

Background

Laparoscopic colon resections are converted to open in up to 16% of cases.¹

Factors that influence conversion have been reported previously:²

- Age, ASA classification, procedure performed

Conversion may negate known benefits of laparoscopy

The morbidity associated with conversion-to-open is debated in the literature

- Some studies show no difference^{3,4}
- Others show increased operative time, hospital stay, and morbidity rates for converted cases^{5,6}

As the use of laparoscopy in colorectal surgery grows,⁷ knowledge about the impact of conversion becomes more critical

Question

Does conversion-to-open increase post operative morbidity for patients undergoing elective colonic resections as compared to planned open procedures?

Methods

- Patients: all elective colectomies in the ACS NSQSIP registry from 2013-2017
 - Identified cases coded as completed open, laparoscopic, or converted to open from a planned laparoscopic procedure
- Excluded: emergency surgery, rectal cases
- **Primary Outcome:** Composite outcome of 30-day post operative morbidity
- **Secondary Outcomes:** surgical site infections, operative time, length of stay, anastomotic leak

Results

Table 1: Patient demographics

	Open (N=36833)	Laparoscopic (N=37928)	Converted (N=9277)
Age (years)	62.1 ± 15.0	60.0 ± 15.1	61.4 ± 14.7
Gender (female)	17046 (46.3)	17823 (47.0)	4787 (51.6)
BMI (kg/m ²)	28.1± 7.1	28.4 ± 6.4	29.7 ± 7.2
ASA classification			
I	412 (1.1)	1048 (2.8)	169 (1.8)
II	11456 (31.1)	18624 (49.1)	3721 (40.1)
III	21550 (58.5)	16777 (44.2)	4918 (53.0)
IV	3304 (9.0)	1411 (3.7)	463 (5.0)
Diagnosis			
Colon cancer	15473 (42.0)	16486 (43.5)	3966 (42.8)
Diverticular disease	6039 (16.4)	7928 (20.9)	2263 (24.4)
Crohn's disease	2795 (7.6)	2401 (6.3)	701 (7.6)
Ulcerative colitis	470 (1.3)	1105 (2.9)	122 (1.3)
Non-malignant polyp	1410 (3.8)	5370 (14.2)	647 (7.0)
Other benign disease	10590 (28.8)	4607 (12.1)	1565 (16.9)
Comorbidities			
COPD	2331 (6.3)	1497 (3.9)	472 (5.1)
Diabetes	5883 (16.0)	5471 (14.4)	1628 (17.5)
Dyspnea	2912 (7.9)	2051 (5.4)	659 (7.1)
Ascites	475 (1.3)	58 (0.2)	59 (0.6)
Congestive heart failure	579 (1.6)	281 (0.7)	67 (0.7)
Steroid use	3920 (10.6)	3483 (9.2)	929 (10.0)
Dialysis	459 (1.2)	204 (0.5)	59 (0.6)
Weight loss (within last 6 mo.)	2789 (7.6)	1319 (3.5)	526 (5.7)
Pre-operative blood transfusion	1476 (4.0)	510 (1.3)	214 (2.3)
Sepsis	1878 (5.1)	208 (0.5)	305 (3.3)
Smoking	3966 (10.8)	5703 (15.0)	1651 (17.8)

Table 2: Converted-to-open vs. open colonic resections

	Relative risk (95% CI)	<i>p</i> value
30-day morbidity	1.05 (1.01-1.09)	0.0056
Prolonged operative time	1.47 (1.42-1.52)	<.0001
Post-operative complications		
Superficial SSI	1.19 (1.09-1.3)	0.0002
Deep SSI	1.01 (0.89-1.14)	0.8965
Composite of infectious complications	1.07 (1-1.15)	0.0568
Blood transfusions	1.08 (0.97-1.19)	0.1493
Anastomotic leak	1.02 (0.92-1.14)	0.6784
Re-operation	1.05 (0.96-1.14)	0.2893
Re-admission	0.99 (0.92-1.06)	0.7222
Extended length of stay	1.16 (1.11-1.2)	<.0001

Table 3: Converted-to-open vs. laparoscopic colonic resections

	Relative risk (95% CI)	<i>p</i> value
30-day morbidity	1.26 (1.22-1.3)	<0.0001
Prolonged operative time	1.43 (1.39-1.47)	<.0001
Post-operative complications		
Superficial SSI	1.62 (1.49-1.77)	<0.0001
Deep SSI	1.24 (1.10-1.40)	0.0006
Composite of infectious complications	1.42 (1.32-1.51)	<0.0001
Blood transfusions	1.21 (1.10-1.33)	<.0001
Anastomotic leak	1.26 (1.13-1.40)	<.0001
Re-operation	1.24 (1.14-1.34)	<.0001
Re-admission	1.16 (1.09-1.24)	<.0001
Extended length of stay	1.00 (0.96-1.04)	0.9938

Conclusions

- Higher morbidity, longer operative times, and prolonged length of hospital stay associated with conversion-to-open
- Completed laparoscopic cases have decreased post-op morbidity compared to both open and converted cases
- Converted-to-open cases likely constitute a unique post-operative population
- Important considerations for laparoscopic cases:
 - Pre-operative likelihood of conversion
 - Surgeon's threshold to convert
 - Impact of prolonged anesthesia

References

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