Colorectal Surgery in the Elderly

Stephen Smith
‘Scope’

- WHO >65
- Social definition

No COI
Age specific incidence of CRC in Australia 2016 (new cases/100,000)
### My data: elective bowel resections

<table>
<thead>
<tr>
<th>Age Group</th>
<th>&lt;65</th>
<th>65-70</th>
<th>70-75</th>
<th>75-80</th>
<th>80-102</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>682</td>
<td>198</td>
<td>253</td>
<td>231</td>
<td>187</td>
<td>1551</td>
</tr>
<tr>
<td>Mortality (90 day)</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2 (0.13%)</td>
</tr>
</tbody>
</table>
Mortality in the elderly following GI surgery

- French n=33220 in 47 institutions
- Control of ‘young’ <65
- Mortality 10.6%
- Age >65 OR: 2.21, 95% CI 1.36 to 3.59; p=0.001
- Age >85 OR: 2.62, 95% CI 1.08 to 6.31; p=0.032
- Emergency OR: 3.42, 95% CI 1.67 to 6.99; p=0.001
- Anaemia OR: 1.80, 95% CI 1.02 to 3.17; p=0.041
- WCC>10 OR: 1.90, 95% CI 1.08 to 3.35; p=0.024
- ASA class 4 OR: 9.86, 95% CI 1.77 to 54.7; p=0.009
- Palliative OR: 4.03, 95% CI 1.99 to 8.19; p=0.001

Frailty

• NSQIP: n=58,448 with CRC
  Frail v non-frail: 56.3% v 5.8% complications (Clavien 4-5)
  p=0.0001

• SEER-Medicare: n=12,979
  age>80 with CRC
  Age, male gender, frailty and
dementia all associated with decreased 1 year
survival, frailty best predictor
Frailty prediction

- Low grip strength
- Low energy
- Slow walking speed
- Low physical activity
- Unintentional weight loss

\[ \frac{3}{5} = \text{frailty} \]

- (CGA)
Case selection and scoring systems

- APACHE
- ASA
- POSSUM
- P-POSSUM
- CR-POSSUM
- ACS NSQIP
ACS NSQIP

riskcalculator.facs.org

### Procedure

Begin by entering the procedure name or CPT code. One or more procedures will appear below the procedure box. You will need to click on the desired procedure to properly select it. You may also search using two words (or two partial words) by placing a `:` between, for example: "cholecystectomy + cholangiography".

### Reset All Selections

#### Are there other potential appropriate treatment options?
- [ ] Other Surgical Options
- [ ] Other Non-operative options
- [ ] None

Please enter as much of the following information as you can to receive the best risk estimates. A rough estimate will still be generated if you cannot provide all of the information below.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Diabetes</th>
<th>Hypertension requiring medication</th>
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<tbody>
<tr>
<td>Under 65 years</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sex</td>
<td>Congestive Heart Failure in 30 days prior to surgery</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Functional Status</td>
<td>Dyspnea</td>
<td></td>
</tr>
<tr>
<td>Independent</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Emergency Case</td>
<td>Current Smoker within 1 Year</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>ASA Class</td>
<td>History of Severe COPD</td>
<td></td>
</tr>
<tr>
<td>Healthy patient</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Steroid use for chronic condition</td>
<td>Dialysis</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Acutes within 30 days prior to surgery</td>
<td>Acute Renal Failure</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Systemic Septicemia within 48 hour prior to surgery</td>
<td>BMI Calculation:</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Height: __ in / __ cm</td>
<td></td>
</tr>
<tr>
<td>Ventilator Dependent</td>
<td>Weight: __ lb / __ kg</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
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<tr>
<td>Disseminated Cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
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</table>
### Age and 30 and 365 day mortality

<table>
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<tr>
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<th>75-79</th>
<th>80-84</th>
<th>85-89</th>
<th>&gt;89</th>
<th>P value</th>
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<tbody>
<tr>
<td><strong>Proximal resection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>30 day mortality</td>
<td>3.8%</td>
<td>5.6%</td>
<td>8.0%</td>
<td>10.1%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>365 day mortality</td>
<td>16.4%</td>
<td>19.3%</td>
<td>22.8%</td>
<td>26.2%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Distal resection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 day mortality</td>
<td>3.7%</td>
<td>6.3%</td>
<td>8.3%</td>
<td>12.9%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>365 day mortality</td>
<td>14.1%</td>
<td>17.6%</td>
<td>24.7%</td>
<td>36.1%</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Elective colonic surgery for cancer in the elderly: an investigation into postoperative mortality in English NHS hospitals between 1996 and 2007
Faiz et al, Colorectal Dis. 2011
Australian colorectal cancer figures 2016

- N= 15,000
- Mortality = 4,200
- 5 yr survival 70%
- Operative decision and Critical Care Bed (>5%) tool
Sarcopenia
ERAS in the elderly

“This patient is too frail/old for ERAS”

PRCT n=87
Flatus: 31 v 38 hrs p=0.001
BM: 55 v 64 hrs p=0.009
Complications: 5% v 21% p=0.045

Effectiveness of fast-track rehabilitation vs conventional care in laparoscopic colorectal resection for elderly patients: a randomized trial. Wang et al. Col. Dis 2012
Laparoscopic v Open resection

- Morbidity: 18% V 23%, RR 0.72 (0.55-0.95) p=0.02, NNT=21
- SSI: 4.6% v 8.7%, RR 0.56 (0.39-0.81) =0.002, NNT=24
- Anastomotic leak: 17(1767), Overall 2%, RR 0.6 (0.02-1.16) p=0.13
- IOT: MD 42.4 mins (30-55), p<0.0001
- Blood loss: MD 72 mls (31-113), p<0.0006
- Pain: Day1; MD -9.3 (-13- -5.4), p<0.0001
  - Day 2; MD -7.9 (-19-3), p=0.16
  - Day 3; MD -13 (-20- -6), P=0.0002
- FVC: MD 0.4 (0.1-0.66), P<0.008
- TTF: MD 1.03 (0.76-1.3), p<0.0001
- TTBM: MD 0.93 (0.74-1.13), p<0.0001
- ALOS: MD 1.5 (1.12-1.94), P<0.0001, no het.
- QOL: day7 and 30, p=0.06 and 0.01, day 60 no diff

CDBSR 2005
Laparoscopy in the elderly

- Effect of increased comorbidities
- Longer operating times
- Effect of time under anaesthesia, head down position, pressure of pneumoperitoneum and effect of $\text{CO}_2$
- Sparse early literature
## Prospective comparative studies

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<tr>
<td>Delgado</td>
<td>Open</td>
<td>&gt;70</td>
<td>59</td>
<td>4.7</td>
<td>6</td>
<td>31</td>
<td>1.7</td>
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<tr>
<td></td>
<td>Lap</td>
<td>&gt;70</td>
<td>67</td>
<td>3.1</td>
<td>7</td>
<td>10</td>
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<tr>
<td>Law</td>
<td>Open</td>
<td>&gt;70</td>
<td>65</td>
<td>4</td>
<td>5</td>
<td>27.7</td>
<td>1.5</td>
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<td></td>
<td>Lap</td>
<td>&gt;70</td>
<td>89</td>
<td>3</td>
<td>3</td>
<td>37</td>
<td>5.6</td>
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<tr>
<td>Stewart</td>
<td>Open</td>
<td>&gt;80</td>
<td>35</td>
<td></td>
<td>17</td>
<td>43</td>
<td>11</td>
<td>43%</td>
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<td>Lap</td>
<td>&gt;80</td>
<td>42</td>
<td></td>
<td>9</td>
<td>16.7</td>
<td>7</td>
<td>80%</td>
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<tr>
<td>Vignali</td>
<td>Open</td>
<td>&gt;80</td>
<td>61</td>
<td>4</td>
<td>12.9</td>
<td>31</td>
<td>3.2</td>
<td>82%</td>
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<tr>
<td></td>
<td>Lap</td>
<td>&gt;80</td>
<td>61</td>
<td>3</td>
<td>9.8</td>
<td>21</td>
<td>1.6</td>
<td>98%</td>
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<tr>
<td>Senagore</td>
<td>Open/ERAS</td>
<td>&gt;70</td>
<td>123</td>
<td></td>
<td>9.3</td>
<td>37</td>
<td>1</td>
<td>$6448</td>
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<tr>
<td></td>
<td>Lap/ERAS</td>
<td>&gt;70</td>
<td>50</td>
<td></td>
<td>4.2</td>
<td>16</td>
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<tr>
<td></td>
<td>Open/ERAS</td>
<td>&lt;70</td>
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<td>6.1</td>
<td>13.1</td>
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<tr>
<td></td>
<td>Lap/ERAS</td>
<td>&lt;70</td>
<td>181</td>
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<td>3.9</td>
<td>10.5</td>
<td>0</td>
<td>$3216</td>
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</tbody>
</table>
Laparoscopy: the NHS picture

- N=28,746 Age>75 1996-2007
- Use of laparoscopy OR 0.56 p=0.003
- 30 day mortality 3.1% (27/865) v 5.4%

Elective colonic surgery for cancer in the elderly: an investigation into postoperative mortality in English NHS hospitals between 1996 and 2007
Faiz etal, Colorectal Dis. 2011
Laparoscopy: the USA picture

- USA 2008: n=32,733 colectomies in 402 hospitals
- Mean age = 64.2, 53% female
- Laparoscopic = 11,044 (33.7%)
- Longer operating time: 17 minutes; p<0.0001
- Shorter LOS: 7.0 v 8.1; p<0.0001
- Less ICU: 0.7 v 1.3; p=0.0002
- Less complications: OR 0.89; p<0.0001
- Less transfusions: OR 0.68; p<0.0001
- Less readmissions: OR 0.89; p=0.0051
- More reoperations: OR 1.78; p=0.002

- Less nursing home care: OR 0.70; p<0.0001
Centres of Excellence??

- 5 yr survival
  - High volume hospitals: HR 0.90, 95% CI 0.85 to 0.96
  - High volume surgeons: HR 0.88, 95% CI 0.83 to 0.93
  - Colorectal: HR 0.81, 95% CI 0.71 to 0.94

- Operative mortality
  - High volume hospitals: HR 0.93, 95% CI 0.84 to 1.04
  - High volume surgeons: HR 0.77, 95% CI 0.66 to 0.91
  - Colorectal: HR 0.74, 95% CI 0.60 to 0.91

- 5 yr survival in rectal cancer
  - High volume hospitals: HR 0.85, 95% CI 0.77 to 0.93
  - High volume surgeons: HR 0.99, 95% CI 0.86 to 1.14

- Permanent stoma rate
  - High volume hospitals: HR 0.64, 95% CI 0.45 to 0.90
  - High volume surgeons: HR 0.75, 95% CI 0.64 to 0.88
  - Colorectal: HR 0.70, 95% CI 0.53 to 0.94

CDBSR: workload and surgeons specialty for outcome after colorectal cancer surgery 2012
HNE (Armidale / Tamworth) experience

- Tamworth (40,000)
- Armidale (20,000)
- Team visit to Newcastle
- Proctorship for 10 cases
- Introduction of ‘ERAS’ program before commencement
- Armidale: 11 cases (5 right, 5 anterior, 1 transverse)
  Mean age: 71
  One conversion
  No major morbidity
  Median stay: 3 days
Stenting

• Palliation and Emergency solution
• ‘bridge to surgery’
• 1/56 perforation
• 91% ‘success’ rate
• Escalation consent essential

• (Bevacizumab contraindication)
Anaemia

- NSQIP 2008: n=69,229 / 227,425 non cardiac surgery
- 30 day mortality OR 1.42 (95% CI 1.31-1.54)
- Mild anaemia OR 1.41 (95% CI 1.30-1.53)
- 30 day morbidity OR mild 1.31 (1.26-1.36)
- 30 day morbidity OR severe 1.56 (1.47-1.66)

Preoperative anaemia and postoperative outcomes in non-cardiac surgery: a retrospective cohort study.
Musallam KM1.
Blood transfusion and CRC recurrence

- CDBSR 2006 Perioperative transfusion and recurrence
- N=36 studies on 12,127 patients
- OR for recurrence: 1.42 (95% CI 1.20 to 1.67)

Causality or association?
- MVA on retrospective, MA on RCTs and MA on PC’s all similar results with no heterogeneity
- Transfusion: Decrease NK cell activity, decrease proliferation of T and B lymphocytes
- Does NOT occur with autologous blood

• SAE with newer formulations <1/200,000 (far less than ABT)
• Hb <130 (males) and 120 (females) with ferritin <30
• Fe carboxymaltose (Ferrinject) 1g then repeat
• Fe polymaltose (Ferrosig) dose according to weight and Hb
• (rHuEPO use)
IDC avoidance (post 2010)

- Assessed for Eligibility: $N = 208$
  - Excluded: $N = 82$
    - APR: $N = 23$
    - Bladder Surgery: $N = 13$
    - Epidural: $N = 34$
    - Incomplete Records: $N = 7$
  - Included: $N = 131$
    - Control (IDC on Leaving OT): $N = 87$
    - Exposure (No IDC on Leaving OT): $N = 44$
Intravenous Fluids

Goal directed therapy

- IVF OT (P=<0.0001)
- IVF 24 hours (P=0.0009)
- IVF 48 hours (P=<0.0001)
- IVF 5 days (P=<0.0001)
Dual ring wound protectors
### SSI

<table>
<thead>
<tr>
<th></th>
<th>SSI</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>15/66</td>
<td>22.7%</td>
</tr>
<tr>
<td>Wound Protector</td>
<td>3/64</td>
<td>4.7%</td>
</tr>
<tr>
<td></td>
<td>P=0.004</td>
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</tbody>
</table>

- Absolute Risk Reduction: 18%
- Numbers Needed to Treat: 6
  95% CI: 3.4-15.0
- 88% Surgeons rated retractor ‘very helpful’
- Mean VAS usefulness: 7/10
- 78% of SSI diagnosed after discharge

*Dis Colon Rectum* 2010; **53**: 1374-80.
TAP trial

• Does a single shot intraoperative TAP block provide effective postoperative analgesia following laparoscopic colorectal surgery, without the hindrance of infusions?
**PRCT n=128**

- No significant difference between groups regarding total analgesic consumption

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Control Group (n=74) ± SEM</th>
<th>TAP Group (n=68) ± SEM</th>
<th>P [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEq morphine consumption (total)</td>
<td>174.68 ± 17.09</td>
<td>161.11 ± 19.08</td>
<td>0.60 [-36.93, 64.08]</td>
</tr>
</tbody>
</table>

No difference in: Pain VAS, Respiratory function, Time to GI function, LOS, Postoperative N and V, Complications, Patient Satisfaction

Int. J. Colorectal Dis. 2015
Neuromuscular infusion

- Does infusion of local anaesthetic into the ‘neuromuscular plane’ decrease postoperative pain and improve function after laparoscopic colorectal surgery?
Opioid Consumption

<table>
<thead>
<tr>
<th></th>
<th>IV Morph Equiv</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
</tr>
<tr>
<td>D1</td>
<td>33.2</td>
</tr>
<tr>
<td>D2</td>
<td>22.1</td>
</tr>
<tr>
<td>D3</td>
<td>12.8</td>
</tr>
<tr>
<td>Total</td>
<td>143.4</td>
</tr>
</tbody>
</table>

P = 0.1078

PRCT n = 50

Techniques in Coloproctology 2012
Spirometry

Difference from Baseline FEV1 (%)

D1 D2 D3

Difference

control

active

P=0.0153
• Which method of local anaesthetic delivery into the ‘neural plane’: bolus or infusion provides the superior form of pain relief following gastrointestinal surgery?
Mobility difference

P=0.025
Regular Opiate Avoidance
• N=13,082, 3158 received NSAIDs after gastrointestinal surgery
• 90 day anastomotic leak 4.3%
• NSAIDs 24% increase in leak rate (4.8% v 4.2%)
• OR: 1.24 (95% CI: 1.01 to 1.56; p=0.04)

• Non-elective colorectal surgery (12.3% v 8.3%)
  OR: 1.70 (95% CI: 1.11 to 2.68; p=0.01)
COX 2 Inhibitors

- Anastomotic leak: 3.3% vs 15.1% vs 1.5%
  Before / During / After COX 2 use in ERAS between 1997-2002
  (Hvidovre Uni Hospital, Denmark)
- Oxford League Table = 2
- COX 2 expression in up to 70% of CRC
- Opiate sparing improves NK cell activity
Protocol for analgesia

Laparoscopic
• Paracetamol
• COX 2 for 24 hours
• Intra-operative lignocaine infusion
• Neural plane infusion: Bolus delivery
• Peritoneal infusion (continuous)
• NO REGULAR OPIATES

• (PRCT on IPA)

Open (Emergency)
• Paracetamol for 5 days
• (Thoracic epidural for respiratory disease)
• Spinal morphine otherwise
• Intra-operative lignocaine infusion
• Bilateral Rectus Sheath infusion: Bolus delivery
• No NSAIDs or COX 2
• NO REGULAR OPIATES
Colorectal surgery in the elderly

- Case selection
- Correct anaemia
- Laparoscopic surgery
- Avoid anastomoses in sarcopenia
- Stent in Emergency
- Bolus neural plane infusions
- Reduce iatrogenic fluid overload
- Avoid regular opiates
- Minimise SSI