Impact of Robotic-Assisted Surgery on Right Colectomy Outcomes: A Retrospective Cohort Study

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Introduction

The American College of Surgeons predicts that by 2025 robotic assisted surgeries (RAS) for colectomies would surpass those performed laparoscopically (1). RAS provides many technical advantages over traditional laparoscopic and open approaches, primarily, an enhanced high-definition three-dimensional view, multi-articulating tools for increased dexterity, motion scaling of surgeon movements, and better specimen quality in minimally invasive surgical (MIS) dissections (2-5). These features of RAS help to overcome the most critical limitations to laparoscopic approaches in colorectal pathology, such as obesity. In Canada, uptake of RAS for colorectal surgical pathologies lags other developed nations due to training gaps and a perceived increase in costs. Work done previously by our group has shown that RAS has shown improvements with regards to length of stay, costing, and increased rates of MIS completion in left colectomies for colorectal cancer resection . Given these findings, it is critical to evaluate the outcomes of robotic right colectomies with historic controls to assess the clinical utility of RAS uptake for improving the outcomes of Canadian cancer patients.

Objective

This study assesses the effects of RAS implementation on operative time, length of stay (LOS), and procedural distribution in right colectomies at a Canadian centre.

Methods

A retrospective cohort study was used to analyzed 157 consecutive right colectomy patients for colorectal cancer at a high-volume Canadian centre from 2021 to 2024. Cohorts were defined as pre-robotic (2021–2022) and post-robotic (2023–2024) eras. Data included patient demographics (age, sex), procedure type (open, laparoscopic, robotic), operative time (minutes), and LOS (days), extracted from institutional records. Medians and interquartile ranges (IQR) were calculated, with Wilcoxon rank-sum tests and χ^2 tests assessing significance ($p<0.05$).

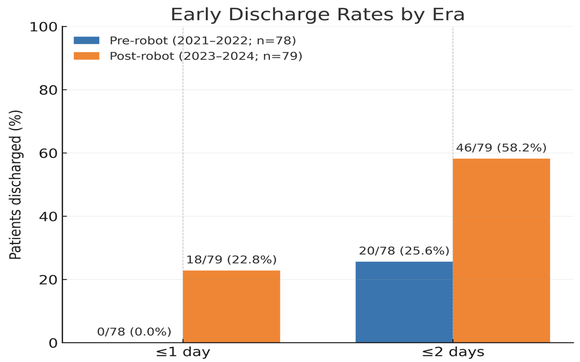
Results

Table 1: Baseline Characteristics and Procedure Distribution by Era

Characteristic	Pre-robot era (2021–2022; n=78)	Post-robot era (2023–2024; n=79)
Baseline characteristics		
Age, mean (years)	71	70
Sex: male (%)	47.4%	49.4%
Procedure distribution, n (%)		
Robotic	0/78 (0.0%)	59/79 (74.7%)
Laparoscopic	74/78 (94.9%)	17/79 (21.5%)
Open	4/78 (5.1%)	3/79 (3.8%)

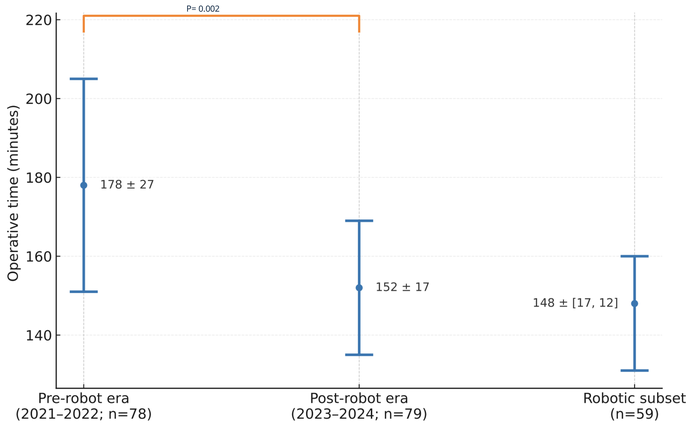
Patient cohorts were demographically similar pre- and post-robotically (mean age: 71 vs. 70 years, male: 47.4% vs. 49.4%). The pre-robotic cohort (n=78) comprised 74 laparoscopic (94.9%) and 4 open (5.1%) cases, with no robotic procedures. The post-robotic cohort (n=79) included 59 robotic (74.7%), 17 laparoscopic (21.5%), and 3 open (3.8%) cases.

Figure 2: Rates of Early Discharge by Pre vs Post Robotic Era



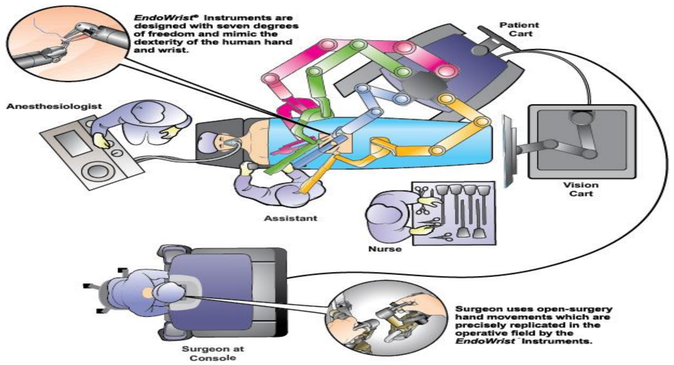
Notably, early discharge rates improved significantly with RAS usage: discharge within 2 days rose from 25.6% to 58.2% ($p<0.001$) and within 1 day from 0% to 22.8% ($p<0.001$).

Figure 1: Changes in Median Operative Time by Era



We also showed that median operative time decreased from 178±27 minutes pre-robotic to 152±17 minutes post-robotic ($p=0.002$), with robotic cases at 148 minutes

Figure 3: Features and Design of RAS



Discussion

Introducing RAS for right colectomy at our centre produced meaningful efficiencies: median operative time fell from 178 to 152 minutes ($p=0.002$) and length of stay declined from 3 to 2 days ($p=0.003$), with robotic cases achieving a 2-day median and substantially higher 1–2-day discharge rates. These improvements occurred despite an already high MIS baseline, indicating an incremental benefit of RAS rather than a mere shift from open surgery.

Conclusion

Despite initial concerns regarding increased operative time, RAS demonstrated efficiency gains and enhanced recovery. Limitations include the single-centre, retrospective design, warranting further multi-centre validation. Nonetheless, these results are supportive of expanding RAS surgical options for colorectal cancer patients across Canada

References

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2. Erozkan K, Gorgun E. Robotic colorectal surgery and future directions. Am J Surg. 2024 Apr;230:91–8.