Prevention and Treatment of Anastomotic Leaks

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Ochsner Clinic Foundation

- I have no affiliations
- I will be discussing off label uses of devices
Cost of Anastomotic Leaks

- Financial
- Functional
- Oncologic
Colocutaneous Fistula- Case 1

- 62 y/o obese diabetic male
- Sigmoid colectomy for colovesical fistula secondary to diverticular dz
- 8 days postop develops feculant drainage from midline wound
- CT demonstrates colorectal anastomotic-cutaneous fistula
Colocutaneous Fistula- Case 1

- POD 14 coated stent placed
- Feculant drainage stopped with 48 hrs
- DC home at 1 week
- Repeat cscope 1 month
  - Anastomosis healed, no stent
Thought for the Day

Beware the man who is an expert at taking care of complications
Do We Really Know Why Colorectal Anastomoses Leak?

Anastomotic Healing
- Anatomic
- Physiologic
  - Patient Factors
  - Operative Factors
Physiologic Factors

- Inflammatory phase
- Proliferative Phase
- Remodeling

Vascular Anatomy
Microvascular Anatomy

- Small vessel collaterals
  - Microvascular disease
  - Vasospasm
- Arterial O2 tension

Anastomotic Leak:
Patient–Related Risk Factors

- Nutritional Status
- Immunosuppression
  - Steroids
  - Anti-TNF
- Crohn’s Disease
- Radiation
- Emergency Surgery
  - Peritonitis
  - “Loaded” colon
  - Hemodynamics
- Location
- Obesity
- Gender
Anastomotic Leak: Operative Risk Factors

- Blood loss/ Operative time
- Intraop complications
- Total Mesorectal Excision
- Tension
- Drains
- Laparoscopy
- Omental wrapping
- Concurrent hepatic resection

Mechanical Bowel Prep

- Multiple studies conclude MBP does not decrease anastomotic leaks
- Rectal anastomoses
Proximal Diversion

- Effect on leak rate
- Effect on leak morbidity/mortality
- Risk of ostomy/closure

Proximal Diversion

- Risk of anastomotic leak
- Ability of patient to tolerate leak
- Patient wishes?
Intraoperative Air Leak Testing

- 998 colorectal anastomoses
- Intraop air leak 7.9%
- Clinical leak
  - Positive air leak = 7.7%
  - Negative air leak = 3.8%
  - No testing = 8.1%
- Leak rate by treatment of air leak
  - Suture = 12.1%
  - Diversion = 0%
  - Reanast. = 0%
Fluorescence Angiography

- No prospective randomized data available
- Systematic review of clinical trials
  - Cohort studies
  - 3.3% vs 8.5% leak rate favoring ICG-FA
  - Langenbecks Arch Surg – published online 11 March 2016

PILLAR III

[Diagram showing the flow of the PILLAR III process, including stratification by site, assessment for eligibility, randomization, and grouping into different categories of treatment.]
Intraoperative Endoscopic Assessment

- No good data

The Microbiome

- Bacteria outnumber cells 10 fold

- Human-associated bacterial communities and their genome
  - Affect overall host homeostasis
  - Affected by host behavior
Microbiome and Leaks

- Which bacteria?
- What makes them pathogenic?
  - Environmental triggers
  - Enzyme production
- How to prevent, eliminate or treat

The Emerging Terminology

- Genomics
- Proteomics
- Metabolomics
- Metagenomics
- Transcriptomics
- Meta-omics
- Pathobiome
Anastomotic Leaks – Spectrum of Disease

Asymptomatic – Radiographic Only

Diffuse peritonitis, Overwhelming Sepsis, MSOF, death

Considerations

- Comorbidities
- Hemodynamics
- Organ system dysfunction
- Physical Exam
- Imaging
- Location
- Underlying etiology
Anastomotic Leaks

- No universally accepted diagnosis
- Little written about selection of treatment

Early Identification

- Fever
- Leukocytosis
- Tachycardia
- Decreased UOP
- Unexplained need for IV fluid after initial 24-48 hrs
Early Identification

- Gastrograffin enema
- CT – rectal contrast

Treatment Options

- Transabdominal
  - Divert
  - Divert/repair
  - Resect/divert
  - Resect/redo/divert
  - Repair
- Interventional Radiology
- Endoluminal
Treatment Options

- Transabdominal
- Interventional Radiology
- Endoluminal
  - Unroofing
  - Closure
    - Coated Stent
    - Clips
    - Suture
    - Sponge/VAC

- Gp 1
  - Anastomotic salvage/diversion
- Gp 2
  - Anastomotic resection/diversion

- All pts who underwent reoperation for anastomotic leak after elective or emergency colorectal surgery....
The present study suggests that the use of a diverting loop ileostomy, associated with salvage of the anastomosis, is an effective alternative strategy to control peritoneal sepsis caused by leakage of both extraperitoneal and intraperitoneal colorectal anastomosis. In our experience, this conservative procedure is safe and involves less mortality compared with anastomotic takedown and end stoma.

Presentation of Contained Leaks

- Phlegmon
- Abscess
- Sinus
- Fistula
The Management of Anastomotic Pouch Sinus After IPAA

Usama Ahmed Ali, M.D. • Bo Shen, M.D. • Feza H. Remzi, M.D. • Ravi P. Kiran, M.D.

### The Management of Anastomotic Pouch Sinus After IPAA

Usama Ahmed Ali, M.D. • Bo Shen, M.D. • Feza H. Remzi, M.D. • Ravi P. Kiran, M.D.

**Dis Colon Rectum 2012; 55: 541–548**

#### TABLE 2. Evaluation of potential factors associated with healing and pouch failure in patients with an anastomotic pouch sinus

<table>
<thead>
<tr>
<th>Potential risk factors</th>
<th>N</th>
<th>Healing rate n (%)</th>
<th>p</th>
<th>Pouch failure n (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>45</td>
<td>27 (60)</td>
<td>—</td>
<td>15 (33)</td>
<td>—</td>
</tr>
<tr>
<td>Pouch construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary pouch</td>
<td>25</td>
<td>22 (88)</td>
<td>0.756</td>
<td>10 (40)</td>
<td>0.205</td>
</tr>
<tr>
<td>Recto pouch</td>
<td>10</td>
<td>5 (50)</td>
<td>0.490</td>
<td>5 (50)</td>
<td>0.526</td>
</tr>
<tr>
<td>History of anastomotic leak or pelvic sepsis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>24</td>
<td>15 (65)</td>
<td>0.001</td>
<td>9 (38)</td>
<td>0.138</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>12 (57)</td>
<td></td>
<td>6 (29)</td>
<td></td>
</tr>
<tr>
<td>Symptomatic sinus presentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>20</td>
<td>6 (30)</td>
<td>0.334</td>
<td>9 (45)</td>
<td>0.673</td>
</tr>
<tr>
<td>No</td>
<td>25</td>
<td>16 (64)</td>
<td></td>
<td>7 (28)</td>
<td></td>
</tr>
<tr>
<td>Time to ileostomy closure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before closure</td>
<td>23</td>
<td>16 (70)</td>
<td></td>
<td>7 (30)</td>
<td></td>
</tr>
<tr>
<td>After closure</td>
<td>22</td>
<td>11 (50)</td>
<td></td>
<td>8 (36)</td>
<td></td>
</tr>
</tbody>
</table>

#### TABLE 5. Studies describing the outcome of anastomotic pouch sinus after IPAA

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Selection criteria</th>
<th>Initial treatment</th>
<th>Healing rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akbari 2009†</td>
<td>22</td>
<td>Asymptomatic, before ileostomy closure</td>
<td>Observation—disbridgement</td>
<td>20/21 (95%)</td>
</tr>
<tr>
<td>Nyam 1997†</td>
<td>41</td>
<td>Asymptomatic, before ileostomy closure</td>
<td>Observation</td>
<td>40/41 (95%)</td>
</tr>
<tr>
<td>Swain 2004†</td>
<td>7</td>
<td>Fibris glue treatment</td>
<td>Fibris glue</td>
<td>7/7 (100%)</td>
</tr>
<tr>
<td>Whitlock 1997†</td>
<td>6</td>
<td>Unroofing as treatment</td>
<td>Unroofing</td>
<td>6/6 (100%)</td>
</tr>
<tr>
<td>Current study</td>
<td>45</td>
<td>Symptomatic and asymptomatic, irrespective of ileostomy closure or type of treatment</td>
<td>Depending on patient condition and presentation</td>
<td>27/45 (60%)</td>
</tr>
</tbody>
</table>
The Management of Anastomotic Pouch Sinus After IPAA
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Ravi P. Kiran, M.D.

- Symptomatic
  - Predictor of non-healing
- Observation
  - Treatment of choice in asymptomatic patients
- Optimal choice of additional treatment
  - Unclear

Treatment of Colorectal and Ileoanal Anastomotic Sinuses
Charles B. Whitlow, M.D., Frank G. Opelka, M.D., J. Byron Guthright, Jr., M.D., David E. Beck, M.D.
DCR 1997;40:760-763
Treatment of Colorectal and Ileoanal Anastomotic Sinuses

Charles B. Whitlow, M.D., Frank G. Opelka, M.D., J. Byron Gathright, Jr., M.D., David E. Beck, M.D.

Minimally Invasive Options

- Drain
- Close
- Protect
Anastomotic Leak

- In addition to the internal opening
  - Stricture

- Fluid collection
The use of a Polyflex coated esophageal stent to assist in the closure of a colonic anastomotic leak

Thomas Scileppi, MD, Jian Jun Li, MD, Kadiravel Iswara, MD, Scott Tenner, MD, MPH
Brooklyn, New York, USA
Gastrointest Endosc 2005;62:643-5

- 52 y/o
- 2 weeks s/p left colectomy
- CT showed contained leak with large pelvic fluid collection
- CT guided drainage
- Subsequent stent placement
  - Polyflex

- Feculent drainage stopped within 7 days
- Stent passed spontaneously in 10 days
- CT proven complete resolution of leak and abscess
Wallflex Fully Coated Esophageal

- Stent outer diameter 23mm
- Distal/Prox flare 28mm
- Lengths (10.5, 12.5, 15.5 cm)
- Delivery system
  - 18.5 Fr
  - 78cm long
  - Retrievable

Technical Aspects

- Visualization
  - Endoscopic
  - Fluoroscopic
  - Combined
Technical Aspects

- Endoscopically place guidewire
- Remove scope
- Place stent over guidewire
  - Introduce scope adjacent to stent
- Deployment
  - Coordinated opening/stabilization of location
- Secure?

Technical Aspects

- Lumen size
- Location
  - Distal
  - Proximal
  - Small bowel
- Time to removal
Covered Self-Expanding Metal Stents for Treatment of Anastomotic Leak After Colorectal Resection

- Evan Feldman, James Fleshman
- Washington University
- Presented at Missouri Chapter of American College of Surgeons, June 2012

- 7 patients after Anterior Resection
- None Diverted
- Mean anastomotic height 7.6cm
- Mean time to diagnosis 7 days
- All had intraperitoneal fluid collection drained
Covered Self-Expanding Metal Stents for Treatment of Anastomotic Leak After Colorectal Resection

- Mean duration of stent placement – 28 days
- 5/7 healed

Endoscopic treatment of postsurgical colorectal anastomotic leak (with videos)

Francisco Pérez Roskoff, MD,1 Pedro González Carro, MD,1 María Concepción Villafañe García, MD,2 Sami Soufi Rabih, MD,3 María Luisa Legaz Huíndobro, MD,3 Esther Bernardos Martín, MD,3 Rosanna Villanueva Hernández, PhD,3 Emilia Tebar Romero, PhD,3 Francisco Ruiz Carrillo, MD3

Alcázar de San Juan, Spain

Gastrointest Endosc 2013:77;967-71

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age (yrs)</th>
<th>Indication</th>
<th>Previous treatment</th>
<th>First endoscopic treatment</th>
<th>Additional endoscopic treatment</th>
<th>Time to closure</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>67</td>
<td>Rectal cancer, RT and LAR (06/2010) v(RTN)</td>
<td>Large rectal fistula</td>
<td>CMS 30G/30L, (11-2010) (12-2010)</td>
<td>Coated BIO, 100 mm + cystoanalysiss</td>
<td>15 wk</td>
<td>22 mo</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
<td>Rectal cancer, RT and LAR (06/2010) v(RTN)</td>
<td>Recurrent anal fistula</td>
<td>Penetrating anal fistula</td>
<td>Fistula treated with fibrin</td>
<td>8 wk</td>
<td>21 mo</td>
</tr>
</tbody>
</table>
| 3       | 55        | Rectal cancer, RT and LAR (06/2011) v(RTN) | Anastomotic fistula | Recombinant tissue factor | Trauma treated with fibrin, 
Cysts, and clips | 18 wk | 18 mo |
| 4       | 66        | Rectal cancer, RT and LAR (06/2011) v(RTN) | Suture dehiscence and pseudocyst | Coated BIO, 80 mm, 8-2011 fibrin | Nite-C CMS at 2 wk, Endo Sponges (9/2011) (2 wks) | 14 wk | 18 mo |
| 5       | 75        | Rectal cancer, RT and LAR (06/2011) v(RTN) | Suture dehiscence with fistula | Coated BIO, 80 mm, 8-2011 fibrin | Change for other CMS, 500 mm (12/2011) Scl (aranelasus fistula, CMS 60 mm (9/2011) | 14 wk | 19 mo |

* v(RTN) = RT and LAR, v(ITN) = IT and LAR, CMS = covered metal stent, BIO = bioabsorbable, PTFE = polytetrafluoroethylene, Scl = sclerotherapy, CE = covered endoprosthesis.
Colocutaneous Fistula Case #2

- 41 y/o male
- Crohn’s
  - s/p ileocectomy
  - Descending colostomy
  - Rectal Prolapse
- Colostomy closure, suture rectopexy

Colocutaneous Fistula Case #2

- POD 9 – feculant drainage from midline wound
- POD 11 – coated stent place; drain place via cutaneous opening
  - Initially drainage stopped
  - Fever/elevated WBC
  - Repeat scan – stent migrated proximal
Colocutaneous Fistula Case #2

- POD 20 –repeat stent; output ceased.
- Discharged home 7 days later
- F/u 1 month
  - CT - no leak, no stent
Cereatti et al.
Ther. Adv. Gastroenterol
2016;9:180-188

- 29 patients – left sided colorectal anastomoses
  - 17 Stricture
  - 12 leak/fistula

- Time to diagnosis
  - 104 days (14 to 360)
Stents for leaks

- Technical success = 100%
- Clinical Success = 62%
  - 20% if no stricture
- Complications
  - Minor (38%)
  - Pain, fever, tenesmus

Most Recent Success

- Ileorectal anastomosis after debulking and HIPEC for colonic adenocarcinoma with peritoneal mets.
- ½ circumference dehiscence
Most Recent Stent Success

- Coated stent placed at time of operative drainage of leak
- Stent in place 3 months
  - Passed
  - Completely radiographic resolution of leak
Summary

- There are a few case reports of stents being used for contained anastomotic leaks in highly selected stable patients.
Promising results after endoscopic vacuum treatment of anastomotic leakage following resection of rectal cancer with ileostomy


Dan Med J
2013;50(4):A4604

- 13 Patients
- 1-18 treatments
  - Median 8
- 12/13 had stoma closed
Anastomotic Deshisence 2
Anastomotic Deshisence 2

[Image of medical condition]

Anastomotic Deshisence 2

[Image of medical condition]
Anastomotic Deshisence 2
Anastomotic Deshisence 2

“Endosponge”

- Homemade device
- Sedation required
- Exchange q3-4 days
Endosponge/“Endosponge”

- Personal experience

- 4 pts
  - 3 acute
    - 2 circumferential
    - 1 – 1/3 circumference (symptomatic)
  - 1 chronic

Endoscopic Management of Anastomotic Leaks

“Close it”- over-the-scope Clips-Ovesco

“Complete sealing of leaks was achieved by using OTSC alone in 8 of 10 patients. For one patient, successful endoscopic management was completed by placing two additional covered stents”

Endoscopic Management of Anastomotic Leaks

"Close it"- over the scope Clips-Ovesco
Other Treatment

- Glue
- Suture closure
  - Transanal
  - TAMIS
  - Counterdrainage?
Chronic Sinuses - Sequelae

- Pain
- Fistula

Algorithm

- Low (coloanal, IPAA)
  - Sinuses
  - Observe
  - Unroof
    - What is the best anatomy (Short track, small opening, larger cavity)
    - If large opening – consider sponge/VAC
  - Divert if needed
Algorithm

- Colorectal (mid/prox rectum), more proximal
  - Drain fluid collections
  - Coated Stent (lumen size dependent)
    - Consider TAMIS suture closure or OTS clips
  - Divert if needed

Minimally Invasive Treatment of Anastomotic Leaks

- Not all leaks require exploration
- Not all leaks require resection/diversion
- Fluid collections associated with leaks usually require drainage
- Endoluminal treatment of leaks requires a knowledge of options available and their appropriate usage