Peripancreatic Fluid Collections (PFC’s) – Definitions & Management

AMOL BAPAYE MD (MS), FASGE
SHIVANAND DESAI CENTER FOR DIGESTIVE DISORDERS
DEENANATH MANGESHKAR HOSPITAL & RESEARCH CENTER, PUNE, INDIA
PFC’s -

- Acute pancreatitis may be complicated by development of peripancreatic fluid collections
- PFC’s are a major cause of morbidity during and after an attack of acute pancreatitis
- PFC’s can be classified on basis of the timing of their occurrence and the contents within
- Revised Atlanta Classification 2012 remains currently the gold standard for this classification

Pancreatic Fluid Collections (PFC’s)
Revised Atlanta Classification 2012

Acute Pancreatitis

2/3

Interstitial edematous pancreatitis

Necrotizing pancreatitis

1/3

Acute peripancreatic fluid collection

Pancreatic pseudocyst

Acute necrotic collection

Walled off necrosis

< 4 weeks

> 4 weeks

< 4 weeks

> 4 weeks

Acute peripancreatic fluid collection (APFC)

- Fluid collections occurring within first 4 weeks of attack
- Usually multiple, ill-defined
- Poor / no defined wall
- Homogeneous contents
- Usually confined by normal fascial planes
- Most remain sterile
- Most resolve spontaneously; do not require specific therapy
- APFC remaining beyond 4 weeks likely to develop into pseudocyst

Pancreatic pseudocyst (PPC)

- Refers to fluid collection in peripancreatic tissues / intra-pancreatic
- Surrounded by a well defined wall
- Contents – liquid, no or minimal solid component; high fluid amylase
- Possibly arises due to disruption of MPD / branches without parenchymal necrosis. Leakage of pancreatic juice results in persistent, localized collection (usually after 4 weeks)
- PPC may also arise due to disconnected duct syndrome during acute necrotizing pancreatitis
- PPC may also remain after necrosectomy due to continued leakage from a disconnected duct

Acute necrotic collection (ANC)

- Collection during initial 4 weeks containing variable amount of fluid and necrotic solid material
- Ill formed wall
- Necrosis can involve pancreatic / peripancreatic tissues
- May be multiple, loculated
- Arises after ANP and may be associated with duct disruption
- Can get infected
- May be difficult to differentiate from APFC during 1st week. Sequential imaging (CECT, MRI, EUS) helpful to differentiate

Walled off necrosis (WON)

- Mature, encapsulated collection of pancreatic and/or peripancreatic necrosis with variable amount of fluid
- Occurs > 4 weeks after ANP
- Has well defined inflammatory wall
- Can involve pancreatic / peripancreatic tissues
- May be multiple, loculated
- May be infected
- MRI / EUS superior to CECT to differentiate between PPC and WON

Pancreatic Fluid Collections (PFC’s)
Clinical relevance of Atlanta Classification

Acute Pancreatitis

2/3rd
Interstitial edematous pancreatitis

1/3rd
Necrotizing pancreatitis

Acute peripancreatic fluid collection
< 4 weeks

Pancreatic pseudocyst
> 4 weeks

Acute necrotic collection
< 4 weeks

Walled off necrosis (WON)
> 4 weeks

Issues in PFC Drainage

• Who should undergo drainage?
• Timing?
• When Not?
• How?
• Are results comparable with other modalities?
PPC’s complicating Acute Pancreatitis (> 4 weeks)

Old Rule: 6cm, 6 weeks and 6 mms wall – no longer valid

Asymptomatic: observe
◦ Less chance of complications like rupture, infection, bleeding

Treat if symptomatic
◦ Pain
◦ Inability to tolerate feeding
◦ Weight loss
◦ Progressive Jaundice
◦ Infection
◦ Rapid increase in size
◦ Complications

Voermans RP Gastrointest Endosc 2009
PPC’s complicating Chronic Pancreatitis

• Symptomatic / infected
• Progressive jaundice / Biliary obstruction
• GOO

Size > 6 cms – less likely to resolve & more complications with time
With Ductal strictures / stones

Walled-Off Pancreatic Necrosis (WOPN) Indications of Drainage

**Infected**
- Obstructive Symptoms
  - 4-8 weeks
- Fistula with surrounding hollow organ/bowel

**Sterile**
- Failure to thrive
- Unable to tolerate feeds
- Weight loss
- Pain
- >8 weeks
Treatment of Pancreatic fluid Collections

PFC’s

- Observant
- Percutaneous
- Surgery
- Endoscopy

Single modality or combination?
Step up approach

- VARD
- Laparoscopic
- Open
Endotherapy of PFC’s: Approaches

PFC

Trans-papillary

Transmural

Gastric

Duodenal

Conventional

EUS

EUS – Multiple gateway

EUS assisted

EUS guided
Not suitable for endoscopic drainage?

- Ill formed PFC
- Wall thickness > 1 cm
- Located away from bowel wall (pelvis, paracolic gutter)
- Doubtful diagnosis –
  - No definite history of acute pancreatitis, trauma, surgery or chronic pancreatitis
Not suitable for endoscopic drainage?

• Masqueraders of PFC’s –
  • Cystic pancreatic neoplasm
  • Duplication cyst
  • True pancreatic cyst
  • Pseudoaneurysm
  • Solid necrotic neoplasm (eg, sarcoma)
  • Lymphocele
  • Gallbladder
EUS guided PFC drainage – Steps

- Linear EUS
- Puncture
- Aspiration
- Dilatation
- Stent/s
- NC Drainage
Metal stents for EUS-guided Drainage

- **Tubular non-fin type**
  - C-WallFlex (Boston)

- **Tubular fin type**
  - GORE VIABIL (Gore)

- **NAGI STENT** (Taewoong)

- **BONASTENT** (Standard Sci Tech)

- **SPAXUS** (Taewoong)

- **Lumen-appose type**
  - AXIOS (Boston)
Is EUS superior to conventional drainage?

EUS = CONVENTIONAL

Kahaleh, Endoscopy 2006
Barthet, Gastrointest Endosc 2008

EUS > CONVENTIONAL

Varadarajalu S, Gastrointest Endosc 2008
Varadarajalu S, J Gastrointest Surg 2011
Seewald S, Dig Endosc 2012

EUS –
Implements technical success (93% vs 60%)
Reduces complications
Avoids misdiagnosis
Mandatory EUS Guided Drainage

- Small “window” of entry on the basis of CT
- Absence of an endoscopic bulge
- Coagulopathy or thrombocytopenia
- Documented intervening varices
- Failed transmural drainage using non-EUS guided approach

Baron T Gastrointest Endosc 2007
Need for necrosectomy (DEN)

Quantification of Necrosis

< 10% - Single session
10-40% - > 2 sessions
>40% – multiple sessions of DEN/ Sx

Rana SS, Endosc Ultrasound 2014
A Step-up Approach or Open Necrosectomy for Necrotizing Pancreatitis
TENSION Trial: Endoscopic or surgical step-up approach for necrotizing pancreatitis, a multicenter randomized controlled trial *S. Van Brunschot et al (UEGW 2016, OP 004)*

<table>
<thead>
<tr>
<th></th>
<th>Endoscopy</th>
<th>Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>51</td>
<td>47</td>
</tr>
<tr>
<td>Primary endpoint</td>
<td>10 (20%)</td>
<td>13 (28%)</td>
</tr>
<tr>
<td>RR = 0.75, CI 0.37-1.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death</td>
<td>18%</td>
<td>13%</td>
</tr>
<tr>
<td>NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO necrosectomy</td>
<td>21 (41%)</td>
<td>23 (49%)</td>
</tr>
<tr>
<td>NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fistula</td>
<td>5%</td>
<td>32%</td>
</tr>
<tr>
<td>P &lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOS</td>
<td>36d</td>
<td>69d</td>
</tr>
<tr>
<td>P = 0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>660228</td>
<td>673883</td>
</tr>
<tr>
<td>13655</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Necrosectomy (DEN)
Blocked SEMS
Hydrogen peroxide ($H_2O_2$) during DEN

To facilitate removal of necrotic debris

Infused into the cavity during endoscopy in a 1:5 or 1:10 dilution with normal saline

To enhance necrotic tissue dislodgement and debris extraction during endoscopy

Advantages:
- reduces procedure time
- reduces complication rates
- decreases total number of DEN sessions until resolution

Adverse events:
- bleeding, perforation, self limited pneumoperitoneum.
Complications

• Bleeding (18%)
  • From puncture, WON wall or pseudo-aneurysm in 18% patients
  • Majority of bleeding episodes (93%) – endoscopic control using coagulation, epinephrine injections or clips.
  • Angio-embolization / surgery (7%)

• Perforation (4%)
  • Of gut wall or WOPN
  • Treatment – Conservative / Surgery

Complications

• Gas embolism
  • Can be fatal
  • Due to communication between source of gas and bloodstream
  • Risk factors – Intervention and inflammation
  • Reduced with CO2 (mandatory), though even reported with it
  • consider and recognize if cardiovascular and/or respiratory symptoms develop abruptly during procedure without another explanation
  • Prior air in portal venous system is contraindication for further DEN sessions
PFC: Endoscopic vs Percutaneous Drainage

DEN superior to Percutaneous drainage –

Superior resolution of PFC – 92% vs 25%

less –
  ◦ antibiotic use
  ◦ pancreatic insufficiency
  ◦ hospitalization

(9 / 12 patients required surgery after percutaneous drainage alone)

Kumar N. Pancreas 2014; 43: 1334-1339
PPC drainage: Endoscopy vs Surgery

• Equal efficacy of endoscopic and surgical cystogastrostomy
• Shorter LOS for endoscopic drainage (median 2 vs 6 days; $P < .001$)
• Lower cost for endoscopy than surgery ($7011 vs $15,052; P = .003$)
• Better QOL with endoscopy

Endoscopy = Sx
Superior for cost, hospital stay  QOL

Comparison between Surgical and Endoscopic Pancreatic Necrosectomy (PENGUIN Trial JAMA 2012)

Significantly less inflammation with endoscopy
Comparison between Surgical and Endoscopic Pancreatic Necrosectomy (PENGUIN Trial JAMA 2012)

- Endoscopy superior to surgery for –
  - Less major complications
  - New onset multiple organ failure
  - Intra-abdominal bleeding
  - Entero-cutaneous fistula
  - Pancreatic fistula
  - Less pancreatic enzyme use at 6 months
Long-term QOL – GEPARD Study

Good QOL in 80% for endoscopy in long term
Poor quality due to co-morbid conditions
## Results

<table>
<thead>
<tr>
<th>Cases</th>
<th>Procedure used</th>
<th>Device used</th>
<th>Clinical success rates</th>
<th>Technical success rates</th>
<th>Complications</th>
</tr>
</thead>
</table>
| Pancreatic pseudocysts  
Hookey et al\[35\], 2006  
116 | Conventional Transmural drainage                   | Stents                                     | 88%                    | 88%                     | 11% complication rate                                                          |
| Antillon et al\[40\], 2006  
33  | EUS-Guided Transmural drainage                     | Double-pigtail Stent                       | 94%                    | 82%                     | 2 major complications and 3 minor complications                                |
| Azar et al\[44\], 2006  
23  | EUS-Guided Transmural drainage                     | Double-pigtail Stent                       | 91%                    | 91%                     |                                                                                |
| Lopes et al\[46\], 2007  
51  | EUS-guided Transmural drainage                     | Straight/Double-pigtail Stent              | 94%                    | 94%                     | 17.7% stent migration, stent obstruction                                           |
| Barthet et al\[45\], 2008  
50  | EUS-guided Transmural drainage                     | Double-pigtail Stent/Straight Polyethylene | 90%                    | 98%                     | 18% morbidity, 5 superinfections                                                 |
| Talreja et al\[86\], 2008  
18  | EUS-guided drainage                                | Covered self-expanding metal stent         | 95%                    | 78%                     | Superinfection (5), bleeding (2), and inner migration (1).                       |
| Berzosa et al\[53\], 2012  
7   | Single-step endoscopic ultrasonography-guided drainage | Single-self expandable metal stent        | 100%                   | 83%                     |                                                                                |
| Fabbri et al\[59\], 2012  
22  | EUS-guided drainage                                | Covered self-expanding metal stent         | 77%                    | 77%                     |                                                                                |
| Penn et al\[62\], 2012  
20  | EUS-guided drainage                                | Fully covered self-expandable metallic stents | 70%                    | 70%                     | Pseudocyst infection (2), post-transmural drainage fever and post-ERCP pancreatitis (1) |
| Itoi et al\[65\], 2012  
15  | EUS-guided drainage                                | Novel lumen-apposing, self-expandable metal stent (Axios) | 100%                   | 100%                    |                                                                                |
### Results

<table>
<thead>
<tr>
<th>Cases</th>
<th>Procedure used</th>
<th>Device used</th>
<th>Clinical success rates</th>
<th>Technical success rates</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weillert et al(^{[15]}), 2012</td>
<td>18</td>
<td>EUS-guided drainage</td>
<td>Fully covered self-expanding metal stent (Axsos)</td>
<td>78%</td>
<td>78%</td>
</tr>
<tr>
<td>Varadarajulu et al(^{[16]}), 2013</td>
<td>20</td>
<td>Endoscopic Cystogastrostomy</td>
<td>Plastic stents</td>
<td>95%</td>
<td>90%</td>
</tr>
<tr>
<td>Sarkaria et al(^{[17]}), 2014</td>
<td>17</td>
<td>EUS-guided drainage</td>
<td>Fully covered esophageal self-expandable metallic stents</td>
<td>88%</td>
<td>88%</td>
</tr>
<tr>
<td>Shah et al(^{[18]}), 2015</td>
<td>33</td>
<td>EUS-guided drainage</td>
<td>Lumen-apposing, covered, self-expanding metal stent (Axsos)</td>
<td>91%</td>
<td>93%</td>
</tr>
<tr>
<td>Walter et al(^{[19]}), 2015</td>
<td>61</td>
<td>EUS-guided drainage</td>
<td>Lumen-apposing, self-expanding metal stent (Axsos)</td>
<td>93%</td>
<td>98%</td>
</tr>
<tr>
<td>Mukai et al(^{[20]}), 2015</td>
<td>2</td>
<td>EUS-guided drainage/Direct endoscopic necrosectomy</td>
<td>Novel flared-type bifilangedmetal stent</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Rinninella et al(^{[21]}), 2015</td>
<td>18</td>
<td>EUS-guided drainage</td>
<td>Lumen-apposing, self-expanding metal stent (Axsos)</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Sharaiha et al(^{[22]}), 2015</td>
<td>230</td>
<td>EUS-guided transmural drainage</td>
<td>118 DP plastic stents/112 FCSEMS</td>
<td>75%-90%</td>
<td>&lt; 90%</td>
</tr>
<tr>
<td>Walled-off Necrosis Seewald et al(^{[23]}), 2005</td>
<td>13</td>
<td>Direct endoscopic necrosectomy</td>
<td>Double-pigtail stent</td>
<td>91%</td>
<td>91%</td>
</tr>
<tr>
<td>Charnley et al(^{[24]}), 2006</td>
<td>13</td>
<td>Direct endoscopic necrosectomy</td>
<td>Double-pigtail stents</td>
<td>92.3%</td>
<td>92.3%</td>
</tr>
<tr>
<td>Voermans et al(^{[25]}), 2007</td>
<td>25</td>
<td>Direct endoscopic necrosectomy</td>
<td>Double-pigtail stents</td>
<td>93%</td>
<td>93%</td>
</tr>
<tr>
<td>Papachristou et al(^{[26]}), 2007</td>
<td>53</td>
<td>Direct endoscopic necrosectomy</td>
<td>Double-pigtail stents</td>
<td>81%</td>
<td>81%</td>
</tr>
</tbody>
</table>

- **Weillert et al\(^{[15]}\), 2012**: Perforation during tract dilation (1)
- **Voermans et al\(^{[25]}\), 2007**: Twelve patients (23%) required open operative intervention a median of 47 d (range, 8–540) after initial endoscopic drainage/debridement, due to persistence of WOPN (n = 3), recurrence of a fluid collection (n = 2), cutaneous fistula formation (n = 2), or technical failure, persistence of pancreatic pain, colonic obstruction, perforation, and flank abscess (n = 1 each).
<table>
<thead>
<tr>
<th>Cases</th>
<th>Procedure used</th>
<th>Device used</th>
<th>Clinical success rates</th>
<th>Technical success rates</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escourrou et al(^{(1)}), 2008</td>
<td>13 Direct endoscopic necrosectomy</td>
<td>Double-pigtail stents</td>
<td>100%</td>
<td>100%</td>
<td>bleeding (n = 3), transient aggravation of sepsis (n = 3)</td>
</tr>
<tr>
<td>Seifert et al(^{(9)}), 2009</td>
<td>93 Transmural endoscopic necrosectomy</td>
<td>Multiple Stents</td>
<td>80%</td>
<td>80%</td>
<td>Bleeding (13), Perforations of the necrosis (5), fistula formation (2), air embolism (2), complications at other organs (2)</td>
</tr>
<tr>
<td>Gardner et al(^{(22)}), 2009</td>
<td>45 25 used direct endoscopic necrosectomy and 20 used conventional standard endoscopic drainage</td>
<td>Multiple Stents</td>
<td>45%</td>
<td>88% for DEN and 45% for Standard endoscopy drainage</td>
<td></td>
</tr>
<tr>
<td>Gardner et al(^{(4)}), 2011</td>
<td>104 Direct endoscopic necrosectomy</td>
<td>Multiple Stents</td>
<td>91%</td>
<td>91%</td>
<td>14%; included 5 retrogastric perforations/pneumoperitoneum</td>
</tr>
<tr>
<td>Attam et al(^{(8)}), 2014</td>
<td>10 Endoscopic transluminal necrosectomy and transmural drain</td>
<td>Novel large-bore, fully covered metal through-the-scope esophageal stent</td>
<td>90%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Smoczyński et al(^{(130)}), 2014</td>
<td>112 Endoscopic drainage</td>
<td>Multiple Stents</td>
<td>84%</td>
<td>93%</td>
<td>Stoma bleeding (19), GI Perforation (4), collection perforation (2), sepsis (1), stent migration (3)</td>
</tr>
<tr>
<td>Sarkaria et al(^{(70)}), 2014</td>
<td>17 EUS-guided drainage</td>
<td>Fully covered esophageal self-expandable metallic stents</td>
<td>83%</td>
<td>83%</td>
<td></td>
</tr>
<tr>
<td>Mukai et al(^{(18)}), 2015</td>
<td>19 EUS-guided drainage and DEN for PFCs using the novel flared-type BFMS</td>
<td>novel flared-type biflangedmetal stent</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Rinninella et al(^{(64)}), 2015</td>
<td>52 EUS guidance FCSEMS/ LACSEMS</td>
<td>Axios Stent</td>
<td>90.4%</td>
<td>100%</td>
<td>3 patients required surgery due to infection/1 patient had a perforated wall</td>
</tr>
<tr>
<td>Walter et al(^{(35)}), 2015</td>
<td>46 EUS guided drainage</td>
<td>Axios Stent</td>
<td>81%</td>
<td>81%</td>
<td>9%</td>
</tr>
<tr>
<td>Cases</td>
<td>Procedure used</td>
<td>Device used</td>
<td>Clinical success rates</td>
<td>Technical success rates</td>
<td>Complications</td>
</tr>
<tr>
<td>-------</td>
<td>----------------</td>
<td>-------------</td>
<td>------------------------</td>
<td>------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Shah et al(^{[8]}), 2015</td>
<td>33</td>
<td>EUS-guided drainage</td>
<td>Lumen-apposing, covered, self-expanding metal stent; Axios</td>
<td>91%</td>
<td>93%</td>
</tr>
<tr>
<td>Walter et al(^{[9]}), 2015</td>
<td>61</td>
<td>EUS-guided drainage</td>
<td>Axios</td>
<td>93%</td>
<td>98%</td>
</tr>
<tr>
<td>Mukai et al(^{[3]}), 2015</td>
<td>19</td>
<td>EUS-guided drainage and DEN for PFCs using the novel flared-type BFMS</td>
<td>novel flared-type biflanged metal stent</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Rinninella et al(^{[9]}), 2015</td>
<td>52</td>
<td>EUS guidance FCSEMS/ LACSEMS</td>
<td>Axios Stent</td>
<td>90.4%</td>
<td>100%</td>
</tr>
</tbody>
</table>
## Endotherapy for PFC’s – plastic vs SEMS

<table>
<thead>
<tr>
<th>Publication</th>
<th>Patients (N)</th>
<th>PFC’s (n)</th>
<th>Study type</th>
<th>PFC / WON</th>
<th>Stent type</th>
<th>Single arm / comparative</th>
<th>Clinical success (%)</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yamamoto N et al 2013^13</td>
<td>9</td>
<td>9</td>
<td>Retrospective</td>
<td>PFC</td>
<td>BFMS</td>
<td>Single arm</td>
<td>78</td>
<td>BFMS feasible</td>
</tr>
<tr>
<td>Bapaye et al 2015^14</td>
<td>19</td>
<td>21</td>
<td>Retrospective</td>
<td>PFC</td>
<td>BFMS</td>
<td>Single arm</td>
<td>100</td>
<td>BFMS safe and effective</td>
</tr>
<tr>
<td>Chandran S et al 2014^15</td>
<td>47</td>
<td>54</td>
<td>Retrospective case series</td>
<td>PFC</td>
<td>BFMS</td>
<td>Single arm</td>
<td>67</td>
<td>BFMS have limitations</td>
</tr>
<tr>
<td>Lee BU et al 2014^16</td>
<td>50</td>
<td>50</td>
<td>Prospective randomized</td>
<td>PFC</td>
<td>BFMS vs. plastic</td>
<td>Comparitive</td>
<td>87 vs. 91</td>
<td>Both comparable</td>
</tr>
<tr>
<td>Bang JY et al^17</td>
<td>881</td>
<td></td>
<td>Meta-analysis</td>
<td>PFC</td>
<td>BFMS vs. plastic</td>
<td>81 vs. 82 (overall)</td>
<td>Both comparable, no additional benefit of BFMS</td>
<td></td>
</tr>
<tr>
<td>Mukai S et al 2015^18</td>
<td>70</td>
<td>70</td>
<td>Retrospective</td>
<td>WON</td>
<td>BFMS vs. plastic</td>
<td>Comparaive</td>
<td>98 vs. 93</td>
<td>Comparable, both safe &amp; effective</td>
</tr>
</tbody>
</table>
### Psuedocyst
- Plastic = Metal
- Single = multiple
- 7fr. = 10fr.

### WOPN
- Metal > Plastic if significant necrosis
- At least 2 plastic
- ? 10fr. > 7 fr.

---

**WON – Plastic / Metal Stents**

- **Treatment Success:** 70% [95% CI, 62–76%] vs 78% [95% CI, 50–93%]).
- **Adverse events:** 18.1% Vs 17%
- **Recurrence:** 10% [95% CI, 8–13%] vs 9% [95% CI, 4–19%]) (for all PFC)

Bang Young Ji, Dig Endosc 2015
• 133 WON patients (72 – BFMS, 61 – plastic); matched for age, etiology & PFC size
• Superior clinical success – 94% vs 73% (p < 0.05)
• DEN required in 33% vs 48% (p = 0.217)
• Fewer DEN sessions (1.46 vs 2.74, p < 0.05)
• Fewer adverse events (4 vs 22, p < 0.05)
• Needed surgery less often (2 vs 16, p < 0.05)
• Reduced LOS (4.1 vs 8, p < 0.05)
What is emerging?

Intensive irrigation with drainage of WON –
- Comparable results Vs DEN with less complications

Combined Transmural & Percutaneous drainage –
- Reduction in DEN sessions, possible less chance of percutaneous fistula

Multiple gateway approach –
- Multiple EUS guided transluminal conduits ± percutaneous catheter placement
- for larger WON (>12 cms) (superior results than single drainage 91.7 % vs 52%)
- with paracolic extension

Vacuum assisted closure system (limited due to frequent sponge changes)

Ross As Gastrointest Endosc 2014
Varadarajulu S Gastrointest Endosc 2011
Bang Young Ji Gastrointest Endosc 2014
What is emerging?

Percutaneous DEN

Placement of large-bore, FCSEMS (20–25 mm dia) or modified flexible overtube to facilitate WON debridement

SEMS remains in situ with ostomy appliance placed over stent between interventions; can be removed when cavity collapses

Ideal adjunct to DEN

Particularly useful in treating – paracolic gutter extensions, areas accessed by percutaneous drains with inadequate drainage, endoscopically inaccessible PFC’s, pelvic collections

Navarrete C Gastrointest Endosc 2011;73(3):609-10
Yamamoto N Endoscopy 2013; 45(Suppl 2):UCTN E44-5
What about ERCP/PD stenting?

PD disruption & PFC resolution

Disruptions in PD associated with
  ◦ increased severity of pancreatitis
  ◦ increased risk of recurrent attacks of pancreatitis & long-term complications
  ◦ decreased rate of PFC resolution after drainage

PFC drainage with transpapillary PD stenting compared with PFC drainage alone (97.5% vs 80%)

ERCP not associated with increase in mortality, need for necrosectomy, or LOS

*Trevino JM J Gastroenterol Hepatol 2010*
Disconnected Pancreatic Duct Syndrome (DPDS)

Complete transaction with disconnection of variable portion of upstream pancreatic parenchyma

Occurs in 50% patients with necrotizing pancreatitis

Problems: recurrent PFCs, ascites, fistula formation, pseudo-aneurysm

Surgery:
- Distal pancreatectomy & splenectomy and/or reconnection of PD to Roux-en-Y SB loop
- High morbidity
- Difficult due to adhesions, inflammation, left sided PHT
- 23% of recurrence of pancreatico-cutaneous fistula

Disconnected Pancreatic Duct Syndrome (DPDS)

High recurrence rate for endoscopic treatment of PFCs with DPDS up to 42 %

- Lawrence C Gastrointest Endosc 2008
- Pelaez-Luna M Gastrointest Endosc 2008
- Voss M J Gastrointest Surg 2003

- Long-term/indefinite stent placement in disconnected duct syndrome
- No significant complications (infection, fracture, migration)

- Deviere J Gastrointest Endsc 1995
- Arvanitakis M, Gastrointest Endosc 2007
- Varadarajulu S, Gastrointest Endosc 2011
Conclusions

• Drainage of APFC / ANC almost never required
• PFC / WON should be drained only when symptomatic / complicated
• EUS guided procedure is superior and should be utilized
• Clinical outcomes of endoscopy drainage are comparable to surgery but have some additional advantages
Thank You!