Stapled Bowel Anastomosis

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Intestinal anastomosis

the basic principles: crucial
- Accurate approximation of the bowel
- No tension
- Good blood supply
- ‘Clean’
- Appropriate use of defunctioning
Principles of Successful Intestinal Anastomosis

- Well-nourished patient with no systemic illness
- No contamination
  - in the gut
  - in the peritoneal cavity
- Adequate exposure and access (lap surgery)
- Well-vascularized tissues
- Absence of tension at the anastomosis
- Meticulous technique
  - (“it will be alright” never will be!!)
- Surgeon Factor – everyone has varying leak rates
Leak rates by region

- ?
- NI
- North East SHA
- North West SHA
- Yorkshire & The Humber SHA
- East Midlands SHA
- West Midlands SHA
- East of England SHA
- London SHA
- South Central / South East Coast SHA
- South West SHA

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Anastomotic failure

Anastomosis failure (leak) rate

- 1.5~2.2% (small bowel)
- 3% colon, 5% rectum (Smith – NBOCAP 2009)
- X3 higher in Crohn’s (Tekkis meta-analysis, DCR 2007)
- Type of anastomosis (stapled/hand sewn)
- Configuration
- Emergency or elective procedure (x1.5)
- Time??
- Increase morbidity & mortality (x10), double the length of hospital stay
Rectal and colonic anastomoses

![Graph showing leak rates over years]

- **AR Only**
- **Other Anastomoses**


Leak rate (%)

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What about type of surgery?

- Open operation
- Laparoscopic then open surgery
- Laparoscopic converted to open
- Laparoscopic completed
Stapling: technical issue

**Choice of Stapler**

- first introduced in 1908 by Hultl;
- Massive Change in surgical practice in last 20-yrs
- Types of stapler
  - Transverse anastomosis (TX) stapler
  - The gastrointestinal anastomosis (TLC) stapler
  - The circular, or end-to-end anastomosis (CDH)
  - For open surgery vs laparoscopic surgery (ATS/ATW)
Choice of Stapler

- **titanium**
  - little tissue reaction.
  - not magnetic

- **Problem**
  - Bleeding from edge
  - Linear stapler end to end: evert ing
  - EEA: enterostomy

- **Staple Height**

  **best blood flow by**
  1. stapled anastomosis adjusted to the thickness of the bowel wall
  2. double-layer stapled and sutured anastomosis
  3. double-layer sutured anastomosis
  4. tightly stapled anastomosis
S-Stapled versus D-Stapled Anastomoses

- Pig model study
- Small bowel anastomosis
- Killed at 10-days

- Intersecting staple lines are created
- > 90% of the intersecting staple lines contained bent or cut staples
- But the integrity of anastomosis was not compromised in any way, nor was healing adversely affected
Hand Sewn vs. Stapled Anastomosis

**Various prospective, randomized trials**

- no differences in clinical and subclinical leakage rates, length of hospital stay, or overall morbidity.
- no significant differences were apparent between stapled and hand-sewn anastomoses.
- ...except, stenosis rates are higher in stapled procedures
- possible reduction in anastomotic recurrence rate with stapled
Failure of anastomosis

Contributing Factors
Type and location of anastomosis

- **Location**
  - Rectum > Colon
  - L1/3 > M1/3 Rectum
  - SB & colon?

- **Type**
  - HS end-end best for propagation of myoelectric waveform
Patient preparation

- Nutrition - good
- Anaemia - bad
- Antibiotics - good
- Bowel Prep – bad
  - Phosphate enema!
Associated disease and systemic factors

- **Co-morbidity**
  - An, DM, Immunosuppression, Radiotherapy, malnutrition with hypoalbuminemia, vitamin deficiency

- **Crohn disease**
  - Risk of anastomotic dehiscence (12%)

- **Steroids**
  - ↓ protein turnover, ↓ wound healing, ↑ sepsis

- **Blood Loss, recent transfusion**

- **Obstruction**
Laparoscopic surgery leak rates

Left sided anastomoses

- Univariate analysis
  - Rectum > colon
  - ↑ operating time
  - Number of stapler firings
  - ↑ diameter of circular stapler

- Multivariate
  - L > M > U rectum
  - Men + L rectum + ↑ firings = bad news!

Kim J Am Coll Surg, 2009
Controversial issues??
Inversion vs. eversion

- No evidence

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Nasogastric decompression

No evidence
Abdominal drain

- No evidence
Trauma
Colonic trauma

- 19 Trauma centres
- Survived 72 hrs
- 297 patients, 2/3 primary anastomosis, 1/3 stoma
- Abdominal complications in ¼
  - 22% in anastomosed
  - 27% in stoma
- Independent risk factors for abdominal complications
  - Severe contamination
  - Transfuse > 4U blood
  - Single agent prophylaxis
  - NO difference in high risk patients
  - NO difference between anastomosis or stoma
- Technique and lavage

Demetriades et al, J Trauma 2001 May;50(5): 765-75
Conclusions???
Conclusions

- Emergency surgery
  - Anastomosis is safe if patient status is satisfactory.
  - Leak rate increases in unstable, malnourished, multi transfused & severe contamination.

- Minimal number of firings in lap surgery

- Crohn’s – side to side is better??

- HS == Stapled (location)

- Defunction

- Good surgical technique is important!