Efficacy of Robot-Assisted Colectomy: Short-Term Outcomes Using Propensity Score Matching

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Backgrounds & Aims

- ✓ The first robotic-assisted laparoscopic surgery (RALS) for colon cancer was performed in 2001 after getting the FDA approval for the da Vinci surgical system in intraabdominal surgery, and since then, its use in this field gradually increased.
- ✓ In Japan, RALS for colon cancer has been covered by insurance since 2022, and our hospital performs it in 80-90% of colon cancer cases.
- ✓ Few reports have made a comparison between RALS and conventional laparoscopic surgery (CLS) for colon cancer. Therefore, this study aimed to compare the short-term outcomes of RALS and CLS for colon cancer using propensity score matching.

Methods

Cases: February 2021 – May 2024
243 cases of minimally invasive surgery for colon cancer (appendix to sigmoid colon) performed at our department

Design: Single-center, retrospective study

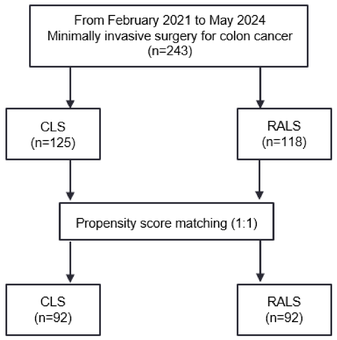
Covariate: Age, Sex, Location, p-Stage

Primary endpoint: Length of hospital stay

Secondary endpoint: Operative time, Intraoperative blood loss, Conversion, Harvested lymphnode number, Proximal margin, Distal margin, Complication, Anastomotic leakage

Statistical Analysis: Propensity score matching (1:1)

Statistical significance: p<0.05



Results -1

Factor		Procedure LAP (n = 125)	RALS (n = 118)	p-value
Age		73 (31 - 91)	74 (31 - 93)	0.983
Sex (%)	Male	73 (58.4)	56 (47.5)	0.096
	Female	52 (41.6)	62 (52.5)	
BMI		22.9 (15.5 - 31.8)	21.8 (15.3 - 35)	0.056
Location (%)	A	27 (21.6)	27 (22.9)	0.344
	C	17 (13.6)	26 (22.0)	
	D	9 (7.2)	10 (8.5)	
	S	51 (40.8)	34 (28.8)	
	T	19 (15.2)	20 (16.9)	
	V	2 (1.6)	1 (0.8)	
Anastomosis (EA/IA) (%)	IA	19 (15.2)	48 (40.7)	<0.001
	EA	101 (80.8)	70 (59.3)	
Anastomosis (Procedure) (%)	Delta	61 (49.2)	36 (30.5)	NA
	FEEA	3 (2.4)	32 (27.1)	
	Overlap	0 (0.0)	1 (0.8)	
	DST	2 (1.6)	14 (11.9)	
	EA	53 (42.7)	30 (25.4)	
	None	0 (0.0)	5 (4.2)	
Dissection (%)	1	5 (4.0)	0 (0.0)	0.08
	2	47 (37.6)	32 (27.1)	
	3	73 (58.4)	86 (72.9)	
Operative time (min)		228 (111 - 527)	237 (144 - 636)	0.002
Intraoperative blood loss (g)		99 (1 - 2865)	48 (1 - 623)	0.072
Conversion (%)		6 (4.8)	4 (3.3)	1
p-Stage (%)	0	9 (7.2)	6 (5.1)	0.103
	1	42 (33.6)	30 (25.4)	
	2	29 (23.2)	38 (32.2)	
	3	41 (32.8)	33 (28.0)	
	4	4 (3.2)	11 (9.3)	
Harvested lymphnode number		16 (0 - 77)	19 (3 - 65)	0.031
Proximal margin (mm)		87 (71 - 51)	90 (75 - 95)	0.786
Distal margin (mm)		72 (63 - 99)	80 (52 - 86)	0.268
Length of hospital stay (day)		12 (10 - 375)	10 (6 - 45)	0.048
Complication (C-D>3) (%)		0 (0.0)	4 (3.4)	0.054
Anastomotic leakage (%)		1 (0.8)	0 (0.0)	1

Table 1. Entire cohort

Results -2

Factor		Procedure LAP (n = 92)	RALS (n = 92)	p-value
Age		73 (31 - 91)	74 (34 - 93)	0.988
Sex (%)	Male	49 (53.3)	51 (55.4)	0.882
	Female	43 (46.7)	41 (44.6)	
BMI		22.6 (15.5 - 30)	22.1 (15.9 - 35)	0.676
Location (%)	A	21 (22.8)	20 (21.7)	1
	C	17 (18.5)	17 (18.5)	
	D	8 (8.7)	7 (7.6)	
	S	31 (33.7)	31 (33.7)	
	T	15 (16.3)	16 (17.4)	
	V	0 (0.0)	1 (1.1)	
Anastomosis (EA/IA) (%)	IA	14 (15.2)	31 (33.7)	0.004
	EA	71 (81.5)	61 (66.3)	
Anastomosis (Procedure) (%)	Delta	51 (56.0)	29 (31.5)	<0.001
	FEEA	2 (2.2)	20 (21.7)	
	Overlap	0 (0.0)	1 (1.1)	
	DST	2 (2.2)	10 (10.9)	
	EA	33 (36.3)	28 (30.4)	
	None	1 (1.1)	4 (4.3)	
Dissection (%)	1	5 (5.4)	0 (0.0)	0.03
	2	33 (35.9)	27 (29.3)	
	3	54 (58.7)	65 (70.7)	
Operative time (min)		218 (111 - 477)	237 (144 - 548)	<0.01
Intraoperative blood loss (g)		26 (1 - 526)	22 (1 - 623)	0.239
Conversion (%)		5 (5.4)	3 (3.3)	1
p-Stage (%)	0	7 (7.6)	3 (3.3)	0.717
	1	26 (28.3)	27 (29.3)	
	2	28 (30.4)	31 (33.7)	
	3	27 (29.3)	25 (27.2)	
	4	4 (4.3)	6 (6.5)	
Harvested lymphnode number		16 (0 - 77)	20 (3 - 49)	0.02
Proximal margin (mm)		68 (11 - 480)	70 (10 - 405)	0.794
Distal margin (mm)		55 (19 - 560)	73 (10 - 265)	0.02
Length of hospital stay (day)		13 (10 - 375)	10 (6 - 45)	<0.001
Complication (C-D>3) (%)		0 (0.0)	4 (4.3)	0.121
Anastomotic leakage (%)		1 (1.1)	0 (0.0)	1

Table 2. After matching

RALS compared to CLS

- ✓ Slightly longer operation time
- ✓ No significant differences in complications
- ✓ Shorter hospital stays
- ✓ Higher frequency of intracorporeal anastomosis
- ✓ Longer distal margin
- ✓ Greater number of harvested lymph nodes

Discussion

- ✓ The RALS group tend to have faster postoperative recovery.
- ✓ The short-term outcomes in this series provide further evidence that RALS is likely to be superior to CLS for colon cancer.
- ✓ Longer distal margin and greater number of harvested lymph nodes may contribute to better long-term outcomes of RALS compared to CLS for colon cancer, although we need follow-up studies.

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