Sphincterotomy & Sphincteroplasty

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Objectives

• Review the principles, indications, & technique of standard biliary sphincterotomy

• Discuss precut (access) biliary sphincterotomy, and some recent data supporting its use

• Describe the indications, technique and recent data behind endoscopic papillary balloon dilation (sphincteroplasty)

• Review the adverse events associated with each of these maneuvers
Sphincter of Oddi

Video
Biliary Sphincterotomy: Indications

- Bile duct stones
- Facilitate biliary stent placement (e.g. multiple plastic stents, metal stents)
- Benign ampullary stenosis, sphincter of Oddi dysfunction
- Bile leaks
- Palliation of malignant ampullary obstruction as an alternative to stent placement (selected cases)
- Access for direct peroral cholangioscopy
- Access for PD cannulation after failed attempts with standard techniques
- Miscellaneous: choledochocele, sump syndrome, parasites, etc.

### Biliary Sphincterotomy

<table>
<thead>
<tr>
<th>Adverse Event (AE)</th>
<th>Incidence (%)</th>
<th>Severe AE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreatitis</td>
<td>5.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>2.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Perforation</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Cholangitis</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Cholecystitis</td>
<td>0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1.1</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9.8</strong></td>
<td><strong>1.6</strong></td>
</tr>
</tbody>
</table>

# Risk Factors for ES-Related Bleeding

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticoagulation &lt;3 days after ES</td>
<td>5.1 (1.6-16.7)</td>
</tr>
<tr>
<td>Coagulopathy Before ES</td>
<td>3.3 (1.5-7.2)</td>
</tr>
<tr>
<td>Ascending Cholangitis</td>
<td>2.6 (1.4-4.9)</td>
</tr>
<tr>
<td>Physician Case Volume ≤ 1 ES/Wk</td>
<td>2.2 (1.1-4.2)</td>
</tr>
<tr>
<td>Bleeding During ES Maneuver</td>
<td>1.7 (1.2-2.7)</td>
</tr>
</tbody>
</table>

*ES=Endoscopic Sphincterotomy*
Access (Precut) Sphincterotomy

• Options for Failed Biliary Cannulation
  1. Double-wire technique
  2. Biliary cannulation above a pancreatic stent
  3. **Precut sphincterotomy**
  4. EUS-guided antegrade biliary access ("rendezvous")
Access (Precut) Sphincterotomy

Video
Access (Precut) Sphincterotomy

• Adverse Events:
  – Bleeding, 1-2%
  – Perforation, 0.3-0.6%
  – Pancreatitis, 5-25%
    • Historically thought to be greater risk than standard sphincterotomy
    • Risk tied to endoscopist experience
    • Precut sphincterotomy generally attempted after multiple failed attempts at standard biliary cannulation
Does leaving a main pancreatic duct stent in place reduce the Incidence of precut biliary sphincterotomy-associated pancreatitis? A randomized, prospective study.


- Total of 151 patients
- PD stent placement, followed by Precut sphincterotomy
- Randomization: Precut + PD stent, vs. Precut + stent removed
- Free-hand Precut patients not randomized

Results:
- Rate of pancreatitis: 4.3% vs. 21.3% (p=0.027)
- Moderate to severe pancreatitis: 0% vs. 12.8% (p=0.026)

- Randomized, prospective study in 73 patients
- Early Precut sphincterotomy, vs. continued standard cannulation

- Results:
  - Equal cannulation rates (86% overall)
    - 65% in standard cannulation group crossed over to Precut
  - Pancreatitis (PEP): 20.5% vs. 17.6% (p=NS)
  - Roughly equal number of PD stents placed
  - >7 cannulation attempts increased the risk of PEP (p<0.01)
Balloon Sphincteroplasty

• Why do it? Why not sphincterotomy?
  – Lower risk of bleeding
  – Possible lower risk of perforation
  – Easy removability of large stones
  – Maintain an intact sphincter of Oddi
    • Lower chance of entero-biliary reflux
    • Less bacterial colonization of the CBD
    • Lower chance of recurrent stone formation
    • Lower chance of future ascending cholangitis
## Timing of Cholecystectomy After One Episode of Ascending Cholangitis

### Independent Risk Factors for Post-Operative Complications

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Odds ratio</th>
<th>95% confidence interval</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Operation after 6 wk</td>
<td>7.117</td>
<td>1.471–12.486</td>
<td>.008</td>
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<tr>
<td>Endoscopic sphincterotomy</td>
<td>4.302</td>
<td>1.062–8.258</td>
<td>.038</td>
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</table>

**Conclusions:** “Patients with endoscopic clearance of choledocholithiasis, especially after endoscopic sphincterotomy, should receive elective laparoscopic cholecystectomy within 6 weeks after a cholangitic attack.”

Endoscopic Papillary Balloon Dilation (EPBD): Early Experience

6 RCTs from 1997-2004:

- Small size balloons (<12mm)
- Lower rates of bleeding
  - 0%, vs. 2% for sphincterotomy
- Higher rates of pancreatitis (PEP)
  - 5% -18%, vs. ~4.3% for sphincterotomy
  - 2 cases of severe PEP with death*

Large balloon dilation after small size sphincterotomy:

• Balloon size >10-12 mm

• Retrieve large stones without need for mechanical lithotripsy

• Small incision lowers risk of bleeding and perforation

• Pre-sphincterotomy dilation may help to reduce the risk of PEP
<table>
<thead>
<tr>
<th>Author</th>
<th>Patients</th>
<th>Balloon Size, mm</th>
<th>Stone size, mm</th>
<th>% 1st Success</th>
<th>PEP %</th>
<th>Bleeding %</th>
<th>Perf %</th>
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<tr>
<td>Ersoz</td>
<td>58</td>
<td>12-20</td>
<td>18</td>
<td>83</td>
<td>2</td>
<td>5</td>
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<tr>
<td>Minami</td>
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<td>14</td>
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<tr>
<td>Heo</td>
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<td>16</td>
<td>97</td>
<td>4</td>
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<td>Misra</td>
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<td>2</td>
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<td>Kochhar</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>1,003</strong></td>
<td><strong>10-20</strong></td>
<td><strong>15</strong></td>
<td><strong>90.2</strong></td>
<td><strong>2.6</strong></td>
<td><strong>5.5</strong></td>
<td><strong>0.2</strong></td>
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</table>

Conclusions

1. Early access (precut) sphincterotomy does not appear to increase the risk of post-ERCP pancreatitis
2. Precut is best attempted on an enlarged, bulging papilla
3. PD stent placement should be inserted if possible when performing a precut sphincterotomy
4. Balloon sphincteroplasty may assist in removing large stones, and allow for lower rates of bleeding
5. Large balloon dilation after a small sphincterotomy (EPLBD after ES) is safer than EPBD with an intact sphincter