ACUTE CARE ROBOTIC COLORECTAL SURGERY A SAFE APPROACH?

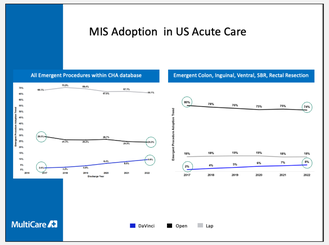
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Background

- Acute care surgery was typically completed in the open fashion
  - Transitioned to laparoscopy as that technology evolved
  - Now standard of care for a wide variety of cases
    - Appendectomies, Cholecystectomies, Perforated ulcers, ect.
- Colorectal Surgery has been slower to adopt this approach
  - Traditionally required more time than open
  - Laparoscopy started with elective cases and is trickling into acute care cases
- Concerns
  - Dilated bowel
  - Distortion from normal anatomy due to scarring, perforation, spillage of enteric contents
  - Physiologically compromised patients unable to tolerate pneumoperitoneum

- Distinct advantages to laparoscopic or minimally invasive surgery
  - Reduction of post-operative pain, lower stress response, lower wound complications, shorter hospital stays, and quicker return to normal activity
- Stullberg et al (2009) compared laparoscopic colon resection to open
  - Shorter hospital stay; less blood loss; reduced ileus
  - Equivalent mortality
- Ballian et al: evaluated emergent laparoscopic colectomies
  - 10% of patients had reanastomosis
  - Similar rates of morbidity and mortality
  - Decreased total and post-op length of stay



- Significant increase in Robotic general surgery
  - 8 fold increase from 2012 to 2018
  - 5 fold increase for emergent cases
  - 4 fold increase specifically for emergent colon, hernia, or small bowel surgeries
- Robotic Benefits
  - Minimizes tremors
  - Improved degrees of freedom
  - Improved ergonomics
  - Optimized visualization
- Robotic Colorectal Specific Benefits
  - Advantages with working in narrow pelvis
  - Benefits in high BMI patients
  - Low rectal dissections
  - Less wound complications
  - Intra-corporeal suturing



Methods

- Scarcity of literature evaluating robotic acute care colorectal surgery
  - Prompted us to seek to share our experiences with the platform
- Retrospective Review of patients from February 2019 to July 2023
  - Single Surgeon
  - Single Institution
  - All procedures performed on Da Vinci Xi System
- Cases were categorized into elective vs acute
  - Acute cases defined as being performed within the first 24 hours of a patients care after evaluation.
- Patients were deidentified and compared on several factors
  - Demographics, ASA class, Malignancy
  - LOS, Operative time, Readmission rate, complication rate
  - Operative Times

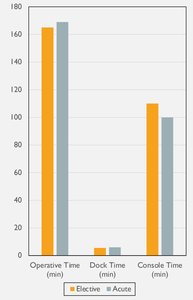




Results

	Elective	Acute
Age	59	59
Male	302	40
Female	426	36
BMI	30	29.9
ASA	2.47	2.66
Malignancy (n)	364	55

	Elective	Acute
LOS (days)	1.35	2.6
ROBF (days)	1.15	0.79
Complication (%)	3	9.2
Readmit (%)	7.3	13.2



Demographics

- 804 Patients
  - 728 Elective
  - 76 Acute
- Statistically significant factors in Acute Cases
  - Malignancy
    - 72% vs 50%
    - p value = 0.001
  - ASA class
    - 2.47 vs 2.66
    - p value = 0.001

Outcomes

- Length of Stay
  - 2.6 vs 1.35 days
  - p value = 0.0001
- Return of Bowel Function
  - 1.15 vs 0.79 days
  - p value = 0.0001
- Complication Rate
  - 9.2% vs 3%
  - p value = 0.022
  - Complications consisted of abscesses, anastomotic leaks, wound infections, C. diff infection, and one pulmonary embolism
- Readmission Rate
  - 13.2% vs 7.3%
  - p value = 0.07
  - Reasons were for small bowel obstruction, infections, and delayed anastomotic leaks and stricture

Operative Factors

- Similar times between both groups
- 165 vs 169 minutes for OR time
- 5.5 vs 5.9 minutes for docking
- 110 vs 110 minutes for console time

Discussion

- National morbidity and mortality rates following colorectal surgery
  - 11 to 32% - morbidity
  - 1 to 16% - mortality rates
  - Almost ¼ of patients undergoing a colectomy will have a complication
  - These number do include open and more emergent cases
    - Data may be skewed towards longer stays
- Readmission rates
  - US – 11.4%, 30 days follow-up
- ASA class and presence of malignancy were statistically significant for requiring acute intervention in our study
- Average length of stay following colorectal surgery
  - Elective: 2-5 days
  - Acute Care: 12-15 days
    - More open cases
    - Higher ASA classification = sicker patients
  - Length of stay is associated with increased costs with prolonged length of stay almost doubling the total cost
- Operative Times
  - Open – 95-135 mins to 180 mins
  - Laparoscopic – 180 mins to 230 mins
  - Robotic – No studies found
    - Our data suggest this is comparable to open and laparoscopic data based off surgeon comfort and ability

Limitations

- Single Surgeon/Single institution study
  - Pioneering an ambulatory colectomy protocol
- Small acute care patient population: 76 patients
- Most patients presenting in extremis are cared for by acute care surgery team
  - Study misses these higher ASA patients or patients in extremis that will not tolerate laparoscopic surgery

Conclusions

- Acute care colorectal surgery
  - Frequently more ill/higher ASA than elective
  - Slightly longer Length of stay, slower return of bowel function
  - Higher complication and readmission rate
    - These are still lower than national average
- Case selection and variety was similar between the two groups
  - Acute care cases were not undergoing a more complex procedure
- Operative times similar between arms
  - Close to open and less than laparoscopic averages
  - We feel this implies that if a surgeon is comfortable with the platform they can expect similar operative times to their laparoscopic or open cases while on the robot
- Similar operative times with shorter length of stay – improved patient outcomes and less costs associated with index case
- Robotic colorectal surgery is a safe approach to offer appropriate patients in the acute setting.