Investigating the Relationship Between Surgical Approach and Length of Stay in Elective Colorectal Surgery

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Background and Rationale

- Post-operative Ileus (POI) is an important determinant of length of stay (LOS) following abdominal surgery[1]
  - Associated with increased perioperative morbidity and healthcare costs[1,2]
- Laparoscopic surgery is associated with decreased POI and LOS compared to equivalent open operations[1]
  - Mechanisms underlying this relationship are not fully understood
  - Inflammatory, neurogenic, and pharmacologic pathways all likely involved[1,2]
- Laparoscopic approach shown to result in decreased inflammatory response in human and mouse models[3]
  - CO_2 has known anti-inflammatory properties[4]
- Research Question: Can the benefit of laparoscopic surgery be partially explained by anti-inflammatory effects of CO2 insufflation and/or pneumoperitoneum?
  - "Converted" operations (laparoscopic → open) receive both CO2 insufflation *and* laparotomy incision
  - If CO2 insufflation has intrinsic benefit, then it may be conferred to this group

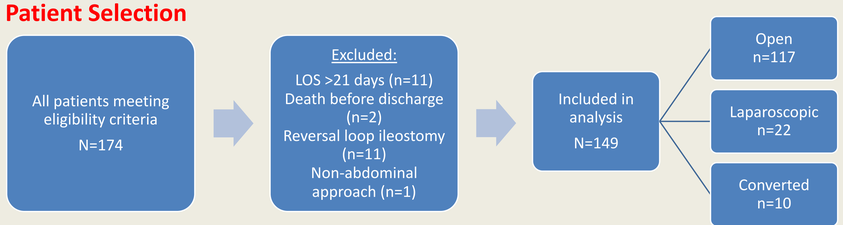
Objective

- To investigate the relationship between surgical approach and length of stay in patients who have undergone elective colorectal surgery.

Methods

- Retrospective, observational study via electronic chart review, using a pre-established dataset[5]
  - **Eligibility criteria:** adults (>18y), elective colorectal operation at St. Clare's Mercy Hospital, March 1, 2016 – February 28, 2017 (
  - **Exclusion criteria:** LOS >21 days, death prior to discharge, reversal of loop ileostomy, non-abdominal approach (ie. perineal)
- **Statistical analysis:** Differences in mean LOS between groups compared using one-way ANOVA and post-hoc Tukey tests.

Patient Selection



Results

Table 1. Group Characteristics

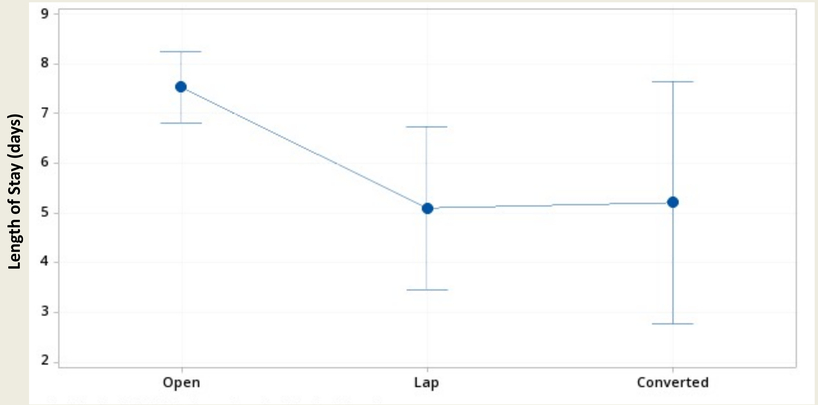
	Open (n=117)	Laparoscopic (n=22)	Converted (n=10)
Age (mean)	65.4 (SD = 11.7)	65.3 (SD = 9.2)	61.0 (SD = 14.5)
Sex	M 55% (n=64) F 45% (n=53)	M 59% (n=13) F 41% (n=9)	M 70% (n=7) F 30% (n=3)
Weight (mean kg)	81.9 (SD = 19.7)	76.2 (SD = 19.8)	88.0 (SD = 19.7)
Rectal operations	38% (n=45)	14% (n=3)	10% (n=1)
Stoma	24% (28/117)	9% (2/22)	0

Table 2. Length of Stay Analysis

	Open	Laparoscopic	Converted
Mean LOS (days)	7.52	5.09	5.20
SD	4.15	3.01	1.81
95% CI	6.81 – 8.23	3.45 – 6.73	2.76 – 7.64

- **One-way ANOVA**: $F(2,146) = 4.75$, $p<0.05$
- **Post-hoc Tukey test** showed Laparoscopic group had significantly shorter LOS compared to Open group ($p < 0.05$)

Figure 1. Plot of mean length of stay grouped by surgical approach



Discussion

- Statistically significant difference in LOS between Open and Laparoscopic groups
  - In keeping with established benefits of laparoscopic approach
- No significant difference between Open and Converted groups
  - May be due to small n and large CI for converted group
  - Practical relevance of 7.52 vs 5.2 days mean LOS should be considered
- Lack of significant difference in LOS between Laparoscopic and Converted groups is interesting
  - Supports possibility of intrinsic benefit of laparoscopic approach/CO_2 insufflation
- Limitations
  - Using previously established dataset, not collected with intention to answer our research question
  - No sample size, power calculation
  - Must be cautious in interpretation of results given small study population and multiple possible confounders (comorbidities, indication for surgery, operation type, presence of stoma, etc.)

Conclusion

- We found no difference in LOS between Laparoscopic and Converted groups
- While there were limitations in this study, this finding is interesting and worthy of further investigation to assess if there is intrinsic benefit of the CO_2 insufflation/pneumoperitoneum utilized in laparoscopic surgery

Future Directions

- Expand inclusion criteria timeframe to increase study population
- Pursue a more detailed assessment of factors underlying LOS by including more variables in analysis
- Define Ileus, use as primary outcome

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