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Enterocutaneous Fistula

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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

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Pre Op CT

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Post Op CT

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Fistulogram

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Fistulogram

Surgery

- 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

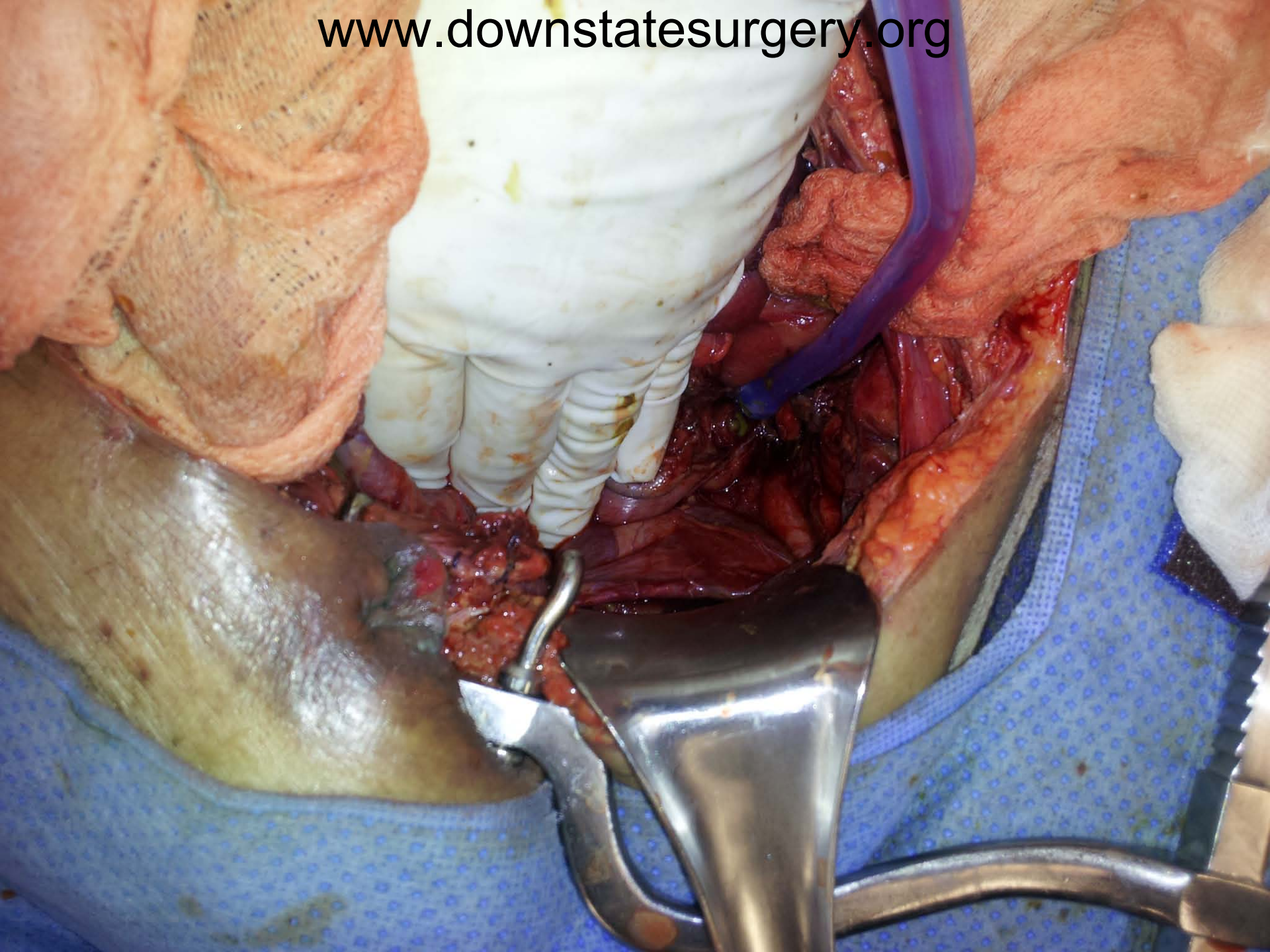
- Entire small and large bowel was checked and there was no other fistula or leak
- Distal colon and rectum filled with hard stool
- Closure of fascia without tension required dissection of subcutaneous tissue off of fascia

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

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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

Schecter WP. **Management of enterocutaneous fistulas.** Surg Clin North Am. 2011 Jun;91(3):481-91.
Lloyd DA. **Nutrition and management of enterocutaneous fistula.** Br J Surg. 2006 Sep;93(9):1045-55.
Schecter WP. **Enteric fistulas: principles of management.** J Am Coll Surg. 2009 Oct;209(4):484-91. Epub 2009 Jul 2.

- 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

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Draus JM Jr. **Enterocutaneous fistula: are treatments improving?** Surgery. 2006 Oct;140(4):570-6; discussion 576-8.
Schecter WP. **Enteric fistulas: principles of management.** J Am Coll Surg. 2009 Oct;209(4):484-91. Epub 2009 Jul 2.

ECF Classification

Box 1
ECF classification

- Anatomic classification
  - Gastrocutaneous
  - Enterocutaneous
  - Colocutaneous
- Etiologic classification
  - Iatrogenic
    - Operation
    - Percutaneous drainage
  - Trauma
  - Foreign body
  - Crohn disease
  - Infectious disease
    - Tuberculosis
    - Actinomycosis
  - Malignancy
- Physiologic classification
  - Low output (<200 mL/d)
  - Moderate output (200–500 mL/d)
  - High output (>500 mL/d)

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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

Lloyd DA. **Nutrition and management of enterocutaneous fistula.** Br J Surg. 2006 Sep;93(9):1045-55.

FRIENDS

- Causes of a persistent ECF
  - Foreign body
  - Radiation
  - Inflammation/Infection
  - Epithelialization
  - Neoplasm
  - Distal obstruction
  - Sepsis

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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

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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

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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

Stevens P, et al. **Systematic review and meta-analysis of the role of somatostatin and its analogues in the treatment of enterocutaneous fistula.** Eur J Gastroenterol Hepatol. 2011 Oct;23(10):912-22.

Randomized Controlled Trials

Reference	Treatment	No. of patients	Closure (%)	Time to closure (days)	Mortality rate (%)	Comments
Isenmann *et al.*[72]	Somatostatin	25	78	13	N.A.	53% pancreatobiliary fistulas. Closure assessed at day 14
	Control	20	19	19	N.A.	
Torres *et al.*[71]	Somatostatin	20	85	14	N.A.	
	Control	10	81	20	N.A.	
Leandros *et al.*[55]	Somatostatin	19	84†	N.A.	N.A.	
	Octreotide	17	65†	N.A.	N.A.	
	Control	15	27	N.A.	N.A.	
Hernandez-Aranda *et al.*[51*]	Octreotide	40	65	18	25	
	Control	45	56	27	31	
Jamil *et al.*[52]	Octreotide	16	94	N.A.	N.A.	Excluded cases unlikely to close spontaneously. Closure assessed at day 21
	Control	17	82	N.A.	N.A.	
Sancho *et al.*[58]	Octreotide	14	57	N.A.	14	Closure assessed at day 20
	Control	17	35	N.A.	12	
Scott *et al.*[59]	Octreotide	11	9	N.A.	N.A.	Closure assessed at day 12
	Control	8	38	N.A.	N.A.	

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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

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Dorta G. Role of octreotide and somatostatin in the treatment of intestinal fistulae. Digestion 1999;60(Suppl 2):53–6.

- 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

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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

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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

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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 superioir to NPO regimens
  - Lower complication rate and shorter hospital stay

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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

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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

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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

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