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Endoscopic Pancreatic Necrosectomy

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Disclosures

- I have no relevant financial disclosures for this presentation.

Direct Endoscopic Pancreatic Necrosectomy (DEN)

- Overview of terms/definitions
- Which patients need DEN?
- General principles/technique and how I do it
- What are alternatives/ancillary techniques when DEN is insufficient or fails?

- 20% pts will develop necrotizing pancreatitis and 1/3 will develop infected necrosis
- All necrotizing pancreatitis, even if infected, does not need drainage
- Endoscopic step-up approach favored

Terms

- Interstitial vs necrotizing pancreatitis
- Acute necrotic collection (ANC) vs walled off necrosis (WON)
- Sterile vs infected necrosis
- Direct endoscopic necrosectomy (DEN)

Terms

- Lumen apposing metallic stent (LAMS) vs double pigtail plastic stent (DPPS)

CASE

- 45 yo M w/ post ERCP pancreatitis
- 2 months after initial diagnosis, develops pain, early satiety, fullness

General pointers

- Have a multidisciplinary approach with agreed-upon general principles
  - Med mgmt first
  - Minimally invasive next (‘step-up’ approach)
- Avoid drainage in asymptomatic or minimally symptomatic patients
- Consider placement of PEG-J in patients during initial drainage if anticipated to be a long road
- Have a mechanism for close outpatient follow-up

General Approach to Walled Off Necrosis

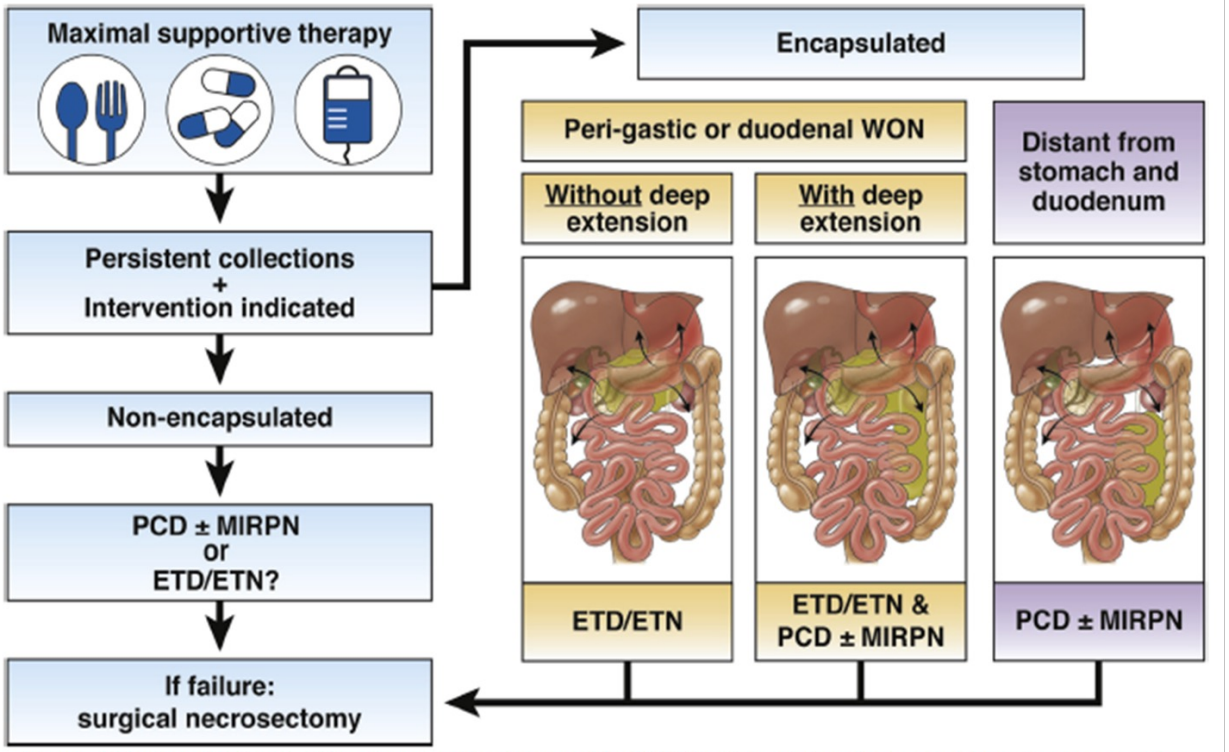


Figure 3. Strategy for interventions in necrotizing pancreatitis. MIRPN, minimally invasive retroperitoneal necrosectomy.

Gastroenterology. 2019;156:1994–2007.

Minimally Invasive Better Than Surgery – Step-Up Approach

Table 2. Summary of Randomized Controlled Trials Comparing Endoscopic and Minimally Invasive Surgical Step-Up Approach

JAMA 2012;307:1053–1061. **Lancet 2018;391:51–58.** **Gastroenterology 2019; 156:1027–1040**

	PENGUIN trial[77]		TENSION trial[96]		MISER trial[78]	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
Modality	Endoscopic	Surgical	Endoscopic	Surgical	Endoscopic	Surgical
No. of patients	10	10	51	47	34	32
Infected necrosis, n (%)	10 (100)	9 (90)	23 (45)	27 (57)	31 (91)	30 (94)
New-onset organ failure, n (%)						
Single	NR	NR	7 (14)	13 (28)	NR	NR
Multiple	0 (0)	5 (50)	2 (4)	6 (13)	2 (6)	3 (9)
Death, n (%)	1 (10)	4 (40)	9 (18)	6 (13)	3 (9)	2 (6)
Composite endpoint, n (%)	2 (20)	8 (80)	22 (43)	21 (45)	4 (12)	13 (41)
Complications, n (%)						
Bleeding	0 (0)	0 (0)	11 (22)	10 (21)	0	3 (9)
Perforation	0 (0)	2 (20)	4 (8)	8 (17)	0	0
Fistula (pancreatic)	1 (10)	7 (70)	2/42 (5)	13/41 (32)	0	9 (28)

Gastroenterology. 2019;156:1994–2007.

CT Features to Consider

- Walled off/encapsulated
  - Appearance much more important than time *
- Adjacent to or distant from stomach/duodenum
- Extension into paracolic gutter
- Presence of air
- Presence of collateral vessels (perigastric varices) and pseudoaneurysms

**Am J Gastroenterol.* 2018;113:1550–1558.

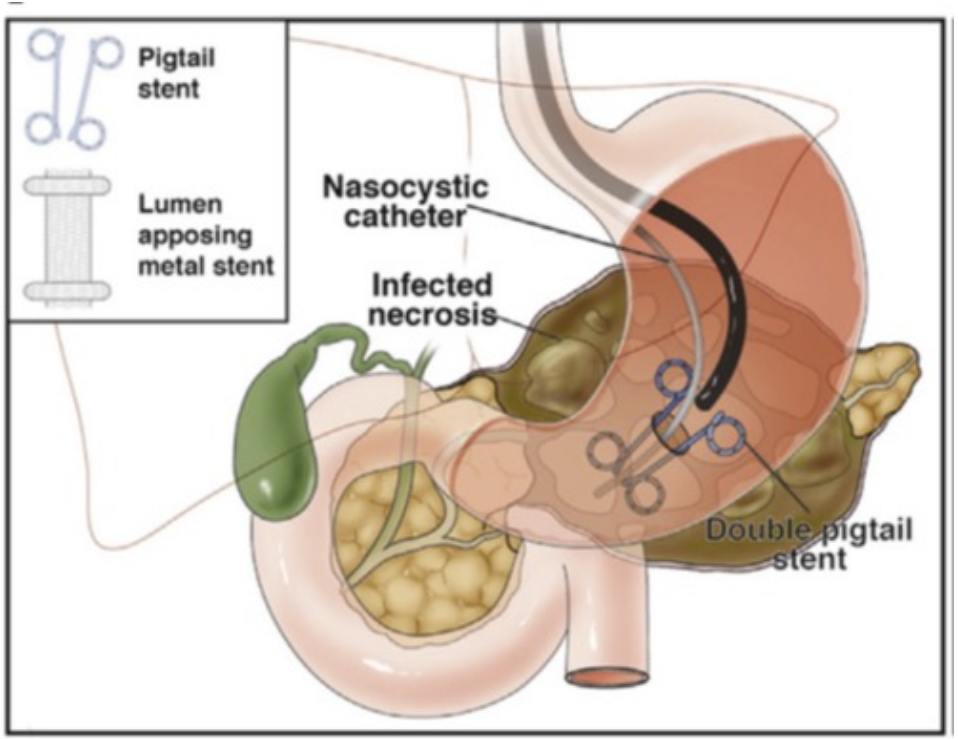
Indications for Drainage

Decision re: timing and method of drainage based on symptoms and radiographic appearance:

- **Symptoms**
  - Pain
  - Obstruction
    - GOO
    - Biliary
    - SMV/PV
  - Infected necrosis in patient not responding to antibiotics
  - Persistent organ failure
  - “Persistent unwellness”
- **Radiographic features**
  - Encapsulated
  - Adjacent to stomach or duodenum

DEN Procedure

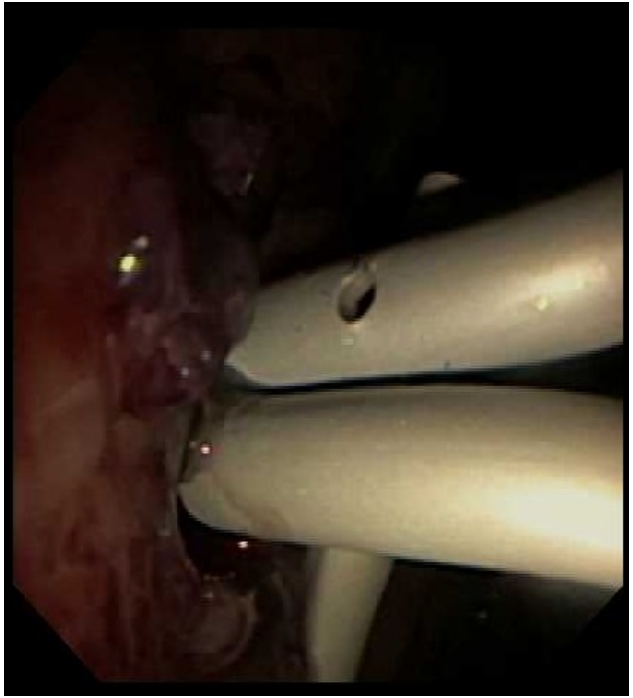
- MUST-HAVES
  - Walled off collection
  - Adjacent to stomach/duodenum
- Initial drainage
  - LAMS vs multiple DPPS *
  - LAMS w/ or w/o coaxial DPPS **
- DEN
  - at initial session vs delayed
  - timed vs symptom-based
  - tools and techniques
  - patient and provider patience
- Other considerations
  - Need for percutaneous drainage
  - Antibiotics
  - Nutrition
  - Modifiable patient characteristics



* *Gastrointest Endosc.* 2018;87:30–42.e15; ***Gastrointest Endosc*. 2018 Jan;87(1):150-157; *Gastroenterology.* 2019;156:1994–2007.

Double Pigtail Stents

- Traditional Approach
- Limitations:
  - Smaller stent diameter
    - Prone to occlusion and more re-interventions
  - Multiple challenges
  - Time consuming
  - Metal stents have more straightforward deployment
  - DPS lower clinical success (63-70%) than LAMS (90-95%) in WON



LAMS

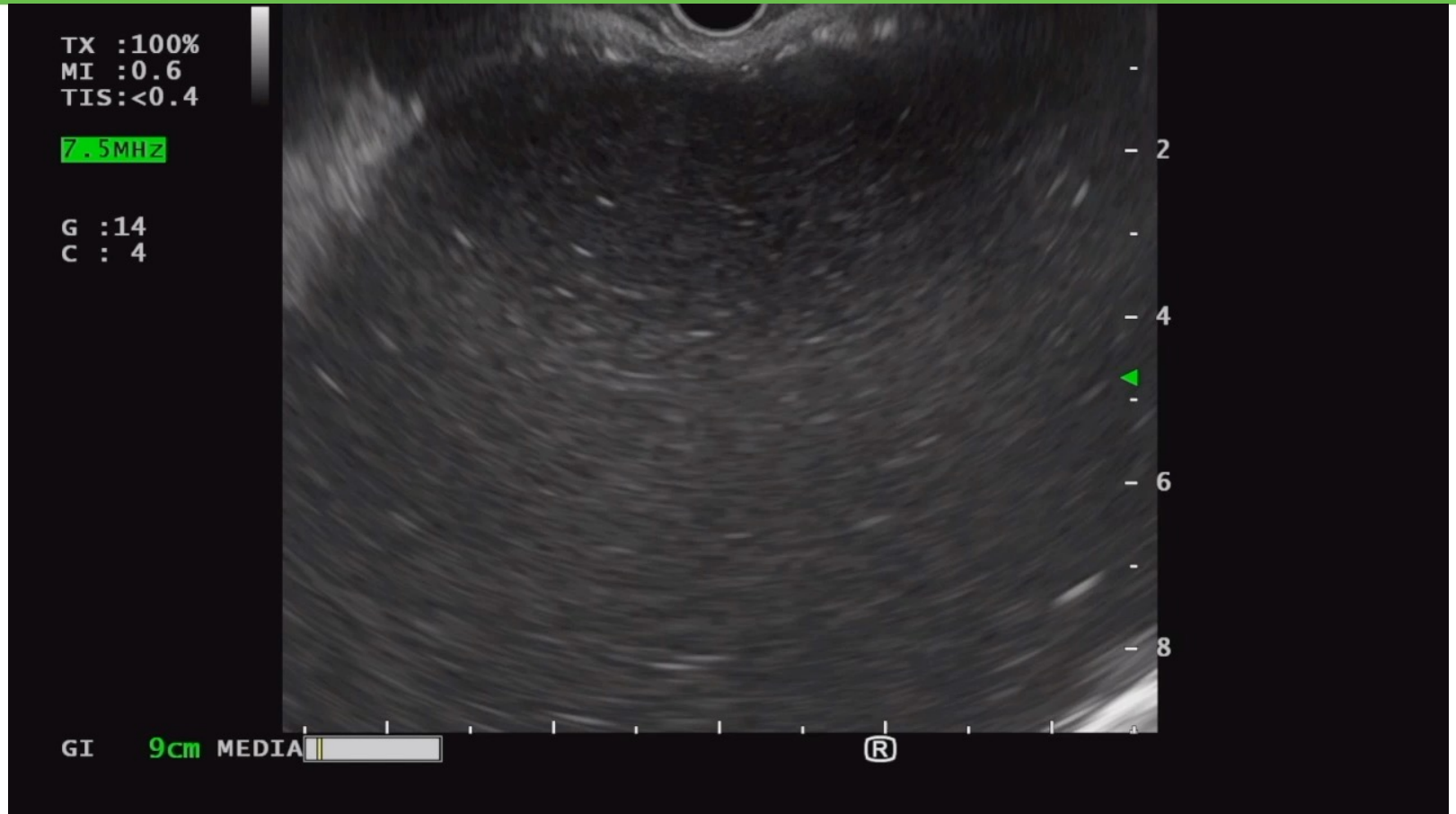
- Dedicated tool for drainage of PPFCs
- Specific stepwise deployment mechanism
- Bi-flanged shape allows for tissue apposition and decreases risk of migration
- Provides conduit for direct endoscopic necrosectomy
- Wider diameter may lead to improved drainage and obviate need for repeat procedures

DEN: How I Do It

- General anesthesia
- CO2 insufflation
- Initial drainage with EUS-guided LAMS with coaxial DPPS
  - Take time to pick a good spot for drainage
  - I do not leave LAMS in longer than 3 weeks *
  - Antibiotics for 3-7 days
  - Hold PPI
  - Gastrojejunostomy tube if unable to maintain nutrition
- CT scan in 3 weeks or sooner for symptoms and necrosis
- Decision re DEN based on persistent symptoms and presence of WON

* *Gut.* 2017;66:2054–2056.

Back to Case: EUS-Guided Drainage With LAMS

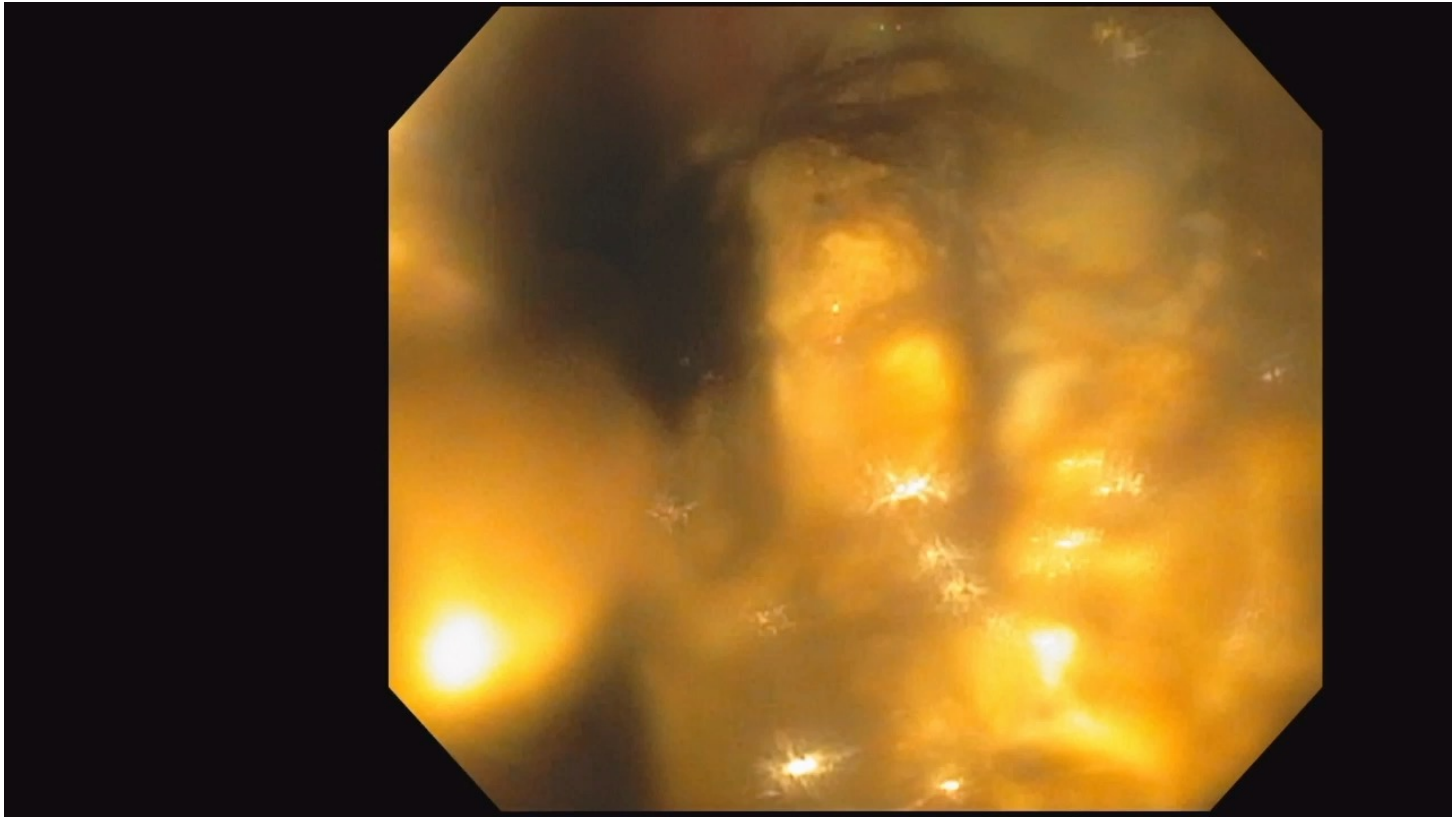


- Did well for ~2 weeks, then developed low grade fever and nausea

DEN: How I Do It

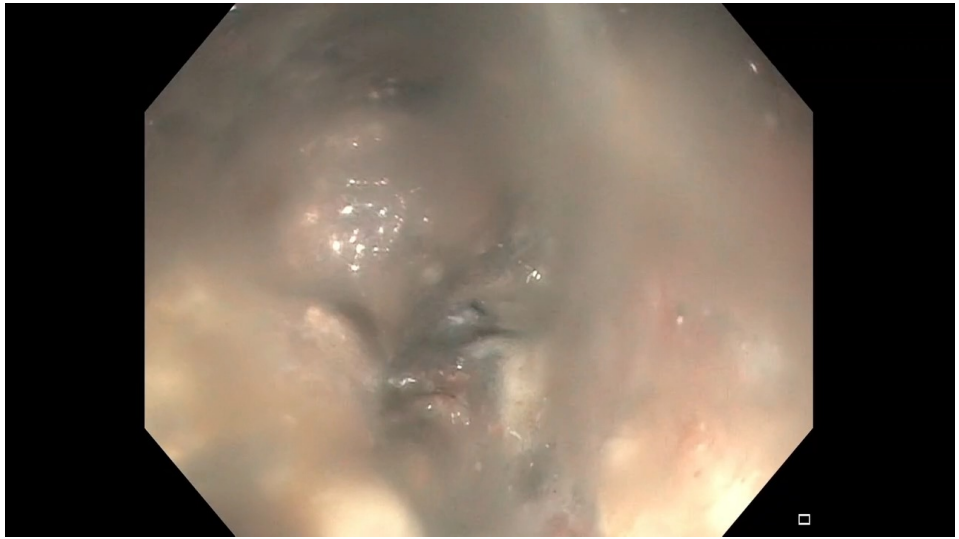
- Therapeutic upper scope
- Usually remove LAMS and dilate tract to 20 mm
- Debridement with 20 mm stiff braided snare
- Attempt to remove as much as possible at one session
- Replace LAMS with multiple DPPS
- Repeat DEN q5-7 days until resolved endoscopically and place 2-3 DPPS
- Obtain imaging once cavity looks clean
- Timing of DPPS removal ‘depends’
- I have not used PED, infrequently use H2O2, do not use NCD

DEN



Other Tools/Techniques

- H_2O_2 lavage *
- Nasocystic drain
- Powered endoscopic debridement (PED) catheter (mechanical morcellation)
  - Non-thermal, automated, continuous irrigation
  - Aspirate, cut, remove



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vimeo.com/643499261 (edited)

Am J Gastroenterol. 2021 Apr;116(4):700-709.

Case: Persistent Symptoms After DEN → CT Scan 5 Days Later

Ancillary Modalities and Alternative Approaches

- Percutaneous drainage
  - ANC
  - WON not adjacent to stomach or duodenum
  - PCD + ETD (perigastric with extension into gutter)
- Minimally invasive retroperitoneal debridement
  - Unsuccessful DEN or large perc tract
- Surgical necrosectomy (should be uncommon)
  - Unsuccessful DEN, very sick patient

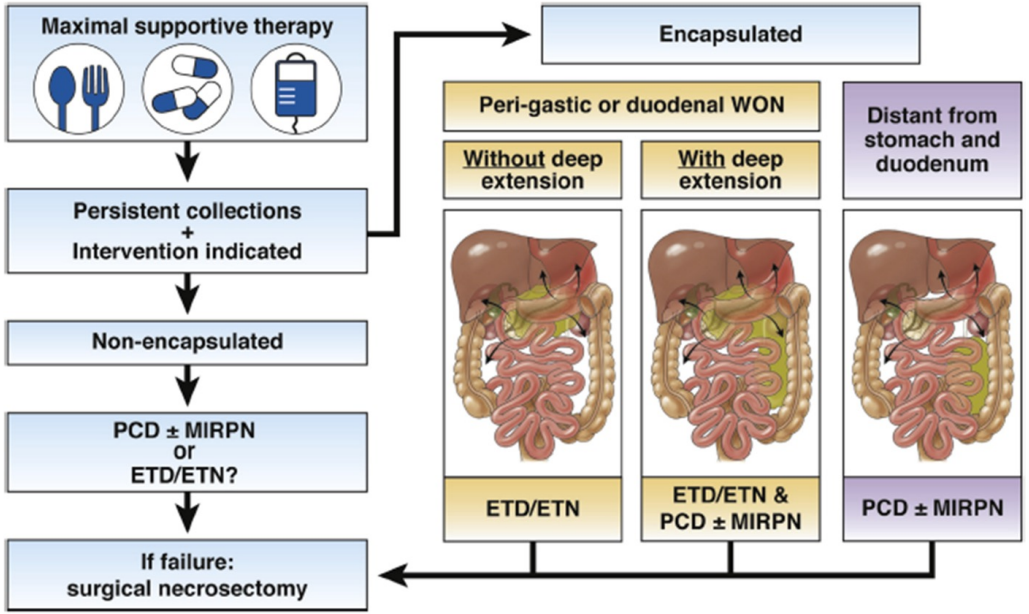

Figure 3. Strategy for interventions in necrotizing pancreatitis. MIRPN, minimally invasive retroperitoneal necrosectomy.

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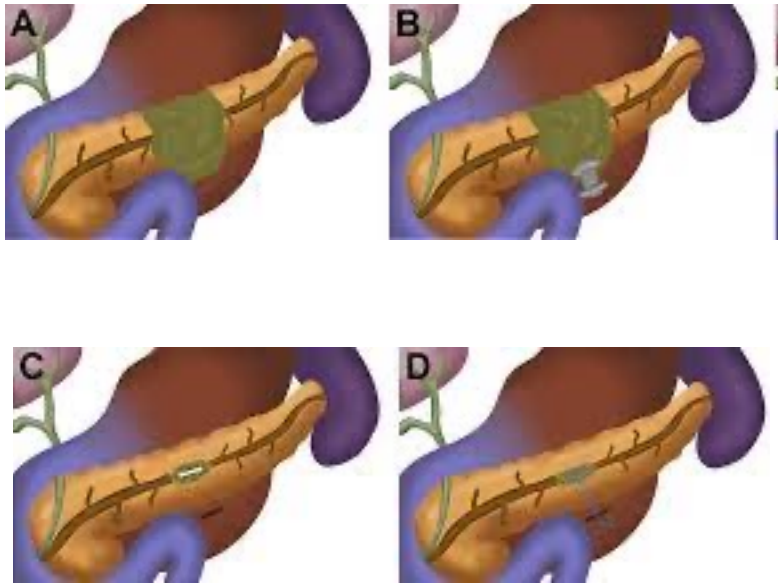
Disconnected Pancreatic Duct Syndrome



Necrosis of the duct leading to separation between viable pancreas and duodenum

I assume that most patients have this

- My goal is to maintain the pancreatoenteric fistula
- Leave DPPS behind indefinitely in tract
  - While distal pancreatectomy should ideally be done (but I have rarely seen this in clinical practice)

ERCP is ineffective for disconnected PD

Role of ERCP in patients with WON:

- Biliary obstruction
- Downstream obstruction (stricture or stone)
- Pancreatic ascites/pancreatic-pleural fistula

Clinical Gastroenterology and Hepatology. 2021;19:1275–1281.

3 Months Later

- 4 months after diagnosis - last drain removed
- 8 months after diagnosis - doing well, gaining weight, tapering pancreas enzymes, no DM

Key Takeaways

- Multidisciplinary approach
- Radiographic appearance more important than duration of illness
- Intervene only for symptoms
- Step-up approach
- LAMS better than DPPS for initial drainage
- Adjuvant PCD for collections extending into paracolic gutters
- Scheduled necrosectomy not clearly better than on-demand necrosectomy
- Disconnected pancreatic duct: leave DPPS to maintain tract at completion of necrosectomy
- Role of ERCP questionable and usually not needed
- Do not forget nutrition during treatment

Key References

- Baron T et al. AGA CPU: Management of pancreatic necrosis. *Gastroenterology.* 2020; 158: 67-75
- Trikudanathan G et al. Current concepts in severe acute and necrotizing pancreatitis: an evidence-based approach. *Gastroenterology.* 2019; 156: 1994-2007.
- Adler D. Top tips for endoscopic drainage and debridement of walled-off pancreatic necrosis. *GIE.* 2022; 96(4): 675-677.