Colorectal Anastomosis
Hand Sewn

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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

- 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

Values:
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5

Regions:
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Rectal and colonic anastomoses

The graph shows the leak rate (%) for AR Only and Other Anastomoses from 2000 to 2007. The leak rate for AR Only generally decreases from 8% in 2000 to around 4% in 2007. The leak rate for Other Anastomoses fluctuates more significantly, with a peak of 8% in 2001 and a low of 1% in 2005.
Intestinal anastomosis healing

■ Submucosa: strongest component of the bowel wall

■ Collagen: single most important molecule for determining intestinal strength

■ The bursting pressure of anastomoses
  ◇ 60% of the strength of the surrounding bowel by 3 to 4 days.
Suturing: technical issue

**Choice of suture material**
- inflammatory reaction by FB
- No difference in anastomosis between absorbable and nonabsorbable
- prolene, dexon, catgut: similar inflammation
- Silk: more cellular reaction
- The ideal suture material (5-0 stainless steel)
  - minimal inflammation, maximum strength
- monofilament vs coated braided sutures
  - advance
Failure of anastomosis

Contributing Factors
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
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*
Evidence?
Inversion vs. eversion

- A 1969 study - greater anastomotic strength, less luminal narrowing, and less edema and inflammation with everted small intestinal anastomoses in dogs.

- Subsequent laboratory and clinical studies have not confirmed these findings and, have often shown opposite results.

- Another argument in favour of inversion - looks neater!

- No risk of pseudomyxoma or increased adhesion in everted edges.
Continuous versus Interrupted Sutures

- No RCT shows an advantage between either
- Retrospective reviews have not shown any advantage either
Single-Layer vs Double-Layer Anastomoses

- Traditionally Double-layer anastomoses have been considered more secure.

- The single-layer technique has significant inherent advantages:
  - take less time to create
  - cause less narrowing of the intestinal lumen
  - foster more rapid vascularization and mucosal healing,
  - increase the strength of the anastomosis
  - improved postoperative return to normal bowel function
  - nonrandomized studies of anastomotic leakage rates: no differences between single- and double-layer anastomoses

- Double-layer anastomoses
  - when the tissues are very edematous or friable
  - under minimal tension
  - lie in highly vascular areas (e.g., the stomach).

- Meta-analysis 2006: no difference in leak rates, increased op time (Shikata et al BMC Surgery 2006, 6:2)
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 (600 pts each group).
- ...except, stenosis rates are higher in stapled procedures
- Possible reduction in anastomotic recurrence rate with stapled
- Increased time with hand sewn

Hand Sewn vs Staple in Pouch Patients

- 2699 hand sewn, 1485 stapled IPAA
- Slightly higher seepage rates in hand sewn
- No difference in frequency, antidiarhoeal meds, leaks etc
- Slightly higher dysplasia in ATZ in stapled

Lovegrove, Tekkis Annals of Surgery • Volume 244, Number 1, July 2006
Nasogastric decompression

- No evidence
Abdominal drain

- No evidence

Wiggers Colorectal Disease 2005, 8, 259–265
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
- HS confers no advantage over stapled
- Crohn’s – side to side is better??
- HS == Stapled (location)
- Defunction
- Good surgical technique is important!
Techniques today

- Simple interrupted (End to side)
- Continuous inverted (Connell)
- Parachute Anterior Resection