Management of Enterocutaneous Fistulas (ECF)

NUTRITION
PATIENCE
TECHNIQUE

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A 61-yo man has had four prior adhesiolyses for SBO, lots of adhesions. He developed a proximal, high-output enterocutaneous fistula after the last adhesiolysis 1 week ago. The optimal time to take down the fistula is:

1) Now
2) 6 weeks
3) 3 months
4) 6 months
5) 1 year
A 61-yo man underwent a jejunal resection for a small, bleeding GIST 1 week ago and has a high-output enterocutaneous fistula. He has had no prior abdominal surgery. The optimal time to take down the fistula is:

1) Now
2) 6 weeks
3) 3 months
4) 6 months
A 61-yo man with an enterocutaneous, high-output fistula is now 3 months postop. You cannot get his serum albumin >2.4 mg% (2.4 g/L). Possible causes are:

1) Undrained sepsis
2) Refusal to get out of bed (no exercise)
3) Inadequate caloric deliver
4) Inadequate protein delivery
5) All of the above
Management of ECF

- BEST OPTION – Fistula closes on its own*
- Assume for remainder of talk --

Fistula will not close

*Don’t count on it if high output or everted mucosa.
Management of ECF
My Approach

- Early consideration – maturation phase
  - Nutrition
  - Control infection
  - Control fistula

- Late considerations – operative repair
  - Coverage with autogenous tissue
  - Obesity
  - Hernia when present – the last consideration
ECF and Abdominal Wall Hernias

SOWATS Approach*

S → Sepsis – treat
O → Optimization nutrition
W → Wound care
A → Anatomy
T → Timing of operation
S → Surgical strategy

*Ruben et al, WJS 2008
Management of ECF

Surgical Principles

- Read all operative dictations
- Exclude undrained infection
- Maximize nutrition
- Define the anatomy – all the anatomy
- Feed the gut?
- Multidisciplinary approach
- Fistula care
- Allow acute/subacute inflammation to resolve
- Residual foreign bodies? – mesh, sutures
- Maximize physical therapy
- Operative plan
Management of ECF
Read All Operative Notes

- No surprises
- How much gut left (small and large bowel)
- Prior gut resections
  - Amount of ileum
  - Ileocecal valve present?
  - Internal bypasses
- Recruitable gut?
Management of ECF

Read All Operative Notes

- No surprises
- How much gut left (small and large bowel)
- Prior gut resections
- Recruitable gut?
- Prior hernia repairs
  - Mesh, ePTFE, bioprosthesis
  - Anatomic site of prosthesis
  - Permanent sutures
  - Prior stomas
Management of ECF
Read All Operative Notes

- No surprises
- How much gut left (small and large bowel)
- Prior gut resections
- Prior hernia repairs
- Loss of abdominal wall (fasciitis?)
- Dysmetabolism
- Severity of adhesions*
  - Don’t be in a hurry (at least 6 weeks to 3 months)
  - Severe adhesions – 6 months
  - Don’t let patient (or their doc) push you!

*Should affect timing of operative intervention!
Management of ECF

Search For Infection

- Suspect if fever, leukocytosis, or persisting malnutrition
- Image lumen - fistulagram
- Image peri-intestinal tissue - CT
- Persistent prosthetic material
  - Mesh
  - ePTFE
  - Sutures

Especially at the edges of prosthesis/sutures
Management of ECF
Maximize Nutrition - 1

- Exclude undrained sepsis
- Proximal vs distal fistula
  - Loss of bile/pancreatic enzymes
  - Implications for proximal absorption
    - Fat
    - Protein
  - Implications of bile salt-induced diarrhea
- **Measure** nutritional needs if necessary
  - Caloric expenditure – calorie requirement
  - Nitrogen balance study – protein requirement
    - Collect urine
    - Fistula output – **all of it**
    - Wound drainage
    - Stool (if any)
    - NG/G tube output
### Management of ECF

#### Nutritional Needs – General Guidelines

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<th>Male</th>
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<td>20-25</td>
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<td>Stress</td>
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<td>Severe</td>
<td>1.5-2.0</td>
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*Never know until you measure it!*
Management of ECF
Maximize Nutrition - 2

- TPN vs enteral feeding*
- TPN with enteral “trickle”
  - Think elemental or semi-elemental formula
- Feed the gut distally
  - Go slowly, go slowly, go slowly
  - 1/4th strength solution 1st
  - Get to target rate
  - Then (and only then) increase strength (osmolality)**
- Biggest mistake – full strength tube feeding at start

*May need to increase serum albumin before successful
**Don’t be bullied by the dieticians or the “nutritional support team”
Management of ECF
Maximize Nutrition - 2

- TPN vs enteral feeding*
- TPN with enteral “trickle”
  - Think elemental or semi-elemental formula
- Feed the gut distally
- Biggest mistake – full-strength tube feeding at slow rate
- Re-feed fistula output**
  - Restore bile salt re-absorption

*May need to increase serum albumin before successful
**Trophic factors
Management of ECF
Maximize Nutrition - 3

- Incorporate physical therapy – formal program
  - Treadmill in room
  - Isometric exercises
  - Orthopedic bed supports
    - Trapeze
    - Foot board
    - Hand cycle
- Anabolic steroids, insulin, glucagon

↓
NO DATA TO SUPPORT
Management of ECF
Maximize Nutrition - GOALS

- Weight gain/stabilization
- Wound healing/epithelialization
- Increasing serum prealbumin
- Serum albumin $\geq 3.0$ g/dl
Management of ECF
Define the Anatomy

- Site of fistula
  - Proximal
  - Distal
  - Colonic
- Presence of distal obstruction!*
- Estimate bowel length
  - Radiology
  - Prior operative notes

*Contrast study of all “stomas”

*Might be cause of fistula
Management of ECF
Multidisciplinary Approach

- Surgeon
- Nutritionist* (dietitian and physician)
- Physical therapist
- Enterostomal therapist – bag the fistula
- Psychiatrist? – Antidepressant?
- Family/social input
- Remember TPN and/or enteral feeding
  - Can be cycled
  - Can be given by back pack to allow mobility

*We as surgeons like to think we know all this, but alas – WE DON’T
Management of ECF
Fistula Site Care

- Enterostomal therapist
  - Bag fistula
  - Bag open wound
  - Offsite referral to major center if necessary
- Lateralize the fistula
- Proximal controlled diversion selectively*
- Somatostatin trial – use if works

*Not a gastrostomy
Management of ECF
Timing of Operative Repair

- Don’t let the patient, family, or physician bully you to operate too soon!
- Allow the acute/subacute inflammation to resolve*
- Most scenarios require $\geq 3$ mo (some $\geq 6$ mo!)
- Skin grafts usually require 6 mo to “pinch”
- Don’t be macho! Well… not too macho
- We are all good surgeons
  BUT
- Many fistulas occur and re-occur from too early re-operation

*The redness of the incisional scar is a good barometer of vascularity intraperitoneally
Management of ECF
Operative Plan

- Repair fistula and cover the repair!
- With autogenous fasica/subcu/skin
- Consider proximal diversion
- Consider proximal feeding tube
Management of ECF

Operative Plan – Repair Fistula

- Remove all foreign material (mesh, sutures)
- Confirm anatomy
  - Proximal/distal
  - Isolate all sites of fistulas
  - Limited vs complete adhesiolysis?
- You must have a good reason not to do a complete adhesiolysis
Management of ECF

Operative Plan – Repair Fistula

- Remove all foreign material
- Confirm anatomy
- Takedown fistula
  - Resect bowel vs closure of fistula (intestinoplasty)
  - Multiple anastomoses vs extended resection*
    - Ileum vs jejunum
    - Intervening bowel quality

* Bbowel length, Crohn’s disease, nutritional state
Management of ECF

Operative Plan – Repair Fistula

- Remove all foreign material
- Confirm anatomy
- Takedown fistula
- Consider controlled proximal diversion
  - Nutritional status
  - Confidence in repair
- Consider gastrostomy and/or jejunostomy
Management of ECF

Operative Plan – Coverage of Repair

Goal – Vascularized autogenous tissue
- Minimum – skin/subcu*
- Ideal – vascularized musculofascial**
- Intraperitoneal
  - Omentum
  - Serosal patch/buttress
  - Mesenteric buttress
- Pedicled “flaps”
- Free “flaps”  

Get advice from Plastic and Reconstructive surgeon†

*Advancement or rotational flaps
**Medialization of rectus complex
†Consider location of defect and mechanical strength
Goal

- Fistula takes precedence
- Repair hernia – secondary precedence
  - 1º repair if possible
  - Don’t burn bridges that will affect future better definitive repairs*
  - Avoid alloplastic prostheses – Infection

*Very **selective** use of components separation!
The large defect unable to be reapproximated

- DIFFICULT PROBLEM
- Options
  - Reapproximate vascularized skin and subcu alone
    - Advancement flaps*
    - Rotational flaps*
    - Lateral “skin/subcu” release (+ STSG)*

*Get advice/help from a Reconstructive Plastic surgeon - perforators
ECF and Abdominal Wall Hernias

Operative Plan – Management of Hernia - 2

The large defect unable to be reapproximated

- DIFFICULT PROBLEM
- Options
  - Reapproximate vascularized skin and subcu alone
  - Very selective use of components separation
ECF and Abdominal Wall Hernias

Operative Plan – Management of Hernia - 2

The large defect unable to be reapproximated
● DIFFICULT PROBLEM
● Options
  ■ Reapproximate vascularized skin and subcu alone
  ■ Very selective use of components separation
  ■ Use of “prosthesis” to bridge fascial defect
    ● Absorbable (Vicryl®, Dexon®)
    ● Selective use of bioprosthetic (dermal-based, gut-based, pericardial-based)**
    ● Avoid uncovered prosthesis

**You don’t really think a new abdominal wall will form – DO YOU?"
Management of ECF
Summary

- Nutrition
- Physical therapy
- Patience
- Realistic, planned technique – NO SURPRISES!
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