QUALITY IN ENDOSCOPY: ERCP

Session 5 - Biliary strictures

BENIGN STRICTURES
OF THE BILE DUCTS

Andrea Tringali
Digestive Endoscopy Unit – Catholic University
Rome, Italy
Benign biliary strictures

- Post-operative (Cholecystectomy and liver transplantation)
- Bile duct strictures in chronic pancreatitis
- \textit{(Primary sclerosing cholangitis)}
## Outcomes Definition

<table>
<thead>
<tr>
<th></th>
<th>Short-term (Rx of “acute” symptoms)</th>
<th>Long-term</th>
</tr>
</thead>
</table>
| **Post-operative** | Jaundice/Cholestasis  
Biliary Fistula | Permanent Dilation  
(normal LFTs) |
| **Chronic Pancreatitis** | Acute Cholangitis  
Jaundice  
Cholestasis | Permanent Dilation  
(normal LFTs) |
| **Sclerosing Cholangitis** | Acute Cholangitis  
Jaundice  
Cholestasis | Delay the progression of the disease |

*Quality in Endoscopy: ERCP, Munich 2011*
Benign biliary strictures
Clinical presentation

Biliary fistula
Anicteric cholestasis
Jaundice
(Cholangitis)

→ Take your time!
Benign biliary strictures

- Usually young patients
- Quality of life
- Need for a definitive treatment
Post-operative biliary strictures: Key points

- Understand biliary anatomy
- Multidisciplinary approach (Surgeon, endoscopist, interventional radiologist)
- Propose and discuss treatments with the patient
- Understand biliary anatomy
Post-operative biliary strictures
Understand biliary and stricture anatomy

Bismuth classification

Quality in Endoscopy: ERCP, Munich 2011
Post-operative biliary strictures
Understand biliary and stricture anatomy

Bismuth classification
Post-operative biliary strictures
Understand biliary and stricture anatomy

Type III ?

Type IV

Quality in Endoscopy: ERCP, Munich 2011
Post-operative biliary strictures
Understand biliary and stricture anatomy
Post-operative biliary strictures
Understand biliary and stricture anatomy
Post-operative biliary strictures
Multiple stenting

- Placement of an increasing number of plastic stents at each stent exchange
- 3 monthly planned stent exchange
- **End Point:** Complete morphologic disappearance of the stricture
- Irrespective of the time of stenting

*Costamagna G et al., Gastrointest Endosc 2001*
Post-operative biliary strictures
Multiple stenting
Post-operative biliary strictures
Multiple stenting
Endotherapy of postoperative biliary strictures with multiple stents: results after more than 10 years of follow-up

Guido Costamagna, MD, FACG, Andrea Tringali, MD, PhD, Massimiliano Mutignani, MD, Vincenzo Perri, MD, Cristiano Spada, MD, Monica Pandolfi, MD, Domenico Galasso, MD

Rome, Italy

<table>
<thead>
<tr>
<th>Follow-up finding</th>
<th>Long term (year 1998)</th>
<th>Very long term (year 2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean follow-up period, years (range)</td>
<td>4 (2-11.3)</td>
<td>13.7 (11.7-19.8)</td>
</tr>
<tr>
<td>Patient lost to follow-up</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Patient died of unrelated cause</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Asymptomatic with normal LFT, no. (%)</td>
<td>39/40 (97.5)</td>
<td>28/35 (80)</td>
</tr>
<tr>
<td>Cholangitis recurrence, no. (%)</td>
<td>1/40 (2.5)</td>
<td>7/35 (20)</td>
</tr>
<tr>
<td>Stricture recurrence</td>
<td>0</td>
<td>4/35 (11.4)</td>
</tr>
<tr>
<td>Stones/food</td>
<td>1 (2.5)</td>
<td>3/35 (8.6)</td>
</tr>
</tbody>
</table>

LFT, Liver function test results.
Post-cholecystectomy biliary strictures: multiple stents

January 1989 - May 2010

186 post-cholecystectomy strictures

120 (64.5%) Laparoscopic (31% converted)

66 (35.5%) Open

25 (13%) combined PTC/Endoscopic approach

Digestive Endoscopy Unit - Catholic University - Rome
Post-cholecystectomy biliary strictures: multiple stents

January 1989 - May 2010

186 post-cholecystectomy strictures

182 completed treatment

2 (1%) failure

2 (1%) interrupted tx (non compliance)

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Quality in Endoscopy: ERCP, Munich 2011
Post-cholecystectomy biliary strictures: multiple stents

January 1989 - May 2010

182 post-cholecystectomy strictures

Mean follow-up 8.5 years (range 0.3-22)

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholangitis</td>
<td>21</td>
<td>11.5</td>
</tr>
<tr>
<td>Stricture recurrence</td>
<td>15</td>
<td>8.2</td>
</tr>
<tr>
<td>Stones recurrence</td>
<td>6</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Digestive Endoscopy Unit - Catholic University - Rome

Quality in Endoscopy: ERCP, Munich 2011
Post-operative biliary strictures
Multiple stenting: issues

- Need for several ERCPs (2-6)
- Usually 1 year treatment
- Patient compliance
- Risk of cholangitis
  (stent displacement / occlusion)
Post-operative biliary strictures
Multiple stents displacement
Post-operative biliary strictures
Avoid stents displacement

Cremer Hilar Stent
Anastomotic strictures after liver transplantation

Balloon dilation 6-8 mm (single treatment)
Success rate < 50%
Recurrence 62%
Zoepf T, Liver Transpl 2006

Multiple plastic stenting
Success rate 70-100%
Recurrence 0-20% (F-up 1-3 y)
Morelli J, GIE 2003
Alazmi WN, Endoscopy 2006
Tabibian JH, GIE 2010

Quality in Endoscopy: ERCP, Munich 2011
Anastomotic strictures after liver transplantation

Is MRCP equivalent to ERCP for diagnosing biliary obstruction in orthotopic liver transplant recipients? A meta-analysis

Jennifer E. Jorgensen, MD, Akbar K. Waljee, MD, MSc, Michael L. Volk, MD, MSc, Christopher J. Sonnenday, MD, MHS, Grace H. Elba, MD, Mahmoud M. Al-Hawary, MD, Amit G. Singal, MD, MSc, Jason R. Taylor, MD, B. Joseph Elmunzer, MD

Ann Arbor, Michigan; Dallas, Texas, USA

MRCP: Sensitivity

97% Anastomotic strictures

94% Non-anastomotic strictures
Anastomotic strictures after liver transplantation
# Anastomotic strictures after liver transplantation

<table>
<thead>
<tr>
<th>Author, year</th>
<th>pts</th>
<th>Mean n° of ERCPs</th>
<th>Mean maximal stent number</th>
<th>Stenting duration (mo)</th>
<th>Follow-up after stent removal (mo)</th>
<th>Success at end of follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morelli, GIE 2008</td>
<td>38</td>
<td>3.5</td>
<td>2.5</td>
<td>3.6</td>
<td>12</td>
<td>87%</td>
</tr>
<tr>
<td>Tabibian, GIE 2010</td>
<td>69</td>
<td>4.1</td>
<td>NA</td>
<td>15</td>
<td>11</td>
<td>91%</td>
</tr>
<tr>
<td>Dig End Unit Catholic University Rome</td>
<td>51</td>
<td>3.8</td>
<td>3.8</td>
<td>14</td>
<td>59</td>
<td>96%</td>
</tr>
</tbody>
</table>
Post-operative biliary strictures
Fully Covered Metal stents

10 mm
3 mm
9 plastic stents
Post-operative biliary strictures
Fully Covered Metal stents
### Post-operative biliary strictures

**Fully Covered Metal Stents**

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Etiology</th>
<th>Pts</th>
<th>Median stenting duration (months)</th>
<th>SEMS migration (%)</th>
<th>Success in SEMS removal</th>
<th>Stricture resolution</th>
<th>Median follow-up after SEMS removal (months)</th>
<th>Success at end of follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kahaleh, 2008</td>
<td>CP, stones, OLT, PO, AI</td>
<td>65</td>
<td>4</td>
<td>14</td>
<td>90</td>
<td>90</td>
<td>12</td>
<td>88</td>
</tr>
<tr>
<td>Mahajan, 2009</td>
<td>CP, stones, OLT, AI, PSC</td>
<td>41</td>
<td>3.3</td>
<td>5</td>
<td>100</td>
<td>83</td>
<td>3.8</td>
<td>NR</td>
</tr>
<tr>
<td>Cahen, 2008</td>
<td>CP</td>
<td>6</td>
<td>4</td>
<td>33</td>
<td>66</td>
<td>66</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Behm, 2009</td>
<td>CP</td>
<td>20</td>
<td>5</td>
<td>5</td>
<td>100</td>
<td>95</td>
<td>22</td>
<td>80</td>
</tr>
<tr>
<td>Traina, 2009</td>
<td>OLT</td>
<td>16</td>
<td>2</td>
<td>37</td>
<td>100</td>
<td>87</td>
<td>10</td>
<td>77</td>
</tr>
<tr>
<td>Chaput, 2010</td>
<td>OLT</td>
<td>22</td>
<td>2</td>
<td>27</td>
<td>100</td>
<td>86</td>
<td>12</td>
<td>53</td>
</tr>
</tbody>
</table>

AI, autoimmune pancreatitis; CP, chronic pancreatitis; PO, post-operative; OLT, orthotopic liver transplantation; PSC, primary sclerosing cholangitis;
Post-operative biliary strictures
Fully Covered Metal stents

After 10 months
Post-operative biliary strictures
Fully Covered Metal stents

12 mm
Benign biliary strictures in chronic pancreatitis

Carolí & Nora classification

Quality in Endoscopy: ERCP, Munich 2011
Benign biliary strictures in chronic pancreatitis

Incidence  
30% at ERCP  
10% *symptomatic*  

*Deviere J. GIE 1990*

**Risks if untreated:** secondary biliary cirrhosis and/or recurrent cholangitis in 6-30%  

*Lesur G. Hepatology 1993*

**Effect of drainage:** reversibility of liver fibrosis  

*Hammel P. NEJM 2001*
Benign biliary strictures in chronic pancreatitis: etiology

1. Edema due to acute episode (*potentially reversible*)
   (Temporary plastic stenting)

2. Compression from a pseudocyst (*reversible*)
   (Drain the pseudocyst)

3. Fibrosis of the intrapancreatic CBD (*non reversible*)
   (Surgery vs SEMS)
Benign biliary strictures in chronic pancreatitis: when to treat

• Do not treat the images!!!

• Symptomatic strictures
  (Cholestasis/Jaundice/Cholangitis)

• Non compliant patient: avoid endoscopy
Benign biliary strictures in chronic pancreatitis

<table>
<thead>
<tr>
<th>Pro</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Low morbidity</td>
<td>• Complications</td>
</tr>
<tr>
<td>• Effective in inflammatory strictures (plastic)</td>
<td>(migration/occlusion)</td>
</tr>
<tr>
<td>• Effective medium-term (SEMS)</td>
<td>• Not definitive treatment</td>
</tr>
<tr>
<td>• Surgery possible</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pro</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Definitive treatment</td>
<td>• Morbidity (15-30 %)</td>
</tr>
<tr>
<td>• Low re-intervention rate</td>
<td>• Complications (anastomotic stricture)</td>
</tr>
<tr>
<td>• Treatment of pancreatic/duodenal strictures</td>
<td></td>
</tr>
</tbody>
</table>

Benign biliary strictures in chronic pancreatitis: plastic stent
## Benign biliary strictures in chronic pancreatitis: single plastic stent

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N</th>
<th>Stricture resolution (%)</th>
<th>Follow-up (mean mo)</th>
<th>Complications stent related (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devière</td>
<td>1990</td>
<td>19</td>
<td>16</td>
<td>14</td>
<td>53</td>
</tr>
<tr>
<td>Barthet</td>
<td>1994</td>
<td>19</td>
<td>10</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Smits</td>
<td>1996</td>
<td>58</td>
<td>28</td>
<td>46</td>
<td>64</td>
</tr>
<tr>
<td>Vitale</td>
<td>2000</td>
<td>25</td>
<td>80 #</td>
<td>32</td>
<td>20</td>
</tr>
<tr>
<td>Kahl*</td>
<td>2003</td>
<td>61</td>
<td>26</td>
<td>40</td>
<td>34</td>
</tr>
<tr>
<td>Catalano*</td>
<td>2004</td>
<td>34</td>
<td>24</td>
<td>50</td>
<td>15</td>
</tr>
<tr>
<td>Cahen</td>
<td>2005</td>
<td>58</td>
<td>38</td>
<td>45</td>
<td>48</td>
</tr>
</tbody>
</table>

* Prospective

# Only 23% with calcifications

- **N**
- **Follow-up** (mean mo)
- **Complications stent related (%)**

10-80 1-4 y 10-64
Benign biliary strictures in chronic pancreatitis: **multiple stents**

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N</th>
<th>Stricture resolution (%)</th>
<th>Follow-up (mean mo)</th>
<th>Complications stent related (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draganov</td>
<td>2002</td>
<td>9</td>
<td>44</td>
<td>48</td>
<td>7</td>
</tr>
<tr>
<td>Catalano*</td>
<td>2004</td>
<td>12</td>
<td>92</td>
<td>47</td>
<td>9</td>
</tr>
<tr>
<td>Pozsår</td>
<td>2004</td>
<td>29</td>
<td>60</td>
<td>13</td>
<td>34</td>
</tr>
</tbody>
</table>

* Prospective
Benign biliary strictures in chronic pancreatitis

Metal stents when:

• Unoperable patients (cavernomatosis, comorbidities)

• Surgery is refused
Benign biliary strictures in chronic pancreatitis. Definitive SEMS

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N</th>
<th>Stent</th>
<th>Stent patency (mean months)</th>
<th>Stent clogged (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devière *</td>
<td>1994</td>
<td>20</td>
<td>Wallstent unc.</td>
<td>33</td>
<td>10</td>
</tr>
<tr>
<td>O’Brien</td>
<td>1998</td>
<td>8</td>
<td>(? uncovered)</td>
<td>35</td>
<td>50</td>
</tr>
<tr>
<td>Hastier</td>
<td>1999</td>
<td>1</td>
<td>Diamond</td>
<td>36</td>
<td>-</td>
</tr>
<tr>
<td>Lopez</td>
<td>2001</td>
<td>15</td>
<td>Wallstent unc.</td>
<td>30</td>
<td>66</td>
</tr>
<tr>
<td>Kahl</td>
<td>2002</td>
<td>3</td>
<td>Wallstent unc.</td>
<td>37</td>
<td>-</td>
</tr>
<tr>
<td>Van Berkel *</td>
<td>2004</td>
<td>13</td>
<td>Wallstent unc.</td>
<td>57</td>
<td>62</td>
</tr>
<tr>
<td>Cantù *</td>
<td>2005</td>
<td>14</td>
<td>Wallstent Partially covered</td>
<td>22</td>
<td>50</td>
</tr>
</tbody>
</table>

* Prospective
# Mixed cases, only 2 in each series with CP

Mean 3 y
Benign biliary strictures in chronic pancreatitis. **Removable SEMS**

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Pts</th>
<th>Stent design</th>
<th>Median time to SEMS removal (months)</th>
<th>Stricture resolution at SEMS removal (%)</th>
<th>Migration rate (%)</th>
<th>Compl. (%)</th>
<th>Median follow-up post stent removal (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cahen (2008)</td>
<td>6</td>
<td>FC-SEMS</td>
<td>5.5</td>
<td>67</td>
<td>33</td>
<td>67 (2 failure to SEMS removal)</td>
<td>20.5</td>
</tr>
<tr>
<td>Behm (2009)</td>
<td>20</td>
<td>PC-SEMS</td>
<td>5</td>
<td>80</td>
<td>5</td>
<td>4 (1 bleed, 1 AP, 1 pain)</td>
<td>22</td>
</tr>
<tr>
<td>Mahajan (2009)</td>
<td>19</td>
<td>FC-SEMS</td>
<td>NA</td>
<td>58</td>
<td>5</td>
<td>16 (1 bleed, 1 SEMS occlusion)</td>
<td>NA</td>
</tr>
<tr>
<td>Dig End Unit, UCSC Rome</td>
<td>7</td>
<td>UE-SEMS</td>
<td>6</td>
<td>43</td>
<td>100</td>
<td>57 (4 cholangitis)</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>FE-SEMS</td>
<td>90</td>
<td>40</td>
<td></td>
<td>10 (1 cholangitis)</td>
<td></td>
</tr>
</tbody>
</table>

**FC:** fully covered; **PC:** partially covered; **UE:** unflared-ends; **FE:** flared ends.

**NA:** not available
Temporary placement of multiple plastic stents is recommended (Grade A).

*Long-term success: 90% for postoperative biliary strictures and 65% for those complicating chronic pancreatitis.*

*Possible stricture relapses are successfully re-treated by ERCP.*

*A recall system should be set up to care of patients who do not present for ERCP at scheduled dates due to the risk of fatal septic complications (Recommendation grade D).*

ESGE Guidelines on Biliary stenting. *Endoscopy (in press)*
Stenting in Benign biliary strictures
Conclusions

Uncovered biliary SEMS insertion is strongly discouraged (Recommendation grade A).

Fully covered SEMS is an investigational option that needs to be carefully evaluated by long-term follow-up studies. (Evidence level 1+)

ESGE Guidelines on Biliary stenting. Endoscopy (in press)