Laparoscopic Bowel Surgery
Dr. G. Mapeso
Sept 14, 2007
Summer School
Thunder Bay Medical Society
☐ Challenges and Barriers
☐ Acquisition of Skills
☐ Laparoscopic Bowel Data and Experience
☐ Technique (How I do it)
☐ Future Challenges
Challenges and Barriers

- Data regarding cancer outcomes
- Proof of improved clinical outcome
- OR Costs
- Equipment
- Support staff
- Training and Skill acquisition
Cancer Outcomes

- Milsom, Lacy each published single centre RCTs showing no detrimental effect on survival in the laparoscopic group
- COST trial in the U.S. showed equivalent cancer outcomes
Position Statement of the American Society of Colon and Rectal Surgeons (ASCRS) Endorsed by the Society of American Gastrointestinal Endoscopic Surgeons (SAGES)

Laparoscopic Colectomy for Curable Cancer

Laparoscopic colectomy for curable cancer results in equivalent cancer related survival to open colectomy when performed by experienced surgeons. Adherence to standard cancer resection techniques including but not limited to complete exploration of the abdomen, adequate proximal and distal margins, ligation of the major vessels at their respective origins, containment and careful tissue handling, and en bloc resection with negative tumor margins using the laparoscopic approach will result in acceptable outcomes. Based upon the COST* trial, pre-requisite experience should include at least 20 laparoscopic colorectal resections with anastomosis for benign disease or metastatic colon cancer before using the technique to treat curable cancer. Hospitals may base credentialing for laparoscopic colectomy for cancer on experience gained by formal graduate medical educational training or advanced laparoscopic experience, participation in hands on training courses and outcomes.
Benefits of Laparoscopic Colectomy

- Lower morbidity
- Lower incidence of ileus
- Shorter hospital stay
- Faster recovery period
- Less adhesions
- Better cosmesis
Laparoscopic resection is not for everybody
Cases are selected
Most are amendable
There are conversions
There are not free of complications
## COST Study

<table>
<thead>
<tr>
<th></th>
<th>Open</th>
<th>Laparoscopic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>6 d</td>
<td>5 d</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Parenteral Analg</td>
<td>4 d</td>
<td>3 d</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>30 d mortality</td>
<td>1%</td>
<td>&lt;1%</td>
<td>ns</td>
</tr>
<tr>
<td>Compl.</td>
<td>20%</td>
<td>21%</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>OR time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
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<td>-------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>135</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>Time to BM</td>
<td>6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>DAT</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>LOS</td>
<td>11</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>
Is One day in hospital a significant benefit?

- Remember, conversion rate in the COST study is 21%
- Lacey showed a difference of 2.6 days
- Other benefits
Cost

- OR costs are increased in laparoscopic colorectal surgery
- Proponents have pointed to the decrease in hospital stay and medication costs as a balance for this
- Critics point out that hospital beds still cost money if they are not filled
Cost

- Duepree et al. DCR. 2002
  - Comparative cohort study in Crohn’s
  - Statistically significant decrease in cost in laparoscopic group

- Senagore et al. DCR. 2002
  - Sigmoid resections for Diverticular Disease
  - Statistically significant decrease in cost in laparoscopic group
Cost

- Many factors contribute to case cost
  - OR time (increased during learning curve)
  - Instruments
  - Technique (e.g. Clipping vessels vs. stapling)
  - OR efficiency (e.g. turnover)
  - Energy sources
Cost

- Convincing administrators
  - Bundling case costs to hospital stay
  - Recognize improved bed utilization
  - Make equipment compromises
  - Recruit private sector and charitable and hospital foundations
Table 1. Diagnosis and Operations Performed by Laparoscopy (n = 234)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Operation Performed</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyps</td>
<td>30</td>
<td>Appendectomy</td>
<td>1</td>
</tr>
<tr>
<td>Carcinoid</td>
<td>3</td>
<td>Strictureplasty</td>
<td>4</td>
</tr>
<tr>
<td>Carcinoma</td>
<td>42</td>
<td>Small bowel resection</td>
<td>4</td>
</tr>
<tr>
<td>Crohn’s disease</td>
<td>42</td>
<td>Ileocaecal resection</td>
<td>28</td>
</tr>
<tr>
<td>Diverticular disease</td>
<td>98</td>
<td>Right hemicolectomy</td>
<td>42</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>2</td>
<td>Colostomy formation</td>
<td>2</td>
</tr>
<tr>
<td>Familial adenomatous polyposis</td>
<td>4</td>
<td>Colectomy</td>
<td>9</td>
</tr>
<tr>
<td>Motility disorders</td>
<td>4</td>
<td>Sigmoid colectomy</td>
<td>135</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>9</td>
<td>Anterior resection</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Abdominoperineal resection</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Ann Surg © 2003 Lippincott Williams & Wilkins

<table>
<thead>
<tr>
<th>Costs</th>
<th>Laparoscopic (range)</th>
<th>Open (range)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency services</td>
<td>0 (range 0–120)</td>
<td>0 (range 0–447)</td>
<td>0.01</td>
</tr>
<tr>
<td>Anesthesia</td>
<td>256.5 (IQR 208–230)</td>
<td>257.5 (IQR 194.8–347)</td>
<td>0.86</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>269 (IQR 209–364)</td>
<td>432.5 (IQR 330.5–612.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Medical therapy</td>
<td>47.5 (IQR 30–66)</td>
<td>96.5 (IQR 56.8–177.5)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Laboratory</td>
<td>64 (IQR 51–101.5)</td>
<td>122.5 (IQR 83.8–213)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Nursing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICU</td>
<td>0 (range, 0–4505)</td>
<td>0 (range, 0–20847)</td>
<td>0.844</td>
</tr>
<tr>
<td>Routine</td>
<td>674 (IQR 464–995.5)</td>
<td>1476 (IQR 1075.3–2038.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Radiology</td>
<td>0 (IQR 0–13.8)</td>
<td>14 (IQR 0–30)</td>
<td>0.0004</td>
</tr>
<tr>
<td>OR costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor costs</td>
<td>292 (IQR 240.5–346)</td>
<td>226 (IQR 185–309)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Supply costs</td>
<td>1154 (IQR 794.5–1371.5)</td>
<td>506.5 (IQR 436.8–567.8)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Total OR costs</td>
<td>1784.5 (1408.8–2097.3)</td>
<td>1021.5 (847.3–1219.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Total direct costs</td>
<td>3208.5 (IQR 2798.8–4034)</td>
<td>3654.5 (IQR 2922.3–4787)</td>
<td>0.0034</td>
</tr>
</tbody>
</table>

Data are presented as median and IQR and as median and range when IQR = 0.

P value: Wilcoxon matched pairs test for nonparametric data.

ICU, intensive care unit; IQR, interquartile range; OR, operating room.

Table 4. Comparison of Costs for Laparoscopic and Open Surgical Approaches for Colorectal Disorders, with a Breakdown of How Savings or Increased Expenses Between Groups Were Determined

Laparoscopic Colon Surgery can be done with fairly rudimentary equipment, however to be done safely and efficiently, several items are desirable if not necessary.
Equipment

- 30 deg camera
- High speed insuffl
- Atraumatic bowel graspers
- Endomechanicals
- “Good” clip appliers
- Needle drivers
- Ports
- Right angle dissector
- Ultrasonic generator and shears
- Bipolar coaptive generator
- Flexible endoscopy in OR
Well orchestrated activity and team work cannot be overemphasized
Support Staff
The Surgical Team

- Nursing
- Assistants
- Central supply
- Anaesthesia
Training needs

- Residents in training
- Fellowship positions
  - Clinical
  - Clinical/research
- Surgeons in practice
  - Acquisition of skills
  - Mentoring
  - Support
Advanced Laparoscopic Surgery Training in Residency

- Nuoz et al, Acta Chirurgica Belgia, 1999
  - 2/3 of senior trainees felt their practical training is inadequate
  - only 53% felt confident in their practical abilities

- Rattner et al, Surgical Endoscopy, 2001
  - 85 respondents
  - 81% 3 or fewer lap colons
  - 86% 3 or fewer lap spleens
  - 60% 3 or fewer lap Nissens
Advanced Laparoscopic Surgery Training in Residency

Chiasson et al, Surgical Endoscopy, 2003

- 92% expected to perform basic laparoscopy
- 53% expected to perform advanced laparoscopy
- 18% felt their training was adequate in advanced laparoscopy
  - lack of volume
  - limited OR time
  - lack of department support
  - lack of interest
Residency training: A Vicious cycle

- Lack of trained surgeons in tertiary care
- Lack of residency training in advanced procedures
- Competition with fellows and training surgeons
Training needs

- Residents in training
- Fellowship positions
  - Clinical
  - Clinical/research
- Surgeons in practice
Training Opportunities

- 2-5 Day hands-on courses
  - Acquisition of knowledge and skills

- Clinical Fellowship positions
  - Acquisition of knowledge, skill, & clinical experience

- Face-to-face mentoring in new procedures
  - Safe acquisition of clinical experience

- Tele-mentoring
Mentoring

- 6-12 cases considered as a norm

- Challenges:
  - Access to Mentor
  - Distance for travel
  - Skill of mentor
  - Financial Re-imbursement
  - Competition
  - Medico-legal concerns

- Need for support with difficult case
Tele-mentoring

- Provides on-demand support from expert
  - Take advantage of experience of expert surgeon
  - Safer delivery of more complex surgeries
Telementoring

- Need for secure connection
- Transmission clarity
- What about a complication
- Medico-legal and licensing issues
Tele-mentoring

- Has been used sporadically in Ontario & Canada
- Is recognized as important support for rural surgeons
- Motion by OAGS to request wide application in Ontario
Tele-robotic surgical assisting

- Extension of tele-mentoring- active support during live surgery
- The robot acts as experts surgeons hands
- Expert surgeon can assist and perform parts of operation as necessary
Summary of Challenges and Barriers

- Multiple barriers to adoption of lap colorectal surgery, all of which are surmountable
- Major effort should be in dissemination of information and obtaining adequate training for surgeons who wish to do this type of surgery
- Support staff training equally important
The Surgeon
Acquisition of Advance
Laparoscopic skills
Basic principles of technical skill acquisition

- Kopta theory of skill acquisition
- Ericsson’s Model of expert skill acquisition
- The behaviorist School
- Neuropsychologic testing
Kopta Theory of skill acquisition

- Cognitive
- Integrative
- Autonomous
Ericsson’s Model

- Two parts
  - Years of extensive training
  - Appearance of expert’s automaticity or autonomous activity is misleading
Behaviorist school

- Verbal information
- Intellectual skills
- Cognitive strategies
- Motor skills
- Attitudes
Neuropsychologic Skill

- Speed and precision of movement
- Imagery
- Visuospatial organization
Educational Strategies

☐ Imagery
  ■ 10-12 % of population unable

☐ Mental practice

☐ Systematic review of performance
Steps to mastery of skill (repetition)

- Unconsciously incompetent
- Consciously incompetent
- Consciously competent
- Unconsciously competent
Laparoscopic Bowel Resection
Thunder Bay

☐ January 2006 – December 2006
☐ Personal experience
☐ 37 Total
☐ Update over 50 now
# BOWEL SURGERY

Thunder Bay Regional Health Sciences Centre  
August 2005 to July 2006

## Open Bowel Surgery

<table>
<thead>
<tr>
<th>Physician Group</th>
<th>Total Cases</th>
<th>Average LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Mapeso</td>
<td>34</td>
<td>19</td>
</tr>
<tr>
<td>Other General Surgeons</td>
<td>126</td>
<td>15</td>
</tr>
</tbody>
</table>

## Laparoscopic Bowel Surgery

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<tr>
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<th>Average LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Mapeso</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Other General Surgeons</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Physician Group</td>
<td>Total Cases</td>
<td>Average LOS</td>
</tr>
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<td>-------------------------</td>
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**Laparoscopic Bowel Surgery**

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<td>11</td>
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</tbody>
</table>

The following criteria was used for extracting the above data either laparoscopic or open approach:

- Colectomy, partial
- Colectomy, transverse
- Diverticulectomy, large intestine
- Hemicolecotomy [sigmoid, left, transverse, right or extended right]
- Ileoceleotomy
- Polypectomy, large intestine
- Resection, segmental, large intestine
- Resection, subtotal, large intestine
- Sigmoidectomy
- Excision total, large intestine
- Colectomy, total
- Colectomy, total with [rectal sparing] ileorectostomy
- Excision, colon
- Excision radical, large intestine
- Resection [on blob], large intestine with adjacent tissue
- Excision partial, rectum
- Hemorrhoidectomy, internal
- Polypectomy, rectal
- Proctectomy, subtotal
- Proctocolectomy, [subtotal rectum]
- Proctosigmoidectomy [subtotal rectum]
- Pull through [perineal], rectum
- Rectosigmoidectomy [subtotal rectum]
- Resection [anterior], rectum
- Resection [Hartmann], rectum
- Resection [Hartmann], rectum with colon
- Excision total, rectum
- Proctostomy, remainder
- Proctectomy, total (with pouch formation)
- Proctocolectomy, total
- Proctosigmoidectomy [total rectum]
- Rectosigmoidectomy [total rectum]
- Resection [abdominoperineal], rectum
- Resection [abdominoperineal], rectum with colon
- Resection, total mesorectal
♀ Male =14
♀ Female =23
Post-op Hospital in patient days

- Range 3-24
  - 2 days=1
  - 3 days=3
  - 4 days=4
  - 5 days=10
  - 6 days=7
  - 7 days=2
  - 8 days=5
  - 9 days=2
  - 23 days=1
  - 24 days=1
Post Op Discharge Days

![Bar Chart](chart.png)

- **2nd POD**
  - # of Patients: 1

- **3rd POD**
  - # of Patients: 4

- **4th POD**
  - # of Patients: 3

- **5th POD**
  - # of Patients: 9

- **6th POD**
  - # of Patients: 7

- **7th POD**
  - # of Patients: 2

- **8th POD**
  - # of Patients: 5

- **9th POD**
  - # of Patients: 2

# of Patients
Complications

- One Anastomotic leak
- One large subcutaneous abscess
- One died attributable to renal failure
  - Known metastatic prostate CA
  - Converted to open due to bleeding
- One readmission for perineal abscess and subsequent small bowel obstruction
- One wound dehiscence (incision not enlarged during repair)
- One converted to open (no instrument!!)
- Update 3 conversions, 2 leaks
Auto Suture
Universal Stapling System

30, 45 and 60 mm
Straight and Roticulating Loading Units – All with 6 Rows of Staples
Technique

† Positioning

† Port site

† Entry (Hasson)

† Pure laparoscopic

† Hand assisted

† Combination

† Partial open dissection

† Extracorporeal anastomosis

† Intracorporeal anastomosis
Intracorporeal Access

- Pure laparoscopic
- Hand assisted
- Hybrid

- The challenge is CO2 distention and maintaining it
LAP DISC Insertion
- Gelport device (another access device to the abdomen while insufflated)
How I do it (Summary)

- Hamilton Courses
- Credentialling
- Equipments
- Staff training
- Mentoring
- Assistant a nightmare sometimes
- Laparoscopic Ventral Hernias
- Laparoscopic Inguinal Hernia
- Laparoscopic Appendectomy
- Imagery
Right Hemicolecctionomy
Left Colectomy or Anterior Resection

Trocar
Left Colectomy or Anterior Resection

Hand port/Lap Disc
Diverticulosis w/ previous Cholecystectomy & Hysterectomy
Acknowledgement

- OR staff
- Anaesthesia Department
- Assistants
- Residents
- Administration
- Dr. Gordon Porter
- CCO – Michael Power
- Those involved in Supporting the MIS
- TBRH Foundation (Georgia Hari)
- Dr. B. Armstrong
Have a nice visuo-imagery/visuo-spatial correlation flying day