“Enteroatmospheric” Fistula: The Feared Complication of the “Open Abdomen”

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Definitions

• Fistula: Abnormal communication between two epithelialized surfaces
• Enterocutaneous fistula: Abnormal communication between the gastrointestinal tract and the skin
• "Enteroatmospheric" fistula: A hole in the gastrointestinal tract in an open abdomen without overlying soft tissue
Causes of Chronic Fistula

- Foreign body
- Radiation
- Inflammatory bowel disease/Infection
- Epithialized tract
- Neoplasm
- Distal Obstruction
- Sepsis
Enterocutaneous Fistulas

• 75-85% iatrogenic post-operative
  – “Entero-atmospheric” Fistula always a post-operative problem

• 15-25% “spontaneous” in origin
  – Radiation
  – Inflammatory bowel disease
  – Diverticular disease
  – Malignancy
  – Tuberculosis
Principles of Fistula Management

• Resuscitation
  – Fluids and Electrolytes
  – Nutritional Support
    • Enteral
    • Parenteral

• Drain Local Abscess/Infection

• Define Anatomy of Fistula

• Rule out/Treat Distal Obstruction

• Resect chronic fistula if it fails to heal
Problem of “Entero-atmospheric” Fistula

• Absence of overlying soft tissue with good blood supply precludes spontaneous healing
• Exposed abdominal viscera predisposes to development of additional holes in the GI tract
• Complex Wound difficult to manage
Principles of Management Specific for “Entero-atmospheric” Fistula

• **PREVENTION**
  - Protect exposed abdominal viscera during open abdomen management
  - Limit access to the wound to one or two SENIOR people
• Attempt to seal leak when first recognized
• Protect adjacent viscera with biologic dressings to avoid additional holes

• Control fistula effluent
• Rotate flaps with good blood supply to cover fistula in selected cases
• Resect well established “entero-atmospheric” fistula only when patient fit and infection free
Principles of Management Specific for “Entero-atmospheric” Fistula

• The patient should be “adopted” by a senior surgeon who sees the patient and the family daily and dictates long term management goals
  – The patients are “psychological disasters”
  – Body image, odor and cleanliness are major issues
  – Intra-familial tensions are the norm
Principle 1: Prevention

Viscera Protection with Cadavre Skin as a Biologic Dressing
Wound healed by Serial Abdominal Closure without Fistula
Complex ventral hernia following open abdomen therapy

5 years s/p gsw to stomach and left adrenal gland. Following initial operation developed bowel ischemia due to cocaine, treated with open abdomen and skin graft closure of viscera.
Completion of Herniorrhaphy
POD #3 – Tachycardia – to OR – ischemic Right Colon – Right hemicolecction

Open abdomen managed with wound VAC. Did well for 5 days until n-g output suddenly increased over a 12 hour period.
Principle 2: Attempt to Seal Leak
Principle 3: Protect Adjacent Viscera

Small bowel “springs a leak” through small hole. Hole covered with fibrin glue and Alloderm. Fistula closed almost immediately—”a miracle” Abdomen closed eventually with autograft

Ruptured Abdominal Aortic Aneurysm

Courtesy of Dr. Andre Campbell
Alloderm Closure of Facial Defect

Courtesy of Dr. Andre Campbell
Principle 4
Control Fistula Effluent

• Free Peritoneal Cavity
  – Major problem is lack of source control causing peritonitis and SIRS
  – Exteriorize fistula if possible or divert proximally: OFTEN IMPOSSIBLE IN AN OPEN ABDOMEN
  – Consider “floating stoma” if exteriorization impossible
Principle 4
Control Fistula Effluent

• Fixed Visceral Block
  – Vacuum Assisted Wound Management System
  – Wound Drainage Bags
    • Requires expert enthusiastic nursing assistance
    • Creativity

Principle 4
Control Fistula Effluent

- DO NOT INTUBATE A FISTULA in the middle of a fixed visceral block open abdomen
  - You won’t control the drainage
  - You will make the hole bigger
  - Risk of additional holes
Options for Soft Tissue Coverage

• Fascia
  – Progressive closure with Vacuum Assisted Wound Management
  – Temporary fascial tension devices to reduce lateral retraction combined with underlying visceral protection and Vacuum Assisted Wound Management
  – Use plastic sheet between visceral block and lateral abdominal walls to maintain abdominal wall mobility
  – “Separation of Parts” Technique
Gunshot wound to stomach and pancreas - damage control laparotomy

- 24 hours later - necrotizing pancreatitis - distal pancreatectomy, gastrojejunostomy, open abdomen
- Fistula x 2
- Serial closure of abdomen
- Final closure with separation of parts technique plus intubation of fistulae

Courtesy of Dr. Robert Mackersie
Other Options for Soft Tissue Coverage

- Skin Flaps
- Dermal Matrix
- Rotation Muscle Flap
- Free Muscle Flap
22 year old man admitted in shock with GSW to abdomen

- GSW to IVC – repaired
- GSW to SMV – oversewn
- Complex injury to duodenum (2nd-3rd porton)- resected
- Right hemicolecctomy
- Damage control laparotomy
Second Look Laparotomy

Findings

Reconstruction
Multiple small bowel fistulas following GSW to abdomen

- Now 1 ½ years after injury

Multiple fistulas to remaining bowel
Fistulas closed, abdomen closed with separation of parts technique

**Post operative Course**

- Leak from small bowel
- Low output fistula
- Fascial necrosis requiring debridement
- Exposed viscera managed with fibrin glue and CSTSG (Principle 3)
Intestinal Leak-Fascial Dehiscence

- Rectus abdominus transposition flap covers exposed bowel and fistula – Principle 5
- Fibrin glue used to limit fistula output – Principle 2
Fistula closed

Healed Wound – Oral Nutrition
Principle 6
Resect Fistula when patient fit and infection free

PLEASE: Do not cover open abdomens with Marlex mesh!!!!!!
Viscera covered with previously “delayed” Rotation skin flap
Principle 7:

Daily Attention by a Senior Surgeon
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