Minimally Invasive Surgery in the Management of Large Bowel Obstructions for Geriatric Patients

H. Spillman[1], C. Schott[1], R. Amarasinghe[1], M. Mitchell[1], J. Zarkower[1], T. Brownlee[1], M. Khalili MD[1], M. Ng MD[1]

1 George Washington University School Of Medicine And Health Sciences, Surgery, Washington, DC, USA

Introduction

As the population of geriatric patients grows, it is vital to investigate the best surgical practices for managing these patients. Minimally invasive surgery (MIS) has been shown to lead to improved outcomes in geriatric patients with colorectal cancer. However, it has not been established if this is the case for the management of large bowel obstructions, a potential complication of colorectal cancer and diverticulitis.

Methods

ACS NSQIP 2005-2021 data was utilized to evaluate patients 65 and older with large bowel obstruction who had partial colectomies. Univariable and multivariable logistic regression and linear regression analysis were performed to assess the relationship between laparoscopic versus open surgical approach and operative outcomes. Analyses were adjusted for age, sex, and diabetes. Exclusion criteria included subjects with ascites, disseminated cancer, ventilator dependence, age younger than 65, or missing data.

Results

Characteristic	Surgical Approach		p-value for difference*
	Open n=2,690	Laparoscopic n=482	
AGE (years)			
Mean (SE)	76.90 (0.14)	75.96 (0.34)	0.0114
WEIGHT (LBS)			
Mean (SE)	160.00 (0.79)	158.48 (1.67)	0.4496
SEX			
Female	1,386 (52%)	287 (60%)	
Male	1,304 (48%)	195 (40%)	0.001
HISTORY OF DIABETES			
Yes	377 (14%)	84 (17%)	
No	2,313 (86%)	398 (83%)	0.050
HISTORY OF SMOKING			
Yes	253 (9%)	44 (9%)	
No	2,437 (91%)	438 (91%)	0.848
IMMUNOSUPPRESSIVE THERAPY			
Yes	109 (4%)	29 (6%)	
No	2,581 (96%)	453 (94%)	0.052
HISTORY OF DIALYSIS			
Yes	-	-	
No	2,653	-	0.894
PREOPERATIVE WEIGHT LOSS			
Yes	87 (4%)	23 (6%)	
No	2,134 (96%)	374 (94%)	0.086

Table 1. Comparison of covariates based on surgical approach for patients who underwent partial colectomy for large bowel obstruction

Surgical Outcomes	Surgical Approach		p-value for difference*
	Open n=2,690	Laparoscopic n=482	
Characteristic			
Hospital Length of Stay (days) Mean (SE)	10.76 (0.15)	8.53 (0.29)	<0.001
SUPERFICIAL SURGICAL SITE INFECTION	162 (6%)	18 (4%)	0.046
THIRTY DAY MORTALITY	208 (8%)	12 (2%)	<0.001
ORGAN SPACE SURGICAL SITE INFECTION	178 (7%)	14 (3%)	0.002
URINARY TRACT INFECTION	103 (4%)	10 (2%)	0.056
UNPLANNED REINTUBATION	113 (4%)	11 (2%)	0.045
CARDIAC ARREST	51 (2%)	-	0.047
UNPLANNED RETURN TO OPERATING ROOM	267 (10%)	22 (5%)	<0.001
SEPSIS	154 (6%)	24 (5%)	0.512
OPERATION TIME (minutes) Mean (SE)	110.66 (1.25)	110.05 (2.65)	0.8472

Table 2. Comparison of Surgical Approach and Surgical Outcomes

Discussion

Decreased surgical site infections

- make up 20% of all hospital-acquired infections, causing increased morbidity and mortality
- one of the most common types of nosocomial infections
- need for additional antibiotic usage as well as prolonged hospitalizations, and increased postoperative pain
- Large bowel operations are particularly susceptible
- For geriatric patients, SSIs can be especially devastating due to their frailty, contributing to a four times greater mortality[1].
- Considering the impact of SSIs on geriatric patients, our findings suggest that surgeons should strongly consider using MIS for large bowel obstructions to decrease the likelihood of this complication.

Decreased post operative UTIs

- Postoperative UTIs complicate around 1-2% of surgeries, however colorectal surgeries have a higher incidence of this complication at around 4%[2,3].
- Geriatric patients are more likely to develop postoperative UTIs[4,5,6].
- UTIs are associated with an increased postoperative hospital stays, myocardial infarctions, stroke, sepsis, venous thrombosis, hospital readmission, pneumonia, and delirium, which increase morbidity and mortality[3,4,7,8,9]
- Our results provide additional evidence that MIS is the preferred approach for avoiding postoperative UTIs.

Decreased unplanned reoperations

- Unplanned reoperations are associated with higher postoperative complications and mortality[10]
- Bowel obstruction surgeries, have one of highest reoperation rates at 11.9%[10]
- Decreased 30-day mortality

- This finding was likely due to the decreased likelihood of SSIs, UTIs, and unplanned reoperations observed with MIS because each of these complications contributed to mortality, especially in geriatric patients who are more likely to be frail with comorbid conditions.

Conclusion

This study demonstrated that geriatric patients who underwent minimally invasive surgery for large bowel obstructions had better outcomes than those with open surgery. These improved outcomes included a decreased likelihood of 30 day mortality, complications such as SSIs and UTIs, unplanned reoperation as well as a shortened hospital stay. Given these differences in outcomes, further research is needed to reevaluate guidelines for surgical intervention of large bowel obstruction in geriatric patients.

References

1. Kaye KS, Anderson DJ, Sloane R, et al. The effect of surgical site infection on older operative patients. J Am Geriatr Soc. 2009;57(1):46-54. doi:10.1111/j.1532-5415.2008.02053.x
2. Regenbogen SE, Read TE, Roberts PL, Marcello PW, Schoetz DJ, Ricciardi R. Urinary tract infection after colon and rectal resections: more common than predicted by risk-adjustment models. J Am Coll Surg. 2011;213(6):784-792. doi:10.1016/j.jamcollsurg.2011.08.013
3. Sheka AC, Tevis S, Kennedy GD. Urinary tract infection after surgery for colorectal malignancy: risk factors and complications. Am J Surg. 2016;211(1):31-39. doi:10.1016/j.amjsurg.2015.06.006
4. Farsi AH. Risk Factors and Outcomes of Postoperative Catheter-Associated Urinary Tract Infection in Colorectal Surgery Patients: A Retrospective Cohort Study. Cureus. 2021;13(5):e15111. Published 2021 May 19. doi:10.7759/cureus.15111
5. Helmen ZM, Helm MC, Helm JH, et al. Predictors of Postoperative Urinary Tract Infection After Bariatric Surgery. Obes Surg. 2018;28(7):1950-1954. doi:10.1007/s11695-017-3095-6
6. Alvarez AP, Demzik AL, Alvi HM, Hardt KD, Manning DW. Risk Factors for Postoperative Urinary Tract Infections in Patients Undergoing Total Joint Arthroplasty. Adv Orthop. 2016;2016:7268985. doi:10.1155/2016/7268985
7. Saadat GH, Alsoof D, Ahmad B, Butler BA, Messer TA, Bokhari F. Incidence, risk factors and clinical implications of postoperative urinary tract infection in geriatric hip fractures. Injury. 2022;53(6):2158-2162. doi:10.1016/j.injury.2022.03.012
8. Attaluri V, Kiran RP, Vogel J, Remzi F, Church J. Risk factors for urinary tract infections in colorectal compared with vascular surgery: a need to review current present-on-admission policy?. J Am Coll Surg. 2011;212(3):356-361. doi:10.1016/j.jamcollsurg.2010.11.014
9. Holroyd-Leduc JM, Sen S, Bertenthal D, et al. The relationship of indwelling urinary catheters to death, length of hospital stay, functional decline, and nursing home admission in hospitalized older medical patients. J Am Geriatr Soc. 2007;55(2):227-233. doi:10.1111/j.1532-5415.2007.01064.x
10. Kassahun WT, Mehdorn M, Wagner TC. The effects of reoperation on surgical outcomes following surgery for major abdominal emergencies. A retrospective cohort study. Int J Surg. 2019;72:235-240. doi:10.1016/j.ijsu.2019.11.024