

Table S1 Qualification of surgeons

Surgeon	Years of training	Year of doing colorectal surgery independently	Year of doing laparoscopic surgery independently
1	>10	2005	–
2	>10	2007	2009
3	>10	1989	2017
4	>10	2000	2008
5	>10	2011	2014
6	>10	2013	2013
7	>10	2006	2008
8	>10	2014	2015

Table S2 Data of test set (n=836)

Variables	Patients without AL (n=791)	Patients with AL (n=45)	P value
BMI, kg/m ²	23.52±2.99	23.95±3.02	0.35
Sex			0.14
Female	267 (96.4)	10 (3.6)	
Male	524 (93.7)	35 (6.3)	
Age	60.49±10.77	59.78±10.17	0.67
Blood transfusion, mL	20.23±158.78	35.56±166.73	0.53
Surgeon volume, /year			0.04
≥100	749 (95.1)	39 (4.9)	
<100	42 (87.5)	6 (12.5)	
Blood loss, mL	166.22±149.70	170.00±151.66	0.87
Surgical approach			0.93
Open	611 (94.6)	35 (5.4)	
Laparoscopic	180 (94.7)	10 (5.3)	
Stoma			0.03
No	250 (97.3)	7 (2.7)	
Yes	541 (93.4)	38 (6.6)	
nCRT			0.08
No	586 (95.4)	28 (4.6)	
Yes	205 (92.3)	17 (7.7)	
Distance, cm	6.60±3.28	5.36±3.09	0.01
Stenosis or obstruction			0.52
No	527 (95.0)	28 (5.0)	
Yes	264 (94.0)	17 (6.0)	
Pathological types			0.26
Well differentiated	20 (95.2)	1 (4.8)	
Moderately differentiated	647 (94.6)	37 (5.4)	
Poorly differentiated	37 (88.1)	5 (11.9)	
Mucinous	80 (97.6)	2 (2.4)	
Signet ring cell	7 (100.0)	0 (0.0)	
pT stage			0.11
1, 2	275 (92.9)	21 (7.1)	
3, 4	516 (95.6)	24 (4.4)	
pN stage			0.64
0	468 (94.9)	25 (5.1)	
1, 2	323 (94.2)	20 (5.8)	
pALB, g/L			0.62
≥35	771 (94.5)	45 (5.5)	
<35	20 (100.0)	0 (0.0)	
pHGB, g/L			0.04
≥90	779 (94.9)	42 (5.1)	
<90	12 (80.0)	3 (20.0)	
Diabetes			0.007
No	662 (95.7)	30 (4.3)	
Yes	129 (89.6)	15 (10.4)	
ASA score			0.31
≤2	711 (94.9)	38 (5.1)	
≥3	80 (92.0)	7 (8.0)	
CA199, U/mL			0.21
≤37	712 (94.9)	38 (5.1)	
>37	79 (91.9)	7 (8.1)	
CEA, ng/mL			0.14
≤5	525 (93.8)	35 (6.3)	
>5	266 (94.6)	10 (3.6)	

Data were presented as n (%) or mean ± standard deviation. AL, anastomotic leakage; BMI, body mass index; nCRT, neoadjuvant chemoradiotherapy; pALB, preoperative albumin; pHGB, preoperative hemoglobin; ASA, American Society of Anesthesiologists; CEA, carcinoembryonic antigen; CA199, carbohydrate antigen 199.

Table S3 Univariate analysis of variables related to stoma (n=5,220)

Variables	Patients without stoma (n=1,766)	Patients with stoma (n=3,454)	P value
BMI, kg/m ²	23.02±2.98	23.52±3.16	<0.001
Sex			<0.001
Female	711 (39.0)	1,113 (4.4)	
Male	1,055 (31.1)	2,341 (68.9)	
Age	59.88±11.43	59.48±11.31	0.23
Blood transfusion, mL	22.37±133.90	33.32±181.64	0.01
Surgeon volume, /year			0.59
≥100	1,551 (33.7)	3,052 (66.3)	
<100	215 (34.8)	402 (65.2)	
Blood loss, mL	183.60±108.41	205.38±165.66	<0.001
Surgical approach			0.048
Open	1,437 (33.2)	2,887 (66.8)	
Laparoscopic	329 (36.7)	567 (63.3)	
nCRT			<0.001
No	1,373 (35.4)	2,504 (64.6)	
Yes	393 (29.3)	950 (70.7)	
Distance, cm	9.42±2.92	5.76±2.52	<0.001
Stenosis or obstruction			0.06
No	1,207 (34.9)	2,256 (65.1)	
Yes	659 (37.5)	1,098 (62.5)	
Pathological types			0.35
Well differentiated	44 (32.1)	93 (67.9)	
Moderately differentiated	1,440 (33.9)	2,810 (66.1)	
Poorly differentiated	86 (35.4)	157 (64.6)	
Mucinous	191 (34.1)	369 (65.9)	
Signet ring cell	5 (16.7)	25 (83.3)	
pT stage			0.30
1, 2	698 (36.7)	1,202 (63.3)	
3, 4	1,268 (38.2)	2,052 (61.8)	
pN stage			0.84
0	1,083 (35.9)	1,936 (64.1)	
1, 2	783 (35.6)	1,418 (64.4)	
pALB, g/L			0.04
≥35	1,674 (33.5)	3,318 (66.5)	
<35	92 (40.4)	136 (59.6)	
pHGB, g/L			0.16
≥90	1,721 (33.7)	3,387 (66.3)	
<90	45 (40.2)	67 (59.8)	
Diabetes			0.10
No	1,561 (34.3)	2,996 (65.7)	
Yes	205 (30.9)	458 (69.1)	
ASA score			0.73
≤2	1,610 (33.9)	3,139 (66.1)	
≥3	156 (33.1)	315 (66.9)	
CA199, U/mL			0.33
≤37	1,880 (41.2)	2,679 (58.8)	
>37	286 (43.3)	375 (56.7)	
CEA, ng/mL			0.07
≤5	1,141 (33.0)	2,319 (67.0)	
>5	625 (35.5)	1,135 (64.5)	

Data were presented as n (%) or mean ± standard deviation. AL, anastomotic leakage; BMI, body mass index; nCRT, neoadjuvant chemoradiotherapy; pALB, preoperative albumin; pHGB, preoperative hemoglobin; ASA, American Society of Anesthesiologists; CEA, carcinoembryonic antigen; CA199, carbohydrate antigen 199.

Table S4 Relationship between stoma and reoperation (n=326)

Stoma	Non-reoperation	Reoperation	P value
No	46 (63.0%)	27 (37.0%)	<0.001
Yes	251 (99.2%)	2 (0.8%)	

Table S5 Relationship between KRAS and AL (n=3,806)

KRAS	Patient without AL	Patient with AL	P value
Wild	2,002 (93.8%)	132 (6.2%)	0.784
Mutant	1,573 (94.1%)	99 (5.9%)	

AL, anastomotic leakage.