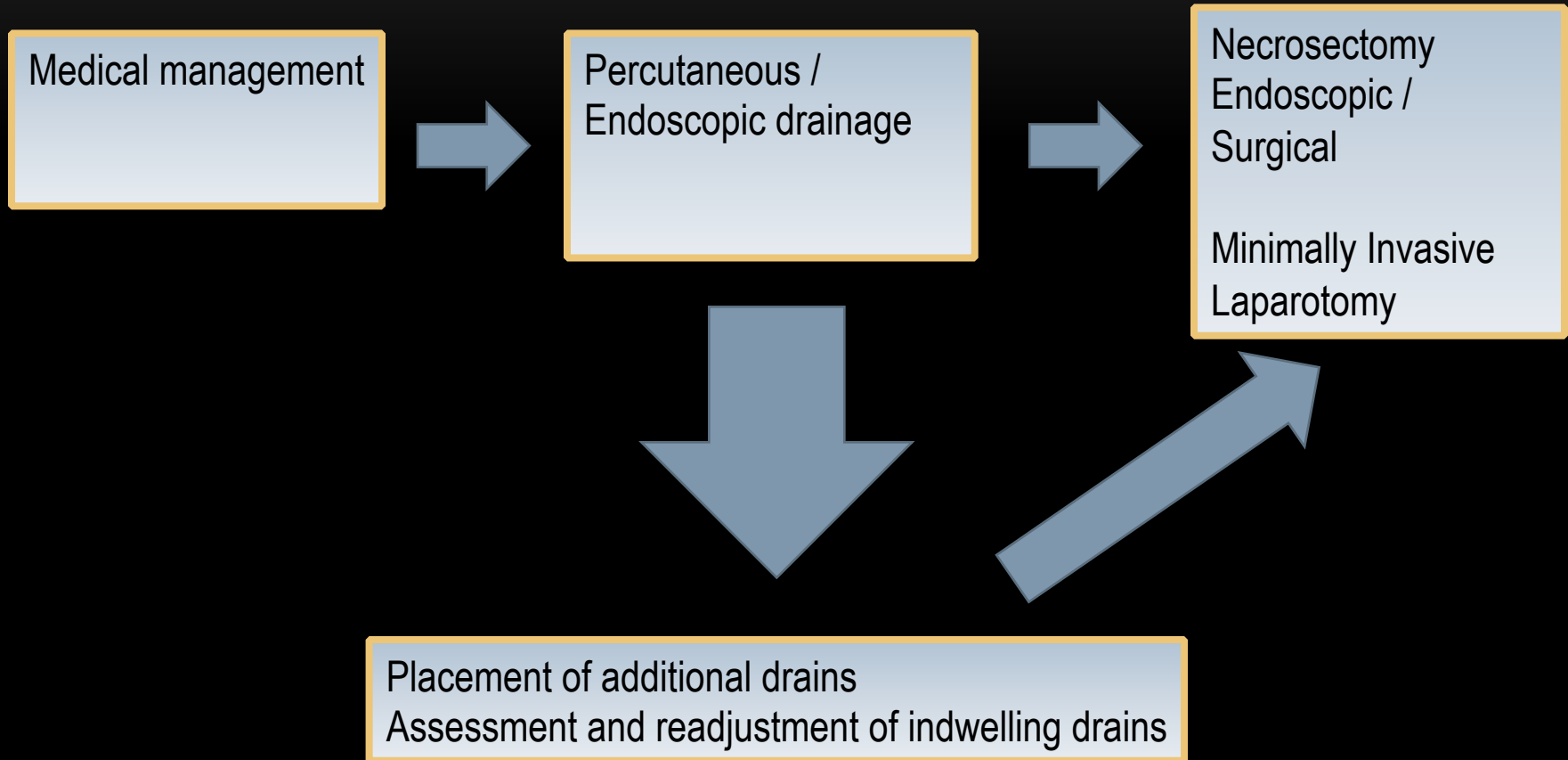
# CLASSIFICATION OF COLLECTIONS

- Location
  - Within pancreatic parenchyma
  - Peripancreatic
  - Both
- Infection
  - Sterile (5% - 10% mortality rate)
  - Infected Necrosis (22% - 44% mortality rate)

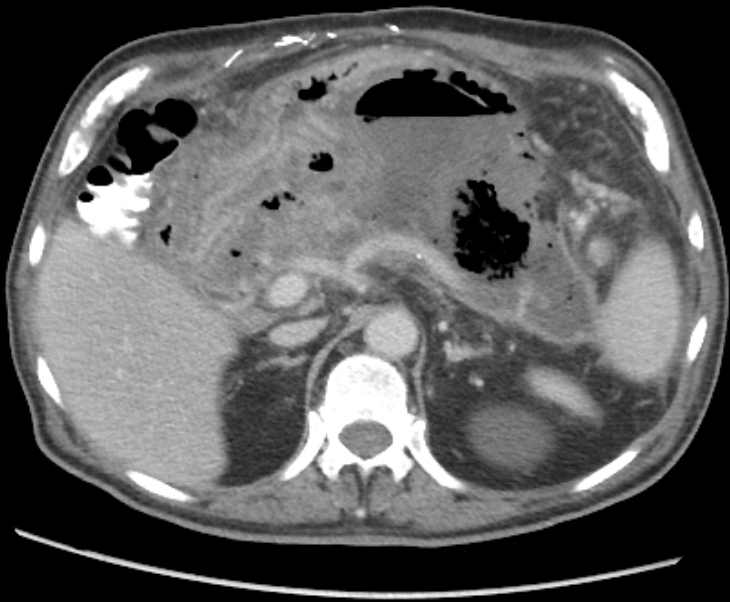
# PERCUTANEOUS MANAGEMENT

- Component of “Step Up Approach”
  - Image guided (CT, US)
    - Retroperitoneal approach
    - Transperitoneal approach

# STEP UP APPROACH







# PANTER TRIAL

- Patients randomized into open necrosectomy vs step-up approach (percutaneous drainage followed by minimally invasive necrosectomy if necessary).
  - Endpoint composite of major complications
    - New onset multiple organ failure
    - Systemic complications (DIC, metabolic disturbance)
    - Enterocutaneous fistula
    - Perforation
    - Bleeding requiring intervention
    - Pancreatic insufficiency
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**Table 3. Primary and Secondary End Points.\***

Outcome	Minimally Invasive Step-up Approach (N=43)	Primary Open Necrosectomy (N=45)	Risk Ratio (95% CI)	P Value
<b>Primary composite end point: major complications or death — no. (%)†</b>	17 (40)	31 (69)	0.57 (0.38–0.87)	0.006
<b>Secondary end points</b>				
Major complication — no. (%)				
New-onset multiple-organ failure or systemic complications‡	5 (12)	19 (42)	0.28 (0.11–0.67)	0.001
Multiple-organ failure	5 (12)	18 (40)		
Multiple systemic complications	0	1 (2)		
Intraabdominal bleeding requiring intervention	7 (16)	10 (22)	0.73 (0.31–1.75)	0.48
Enterocutaneous fistula or perforation of a visceral organ requiring intervention	6 (14)	10 (22)	0.63 (0.25–1.58)	0.32
Death — no. (%)	8 (19)	7 (16)	1.20 (0.48–3.01)	0.70
Other outcome — no. (%)				
Pancreatic fistula	12 (28)	17 (38)	0.74 (0.40–1.36)	0.33
Incisional hernia§	3 (7)	11 (24)	0.29 (0.09–0.95)	0.03
New-onset diabetes¶	7 (16)	17 (38)	0.43 (0.20–0.94)	0.02
Use of pancreatic enzymes¶	3 (7)	15 (33)	0.21 (0.07–0.67)	0.002
Health care resource utilization				
Necrosectomies (laparotomy or VARD) — no. (%)				<0.001
0	17 (40)	0		
1	19 (44)	31 (69)		
2	6 (14)	8 (18)		
≥3	1 (2)	6 (13)		
Total no. of operations¶¶				0.004
Per study group	53	91		
Range per patient	0–6	1–7		
Total no. of drainage procedures				<0.001
Per study group	82	32		
Range per patient	1–7	0–6		
New ICU admission at any time after first intervention — no. (%)**	7 (16)	18 (40)	0.41 (0.19–0.88)	0.01
Days in ICU				
Median	9	11		0.26
Range	0–281	0–111		
Days in hospital				
Median	50	60		0.53
Range	1–287	1–247		

## Systematic review of percutaneous catheter drainage as primary treatment for necrotizing pancreatitis

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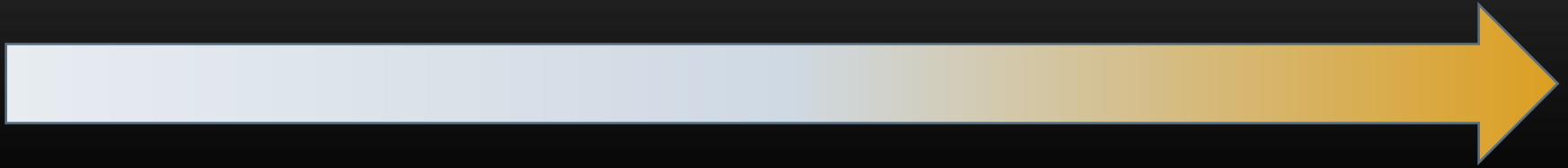
**Table 3** Outcome of percutaneous catheter drainage as primary treatment for necrotizing pancreatitis in the included studies

Reference	No. of patients	Time from admission until PCD (days)*	Successful PCD†	Need for additional surgery‡	Time between PCD and necrosectomy (days)*	Patients with one or more complications‡	Deaths‡
Freeny <i>et al.</i> <sup>10</sup>	34	Mean 9 (1–48)	16 (47) All IPN	18 (53) All IPN	Mean 32 (6–78)	9 (26)	4 (12) All IPN
Gambiez <i>et al.</i> <sup>48</sup>	10	Mean 17 (10–25)	3 (30) IPN 0 of 3 SPN 3 of 7	7 (70) IPN 3 of 3 SPN 4 of 7	NR	6 (60)	2 (20) IPN 2 of 3 SPN 0 of 7
Fotoohi <i>et al.</i> <sup>49</sup>	60	NR	54 (90)	3 (5)	NR	6 (10)	3 (5)
Baril <i>et al.</i> <sup>50</sup>	38	NR	30 (79) IPN 18 of 25 SPN 12 of 13	7 (18) IPN 6 of 25 SPN 1 of 13	NR	1 (3)	2 (5) IPN 2 of 25 SPN 0 of 13
Cheung <i>et al.</i> <sup>51</sup>	8	Mean 55 (21–154) IPN 30 SPN 81	3 (38) IPN 1 of 4 SPN 2 of 4	5 (63) IPN 3 of 4 SPN 2 of 4	Mean 70 (1–161) IPN 59 SPN 88	4 (50)	1 (13) IPN 1 of 4 SPN 0 of 4
Navalho <i>et al.</i> <sup>52</sup>	30	Mean 18	19 (63) All IPN	10 (33) All IPN	Mean 18	NR	5 (17) All IPN
Lee <i>et al.</i> <sup>53</sup>	18	Median 10 (1–58)	14 (78) All IPN	3 (17) All IPN	NR	2 (11)	1 (6) All IPN
Bruennler <i>et al.</i> <sup>54</sup>	80	Median 3.5 (1–40)	38 (48)	24 (30)	NR	23 (29)	27 (34)
Mortelé <i>et al.</i> <sup>55</sup>	35	Mean 11 (2–33) IPN 12 SPN 10	17 (49) IPN 6 of 13 SPN 11 of 22	13 (37) IPN 7 of 13 SPN 6 of 22	Mean 69 (3–445) IPN 42 SPN 101	4 (11)	6 (17) IPN 1 of 13 SPN 5 of 22
Rocha <i>et al.</i> <sup>56</sup>	28	NR	5 (18)	17 (61)	Median 109 (1–600)	3 (11)	8 (29) IPN 4 of 9 SPN 4 of 19
Van Santvoort <i>et al.</i> <sup>16</sup>	43	Median 30 (11–71)	15 (35) IPN 13 of 39 SPN 2 of 4	26 (60) IPN 25 of 39 SPN 1 of 4	Median 10 (1–52)	17 (40)	8 (19) IPN 7 of 39 SPN 1 of 4

Values in parentheses are \*ranges and †percentages. PCD, percutaneous catheter drainage; IPN, infected pancreatic necrosis; SPN, sterile pancreatic necrosis; NR, not reported.

- 55.7 % (214/384) patients survival without need for necrosectomy.
- Necrosectomy performed in 34.6% (9.6% unfit for surgery or died).
- Overall mortality 17.4% which is similar to minimally invasive necrosectomy with mean mortality 19%.
- Complication rate of 21.1% vs 34-68% for surgical necrosectomy.

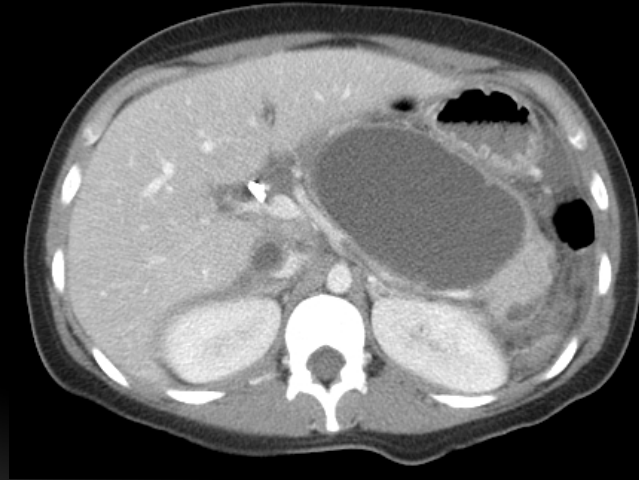
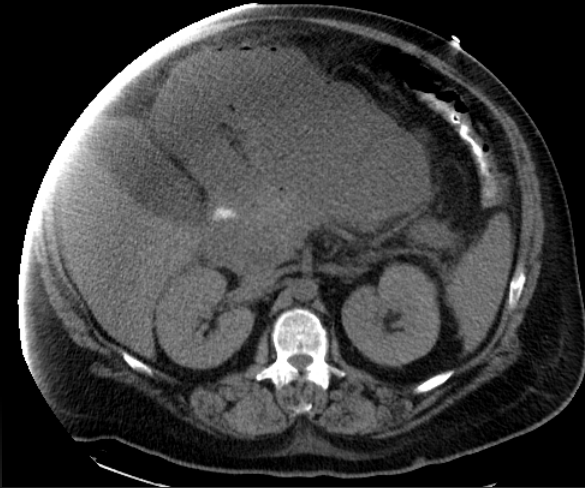
# TIMING



Collection without  
evidence of infection

Infected collection

Walled off collection



# TIMING

- Confirmed or suspected infected necrosis
- >4 weeks after onset of disease

# TIMING

- Postponement until encapsulation may not be necessary and may delay recovery.
  - Other clinical factors such as deterioration of patient condition related to bowel or gastric outlet obstruction can be an indication for drainage without evidence of infection.
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# WHY DO WE WAIT?

- Waiting for walled off necrosis derives from data on open necrosectomy.
  - Data showed improved outcomes including lower mortality in WON vs. early necrosectomy.
- Will antibiotics alone treat infection before it is walled off?
- Does a drainage catheter increase the risk of infecting a sterile collection?
- Definitive evidence of infection is easier when other sources of infection or SIRS are ruled out.
- Necrotic material may be more liquefied.



# Is Infection the Only Indication for Drainage?

## CLINICAL STUDY

### **Better Outcomes if Percutaneous Drainage Is Used Early and Proactively in the Course of Necrotizing Pancreatitis**

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#### **ABSTRACT**

**Purpose:** To compare outcomes after percutaneous catheter drainage (PCD) for acute necrotizing pancreatitis versus those in a randomized controlled trial as a reference standard.

**Materials and Methods:** Between September 2010 and August 2014, CT-guided PCD was the primary treatment for 39 consecutive patients with pancreatic necrosis. The indication for PCD was the clinical finding of uncontrolled pancreatic juice leakage rather than infected necrosis. Subsequent to PCD, the drains were proactively studied with fluoroscopic contrast medium every 3 days to ensure patency and position. Drains were ultimately maneuvered to the site of leakage. These 39 patients were compared with 43 patients from the Pancreatitis, Necrosectomy versus Step-up Approach (PANTER) trial.

**Results:** The CT severity index was similar between studies (median of 8 in each). Time from onset of acute pancreatitis to PCD was shorter in the present series (median, 23 d vs 30 d). The total number of procedures (PCD and subsequent fluoroscopic drain studies) per patient was greater in the present series (mean, 14 vs 2). More patients in the PANTER trial had organ failure (62% vs 84%), required open or endoscopic necrosectomy (0% vs 60%), and experienced in-hospital mortality (0% vs 19%;  $P < .05$  for all).

**Conclusions:** Even though patients in the present series had a similar CT severity index as those in the PANTER trial, the former group showed lower incidences of organ failure, need for necrosectomy, and in-hospital mortality. The use of a proactive PCD protocol early, before the development of severe sepsis, appeared to be effective.

- Presence of enlarging collections
- Increasing inflammatory data (WBC, CRP)
- Refractory pain
- Distention / Obstruction
- SIRS
- Organ Failure
- Persistent increase in amylase lipase

- Prospective single arm series comparing outcome of proactive drainage to “Step Up” arm of PANTER trial.
- Median time from onset of symptoms to drainage
  - 23 days (2-124) Sugimoto et al
  - 30 days (11-71) PANTER

**Table 4 . Complications after Drainage in the Present Series and PANTER Trial (1)**

<b>Complication</b>	<b>Present Series (n = 39)</b>	<b>PANTER Trial (n = 43)</b>	<b>P Value</b>
Major complication or death	4 (10)	17 (40)	.003
New-onset multiple-organ failure	0	5 (12)	.056
Intraabdominal bleeding requiring intervention	1 (3)	7 (16)	.060
Enterocutaneous fistula requiring intervention	4 (10)	6 (14)	.609
In-hospital death	0	8 (19)	.006
Mortality up to 3 mo after discharge	1 (3)	8 (19)	.031

Note–Values in parentheses are percentages.

PANTER = Pancreatitis, Necrosectomy versus Step-up Approach.

# DRAINAGE CATHETER MAINTENANCE

- Effective drainage requires optimal positioning and preservation of patency
  - Frequent imaging using CT and / or Fluoro
  - Exchange
  - Upsize
  - Lavage
- Checking drain output amylase level can help assess ongoing enzyme leak.
- More than one drainage catheter may be necessary.

# GOAL

- Collapse of necrotic cavity without re accumulation.
  - Catheter maintenance
  - Antibiotic therapy
  - Nutritional support
- No further drainage

# POINTER TRIAL

- Ongoing study -- Dutch Pancreatitis Study Group.
- Postponed or immediate drainage of infected necrotizing pancreatitis.
- Expected to complete enrollment July 2018. Expected publication 2019.

# CONCLUSIONS

- Management of severe pancreatitis requires a multidisciplinary approach.
  - Percutaneous catheter drainage decreases morbidity and mortality in infected pancreatitis and is an important initial component of the step up approach.
  - While some cases require advancement to minimally invasive surgical techniques, adequacy and function of indwelling drains should be assessed before proceeding.
  - Timing of drainage placement requires further study.
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