Enterocutaneous Fistula

Christopher Lau
SUNY Downstate
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History

• 62 year old female with history of repair of an incarcerated ventral hernia
• Primary repair with suture, no mesh, no bowel repair/resection
• Patient returned 5 weeks later with drainage from the wound due to enterocutaneous fistula
• Low output fistula was managed non-operatively with antibiotics, wound care, and nutritional optimization
• Patient was discharged home with PO nutrition and stoma appliances for control of output
Patient was followed as an outpatient

Stoma appliance could not provide a proper seal and surrounding skin became macerated

Constant foul odor

Causing hardship for patient and family

Explained risks of surgery including leak, inability to find fistula, need for ostomy, recurrent fistulas, etc

Patient wanted surgery regardless
Past Medical History

- PMH: none
- PSH: repair of incarcerated epigastric hernia
- Allergies: NKDA
- Medications: none
- Social Hx: denied excessive, alcohol, tobacco or drugs
- Family Hx: non-contributory, no history of IBD
Physical Exam

- Gen: AAOx3, NAD
- CVS: S1S2, normal
- Chest: clear bilaterally
- Abdomen: soft, nondistended, midline fistulous opening with bilious content draining, large area of macerated and tender skin with serous discharge, foul odor from output
- Ext: no edema
Labs

- CBC: 5.18>12.2/37.2<344
- Chem: 141/3.2/103/26/4/0.44/105/9.5
- LFT: 7.2/3.8/24/10/60/0.5
Pre Op CT
Post Op CT
Fistulogram
Fistulogram
Over 4 months after the initial surgery, patient was taken back to the OR for exploratory laparotomy.

- Adhesions were lysed.
- Methylene blue was instilled into ECF tract.
- EC fistula tract to ileum was excised.
- Cutaneous portion of EC fistula was excised.
**Surgery**

- Entire small and large bowel was checked and there was no other fistula or leak
- Distal colon and rectum filled with hard stool
- Closure of fascia without tension required dissection of subcutaneous tissue off of fascia
Postop

- POD 1: Doing well
- POD 2: Patient became tachycardic and hypotensive
  - Abdomen was increasingly distended and tender
  - Patient became oliguric
  - Patient was resuscitated and taken back to the OR
Re-exploration

- Peritoneal cavity filled with liquid stool
- Proximal colon filled with liquid stool and distal colon hard stool
- No small bowel perforation or fistula opening
- Small 1-2mm hole on inferior part of base of cecum
- Resection of cecum and terminal ileum with end ileostomy
Postop

- Patient became hypotensive, bradycardic, had severe bronchospasm, severe facial swelling
- Anaphylactic shock secondary to anesthetic agent
- Treated with dexamethasone, epinephrine and diphenhydramine
- Patient improved but required multiple vasopressors and aggressive resuscitation with colloids and crystalloids
Postop

- Patient weaned to minimal vent support and off vasopressors over the next 2 days

- HD 4: Patient noted to have bowel protruding into midline wound
  - Returned to OR for reduction of parastomal hernia
  - Fascia tightened with sutures
  - Subcutaneous tissue tacked back down to fascia
  - VAC dressing placed
Postop

- HD 8: Again noted to have bowel in midline wound
  - Dehiscence of lower midline wound
  - Repaired with underlay biologic mesh
  - Superior portion reinforced with overlay biologic mesh
  - VAC dressing placed
Postop

- Patient continued to improve
- Ileostomy functioning
- Regular diet
- Wound healing with VAC
- Discharged to Rehab
Pathology

1: Enterocutaneous fistula tract
   - Granulation tissue
   - Acute and chronic inflammation including foreign body giant cell reaction

2: Terminal ileum, cecum, and appendix
   - Cecal perforation with surrounding inflamed granulation tissue
   - Serosal fibrosis and chronic inflammation of ileum, cecum, and appendix
   - Focal submucosal and intramural fibrosis, and submucosal congestion in the cecum consistent with chronic ischemia
Management of Low Output Enterocutaneous Fistula
Introduction

- ECF is an abnormal communication between the bowel lumen and skin, often associated with sepsis, fluid and electrolyte abnormalities, and malnutrition.

- Estimated 75-85% of fistulas form after operation due to bowel injury, inadvertent enterotomy, or anastamotic leak.

- Associated with high morbidity and mortality.

- Enterocutaneous fistula ranges from:
  - Easily manageable low-output colocutaneous fistula
  - High output enteroatmospheric fistula in an open abdomen

Anatomy of fistula can be characterized by clinical observation, analysis of the effluent, and radiologic studies.

In general, about 1/3 of ECF will close spontaneously.

If ECF remains open after 2 months, spontaneous closure is unlikely.

Fistula healing rate is 75-85% after definitive surgery.

Key principle of fistula care:
- Fluid resuscitation
- Drainage of local abscess
- Control of fistula effluent
- Skin protection

## ECF Classification

<table>
<thead>
<tr>
<th>Box 1</th>
<th>ECF classification</th>
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<tbody>
<tr>
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<td>Anatomic classification</td>
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<tr>
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<td>Operation</td>
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<td>Physiologic classification</td>
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<td>Low output (&lt;200 mL/d)</td>
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<td>Moderate output (200–500 mL/d)</td>
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<td>High output (&gt;500 mL/d)</td>
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</table>

Factors That Predict Spontaneous Closure

- Surgical aetiology
- Free distal flow
- Healthy surrounding bowel
- Simple fistula with no associated abscess cavity
- Fistula tract > 2 cm
- Fistula tract not epithelialized
- Enteral defect < 1 cm (with no discontinuity)
- Low fistula output
- No co-morbidity

Causes of a persistent ECF

- Foreign body
- Radiation
- Inflammation/Infection
- Epithelialization
- Neoplasm
- Distal obstruction
- Sepsis

Initial Management

- Aggressive fluid resuscitation and correction of electrolytes
  - High output should be replaced with K+ containing crystalloid

- Skin care
  - Requires a dedicated wound care person who will adapt to the changing characteristics of the fistula
  - Prevent intestinal contents from damaging surrounding skin
  - VAC dressing may help control the output
    - Data unclear about whether VAC is better or worse than traditional

Control of Fistula Output

- Minimize fluid and electrolyte loss
- May allow patient to be weaned off of TPN and IVF
- Reduces volume of skin irritant

Methods to reduce fistula output
- Restrict hypo-osmolar fluids
- Encourage electrolyte mix
- Antisecretory agents
  - Protein pump inhibitors
  - Somatostatin or octreotide
- Antimotility agents
  - Loperamide
  - Codeine

Control of Fistula Output

- Somatostatin infusion reduces fistula output
  - May be associated with higher fistula closure rate and shorter time to spontaneous closure
  - Limited by short half life (1-3 minutes)

- Octreotide has a half life of 2 hours
  - Can reduce fistula output 40-90%
  - Reduction of time to fistula closure from 50 days to 5-10 days
  - Does not improve overall rate of fistula closure
  - May increase intestinal atrophy

Randomized Controlled Trials

<table>
<thead>
<tr>
<th>Reference</th>
<th>Treatment</th>
<th>No. of patients</th>
<th>Closure (%)</th>
<th>Time to closure (days)</th>
<th>Mortality rate (%)</th>
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<tbody>
<tr>
<td>Isenmann et al.</td>
<td>Somatostatin</td>
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<td>53% pancreatobiliary fistulas. Closure assessed at day 14</td>
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<td>Torres et al.</td>
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<td>Leandros et al.</td>
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<td>Hernandez-Aranda et al.</td>
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<td>Jamil et al.</td>
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<td>Sancho et al.</td>
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<td>Scott et al.</td>
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Control of Fistula Output

- Lanreotide single injection lasts 10-14 days
  - Reduces fistula output
  - Does not improve overall rate of closure
- Octreotide and lanreotide act on a limited range of somatostatin receptors
  - May differ from somatostatin in pharmacologic effect

Control of infection with antibiotics

- Many ECF associated with intra-abdominal abscess which should be drained percutaneously

Nutritional support to correct catabolic consequences of ECF

- Enteral feedings are preferred
  - Preserve intestinal mucosal barrier
  - Preserve gut hormonal and immunologic function
  - Avoid problem of line sepsis

- If enteral feeding is not possible, use TPN

Nutritional support

- Significant loss of protein, fluid, and electrolytes in the fistula effluent, especially with high output
- Incidence of malnutrition is 20% with colonic fistula and 74% with jejunal or ileal fistula
- Patients with optimal nutritional support have higher fistula closure rate (89 vs 37%) and decreased mortality
- Nutrition should be optimized with a combination of oral intake, tube feeding, and parenteral nutrition
- High output fistula: need 30kcal/kg/day and 1.5 g/kg/day protein

Enteral vs Parenteral Nutrition

- Is NPO and bowel rest beneficial or detrimental?
- Widespread availability of PN in the 1970's reduced incidence of malnutrition
- TPN reduces GI secretions by 30-50%
- Helps with fluid and electrolyte balance
- Does not improve rate of spontaneous closure
- Does allow time for fistula to close or nutrition to be optimized before surgery
- Enteral elemental diet may reduce fistula output by as much as TPN

Enteral vs Parenteral Nutrition

- Critical care literature has demonstrated reduced incidence of infection in those receiving enteral nutrition
  - No change in overall mortality
- TPN may induce small intestinal mucosal atrophy allowing translocation of bacteria
- Early enteral feeding after elective GI surgery has been shown to be superior to NPO regimens
  - Lower complication rate and shorter hospital stay

Enteral vs Parenteral Nutrition

- There is no Level 1 evidence to favor either

- Enteral nutrition is cheaper and easier
  - May not be possible due to feeding intolerance, inability to access GI tract, or high fistula output

- Some studies have shown TPN to improve spontaneous closure rate
  - Probably in malnourished patients

When to operate?

- Spontaneous closure is unlikely after 2 months
- Major surgery stimulates dense adhesions, especially when associated with intra-abdominal sepsis
  - Worst between 3 weeks and 3 months
  - With open abdomens, 6-12 months
  - Surgery during this time likely to be complicated by fistula recurrence
- Delayed surgery allows time to correct metabolic and nutritional deficiencies

Christopher Lau’s Recommendations for Managing a Low Output Enterocutaneous Fistula

1. Resuscitate volume and replace electrolytes as needed
2. Control sepsis with antibiotics and percutaneous drainage as needed
3. Localization and definition of anatomy with CT/fistulogram
4. Proper skin protection and control of fistula effluent
5. Optimize nutritional support
   - Enteral feeding if possible
   - Parenteral supplementation if needed
6. If fistula is not closed in 6-8 weeks, plan for surgery
7. Definitive surgery after at least 3 months, preferably 6 months
References


