COMMON GI DISORDERS AND ROBOTIC COLORECTAL SURGERY

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Division of Colorectal Surgery

Roper St. Francis Hospital System

Charleston Colorectal Surgery

Charleston, SC
Disclaimer

• Intuitive Surgical Research
  • Payment for collecting and entering patient data
The da Vinci surgical platform is the first line surgical approach in MIS Colorectal Surgery at Charleston Colorectal Surgery.
Objectives
Objectives
COMMON GI DISORDERS (treated with robotic surgery)

- Rectal Cancer
- Colon cancer
- Diverticulitis
- Crohn’s Disease
- Ulcerative Colitis
- Constipation
- Rare Pelvic Tumors (Presacral Masses)
Colon Anatomy

- Transverse colon
- Descending (left) colon
- Ascending (right) colon
- Lymph node
- Cecum
- Rectum
- Sigmoid colon
- Anus
Colon (and Rectal) Cancer Staging

T - stage of rectal cancer

- T1: Tumor limited to submucosa
- T2: Tumor invading the muscularis propria
- T3: Invasion into mesorectal fat
- T4: Invasion into surrounding organs
  - surrounding structures
  - perforates visceral peritoneum
Rectal Cancer

- Symptoms
  - “Hemorrhoids”
  - Rectal bleeding
  - Pain
  - Change in stool caliber

- Workup
  - Colonoscopy!
  - Endorectal Ultrasound/MRI with Endorectal Coil
  - CT Chest, Abdomen/Pelvis with PO and IV
  - PET/CT
  - CEA level
  - LFTs
  - Oncology referral
Endorectal Ultrasound

TUMOR
CT Abd/Pelvis

TUMOR
Rectal Cancer

- Schedule for surgery
  - 8-12 weeks after pre-op CT and RT
- Upper Rectal Cancer (upper 1/3 of rectum, above peritoneal reflection)
  - Low Anterior Resection (LAR)
- Mid or Lower Rectal Cancer (lower 2/3 of rectum, below peritoneal reflection)
  - Abdominoperineal Resection (APR)
  - Sphincter sparing procedures
    - Ultra-Low Anterior Resection
    - Coloanal pull-through ± reservoir
- Diverting Loop Ileostomy
Rectal Cancer

Low Anterior Resection (LAR)

Ultra Low Anterior Resection (LAR)

Abdominoperineal Resection (APR)
Advances in Surgical Technique: Total Mesorectal Excision (TME)

• Heald\(^5\) (1982)
  – 1\(^{st}\) to describe technique
  – 5 yr follow-up
  • local recurrence rate – 2.7%
  • overall survival – 87.5%
  • disease free survival – 81%

Heald R, Husband E, Ryall R. BJS 1982
Muscular plane
(1 or poor)
Poor bulk to mesorectum with defects down to muscularis propria and/or very irregular CRM

Intramesorectal plane
(2 or moderate)
Moderate bulk to mesorectum but irregularity of mesorectal surface. Moderate coning of the specimen toward distal margin. At no site is MP visible except at the levator insertion. Moderate irregularity of CRM

Mesorectal Plane
(3 or good)
Intact mesorectum with only minor irregularities of the smooth mesorectal surface. No defect deeper than 5mm. No coning at distal margin. Smooth CRM on sectioning.

Surgical Therapy:
The Concept of Total Mesorectal Excision
Circumferential Resection Margin

- Quirke P, et al.\(^1\) (1986)
  - 52 patients with rectal cancer resections
  - 14/52 (27\%) → positive CRM
  - 85\% positive predictive value for local recurrence with positive CRM
Robotic rectal surgery was associated with:

- Increased cost and operating time
- Lower conversion rates (even in obese individuals, distal rectal tumors, and patients who had preoperative CT/RT) regardless of the experience of the surgeon
- Marginally better outcome in:
  - Anastomotic leak rates
  - Circumferential resection margin positivity
  - Preseveration of autonomic function
    - This did not reach statistical significance
Colon Cancer (above peritoneal reflection)

• Symptoms
  • Pain
  • N/V
  • Weight loss
  • + FOBT?

• Workup
  – Colonoscopy!
  – CT Chest, Abdomen/Pelvis with PO and IV contrast
  – PET/CT
  – CEA level
  – LFTs
  – Oncology referral
Colon Cancer

• Schedule for surgery
  • Laparoscopic Robotic Assisted Segmental Colectomy
    • Single or Multiport?
  • VERY IMPORTANT LOCATION FOR DOCKING
Diverticulitis

- **Symptoms**
  - LLQ Pain and fever
  - Diarrhea

- **Workup**
  - CBC
  - CT Abdomen/Pelvis with PO and IV contrast
  - Colonoscopy after acute attack to rule out other disorders (6-8 weeks after treatment of attack)

- **Acute?**
  - May need admission with IV abx and bowel rest
Diverticulitis

- What # flare?
  - Consideration for surgery after 2-3 attacks

- Hospitalized?

- Complicated?

- Fistulas
  - Colovaginal
  - Colovesical
Diverticulitis

• Surgery?
  – Laparoscopic Robotic Assisted Sigmoid Colectomy
  – With or without an ileostomy?
    • Test anastomosis
    • Complicated?
  – Temporary colostomy?
    • Complicated
Crohn’s Disease

- Can occur anywhere in the digestive tract
- Symptoms
  - Pain
  - Diarrhea
  - Abscess?
  - Fistula?
- Workup
  - Colonoscopy with biopsies with intubation of Terminal Ileum
  - Capsule Enteroscopy
  - CT Abdomen/Pelvis with PO and IV contrast
  - MR Enterography?
Crohn’s on Colonoscopy
Crohn’s on CT

- Inflammation and stricture of terminal ileum
- Proximal bowel dilatation
Crohn’s Disease

- Surgery if complicated disease or refractory to medical therapy

- Treatments in the past?
  - Anti-inflammatories
    - Sulfasalazine®
    - 5-ASA (Asacol®, Dipentum®, or Pentasa®)
  - Steroids
    - Prednisone
    - Budesonide
Crohn’s Disease

- Surgery?
  - Treatments in the past?
    - Immunomodulators
      - 6-mercaptopurine (Purinethol®)
      - Azathioprine (Imuran®)
    - Biologics
      - infliximab (Remicade®) IV
      - adalimumab (HUMIRA®) IM
Crohn’s Disease

- Surgery
  - Laparoscopic Robotic Assisted Segmental Colectomy
  - Laparoscopic Robotic Assisted Subtotal Colectomy
  - Laparoscopic Robotic Total Proctocolectomy with End Ileostomy
Mucosal Ulcerative Colitis

• Only effects innermost lining of the colon and/or rectum
  – Usually a continuous portion

• Classified according to location
  – Ulcerative Proctitis
    • Rectal bleeding
    • Pain
    • Urgency
  – Proctosigmoiditis
    • Bloody diarrhea
    • Abdominal cramping
    • Pain
    • Tenesmus

http://www.mayoclinic.com/health/ulcerative-colitis
Mucosal Ulcerative Colitis

• Classifications continued
  – Left sided colitis
    • Bloody diarrhea
    • Abdominal cramps
    • Pain
    • Weight loss
  – Pancolitis
    • Bloody diarrhea (severe)
    • Abdominal cramps
    • Pain
    • Fatigue
    • Significant weight loss

http://www.mayoclinic.com/health/ulcerative-colitis
Mucosal Ulcerative Colitis

- Classification continued
  - Fulminant colitis
    - Life-threatening!
    - Severe pain
    - Profuse diarrhea
    - High risk of complications
      - Perforation
      - Toxic megacolon

http://www.mayoclinic.com/health/ulcerative-colitis
Mucosal Ulcerative Colitis

• Workup
  – Colonoscopy
  – Barium enema
  – CT Abdomen/Pelvis with PO and IV contrast

http://www.mayoclinic.com/health/ulcerative-colitis
Mucosal Ulcerative Colitis
Mucosal Ulcerative Colitis

• Treatment
  – Anti-inflammatories
    • Sulfasalazine (Azulfidine®)
    • Mesalamine (Asacol®, Lialda®, others), balsalazide (Colazal®) and olsalazine (Dipentum®)
    • Corticosteroids
  – Immune system suppressors
    • Azathioprine (Azasan®, Imuran®) and mercaptopurine (Purinethol®)
    • Cyclosporine (Gengraf®, Neoral®, Sandimmune®)
    • Infliximab (Remicade®)
    • Adalimumab (Humira®)

http://www.mayoclinic.com/health/ulcerative-colitis
Mucosal Ulcerative Colitis

• Surgery if failed medical therapy or if complicated
  – Laparoscopic Robotic Assisted Protocolectomy with Ileoanal Pouch Anastomosis

http://www.mayoclinic.com/health/ulcerative-colitis
Constipation

• Symptoms
  • Inability to defecate or have normal bowel movement
  • Bloating, cramping, abdominal discomfort
• Cause?
  • Diet
  • Narcotics
  • Outlet obstruction
    • Prolapse
    • Stricture?
  • Colonic Inertia
  • IBS with constipation predominance
  • Gastroparesis?
Constipation

- **Workup**
  - CT Abdomen/Pelvis with PO and IV contrast
  - Defecography
  - Colonic transit study
  - Gastric emptying study

- **Treatment**
  - Diet modification and fiber supplementation
  - Laxatives
  - Relistor®
  - Repair/Surgery
Defecography
Constipation: Treatment

• Surgery

  • Rectocele repair

  • Laparoscopic Robotic Assisted Rectopexy (with or without sigmoid resection)

  • Laparoscopic Robotic Assisted Enterocele Repair and Anterior Compartment Suspension

    • Use absorbable mesh

  • Laparoscopic Robotic Assisted Subtotal Colectomy
So the real question is …
Robotic Colorectal Surgery

- Despite the experience of the team it is important to standardize the equipment used and the positioning of the patient and robot
  - Roper Hospital Colorectal Surgery Robotic MIS Program has standardized steps facilitating the surgical planning and patient experience
  - The same port and arm placement is used for each specific operation with slight variations depending on the need of take down of the splenic flexure and patient body habitus
Robotic Right Colectomy Multiport Technique
OR Set up
Option 1: Trochar Placement
Option 2: Trochar Placement
Option 3: Other Options
2 port Technique
Option 4: “Korean” Style
Robotic Right Colectomy OR view
Potential Advantages

Intracorporeal Anastomosis
Robotic Right Colectomy

Specimen Extraction
Robotic Right Colectomy

- 3 arm technique
  - 8.5 or 12 mm Camera, (3) 8 mm robot ports
  - 5 mm assistant port

- Medial to Lateral Dissection

- Functional side-to-side anastomosis
  - Extracorporeal (GIA 75, TL 60 Green load)
  - Intracorporeal anastomosis
  - Endoscopic Stapler Echelon 60 mm
  - 3/0 PDS running suture
  - Omentoplasty
How about single incision resection?
ADVANCED APPLICATIONS: SINGLE PORT COLECTOMY
Single Incision Laparoscopy for Colorectal Resection: A systemic review and meta-analysis of more than 1000 procedures

- 64 studies reviewed with 1026 single incision colectomies attempted

- 15 nonrandomized studies compared single incision to conventional lap (1075 total)
  - No differences noted in conversions, or OR time
  - Decrease incision length
  - And shorter length of stay (p=0.008)
Robotic Assisted Single Incision Right Colectomy: Our Early Experience

- 3 patients total
- Through 4 cm incision
- Used three ports: 12mm and 2-8mm ports
- Medial to lateral approach, extracorporeal resection and anastamosis
- Op time 152 minutes
- 33% conversion rate (air leak)

Robotic single-incision anterior resection for sigmoid colon cancer: access port creation and operative technique.

Lim MS, Melich G, Min BS.

- Small transumbilical incision:
- Alexis wound retractor
- Surgical gloves are access port
- 3-arm da Vinci robot with a 30° up-scope was used
- N=22 (12 males, 10 females)
- Mean age of 58.5 years (range = 35-70)
- No conversion to open surgery
- One case was converted to multiport surgery

Robotic single-incision anterior resection for sigmoid colon cancer: access port creation and operative technique.

Lim MS, Melich G, Min BS.

- EBL 24.5 ml (range = 5-230)
- OR time was 167.5 min (range = 112-251)
- Skin incision length was 4.7 cm (range = 4.2-8.0)
- Proximal and Distal resection margins were 12.9 cm (range = 7.5-25.1) and 12.3 cm (range = 4.5-19.2)
- LN 16.8 (range = 0-42)
- Postoperative pain score was 2.8 (range = 1-5) and on postoperative day 1 it was 1.4 (range = 1-3)
- LOS 6 days (range = 5-9)
Single Port Right Colectomy

Robotic Assisted Single Port Right Colectomy for Dysplastic Polyp

Jorge A. Lagares-Garcia, MD, FACS, FASCRS
Anthony Firilas, MD, FACS, FASCRS
C. Chad Robinson, PA-C
Division Colorectal Surgery
Roper Hospital
Charleston Colorectal Surgery
Charleston, SC
SINGLE-INCISION ROBOTIC COLECTOMY USING A WRISTED, ROBOTICALLY CONTROLLED VESSEL SEALER

Jorge A. Lagares-Garcia, MD, FACS, FASCRS
Anthony Firilas, FACS, MD
Christopher C. Robinson, PA-C
Division Colon and Rectal Surgery
Roper Hospital
Charleston, SC
Single Port Sigmoid Colectomy
Courtesy Dr. Vince Obias
Medial to lateral dissection
Pedicle take down
Medial to lateral dissection to liver/gallbladder fossa
Lateral Attachments Take Down
Hepatic flexure take down
ROBOTIC SIGMOID RESECTION ± RECTOPEXY
Patient placement and Trendelemburg safety

- Advantages include:
  - Strap to bed
  - Excellent positioning of the patient
  - Very minimal sliding on Trendelemburg
Patient Positioning

• Trendelemburg with rotation to the right side

• Tilt test for tolerance of ventilation
  – Very important on morbidly obese patients
  – Anesthesiologist appreciate this

• Special table and strap patient with bean bag
Robot Docking

- Left hip with the “sweet spot” pointing towards left shoulder
- Recommend the staff to enter lateral and at the end rotate towards the left shoulder
- Consider an additional Mayo table at the patient’s head for instrument placement and protection of patient’s face
Robotic Docking
da Vinci Instrumentation
Instrumentation

• Camera:
  - Straight for pelvic floor
  - May use 30 degree angle down on splenic flexure and Single Port Right Colectomy
  - Many times it will depend on the surgeon and their laparoscopic experience
Instrumentation

• **ARM 1: DISSECTION**
  - Scissors
  - Hook
  - Vessel Sealer
  - Robotic Stapler
Instrumentation: ARM 1 Dissection
Instrumentation: ARM 1 Dissection
Instrumentation: ARM 1 Dissection
Instrumentation

- **ARM 2: RETRACTION**
  - Cadiere
  - Fenestrated bipolar
Instrumentation: Retraction ARM 2
Instrumentation:
Retraction/Triangulation ARM 3
Instrumentation: Retraction/Triangulation ARM 3
da Vinci Sigmoid Colectomy
Medial to Lateral Approach
Steps
Pedicle Ligation
Pedicle Ligation
Mesorectal dissection
Mesorectal dissection
Mesorectal dissection
Additional take down Adhesions
Firefly Technology: Transection Margins
Opening Mesenteric window
Transection Distal Colon
Sigmoidectomy for Diverticulitis

Robotic Assisted Sigmoid Colectomy for Diverticular Disease

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Anthony Firilas, MD, FACS, FASCRS
C. Chad Robinson, PA-C
Division Colorectal Surgery
Roper Hospital
Charleston Colorectal Surgery
Charleston, SC
Rectopexy portion

Modified Well’s Procedure

180 degree wrap to the rectum
Robotic Rectopexy

• Same steps for sigmoid colectomy

• TME to levators
  − Avoid lateral attachments
    • Higher incidence of constipation
    • Bladder paresis
  − Routinely the rectovaginal septum is spared
Modified Well’s procedure
Low Anterior Resection
Robotic Palliative LAR

Laparoscopic Robotic Low Anterior Resection

Jorge A. Lagares-Garcia, MD, FACS, FASCRS
Anthony Firlas, MD, FACS
Christopher C. Robinson, PA-C
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Division of Colon and Rectal Surgery
Charleston, SC
ULTRALOW PROCTECTOMY AND COLOANAL PULL-THROUGH ANASTOMOSIS
Robotic Ultralow Anterior Resection
QUALITY ASSESSMENT OF THE ANASTOMOSIS IMMUNOFLUORESCENCE

Proximal Vascularized Margin
JUSTIFYING A ROBOTIC PROGRAM ...
Roper da Vinci Surgical Volume

Colorectal
Gynecology
Urology
Demonstrate a Growth: Charleston Robotic Colorectal Case Volume

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
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<tbody>
<tr>
<td>2008</td>
<td>8</td>
</tr>
<tr>
<td>2009</td>
<td>34</td>
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<tr>
<td>2010</td>
<td>26</td>
</tr>
<tr>
<td>2011</td>
<td>70</td>
</tr>
<tr>
<td>2012</td>
<td>83</td>
</tr>
<tr>
<td>2013-</td>
<td>29</td>
</tr>
<tr>
<td>Expected</td>
<td>116</td>
</tr>
</tbody>
</table>

Move from RI
# Show Results and Cost Benefit Ratio

<table>
<thead>
<tr>
<th>Data</th>
<th>#</th>
<th>Time (min)</th>
<th>LOS (days)</th>
<th>Avg Staffing Cost</th>
<th>Average Direct Supply Cost</th>
<th>Average Net Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>da Vinci Colectomy</td>
<td>23</td>
<td>187</td>
<td>5.0</td>
<td>$3,852</td>
<td>$3,838</td>
<td>$1,863</td>
</tr>
<tr>
<td>Lap Colectomy</td>
<td>127</td>
<td>151</td>
<td>6.4</td>
<td>$2,578</td>
<td>$1,732</td>
<td>$1,452</td>
</tr>
<tr>
<td>Open Colectomy</td>
<td>17</td>
<td>149</td>
<td>12.4</td>
<td>$2,124</td>
<td>$1,030</td>
<td>-$10,729</td>
</tr>
</tbody>
</table>
## Data FY2011
### Sigmoid Colectomy

<table>
<thead>
<tr>
<th>Data</th>
<th>#</th>
<th>Time (min)</th>
<th>LOS (days)</th>
<th>Supply Cost</th>
<th>Average Direct Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>da Vinci Colectomy</td>
<td>48</td>
<td>189</td>
<td>4.6</td>
<td>$3,927</td>
<td>$5,266</td>
</tr>
<tr>
<td>1 surgeon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lap Colectomy</td>
<td>106</td>
<td>162</td>
<td>6.3</td>
<td>$1,870</td>
<td>$6,313</td>
</tr>
<tr>
<td>12 surgeons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Colectomy</td>
<td>11</td>
<td>175</td>
<td>11.7</td>
<td>$1,496</td>
<td>$10,747</td>
</tr>
<tr>
<td>6 surgeons</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
• Patients undergoing robotic and laparoscopic procedures:
  - Similar rates of Intraoperative (3.0% vs 3.3%; adjusted OR = 0.88 (0.35–2.22)) and Postoperative (21.7% vs 21.6%; adjusted OR = 0.84 (0.54–1.30)) complications
  - Risk-adjusted average lengths of stay (5.4 vs 5.5 days, \( p = 0.66 \))
  - *Robotic-assisted colectomy* resulted in significantly higher costs of care ($19,231 vs $15,807, \( p < 0.001 \))
However…

Ileus, anastomotic complications, and mortality were significantly less in the robotic group!!!
LET’S ADD THE CLINICAL BENEFIT TO THE PATIENT...
Why is MIS laparoscopic better than open? NSQIP data in diverticular disease

Kakarla et al. Surg Endos 2012

<table>
<thead>
<tr>
<th>Total=7,629</th>
<th>Laparoscopic N=3,759 (49.3%)</th>
<th>Open N=3,870 (50.7%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morbidity%</td>
<td>11.9</td>
<td>23.2</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Serious Morbidity %</td>
<td>4.6</td>
<td>10.9</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Wound Complications %</td>
<td>9.1</td>
<td>17.5</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Mortality %</td>
<td>0.3</td>
<td>0.8</td>
<td>n.s.</td>
</tr>
<tr>
<td>OR time (min)</td>
<td>176.64</td>
<td>166.70</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>LOS (days)</td>
<td>4.77</td>
<td>7.68</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>
Outcomes Length of Hospital Stay: NSQIP data

- Data from NSQIP 2005-2009
- Outlier status for surgical length of stay (SLOS) was defined as >75th percentile
- Logistic regression analysis predict this outlier status
- Linear regression to directly predict SLOS
- Acuity adjustment
- 45,645 colectomies
  - LC 12,455 (27.3%)
  - OC 33,190 (62.7%)
- 75% percentile >11 days SLOS
- Open colectomy 1.8 days SLOS over LC
- OC independent effect on increase LOS (OR 3.379 p<0.001)

Stefanou et al. Surg Endos 2012
MIS rectal cancer surgery

- Comparison between O-Proctectomy vs L-Proctectomy
- 2005-2009 ACS NSQIP
- 5,420 patients
  - No difference in 30-day mortality was detected
  - The frequencies of superficial surgical site infection, sepsis, respiratory complications, renal failure, and venous thromboembolism were each lower in the L-proctectomy
  - The likelihood of 30-day morbidity was significantly greater in O-proctectomy vs L-proctectomy (OR = 1.41; 95% CI, 1.19-1.68).

<table>
<thead>
<tr>
<th></th>
<th>L-Proctectomy</th>
<th>O-Proctectomy</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=5,420</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfusion</td>
<td>4.3</td>
<td>12.3</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>OR time</td>
<td>242</td>
<td>219</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LOS</td>
<td>5</td>
<td>7</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Complications</td>
<td>20.5</td>
<td>28.8</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Greenblatt et al. JACS 2011
Use of Lap by Indication

<table>
<thead>
<tr>
<th>Indication</th>
<th>Private</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colon Cancer</td>
<td>62%</td>
<td>63%</td>
</tr>
<tr>
<td>Rectal Cancer</td>
<td>37%</td>
<td>19%</td>
</tr>
<tr>
<td>IBD</td>
<td>40%</td>
<td>38%</td>
</tr>
<tr>
<td>Diverticular</td>
<td>66%</td>
<td>55%</td>
</tr>
</tbody>
</table>

Surgical residents are currently being trained in laparoscopic surgery, but why is utilization still less than 50%?
The Impact of Practice Environment on Laparoscopic Colectomy Utilization Following Colorectal Residency: A Survey of the ASCRS Young Surgeons

Scott R. Steele MD¹, Sharon L. Stein MD², Liliana G. Bordeianou, MD³, Eric Johnson, MD⁴, Dan O. Herzig, MD⁵, Bradley J. Champagne MD² on behalf of the American Society of Colon & Rectal Surgeons’ Young Surgeons Committee

<table>
<thead>
<tr>
<th>Impediments to Utilization of Lap</th>
<th>Private</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Appropriate Patient Availability</td>
<td>44%</td>
<td>48%</td>
</tr>
<tr>
<td>2  Trained Assistant/Partner</td>
<td>35%</td>
<td>33%</td>
</tr>
<tr>
<td>3  Personal Experience/Comfort</td>
<td>30%</td>
<td>28%</td>
</tr>
<tr>
<td>4  Hospital Equipment</td>
<td>33%</td>
<td>20%</td>
</tr>
<tr>
<td>5  Hospital Support</td>
<td>29%</td>
<td>17%</td>
</tr>
<tr>
<td>6  Financial Reimbursement</td>
<td>8%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Can the robot bridge the gap between these impediments and MIS CR Surgery?
Robotic Progression
n=251

2005 - 2008
Open – 84%
LAP – 16%

2011
Open – 4%
Robotic – 96%

dVLAR and dVAPR

Roper
N=185
# Roper Hospital Data

<table>
<thead>
<tr>
<th>Age</th>
<th>59.0</th>
<th>#</th>
<th>59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female</td>
<td>28</td>
<td>Males</td>
</tr>
<tr>
<td>Race</td>
<td>W</td>
<td>48</td>
<td>AA</td>
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<tr>
<td>Weight</td>
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<tr>
<td>BMI</td>
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<tr>
<td>Completion</td>
<td>59</td>
<td>Conversion%</td>
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<tr>
<td>Sphincter Sparing%</td>
<td>86.4</td>
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### Roper Hospital Data

<table>
<thead>
<tr>
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<tr>
<td>Clinical Leak</td>
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<td>Readmit30</td>
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<tr>
<td>Death</td>
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<td>DNR UTI</td>
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<tr>
<td>Infection</td>
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<td>10.1694915</td>
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<tr>
<td>Ileus/SBO</td>
<td>9</td>
<td>15.2542373</td>
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<tr>
<td>Complication</td>
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<td>28.8135593</td>
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<table>
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<tr>
<td>Distal Margins (cm)</td>
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<td>Radial margin (mm)</td>
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<tr>
<td>Radial margins (+/-)</td>
<td>3 (all palliative surgeries)</td>
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<tr>
<td>#LN</td>
<td>15.3793103</td>
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The use of indocyanine green fluorescence to assess anastomotic perfusion during robotic assisted laparoscopic rectal surgery.

- Robot-assisted LAR for rectal cancer with and without ICG were analyzed for the years 2011 and 2012.
- N=40
- NIR + ICG 16 cases (41 %)
- ☀ 74 %
- Median level of the anastomosis
  - 3.5 cm in the NIR + ICG group
  - 5.5 cm in the control group

The use of indocyanine green fluorescence to assess anastomotic perfusion during robotic assisted laparoscopic rectal surgery.

- No difference in the use of diverting ileostomy
- 3 patients (19%), the use of NIR + ICG resulted in revision of the proximal bowel (colonic) transection point before formation of the anastomosis
- Distal transection point was never revised
- Leak rate in the NIR + ICG group was 6% versus 18% in control group.
- ICG fluorescence may play a role in anastomotic tissue perfusion assessment and affect the AL rate.

THE INFLUENCE OF FLUORESCENCE IMAGING ON THE LOCATION OF BOWEL TRANSECTION DURING ROBOTIC LEFT-SIDED COLORECTAL SURGERY: PRELIMINARY RESULTS OF A PROSPECTIVE MULTICENTER STUDY

Dr. J. Lagares-Garcia, Roper St. Francis, Charleston Colorectal, Charleston, SC, USA

Dr. G. Spinoglio, AZ. OSP. SS Antonio E Biagio E C. Arrigo, Alessandria, I

Dr. M. Hellan, Miami Valley Hospital, Dayton, OH, USA

Dr. A. Pigazzi, University of California Irvine, Irvine, CA, USA

Proximal Vascularized Margin
THE INFLUENCE OF FLUORESCENCE IMAGING ON THE LOCATION OF BOWEL TRANSECTION DURING ROBOTIC LEFT-SIDED COLORECTAL SURGERY: PRELIMINARY RESULTS OF A PROSPECTIVE MULTICENTER STUDY

- 20 patients (8 male, 12 female)
- Average BMI 26.8 kg/m²
- Average ASA 2.6
- 70% of patients were diagnosed with a malignant pathology
- 40% CT/RT preoperatively
- 60% Rectum  40% Colon
THE INFLUENCE OF FLUORESCENCE IMAGING ON THE LOCATION OF BOWEL TRANSECTION DURING ROBOTIC LEFT-SIDED COLORECTAL SURGERY: PRELIMINARY RESULTS OF A PROSPECTIVE MULTICENTER STUDY

- Proximal fluorescent imaging delivered additional information when compared to white light in 60% of patients
- 45% of proximal transection locations were changed
- Proximal location change averaged 1.5 cm after fluorescent imaging
- Additional information 45% of the patients during the distal assessment.
- No intra-operative or device-related complications were observed
- No postoperative leaks occurred
Upcoming Advantages
Robotics
FOR
DUMMIES®
2nd Edition

Katharine Kaye McMillan
Author and co-creating owner of Homie Design
Patricia Hart McMillan
Interior decorator and author

A Reference for the Rest of Us!®
FREE eTips at
dummies.com®
Case description and complexity

1. dV Right Hemicolecetomy
2. dV Rectopexy
3. dV Sigmoid Resection
4. dV LAR
5. dV Ultralow LAR/Coloanal

• Single port dV Colectomy
Next steps

• Extracorporealization and Anastomosis
  – Most of the time since the mesorectum has been released, anastomosis will be at the level of the suprapubic area
  – Alexis wound retractor (medium size) for wound protection
  – First assist surgeon with EEA stapler
    • Staple under direct vision
  – Reinforcement of the anterior anastomosis with 3/0 PDS, leaving 2 long tails
  – Omentoplasty using the left gastroepiploic vessel to the anterior part of the anastomosis
Next steps

• Intracorporeal anastomosis
  – Baker anastomosis: lateral-to-end descending-rectum
  – End-to-end anastomosis: intracorporeal purse string and stapling
  – Intracorporeal suturing and reinforcement of the anterior anastomosis ± omentoplasty
Recommendations

• Go back with patient to OR
• Help set-up/prep
• Smooth movements
• Provide triangulation when needed
• Rehearse with surgeon prior to the case
• Get to know your Intuitive representative
  – Tips on arms collisions, set-up, positioning, tricks
The importance of marketing

Firefly Illuminates Cutting Edge Surgery

2011 da Vinci
Advancements in da Vinci Surgery

New Horizons

RSFH will be one of first in the U.S. to combine Firefly with da Vinci robot for colon surgery

Charleston, SC (PRWEB) December 30, 2011

Colon cancer patients being treated through Roper St. Francis Cancer Care will have a new, distinct advantage beginning with the first surgery of its kind in the state of South Carolina on Jan. 2, 2012. Roper Hospital is one of the first centers in the U.S. to utilize a da Vinci robot outfitted with Firefly fluorescence imaging to help make colon cancer surgery less invasive and more precise.

“Robotic-assisted surgery provides surgeons with a higher level of visualization and therefore, accuracy. Now, with the integration of Firefly fluorescence imaging during robotic procedures, surgeons can observe tissue even more clearly, further improving surgical precision,” said Lisa Horvath, director perioperative services, Roper St. Francis Healthcare (RSFH). “The process involves the injection of a fluorescent dye that helps surgeons identify healthy, viable tissue. Using this imaging technology will potentially lower the risk of leaks in the reconstructed tissue and help prevent the need for multiple surgeries.”

The da Vinci Surgical System is a robot-assisted, minimally invasive tool that enables doctors to perform delicate and complex operations through tiny incisions with breakthrough vision, precision, dexterity and control. Firefly will enhance these advantages considerably according to Jorge Lagares-Garcia, MD, who will perform the Jan. 2 surgery.
Roper Hospital Administration Quote: “our robotics program has helped us reduce LOS, etc.”
Maturing as a Robotic Surgery First-Assist

Personal experience and recommendations
The Operating Room Training and Set Up

• BREATHE!!!

• All procedures standardized
  – Docking
  – Instrumentation
  – Assistant’s side and positioning

• Cost containment very important
  – Avoid unnecessary equipment
  – Know what the surgeon is going to use for the case
  – Help identify ways to cut costs

• Identify ways to decrease “In and Outs” and instrument changes

• Review case/assistance with the surgeon

• Periodically review outcomes
  – Operating room efficiency
  – Turnover time
  – Length of stay and complication/conversion rate