Types of Enterocutaneous Fistula

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Intestinal Fistula

- Abnormal communication between 2 epithelialized surfaces
  - Internal – to hollow viscus
  - External – to skin
- Single or complicated
- High output >500 ml/24 hrs
Severe Intestinal Failure in 117 In-patients


<table>
<thead>
<tr>
<th>Type</th>
<th>Condition</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short term - Type 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ileus</td>
<td>17 (15)</td>
</tr>
<tr>
<td></td>
<td>Chemotherapy / GVHD</td>
<td>12 (10)</td>
</tr>
<tr>
<td></td>
<td>HIV</td>
<td>4 (3)</td>
</tr>
<tr>
<td><strong>Medium term - Type 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fistula / anastomotic leak</td>
<td>35 (30)</td>
</tr>
<tr>
<td></td>
<td>Small bowel obstruction</td>
<td>28 (24)</td>
</tr>
<tr>
<td><strong>Long term - Type 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High output stoma / short bowel</td>
<td>18 (15)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>3 (3)</td>
</tr>
</tbody>
</table>
Reasons for Enterocutaneous fistula(s)

**Surgical**
- Anastomotic leak (20%, range 1-30)
- Abdominal closure
- Serosal tear
- Obstruction / Stricture (adhesions)

**Peri-operative management**
- Saline excess (low albumin)
- Bowel preparation and antibiotics
- Abdominal sepsis
- Smoking
- Poor glucose control

**Disease**
- Crohn’s
- Malignancy
- Diverticula(s)
- Irradiation damage
Acute Intestinal Failure Management
Enterocutaneous Fistula(s)

• **Immediate**
  - Water / electrolytes (Na+, Mg++)
  - Sepsis
  - Wound management
  - Pain control

• **Early**
  - Nutrition (refeeding risks)
  - Reduce stoma / fistula output
  - Psychosocial
  - Mobility

• **Late**
  - Anatomy - mapping - fistula - site / drainage
    - proximal + distal gut - length / quality
  - Procedure – Not days 10 – 100
  - Disease treatment
Intestinal Failure

Main diagnoses:

Abdominal surgery: Date(s):

ANATOMY

Remaining small bowel length: cm

Urological

Gynae

Other problems:

Venous
Intestinal Fistula

Death due to:

- Sepsis
- Underlying disease
- Bleeding
- Electrolyte imbalance
- Undernutrition
Enterocutaneous Fistula(s)

‘The Danger of Sepsis in 186 patients’


<table>
<thead>
<tr>
<th>Sepsis</th>
<th>Deaths</th>
<th>Spontaneous closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlled within 1 month</td>
<td>5 (8%)</td>
<td>32 (48%)</td>
</tr>
<tr>
<td>Not controlled within 1 month</td>
<td>28 (85%)</td>
<td>2 (6%)</td>
</tr>
</tbody>
</table>

Overall: 11% mortality (65% from sepsis) 32% spontaneous closure
Suspect Ongoing Sepsis

1. Temperature (not if very malnourished)
2. Tachycardia
3. Raised inflammatory markers
   - WBC, Platelets
   - CRP
   - Ferritin / B_{12}
4. Low albumin
5. Abnormal liver function tests (jaundiced)
6. Hyponatraemia
7. Low phosphate
8. Weight / muscle not increasing with nutrition
Wound Care

• Excoriated skin
  – Caused by leaking

• Use
  – Suction
  – Flamazine
  – Hairdryer
  – Barrier protection
  – Appropriate appliance
  – 3 - 4 changes / 24hrs

• No patching of leaking appliances
Development of Enterocutaneous Fistula Route for Nutritional Support

PN

EN
Unless SB<100 cm

PN

EN
Unless SB<100 cm
Stomal / Fistula Output and Jejunal Length

50 cm  
PN

100 cm  
IVF or Oral

200 cm  
Oral

Sodium = 100 mmol/l (80-140)
Enterocutaneous Fistula
Spontaneous Closure – Unlikely

- Discontinuity of bowel ends
- Bowel mucosa visible
- Short fistula tract
- Disease, foreign body or sepsis at fistula
- Distal obstruction
- Multiple fistulas
### Clinical Course of Enterocutaneous Fistulas

<table>
<thead>
<tr>
<th>Author</th>
<th>Number of Fistulas</th>
<th>Closed</th>
<th>Closed OR</th>
<th>Not Closed</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacFayden 1973</td>
<td>78</td>
<td>55 (70%)</td>
<td>17 (22%)</td>
<td>6 (8%)</td>
<td>4 (5%)</td>
</tr>
<tr>
<td>Aguirre 1974</td>
<td>38</td>
<td>11 (29%)</td>
<td>17 (45%)</td>
<td>10 (26%)</td>
<td>8 (21%)</td>
</tr>
<tr>
<td>Himal 1974</td>
<td>25</td>
<td>14 (56%)</td>
<td>6 (24%)</td>
<td>5 (20%)</td>
<td>2 (8%)</td>
</tr>
<tr>
<td>Weisz 1976</td>
<td>19</td>
<td>17 (89%)</td>
<td>0 (0%)</td>
<td>2 (10%)</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>Deitel 1976</td>
<td>100</td>
<td>81 (81%)</td>
<td>8 (8%)</td>
<td>9 (9%)</td>
<td>8 (8%)</td>
</tr>
<tr>
<td>Levy 1989</td>
<td>234</td>
<td>88 (38%)</td>
<td>102 (44%)</td>
<td>0 (0%)</td>
<td>44 (18%)</td>
</tr>
<tr>
<td>Alhan 1993</td>
<td>23</td>
<td>13 (56%)</td>
<td>5 (22%)</td>
<td>0 (0%)</td>
<td>5 (23%)</td>
</tr>
<tr>
<td>Duke 1995</td>
<td>313</td>
<td>160 (53%)</td>
<td>116 (37%)</td>
<td>0 (0%)</td>
<td>37 (12%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>830</strong></td>
<td><strong>439</strong> (53%)</td>
<td><strong>271</strong> (33%)</td>
<td><strong>32</strong> (4%)</td>
<td><strong>110</strong> (13%)</td>
</tr>
</tbody>
</table>

Mean time for spontaneous closure 15 - 30 days (range 3 – 90)
Post-operative Intestinal Fistula

- About 50% close within first 6 weeks
Drug Therapy for Enterocutaneous fistulas

- High output stoma / obstruction therapy
- Somatostatin / Octreotide +/- NBM +/- PN
- Distal bowel feeding
Somatostatin Receptor Subtypes

Binding affinities

<table>
<thead>
<tr>
<th>Receptor subtype</th>
<th>SSTR 1</th>
<th>SSTR 2</th>
<th>SSTR 3</th>
<th>SSTR 4</th>
<th>SSTR 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatostatin-14</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Octreotide</td>
<td>—</td>
<td>++</td>
<td>+</td>
<td>—</td>
<td>++</td>
</tr>
</tbody>
</table>

+++ high affinity; +, moderate affinity; —, does not bind

All 5 receptor subtypes are expressed in the GI tract (esp SSTR 3)
Fistula Closure with Somatostatin and Octreotide. Meta-analysis

### Time to Fistula Closure with Somatostatin and Octreotide. Meta-analysis

#### Somatostatin vs Control

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
<th>Std. Mean Difference IV, Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isenmann et al 1994</td>
<td>13</td>
<td>7.7</td>
<td>25</td>
<td>19</td>
<td>7.7</td>
<td>20</td>
<td>27.5%</td>
<td>-0.77 [-1.38, -0.15]</td>
</tr>
<tr>
<td>Leondros et al 2004</td>
<td>10.5</td>
<td>7.5</td>
<td>19</td>
<td>18</td>
<td>5.3</td>
<td>15</td>
<td>19.1%</td>
<td>-1.10 [-1.84, -0.37]</td>
</tr>
<tr>
<td>Spiliotis et al 1990</td>
<td>18.2</td>
<td>11.5</td>
<td>18</td>
<td>27.4</td>
<td>11.5</td>
<td>30</td>
<td>27.9%</td>
<td>-0.79 [-1.39, -0.18]</td>
</tr>
<tr>
<td>Torres et al 1992</td>
<td>13</td>
<td>9.8</td>
<td>20</td>
<td>19</td>
<td>9.8</td>
<td>20</td>
<td>25.5%</td>
<td>-0.60 [-1.24, 0.03]</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>82</strong></td>
<td></td>
<td><strong>85</strong></td>
<td></td>
<td></td>
<td><strong>100.0%</strong></td>
<td></td>
<td><strong>-0.79 [-1.11, -0.47]</strong></td>
</tr>
</tbody>
</table>

Heterogeneity: Chi² = 1.06, df = 3 (P = 0.79); I² = 0%
Test for overall effect: Z = 4.86 (P < 0.00001)

#### Somatostatin Analogue vs Control

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
<th>Std. Mean Difference IV, Fixed, 95% CI</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sancho et al 1995</td>
<td>7</td>
<td>3</td>
<td>14</td>
<td>12</td>
<td>7</td>
<td>17</td>
<td>10.1%</td>
<td>-0.87 [-1.62, -0.13]</td>
<td>1995</td>
</tr>
<tr>
<td>Hernandez et al 1996</td>
<td>18</td>
<td>13</td>
<td>40</td>
<td>27</td>
<td>13</td>
<td>45</td>
<td>29.0%</td>
<td>-0.69 [-1.12, -0.25]</td>
<td>1996</td>
</tr>
<tr>
<td>Jamil et al 2004</td>
<td>14</td>
<td>5.4</td>
<td>16</td>
<td>17.7</td>
<td>5.4</td>
<td>17</td>
<td>11.3%</td>
<td>-0.67 [-1.37, 0.04]</td>
<td>2004</td>
</tr>
<tr>
<td>Leondros et al 2004</td>
<td>16.5</td>
<td>16.6</td>
<td>54</td>
<td>18</td>
<td>5.3</td>
<td>15</td>
<td>11.5%</td>
<td>-0.12 [-0.81, 0.58]</td>
<td>2004</td>
</tr>
<tr>
<td>Gayral et al 2009</td>
<td>17</td>
<td>24.5</td>
<td>54</td>
<td>26</td>
<td>24.5</td>
<td>53</td>
<td>38.2%</td>
<td>-0.36 [-0.75, 0.02]</td>
<td>2009</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>141</strong></td>
<td></td>
<td><strong>147</strong></td>
<td></td>
<td></td>
<td><strong>100.0%</strong></td>
<td></td>
<td><strong>-0.51 [-0.75, -0.28]</strong></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Chi² = 3.52, df = 4 (P = 0.47); I² = 0%
Test for overall effect: Z = 4.27 (P < 0.00001)
Imaging Prior to Surgical Repair

Assess proximal and distal bowel. Exclude distal obstruction or disease.

Exclude sepsis

Assess abdominal wall

Find the optimal site of entry into the abdomen
## EC Fistula Repair: Timing of Surgery

<table>
<thead>
<tr>
<th></th>
<th>Early</th>
<th>3-12 weeks</th>
<th>6-12 months</th>
<th>&gt;12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mortality</strong></td>
<td>30-100%</td>
<td>7-20%</td>
<td>3-9%</td>
<td>0-3%</td>
</tr>
<tr>
<td><strong>ECF recurrence</strong></td>
<td>40-60%</td>
<td>17-31%</td>
<td>10-14%</td>
<td>3%</td>
</tr>
</tbody>
</table>

### References
- Conter RL, AmJS 1988, 54, 589
- Datta V, Dis Col R 2010, 53, 192
- Draus Surgery 2006, 140, 570
- Levy E, BJS, 1989, 676
- Martinez JGS 2012, 16, 156.
- Mulier WJO, 2003, 27, 379
- Peralta R, 2011
- Pertkiewicz M, PhD dissert. 1999
- Vischers WJS 2008, 32, 445
- West JP, SGO 1961, 490
Crohn’s Disease and Post-operative Entero-cutaneous Fistula after 3 months parenteral nutrition
Summary - Enterocutaneous Fistula

1. Drain / treat sepsis

2. 50% post-operative fistula heal spontaneously

3. Give oral / enteral feeding if not collecting

4. Somatostatin / octreotide may have a role

5. Delay surgery for 6 months
Current Management of Intestinal Failure in the United Kingdom

Post-operative ileus
Management of dense adhesions
Abdominal wall closure
Enterocutaneous fistula
Mesenteric ischaemia
Intestinal transplantation
Case discussions
4 oral presentations (from abstracts submitted)
Current Management of Intestinal Failure in the United Kingdom

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Intestinal transplantation
Case discussions
4 oral presentations (from abstracts submitted)
Formed in 2005, named after Florence Nightingale

**Aims**

- To raise money to support education and practical training of healthcare professionals, patients, and carers.
- To help with the prevention, recognition and treatment of malnutrition.
- To help with the purchase or loan of essential educational equipment.
- To support research into issues relating to nutritional support.

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