Anastomotic Leak: Management and Prevention

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Disclosure of Affiliations

• None

Anastomotic Leak

Prevention

Treatment
  • Traditional
  • Non-traditional

Ultimate Fate of the Leaking Anastomosis

Early Detection
**Sweet case**

48 year old woman
- Bulky sigmoid cancer
- Mid rectal cancer in polyp s/p polypectomy + margin
- Body Mass Index = 49

- Plan: Low anterior resection

**OR: Low Anterior Resection**

Mobilization splenic flexure

Margins of resection
- Distal descending colon
- Mid-Distal Rectum (1st valve)

**Should you construct an anastomosis?**

48 year old woman
- Bulky sigmoid cancer
- Mid rectal cancer in polyp s/p polypectomy + margin
- BMI 49

- Plan: Low anterior resection

“I don’t want a poopy bag”
Not sleeping at night

Day of operation
  • Is she bleeding?

The next 3 weeks
  • Is she leaking?

Leaks are Bad

Mortality
Morbidity
Re-operation
Permanent stoma
Poor oncologic outcomes
  • increased local recurrence, decreased cancer specific survival and decreased overall survival

Implications for the surgeon
  • Poor technique
  • Poor judgment

Risk Factors

Nonsteroidal Anti-inflammatory Drugs and Anastomotic Dehiscence in Bowel Surgery: Systematic Review and Meta-Analysis of Randomized, Controlled Trials

Thomas P. Burton, M.B.Ch.B., Prabhav Mittal, M.B.Ch.B., Ph.D., F.R.A.C.S., Mattias Soop, M.D., Ph.D.

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Variables Associated with Anastomotic Leak

Patient factors
- ASA score
- Charlson Comorbidity Index
- Poor nutrition
- Smoking
- Obesity
- Steroids
- Male sex (pelvic anastomosis)
- Vascular Disease

Intraoperative factors
- Low rectal anastomosis
- Adverse events

Surgeon factors
- Surgeon

Radiotherapy

Variables Associated with Anastomotic Leak

Problems with the Data
- Retrospective
- Selection bias
  - Use of diverting stomas
- Underpowered
  - Multivariate analysis
    - Rule of 10s
- Lack of standard definition of leak

Definition of “Anastomotic Leak”

Systematic review of the definition and measurement of anastomotic leak after gastrointestinal surgery
J. Bruce, Z. H. Karimovski, G. M. K. Clancy, E. M. Rassell and S. G. M. Park

Proposed definitions for the audit of postoperative infection: a discussion paper

Anastomotic leak
This is defined as a leak of faecal contents from a surgical anastomosis into the peritoneal cavity or adjacent organs. The leakage may be visible, audible, or palpable. Symptoms and signs may include fever, abdominal pain, and discharge of abdominal contents. A diagnosis of anastomotic leak should be made clinically and confirmed by imaging or endoscopy.

Comparison of Anastomotic Leak Rate After Colorectal Surgery Using Different Databases
Caroline E. Reiner, M.D., M.S.P.H. • Shyna Showalter, M.D. • Najia N. Mahmoud, M.D. • Rachel R. Kitz, M.D., M.S.C.E.
Department of Surgery, University of Pennsylvania, Philadelphia, Pennsylvania

Comparison of Anastomotic Leak Rate After Colorectal Surgery Using Different Databases

\[ \frac{\text{Number of leaks}}{\text{Number of surgeries}} \times 100 \]

\( \text{Rule of 10s}\)
Variables Associated with Anastomotic Leak

Problems with the Data

- Failure to account for other important variables
  - Tension
  - Blood supply
  - Surgeon as variable

Anastomotic technique

How do you perform colorectal anastomosis?

A. Stapled
B. Stapled, buttressed
C. Hand sewn
D. Compression device

Reinforcing stapled colorectal anastomosis with suture

Left colon mobilization
Anastomotic internal reinforcement

Anastomotic external reinforcement

Fibrin - Thrombin

Omentoplasty


- No difference in leak rates


- Reduced clinical anastomotic leakage (RR 0.36, 95% CI 0.16 to 0.78)
- No difference in:
  - radiological anastomotic leakage (RR 0.76, 95% CI 0.41 to 1.40)
  - death (RR 1.01, 95% CI 0.55 to 1.86)
  - repeat operation (RR 0.60, 95% CI 0.35 to 1.05)
Making a Better Anastomosis?

Internal covering
- Coloshield
- C-Seal

Compression devices
- Murphy button, c. 1892
- Val-Trac, c. 1992

Nitinol

Low anterior resection

What is the next step after performing low colorectal anastomosis?

A. Loop ileostomy
B. Leak test with air or CO2
C. Leak test with fluid (Betadine, etc.)
D. Close the abdomen
Air Leak Test

Carbon dioxide video endoscopy

Prospective Database

- 998 left sided anastomoses without proximal diversion
Clinical Leak vs. Intraoperative Air Leak Testing

All Anastomoses

<table>
<thead>
<tr>
<th></th>
<th>Clinical Leak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airtight</td>
<td>4%</td>
</tr>
<tr>
<td>Airleak</td>
<td>8%</td>
</tr>
<tr>
<td>Untested</td>
<td>8%</td>
</tr>
</tbody>
</table>

p=0.03

Clinical Leak vs. Intraoperative Air Leak Testing

Circular stapled anastomoses

<table>
<thead>
<tr>
<th></th>
<th>Clinical Leak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airtight</td>
<td>4%</td>
</tr>
<tr>
<td>Airleak</td>
<td>5%</td>
</tr>
<tr>
<td>Untested</td>
<td>21%</td>
</tr>
</tbody>
</table>

p=0.04

State of Washington Surgical Care and Outcomes Assessment Program

Hospitals performing routine anastomotic leak testing (>90% of cases) had fewer anastomotic leaks

odds ratio 0.23 (95% CI 0.05-0.99)

Back to our patient…

CO₂ flexible sigmoidoscopy
Visual inspection of anastomosis
Leak test with gas insufflation

Everything is perfect
Low anterior resection

What is the next step after performing colorectal anastomosis and negative air leak testing?

A. Loop ileostomy
B. Loop colostomy
C. Fibrin glue around anastomosis
D. Close the abdomen

Sweet case

Postoperative course

- She does great for 5 days…
- Saturday evening she has fever, dysuria, tachycardia
  - Minimal abdominal pain and tenderness

Sweet case…now with a fever

What do you do next?

A. Urinalysis, CBC, CRP, Blood cultures, Chest radiograph
B. Water soluble contrast enema
C. CT
D. Laparotomy
Anastomotic Leak

Prevention

Treatment
- Traditional
- Non-traditional

Ultimate Fate of the Leaking Anastomosis

Early Detection
Sweet case...now with a fever and a CT

What do you do next?

A. Antibiotics
B. Percutaneous drain
C. Laparotomy
D. Laparoscopy

OR

Laparotomy
- Intraperitoneal contents appear normal
- Murky fluid in pelvis posterior to neorectum
- Flexible sigmoidoscopy: anastomosis normal; air leak test negative

Murky fluid in pelvis posterior to neorectum
Flexible sigmoidoscopy: anastomosis normal; air leak test negative

What do you do next?

A. Close the abdomen
B. Pelvic drain
C. Proximal fecal diversion + drain
D. Hartmann resection

Anastomotic Leak

Prevention

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  • Traditional
  • Non-traditional

Ultimate Fate of the Leaking Anastomosis

Early Detection

Fixing a blown sewer pipe

Management of colonic perforation

Endoscopic clips

Endoscopic Clips: Bear Claw

Bear Trap

Bear Claw endoscopic clip
Endoscopic Clips: Bear Claw

Anastomotic fistula

Probe in fistula

Clip deployed

Transanal Endoscopic Microsurgery

Management of anastomotic leak

Endoscopic lavage of cavity

Endoscopic placement of vac sponge into leak cavity

Vacuum sponge in leak cavity

17 patients with leak from rectum or rectosigmoid without sepsis

Endoscopic lavage of cavity

Endoscopic placement of vac sponge into leak cavity

16 did OK

Mean 5 sponge changes

Mean time to healing 53 days

Placement of a covered polyester stent prevents complications from a colorectal anastomotic leak and supports healing: Randomized controlled trial in a large animal model

Surgery 2008

Prospective, randomized, pigs

2cm colorectal anastomotic defect

Stented group did great

Non-stented group: abscesses, fistulae

Stent

Endoscopic management of leak
Vacuum sponge in leak cavity

Novel Treatment of Leak

Problems with the data
- Selection bias
- Small numbers
- Underpowered

Anastomotic Leak

Prevention

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Ultimate Fate of the Leaking Anastomosis

Early Detection
What happens after a leak?

Prospective database 2001-2007

2627 intestinal operations
- 88 clinical leaks (3.3%) in 79 patients
- 10% mortality

Management

Outcome

Mean follow up 32 +/- 26 months
Anastomotic Leak

Prevention

Treatment
• Traditional
• Non-traditional

Ultimate Fate of the Leaking Anastomosis

Early Detection

Early Detection

Drain sampling
• Bacteria
• Inflammatory cytokines
  • IL-6, IL-10, TNF

C-Reactive Protein

Cutoff: 190

Odds Ratios for infectious complications

C-Reactive Protein

Odds Ratios for infectious complications

POD 4
Cutoff: 135
Anastomotic Leak

Optimal Management = Prevention
- Good blood supply
- No tension
- Technically optimal
- Good judgment

If leak occurs, survival depends on:
- Prompt recognition
- Tailored treatment