Risk Factors Related to Conversion to Open Surgery for Rectal Cancer

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Introduction

Minimally invasive surgery, and in particular the robotic platform, is increasingly used in the surgical treatment of rectal cancer. While the rate of converting to open has decreased with greater experience with minimally invasive surgery, conversion rates continue to be about 11%[1]. We aim to determine perioperative risks factors for conversion to open for rectal cancer.

Methods

We reviewed the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) proctectomy-targeted database for rectal cancer from 2017 - 2018 and identified patients who had operations done robotically and laparoscopically. Unplanned conversions, both robotic and laparoscopic, to open were analyzed separately. Incomplete records without TNM staging for rectal cancer were excluded. Perioperative factors and postoperative complication rates were analyzed using univariate analysis (chi-square and t-test).

Results

- A total of 1309 patients with rectal cancer who underwent minimally invasive proctectomy were identified of which there were 784 (59.9%) laparoscopic and 525 (40.1%) robotic
- Unplanned conversion from laparoscopic occurred in 13.0% (n=102), and 4.2% (n=22) had unplanned robotic converted to open (p<0.01)
- Body mass index was higher in unplanned conversion group (30.4±6.5) compared with laparoscopic (27.5±5.5) and robotic groups (28.1±6.1) (p<0.001)

Results

	Overall	Convert to Open	Laparoscopic	Robotic	p
Age (mean (SD))	61.04 (12.58)	61.68 (13.86)	61.07 (12.78)	60.83 (11.98)	0.792
BMI (mean (SD))	28.01 (5.88)	30.44 (6.45)	27.53 (5.49)	28.07 (6.09)	<0.001
Preoperative hematocrit (mean (SD))	39.07 (4.61)	37.96 (4.60)	39.29 (4.53)	39.04 (4.70)	0.015
Male sex (%)	836 (63.9)	91 (73.4)	414 (60.7)	331 (65.8)	0.013
Diabetes (%)	198 (15.1)	22 (17.7)	96 (14.1)	80 (15.9)	0.476
Chemotherapy (within 90 days) (%)	827 (63.8)	74 (61.2)	423 (62.5)	330 (66.1)	0.359
Radiation (within 90 days) (%)	794 (61.2)	69 (56.6)	403 (59.7)	322 (64.4)	0.142
Pretreatment clinical T4 (%)	157 (12.0)	19 (15.3)	65 (9.5)	73 (14.5)	0.016
Pretreatment clinical N1/N2 (%)	543 (41.5)	63 (50.8)	271 (39.7)	209 (41.6)	0.071
Pretreatment clinical M1 (%)	62 (4.7)	13 (10.5)	26 (3.8)	23 (4.6)	0.006
Anastomotic leak (%)	47 (3.6)	9 (7.3)	22 (3.2)	16 (3.2)	0.07
Ileus (%)	220 (16.8)	36 (29.0)	106 (15.6)	78 (15.5)	0.001
Superficial SSI (%)	63 (4.8)	13 (10.5)	28 (4.1)	22 (4.4)	0.008
Deep Incisional SSI (%)	17 (1.3)	1 (0.8)	7 (1.0)	9 (1.8)	0.455
Organ Space SSI (%)	97 (7.4)	17 (13.7)	44 (6.5)	36 (7.2)	0.017
n	1309	124	682	503	

Table 1. Perioperative factor comparisons between minimally invasive surgery and conversion to open surgery

- Preoperative hematocrit was lower in the conversion group at 38.0±4.6 compared to the minimally invasive group (39.3±4.5 (laparoscopic) and 39.0±4.7 (robotic)) (p=0.015)
- Most patients who had conversion were male at 73.4% (n=91) (p=0.013)
- Patients with pretreatment clinical T4 disease had higher risk for conversion with 15.3% (n=19) compared to the minimally invasive group (9.5% in laparoscopic and 14.5% in robotic) (p=0.016)
- Patients with pretreatment clinical M1 disease were more likely to have conversion to open 10.5% (n=13) (p=0.006)

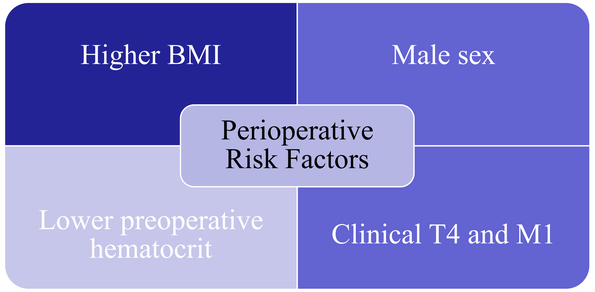
Results

- The unplanned conversion group had higher association with post-operative ileus at 29.0% (n=36) compared with laparoscopic (3.2%) and robotic (3.2%) groups (p=0.001)
- The unplanned conversion group were more likely to have superficial (10.5%, p=0.008) and organ space surgical site infections (13.7%, p=0.017) compared with the laparoscopic and robotic groups
- Due to sample size, robotic surgery separately did not have any statistically significant differences

Conclusion

Unplanned conversion to open surgery occurs significantly less in robotic procedures compared to laparoscopic for proctectomy performed for rectal cancer in the NSQIP database.

Conversion occurs more often in patients with higher BMI, male sex, lower preoperative hematocrit, and pretreatment clinical T4 and M1 disease. Those who do undergo conversions are also at higher risk for ileus, superficial and organ space SSI.



References:
1. Melstrom KA, Kaiser AM. Role of minimally invasive surgery for rectal cancer. *World J Gastroenterol*. 2020;26(30):4394-4414. doi:10.3748/wjg.v26.i30.4394