Small Bowel Endoscopy

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(Equipment support from Olympus)
Learning goals!

• To understand technology available for scoping the small bowel
• Indications and limitations of capsule endoscopy
• Indications and limitations of device assisted enteroscopy
Summary

• The problem with the small bowel
• Old technology
• Capsule Endoscopy
• Device assisted enteroscopy
• Cases
• The future
The small intestine is about 17 feet (5–6 m) long.

The large intestine is about 5 feet (1.5 m) long.
Capsule endoscopy

- “Pill” containing camera, light and transmitter
- Transmits 55,000 (2-4/sec) over 10-12 hours
- Images collected by abdominal leads/stored
- Downloaded and video read on computer
- Capsule is disposable!
Indications for Capsule Endoscopy

- Obscure bleeding
  - Iron deficiency anaemia
  - Crohn's disease
  - Refractory coeliac disease
  - Small bowel polyposis
  - Abnormal imaging of small bowel
  - Neoplastic surveillance (melanoma, lymphoma)
- Bowel transplant
Advantages

- Convenient
- Comfortable
- Non-invasive
- No sedation
- No analgesia
- No prep?
- Pan-enteric
### Number of Investigations before Capsule Endoscopy

<table>
<thead>
<tr>
<th></th>
<th>Bleeding disorders studies</th>
<th>Nonbleeding disorders studies</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>310</td>
<td>220</td>
<td>530</td>
</tr>
<tr>
<td>Previous investigations, n</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastroscopy</td>
<td>771</td>
<td>338</td>
<td>1109</td>
</tr>
<tr>
<td>Colonoscopy</td>
<td>633</td>
<td>399</td>
<td>1032</td>
</tr>
<tr>
<td>Small-bowel series</td>
<td>239</td>
<td>312</td>
<td>551</td>
</tr>
<tr>
<td>Push enteroscopy</td>
<td>391</td>
<td>52</td>
<td>443</td>
</tr>
<tr>
<td>Computed tomography (CT)</td>
<td>98</td>
<td>107</td>
<td>205</td>
</tr>
<tr>
<td>Abdominal radiography</td>
<td>27</td>
<td>49</td>
<td>76</td>
</tr>
<tr>
<td>Nuclear medicine</td>
<td>61</td>
<td>21</td>
<td>82</td>
</tr>
<tr>
<td>Angiography</td>
<td>72</td>
<td>10</td>
<td>82</td>
</tr>
<tr>
<td>Intraoperative enteroscopy</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2296</strong></td>
<td><strong>1293</strong></td>
<td><strong>3589</strong></td>
</tr>
<tr>
<td>Mean number of procedures per patient</td>
<td><strong>7.41</strong></td>
<td><strong>5.88</strong></td>
<td><strong>6.77</strong></td>
</tr>
</tbody>
</table>
How good is capsule

• Yield is 60%
  – Indications and detection, completion, and retention rates of small-bowel capsule endoscopy: a systematic review.
    • Liao Z et al. GIE 2012
  – 22,840 procedures / 66% for OGIB
  – Yield all cases – 59.4%
Device Assisted Enteroscopy

2001

2007

2008

Single Balloon Enteroscope System

NHS Trust
Indications

- As per capsule endoscopy / Instead of capsule??
- Haemostasis (APC, clipping)
- Tissue diagnosis post capsule/CT/MRI/coeliac
- Lesion removal (polypectomy, EMR)
- Localise lesion (tattoo)
- Stricture dilatation and stenting
- Percutaneous jejunostomy
- Difficult colonoscopy
- Altered anatomy
  - Roux-en-Y ERCP/exploration
  - Post bariatric surgery
- Foreign body retrieval (capsule)
Advantages

• Much deeper intubation than previous techniques
  – up to 4 metres in one examination
• Complete small bowel examination achievable
  – Bi-directional – approx. 45% success
• Targeted therapy
  – APC/dilatation/polypectomy
• Reduce need for surgery
• Useful for small bowel lesions requiring further investigation – biopsy/tattoo
• Less complications
• Faster recovery
Balloon Enteroscopy/Indications

164 patients with an indication for intestinal investigations

- PPE without capsule endoscopy (n = 4)
  - Normal capsule endoscopy findings (n = 40, 25.0%)
    - Indication for PPE (n = 38, 23.8%)
    - PPE through oral route (n = 33)
    - PPE through anal route (n = 4)
  - Capsule endoscopy showed an intestinal lesion (n = 100, 62.5%)
    - Diagnosis completed (n = 62, 38.8%)
    - PPE through both routes (n = 5)
  - Capsule endoscopy showed a lesion outside the small bowel (n = 20, 12.5%)
    - New esophagogastroduodenoscopy or colonoscopy

160 patients investigated by capsule endoscopy

Gay, G: Endoscopy 2006

Imperial College Healthcare NHS Trust
Insertion Route: Guided by SBCE

Predictive role of capsule endoscopy on the insertion route of double-balloon enteroscopy.
Li X et al. Endoscopy. 2009
<table>
<thead>
<tr>
<th>Author, year (reference)</th>
<th>Patients with bleeding^3/DBE examinations (%)</th>
<th>Diagnostic yield (%)</th>
<th>Diagnostic or treatment success (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yamamoto et al. 2004(^{142})</td>
<td>66/178 (37)</td>
<td>76</td>
<td>61</td>
</tr>
<tr>
<td>May et al. 2005(^{140})</td>
<td>90/248 (36)</td>
<td>80</td>
<td>76</td>
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<tr>
<td>Ell et al. 2005(^{144})</td>
<td>64/147 (44)</td>
<td>72</td>
<td>62</td>
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<tr>
<td>Di Caro et al. 2005(^{145})</td>
<td>33/89 (37)</td>
<td>80</td>
<td>42</td>
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<tr>
<td>Matsumoto et al. 2005(^{151})</td>
<td>13/22 (59)</td>
<td>46</td>
<td>N/A</td>
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<tr>
<td>Mehdizadeh et al. 2006(^{141})</td>
<td>130/237 (55)</td>
<td>43</td>
<td>60</td>
</tr>
<tr>
<td>Hadithi et al. 2006(^{146})</td>
<td>35/35 (100)</td>
<td>60</td>
<td>77</td>
</tr>
<tr>
<td>Heine et al. 2006(^{147})</td>
<td>168/275 (61)</td>
<td>73</td>
<td>55</td>
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<tr>
<td>Kaffes et al. 2006(^{148})</td>
<td>32/40 (80)</td>
<td>48</td>
<td>75</td>
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<tr>
<td>Monkemuller et al. 2006(^{149})</td>
<td>29/70 (41)</td>
<td>67</td>
<td>57</td>
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<tr>
<td>Nakamura et al. 2006(^{150})</td>
<td>32/28 (100)</td>
<td>41</td>
<td>43</td>
</tr>
<tr>
<td>Manabe et al. 2006(^{152})</td>
<td>31/31 (100)</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>723 patients, 1400 examinations</strong></td>
<td><strong>65</strong></td>
<td><strong>64</strong></td>
</tr>
</tbody>
</table>
Long-term outcome after argon plasma coagulation of small-bowel lesions using double-balloon enteroscopy in patients with mid-gastrointestinal bleeding

Fig. 1 Hemoglobin levels before and after argon plasma coagulation.

Mean follow up 54 months (44-72)
VAS symptom scores pre & post-dilatation by DBE
Balloon Enteroscopy/Impact

• All indications
  – A retrospective study of the application on double-balloon enteroscopy in 378 patients with suspected small-bowel diseases. Zhong et. al, Endoscopy 2007
  – Retrospective series / largest published
  – Lesions detected in 247/378 (65.3%)
  – 84% had specific treatment
  – 91% symptoms improved or disappeared

• Failed colonoscopy
  – Gay et. al, Endoscopy 2007 : Complete colonoscopy in 28/29
Balloon Enteroscopy/Complications

• Complications
  – 10 centres/4 continents
  – 40 complications in 2362 procedures
    • 13 in 1728 diagnostic - 0.8%
    • 27 in 634 therapeutic - 4.3 %
  – 7 cases pancreatitis – 0.3%
  – perforation rate high for polypectomy (1.5%)
Balloon Enteroscopy: Limitations

- Long and difficult procedures
  - Resource intensive – time/equipment
  - Rectal approach
  - Pan enteroscopy in only 45%
  - Therapy is difficult
- Capsule/imaging first – know target
- Technology will evolve
Which scope?

- Trials between:
  - DBE vs. SBE – SBE “not inferior”
  - Spiral vs. DBE – Spiral quicker, DBE further
  - Spiral vs. SBE – Spiral further, SBE yield greater

- Not much difference!
  - DBE ? goes further
  - DBE ? better for retrograde
  - Spiral is quickest but probably need GA
  - SBE probably most “efficient”

- TECHNIQUE MORE IMPORTANT THAN DEVICE
Questions
Summary

• Small bowel endoscopy is here to stay!
  – Clear advantages over previous techniques
• Evolving field – technology and indications
• Capsule and balloon enteroscopy combine well for majority of cases
• Good evidence for diagnostic/therapeutics
• Safe – but higher complication rate than colonoscopy
Summary

• It is difficult and patients often complicated
• Great fun!
Thank you for your attention

Thanks to Dr Edward Despott, St Mark's for slides