How And When To Intervene on WOPN

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Disclosure

No financial relationships related to this talk
When And How To Intervene on WOPN

- When
  - Indications
  - Time Frame
WOPN Indications for Intervention

- Infection
- Organ failure
- Intractable pain
- Gastric outlet obstruction
- Disconnected duct
When And How To Intervene on WOPN

When

- Indications
- Time Frame
Acute necrotic collection

2 to 4 weeks
Outcome of PCD for ANC and WOPN

Percutaneous catheter drain (PCD) (n=375)

Acute necrotic collection (ANC) (n=258)
- PCD only (n=222)
  - Improved (n=188)
  - Mortality (n=34)
- Surgical necrosectomy (n=36)
  - Improved (n=21)
  - Mortality (n=15)

Walled-off necrosis (WON) (n=117)
- PCD only (n=103)
  - Improved (n=92)
  - Mortality (n=11)
- Surgical necrosectomy (n=14)
  - Improved (n=9)
  - Mortality (n=5)

Mallick B et al Pancreatology 2018
Complications and outcome of percutaneous catheter drainage

<table>
<thead>
<tr>
<th>Complication</th>
<th>Total</th>
<th>Acute necrotic collection (ANC)</th>
<th>Walled-off necrosis (WON)</th>
<th>Significance (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPF</td>
<td>103 (27.5%)</td>
<td>63 (24.4%)</td>
<td>40 (34.2%)</td>
<td>0.034</td>
</tr>
<tr>
<td>Bleed</td>
<td>14 (3.7%)</td>
<td>8 (3.1%)</td>
<td>6 (5.1%)</td>
<td>0.247</td>
</tr>
<tr>
<td>Blockade</td>
<td>46 (12.3%)</td>
<td>29 (11.2%)</td>
<td>17 (14.5%)</td>
<td>0.231</td>
</tr>
<tr>
<td>Slippage</td>
<td>41 (10.9%)</td>
<td>18 (10.9%)</td>
<td>13 (11.1%)</td>
<td>0.534</td>
</tr>
<tr>
<td>PD stenting for EPF</td>
<td>75 (72.8%)</td>
<td>43 (68.3%)</td>
<td>32 (80.0%)</td>
<td>0.013</td>
</tr>
<tr>
<td>Surgery</td>
<td>50 (13.3%)</td>
<td>36 (14.0%)</td>
<td>14 (12.0%)</td>
<td>0.364</td>
</tr>
<tr>
<td>Mortality</td>
<td>65 (17.3%)</td>
<td>49 (19.0%)</td>
<td>16 (13.7%)</td>
<td>0.132</td>
</tr>
</tbody>
</table>

Mallick B et al Pancreatologia 2018
## Early (<4 Weeks) Versus Standard (≥ 4 Weeks) Endoscopically Centered Step-Up Interventions for Necrotizing Pancreatitis

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>NP patients with interventions &lt; 4 weeks (usually ANC collections) (n = 76)</th>
<th>NP patients with interventions ≥ 4 weeks (usually WON collections) (n = 117)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (%)</td>
<td>10 (13.2%)</td>
<td>5 (4.3%)</td>
<td>0.024</td>
</tr>
<tr>
<td>Morbidity (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aMedian length of stay in days (IQR)</td>
<td>37 (27–61)</td>
<td>26 (0–207)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>bMedian length of ICU stay in days (IQR)</td>
<td>2.5 (0–22)</td>
<td>0 (0–3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Complications (procedure and disease related)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stent occlusion and Infection</td>
<td>30 (40%)</td>
<td>39 (33%)</td>
<td>0.36</td>
</tr>
<tr>
<td>Bleeding</td>
<td>8 (10.5%)</td>
<td>12 (10.3%)</td>
<td>0.95</td>
</tr>
<tr>
<td>Perforation</td>
<td>0</td>
<td>7 (6.0%)</td>
<td>0.044</td>
</tr>
<tr>
<td>Fistulae</td>
<td>25 (32.9%)</td>
<td>24 (20.5%)</td>
<td>0.054</td>
</tr>
<tr>
<td>New-onset diabetes</td>
<td>15 (19.7%)</td>
<td>25 (21.4%)</td>
<td>0.785</td>
</tr>
</tbody>
</table>

_Trikudanathan et al American Journal of Gastroenterology 2018_
Acute Necrotic Collection

Early drainage: < 4 weeks

Encapsulated
  - Endoscopic drainage

Non Encapsulated
  - Percutaneous drainage

± latter endoscopic necrosectomy
When And How To Intervene on WOPN > 4 wks
Pancreatic Necrosis

- Open Surgery
- Minimally invasive Surgery
- Endoscopic
- Percutaneous
WOPN Surgical Indications

- > 75% necrosis
- Marked extention into paracolic space
- Not accessible to endoscopy / percutaneous
- Associated pathology
- Diffuse or multifocal collections
- Failed interventions
Stepup vs Direct vs Drainage

Open Surgery
Minimally invasive Surgery
Endoscopic
Percutaneous
A Step-up Approach or Open Necrosectomy for Necrotizing Pancreatitis

Hjalmar C. van Santvoort et al NEJM April 2010

<table>
<thead>
<tr>
<th>Complications</th>
<th>Open Necrosectomy</th>
<th>Step-up Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMOF</td>
<td>40%</td>
<td>12%</td>
</tr>
<tr>
<td>NDM</td>
<td>38%</td>
<td>16%</td>
</tr>
</tbody>
</table>

31/45 (69%) 17/43 (40%)
Superiority of Step-up Approach vs Open Necrosectomy in Long-term Follow-up of Patients With Necrotizing Pancreatitis

![Graph showing event-free survival over time for Step-up approach and Open necrosectomy compared to the number of patients at risk.]

No. at risk:
- Step-up approach:
  - 29
  - 28
  - 26
  - 22
  - 5
- Open necrosectomy:
  - 15
  - 13
  - 13
  - 10
  - 2

*Hollemans et al Gastroenterology 2019*
Endoscopic Necrosectomy

Seewald S et al Gastrointest Endosc 2005
Endoscopic transluminal necrosectomy in necrotising pancreatitis: a systematic review
Sandra van Brunschot · Paul Fockens · Olaf J. Bakker · Marc G. Besselink

14 studies 455 patients

- Endoscopic interventions 4n.o
- Successful treatment 81%
- Mortality 6%
- Complications 36%

Surg Endosc 2013
Necrosectomy-Perforation

Cyst Wall

Posterior Gastric Wall

Cyst Wall

Cyst Cavity
Short bi-flanged SEMS (LAMS)

Nagi stent

Axious stent

Spaxus stent
Short biflanged SEMS EUS guided
Necrosectomy-bleeding
Endotherapy - WOPN

Complications

- Bleeding
- Perforation
- Infection
- Air embolism
Can we avoid this complicated necrosectomy?

Endoscopic “step-up approach” using dedicated bi-flanged metal stent reduces the need for direct necrosectomy in WON

Sundeep Lakhtakia, Jahangeer Basha, Rupjyoti Talukdar, Rajesh Gupta, Zaheer Nabi, Mohan Ramchandani, BVN Kumar, Partha Pal, Rakesh Kalpala, Palle M Reddy, Rebala Pradeep, Jagadeesh Singh, G V Rao, D N Reddy,

Gastrointest Endosc 2016
Step 1: De-clogging
NCT Irrigation

NASO-CYSTIC TUBE (NCT)
Step 3: Direct Necrosectomy
Step-wise incremental success (N=205)

1. **Index procedure (BFMS)**
   - N=153
   - 74.6%

2. **1st step De-clogging**
   - N=163
   - 79.5%

3. **2nd step NCT & irrigation**
   - N=179
   - 87.3%

4. **3rd step DEN**
   - N=198
   - 96.5%
How?

LAMS vs Plastic Stents
Lumen-apposing metal stents (LAMS) for pancreatic fluid collection (PFC) drainage: may not be business as usual
Non-superiority of lumen-apposing metal stents over plastic stents for drainage of walled-off necrosis in a randomised trial

<table>
<thead>
<tr>
<th></th>
<th>LAMS (n=31)</th>
<th>Plastic stents (n=29)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure duration</td>
<td>15 min</td>
<td>40 min</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Adverse events (stent related)</td>
<td>32.3%</td>
<td>6.9%</td>
<td>0.014</td>
</tr>
<tr>
<td>Treatment success</td>
<td>93.5%</td>
<td>96.6%</td>
<td>0.999</td>
</tr>
</tbody>
</table>

J Y Bang et al Gut 2019
Metal stents versus plastic stents for the management of pancreatic walled-off necrosis: a systematic review and meta-analysis

<table>
<thead>
<tr>
<th></th>
<th>Plastic stents</th>
<th>Lumen-apposing metal stents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall resolution</td>
<td>80.9%</td>
<td>91.5% (OR, 2.5; 95% CI, 1.4-4.3; <em>P</em> = .001)</td>
</tr>
<tr>
<td>Rate of resolution with a single procedure</td>
<td>43.4%</td>
<td>52.3% (OR, 1.4; 95% CI, 0.56-3.6; <em>P</em> = .4)</td>
</tr>
<tr>
<td>Bleeding</td>
<td>7.1%</td>
<td>5% (OR, 0.64; 95% CI, 0.13-3.1; <em>P</em> = .5)</td>
</tr>
<tr>
<td>Perforation</td>
<td>3%</td>
<td>4% (OR, 1.2; 95% CI, 0.24-6.18; <em>P</em> = .8)</td>
</tr>
<tr>
<td>Stent migration</td>
<td>5.3%</td>
<td>6.3% (OR, 1.12; 95% CI, 0.51-2.47; <em>P</em> = .7)</td>
</tr>
<tr>
<td>Stent occlusion</td>
<td>16.9%</td>
<td>3.8% (OR, 0.36; 95% CI, 0.03-4; <em>P</em> = .4)</td>
</tr>
<tr>
<td>Number of procedures to achieve resolution</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean difference –.92 (95% CI, –1.283-561, *p* < 0.001) (favoring metal stents)
EUS-guided pseudocyst drainage: prospective evaluation of early removal of fully covered self-expandable metal stents with pancreatic ductal stenting in selected patients

Vinay Dhir, MD, Anthony Yuen Bin Teoh, MS, FRCS, Mukta Bapat, MD, Suryaprakash Bhandari, MD, Nitin Joshi, MD, Amit Maydeo, MD
Mumbai, India; Shatin, Hong Kong

Early removal of biflanged metal stents in the management of pancreatic walled-off necrosis: a prospective study

Authors
Safety and efficacy of lumen-apposing metal stents with and without simultaneous double-pigtail plastic stents for draining pancreatic pseudocyst.

Aburajab et al Gastrointestinal Endoscopy 2018
Plastic Stents: remove or leave in

Pancreatic-fluid collections: a randomized controlled trial regarding stent removal after endoscopic transmural drainage

Kaplan-Meier analysis of the probability that PFC recurrence would occur according to group allocation for the 28 randomized patients

M Arvanitakis et al Gastrointest Endoscopy 2007
Combined Procedure
Single or multiport percutaneous endoscopic necrosectomy performed with the patient under conscious sedation is a safe and effective treatment for infected pancreatic necrosis (with video)
Percutaneous Endoscopic Step-Up Therapy Is an Effective Minimally Invasive Approach for Infected Necrotizing Pancreatitis

177 Infected pancreatic necrosis

- Conservative
  N=27
- PCD alone
  N=56
- PC endo necrosectomy
  N=53
- Surgery
  N=52

Success: 42 (79%)
  PEN: 34
  PEN + Sx: 8

Jain S et al Digestive Diseases and Sciences 2019
### Infected Necrotizing Pancreatitis: Evolving Interventional Strategies From Minimally Invasive Surgery to Endoscopic Therapy—Evidence Mounts, But One Size Does Not Fit All

<table>
<thead>
<tr>
<th></th>
<th>TENSION Trial</th>
<th></th>
<th>MISER Trial</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Endoscopic</td>
<td>Surgical</td>
<td>Endoscopic</td>
<td>Surgical</td>
</tr>
<tr>
<td>No. of patients</td>
<td>51</td>
<td>47</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>Percent infected necrosis</td>
<td>23 (45%)</td>
<td>27 (57%)</td>
<td>31 (91%)</td>
<td>30 (94%)</td>
</tr>
<tr>
<td>Outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Composite end point</td>
<td>22 (43%)</td>
<td>21 (45%)</td>
<td>4 (12%)</td>
<td>13 (41%)</td>
</tr>
<tr>
<td>New-onset organ failure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>7 (14%)</td>
<td>13 (28%)</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Multiple</td>
<td>2 (4%)</td>
<td>6 (13%)</td>
<td>2 (6%)</td>
<td>3 (9%)</td>
</tr>
<tr>
<td>Death</td>
<td>9 (18%)</td>
<td>6 (13%)</td>
<td>3 (9%)</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>Complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bleeding</td>
<td>11 (22%)</td>
<td>10 (21%)</td>
<td>0</td>
<td>3 (9%)</td>
</tr>
<tr>
<td>Perforation</td>
<td>4 (8%)</td>
<td>8 (17%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fistula (pancreatic)</td>
<td>2/42 (5%)</td>
<td>13/42 (32%)</td>
<td>0</td>
<td>9 (28%)</td>
</tr>
</tbody>
</table>

*P K Garg et al Gastroenterology 2019*
Algorithmic Approach to Interventions in WOPN

Maximal supportive therapy

Intervention indicated
Delay until >4 weeks if possible

Encapsulated

Peri gastric/duodenal WON
Without deep extension

ETD/ETN

If failure

Surgical necrosectomy

Peri gastric/duodenal WON
With deep extension

ETD/ETN and PCD±STE

Non-encapsulated

Distant from stomach/duodenum

ETD/ETN and PCD±STE

PCD±STE

Adapted from Yukako Nemoto, Pancreatology 2017
Pearls in Practice

- ANC can be drained if needed: PCD/ED
- WON – Step up approach: Endoscopy or MIS
- Hybrid techniques PTD+ED in large lesions
- Metal vs Plastic Stents - ?????
- Multidisciplinary approach