

**SERVIZIO SANITARIO REGIONALE  
EMILIA-ROMAGNA**  
Azienda Ospedaliero - Universitaria di Ferrara



12 Febbraio, ore 8.30 - 17.30		ADVANCES IN RECTAL CANCER MANAGEMENT: NEW INSIGHTS FOR EVIDENCE-BASED PRACTICE		SIPAD		
8.30	REGISTRAZIONE DEI PARTICIPANTI	12.00	"The perfect TME": parametri qualitativi di una TME - Paolo Delio			
9.00	<b>SALUTI DELLE AUTORITÀ</b> Matteo Lurio - Magnifico Rettore Università degli Studi di Napoli Federico II Giuseppe Longo - Direttore Generale A.O.U. Policlinico Federico II Giovanni Esposito - Presidente della Scuola di Medicina e Chirurgia Giovanni Domenico De Palma - Direttore D.A.I. Chirurgia Generale, dei Trapianti e Gastro. Vincenzo Botino - Presidente ACOI Salvatore Ramuscello - Presidente SIPAD	12.15	Beyond TME surgery - Salomone Di Savio			
9.20	<b>INTRODUZIONE AL CONGRESSO:</b> Vincenzo Piloni - Direttore U.O.C. Chirurgia Generale, Oncologica e Minimivasi <b>SESSIONE I - NEW FRONTIERS</b> Presidente: Roberto Bianco Moderatori: Chiara Carlomagno, Antonio Avallone	12.30	La prevenzione del leakage anatomico dopo Resezione Anteriore del Retto - Gabriele Anania			
9.45	Immunotherapy and Mismatch Repair Deficiency - Vincenzo De Falco	12.45	Angiografia a fluorescenza con ICG assistita da intelligenza Artificiale - Pasquale Arpaia			
10.00	TNI: why, when, how? - Alfonso De Stefano	13.00	Approcci innovativi per la resezione delle metastasi epatiche - Francesco Izzo			
10.15	Organ preservation strategy: the "Watch and Wait" approach - Antonio Farfella	13.15	Invitati alla discussione: Antonio Brillantino, Alberto Buonanno, Domenico Carbone, Gaetano Cimmino, Dario D'Antonio, Antonio Giuliani, Vincenzo Landolfi, Alberto Marvaso, Pasquale Talento.			
10.30	Invitati alla discussione: Luigi Bruscianno, Filomena Calabrese, Bruno Daniele, Giovanni Fiore, Gaetano Luglio, Roberta Marcianno, Vincenzo Montesarchio, Daniela Rega, Dario Scala	13.30	<b>LUNCH</b>			
11.00	<b>Letture Magistrali:</b> Le nuove tecnologie in Chirurgia del Retto: dove andiamo? Francesco Cordone	13.30	<b>SESSIONE III - DIDACTIC VIDEO SESSION</b> Presidente: Felice Borghi - Salvatore Ramuscello Moderatori: Mario Fortunato Armettino, Marco Caricato, Nicolò De Manini			
11.15	<b>COFFEE BREAK</b>	14.45	Robotic TME (video) - Giovanni Ferrari			
	<b>SESSIONE II - IMPROVING SURGICAL PRACTICE</b> Presidente: Ludovico Dolcini Moderatori: Francesco Bianco, Luigi Bacci, Carlo Molino	15.00	<b>EXPERT OPINION: HOW TO DO IT</b> 15.00 Posizionamento dei trocars e single/dual docking - Biagio Sodano 15.10 Agnizione vascolare: prime arterie e vene? Legatura a alla o laser? - Mario Ammarchio 15.20 Mobilizzazione flessura splenica: cosa cambia in robotica - Graziano Ceccarelli 15.30 Angiografia con Fluorescenza (ICG): un valore aggiunto? - Felice Pirozzi 15.40 Capire ed Energy device: il mio strumento? - Pietro Malda 15.50 Ileostomia di protezione: sistematica o selettiva? - Diego Cucurullo	16.00	Invitati alla discussione: Carmine Anzopoli, Giovanni Aprisi, Antonio Cricelli, Giampaolo Formisano, Gianluigi Iarolino, Francesco Savio Lucido, Marco Milone, Nicola Sanguinano, Antonio Sciuto, Fabrizio Scognamiglio, Giovanni Tebala.	
			<b>SESSIONE IV - EDUCATIONAL CORNER</b> Presidente: Angela Pezolla			



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UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

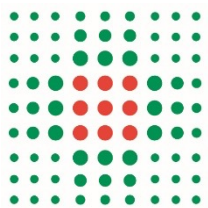
SIPAD Società Italiana Patologia Apparato Digerente

Presidente Vincenzo Piloni  
Coord. Scientifico Roberto Peltrini

CONGRESSO REGIONALE SIPAD CAMPANIA  
NAPOLI, 12 FEBBRAIO 2025

**ADVANCES IN  
RECTAL CANCER  
MANAGEMENT**

New insights for evidence-based practice



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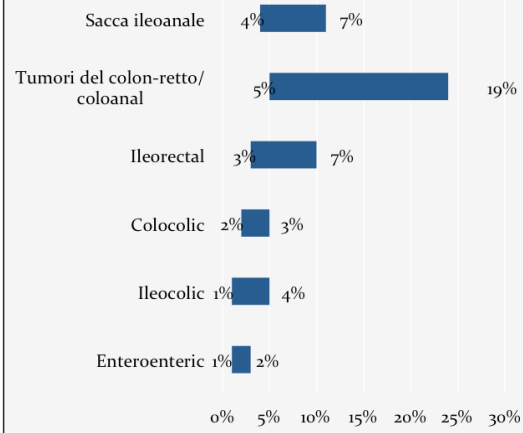


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ORIGINAL ARTICLE



**Tassi di Anastomotic leak  
per sede**



**Risk factors for anastomotic leakage after anterior resection for rectal cancer (RALAR study): A nationwide retrospective study of the Italian Society of Surgical Oncology Colorectal Cancer Network Collaborative Group**

Maurizio Degiuli<sup>1</sup> | Ugo Elmore<sup>2</sup> | Raffaele De Luca<sup>3</sup> | Paola De Nardi<sup>2</sup>

Anastomotic leakage (AL) represents a frequent and severe complication after resection for rectal cancer (RC), with reported incidence and related mortality ranging from 0.0% to 36.3% and from 2% to 9%, respectively [1]. Additionally, many AL-related compli-

J Gastrointest Surg (2014) 18:1176–1185  
DOI 10.1007/s11605-014-2506-4

ORIGINAL ARTICLE

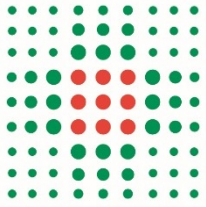


**The Burden of Gastrointestinal Anastomotic Leaks:  
an Evaluation of Clinical and Economic Outcomes**

Jeffrey Hammond · Sangtaeck Lim · Yin Wan · Xin Gao · Anuprita Patkar

Costo senza AL  
Costo con AL

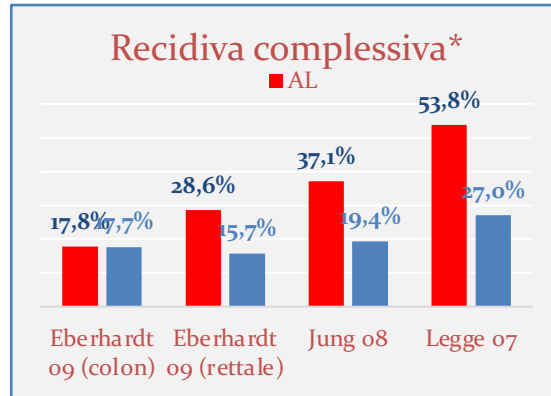
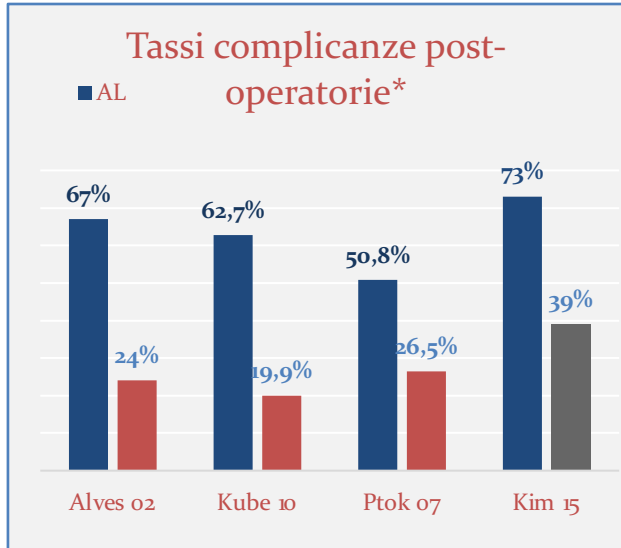




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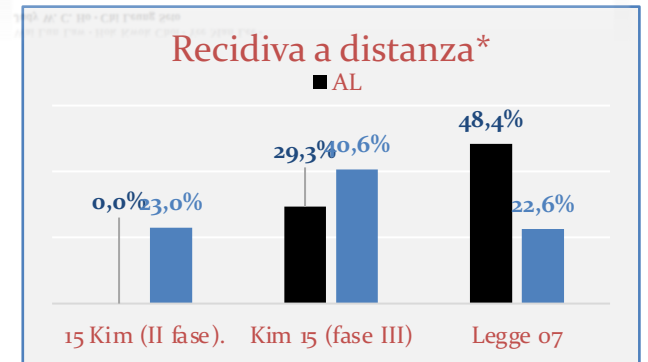
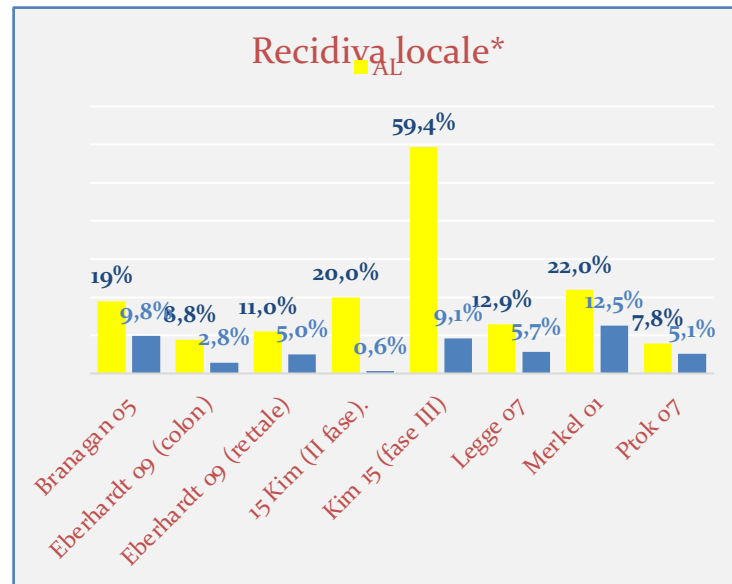
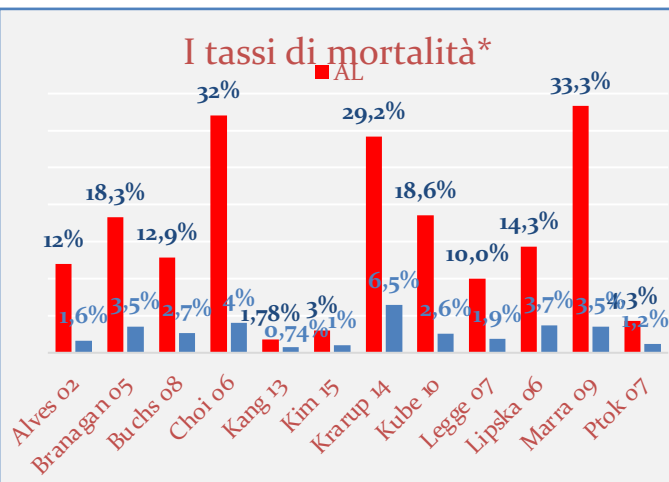
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J Gastrointest Surg (2007) 11:8-15  
DOI 10.1007/s11605-006-0049-z

**Anastomotic Leakage is Associated with Poor Long-Term Outcome in Patients After Curative Colorectal Resection for Malignancy**

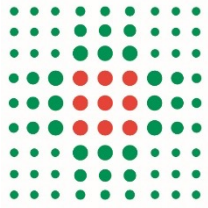
Wai Lun Law · Hok Kwok Choi · Yee Man Lee ·  
Judy W. C. Ho · Chi Leung Seto



OPEN

ESA PAPER

**Long-Term Oncological Outcomes After Colorectal Anastomotic Leakage**  
A Retrospective Dutch Population-based Study



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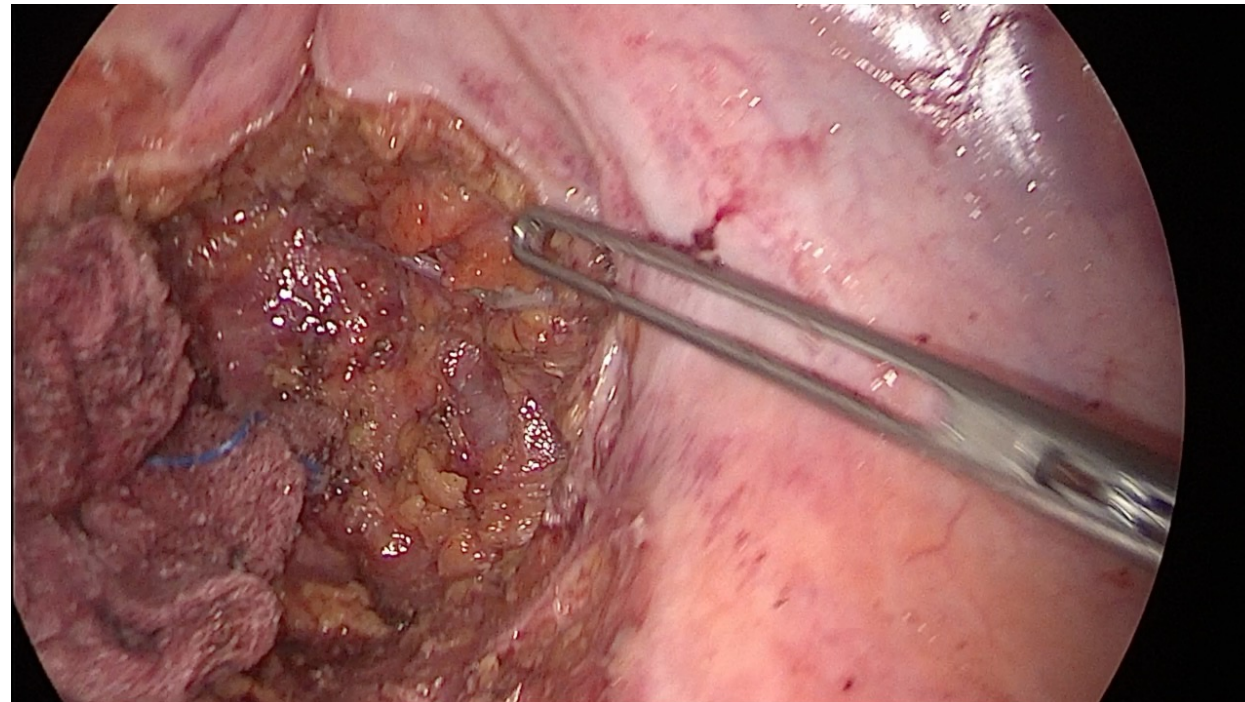
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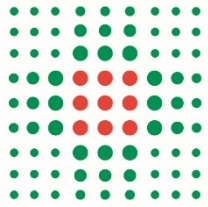
**Prevention**

**Technical  
aspects**

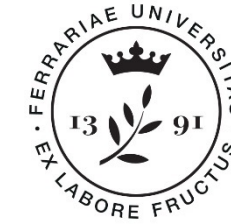
**Early  
diagnosis AL**

**Treatment**





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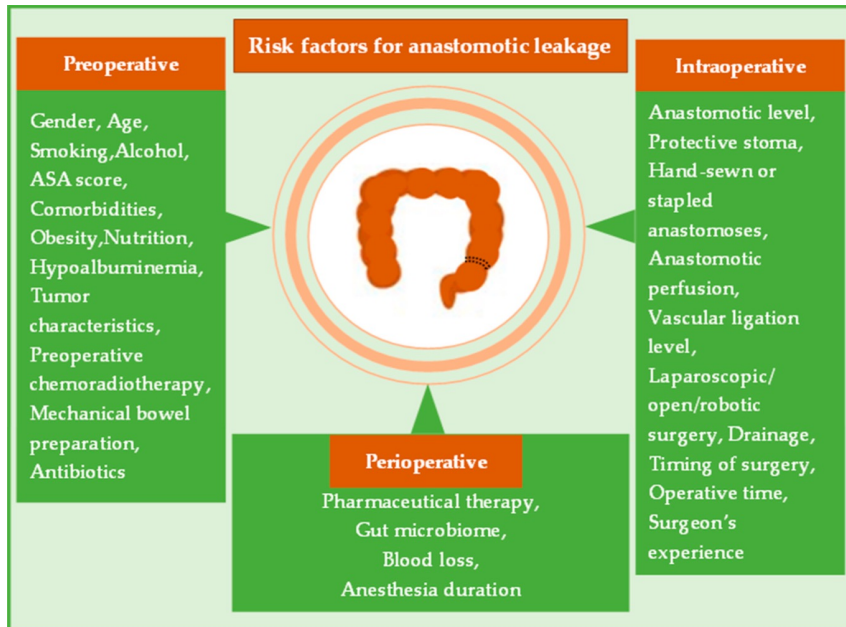
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**Current Oncology**



Review

## Predictive Factors for Anastomotic Leakage Following Colorectal Cancer Surgery: Where Are We and Where Are We Going?



ORIGINAL ARTICLE



## Risk factors for anastomotic leakage after anterior resection for rectal cancer (RALAR study): A nationwide retrospective study of the Italian Society of Surgical Oncology Colorectal Cancer Network Collaborative Group

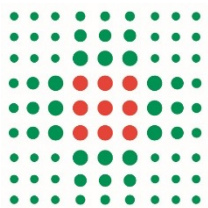
Maurizio Degiuli<sup>1</sup> | Ugo Elmore<sup>2</sup> | Raffaele De Luca<sup>3</sup> | Paola De Nardi<sup>2</sup>

TABLE 2 Treatment-related variables

	No AL	AL	95% CI	Total	P	
No. procedures/year	<10	18 (78.3)	5 (21.7)	75-43.7	23 (100)	0.296
	10-19	397 (89.0)	49 (11.0)	8.6-11	446 (100)	
	20-29	543 (89.8)	62 (10.2)	10.3-13.5	605 (100)	
	30+	3888 (89.9)	436 (10.1)	7.8-10.9	4324 (100)	
Emergency surgery	No	4630 (89.8)	526 (10.2)	8.2-14.3	5156 (100)	0.734
	Yes	82 (88.2)	11 (11.8)	8-12.9	93 (100)	
	(Missing)	134 (89.9)	15 (10.1)		149 (100)	
Number of cartridges	1	1651 (92.0)	143 (8.0)	9.4-11.1	1794 (100)	<0.001
	>1	1108 (87.7)	155 (12.3)	6.1-20.2	1263 (100)	
	(Missing)	2087 (89.1)	254 (10.9)		2341 (100)	
Type of approach	Open surgery	2222 (91.1)	218 (8.9)	6.8-9.3	2440 (100)	0.003
	MIS not converted	2232 (88.9)	280 (11.1)	10.5-14.2	2512 (100)	
	MIS converted	191 (85.3)	33 (14.7)	9.6-12.2	224 (100)	
	(Missing)	201 (90.5)	21 (9.5)		222 (100)	
Type of procedure	Down to up	4640 (89.8)	530 (10.2)	9.9-12.4	5190 (100)	0.883
	Up to down	182 (89.2)	22 (10.8)	10.4-20.1	204 (100)	
	(Missing)	4 (100.0)	0 (0.0)		4 (100)	
Splenic flexure mobilization	No	955 (91.2)	92 (8.8)	6.9-15.9	1047 (100)	0.273
	Yes	3482 (90.0)	386 (10.0)	9.4-11.1	3868 (100)	
	(Missing)	409 (84.7)	74 (15.3)		483 (100)	
Site of vascular ligation	High tie	3922 (90.2)	424 (9.8)	7.1-10.7	4346 (100)	0.454
	Low tie	605 (91.3)	58 (8.7)	9.1-11	663 (100)	
	(Missing)	319 (82.0)	70 (18.0)		389 (100)	
Type of anastomosis	End to end	4240 (89.3)	501 (10.5)	8.9-10.7	4741 (100)	0.101
	Side to end	554 (91.7)	50 (8.3)	6.7-11.2	604 (100)	
	(Missing)	32 (97.0)	1 (0.0)		33 (100)	
Type of anastomosis	Mechanical	4670 (89.8)	529 (10.2)	9.7-11.4	5199 (100)	0.526
	Manual	163 (88.1)	22 (11.9)	6.2-10.8	185 (100)	
	(Missing)	13 (92.9)	1 (7.1)		14 (100)	
Protective ostomy	No	2219 (89.3)	267 (10.7)	9.4-11	2486 (100)	0.066
	Reostomy	1976 (90.6)	206 (9.4)	7.6-17.5	2182 (100)	
	Colostomy	400 (87.1)	59 (12.9)	0.2-33.9	459 (100)	
	(Missing)	251 (92.6)	20 (7.4)		271 (100)	
Combined multiorgan resection	No	3767 (90.8)	380 (9.2)	8.3-10.8	4147 (100)	0.004
	Yes	788 (87.7)	111 (12.3)	9.9-16.3	899 (100)	
	(Missing)	291 (82.7)	41 (17.3)		332 (100)	
Operative time (h)	<3 h 00	992 (92.3)	83 (7.7)	6.2-9.5	1075 (100)	<0.001
	3 h 00-4 h 59	2252 (89.8)	255 (10.2)	9.0-11.4	2507 (100)	
	5 h 00+	1052 (85.5)	178 (14.5)	12.6-16.6	1230 (100)	
	(Missing)	550 (93.9)	36 (6.1)		586 (100)	
Pelvic drain	No	71 (91.0)	7 (9.0)	7.4-10	78 (100)	0.978
	Yes	4486 (90.3)	483 (9.7)	10.9-13.3	4969 (100)	
	(Missing)	289 (82.3)	62 (17.7)		351 (100)	

TABLE 3 Clinical staging and pathological data

	No AL	AL	95% CI	Total	P	
Tumour distance from the AV (cm)	Median (IQR)	9.0 (6.0-12.0)	8.0 (5.0-11.0)	9.0 (6.0-12.0)	0.042	
Cancer location (anatomical subdivision)	Upper rectum	1482 (91.5)	137 (8.5)	3.7-17.6	1619 (100)	0.004
	Middle rectum	2153 (89.1)	263 (10.9)	8.9-11.6	2416 (100)	
	Lower rectum	984 (87.8)	137 (12.2)	13.8-22.1	1121 (100)	
	(Missing)	227 (93.8)	15 (6.2)		242 (100)	
cT	cT0-1-2	1146 (92.2)	97 (7.8)		1243	0.043
	cT3-4	2161 (90.2)	236 (9.8)		2397	
	(Missing)	1539 (87.5)	219 (12.5)		1758	
cN	cN0	1880 (92.2)	159 (7.8)		2039	0.166
	cN1	499 (89.9)	56 (10.1)		555	
	cN2	154 (93.3)	11 (6.7)		165	
	(Missing)	2313 (87.6)	326 (12.4)		2639	
cM	cM0	3299 (91.1)	321 (8.9)		3620	0.750
	cM1	136 (91.9)	12 (8.1)		148	
	(Missing)	85 (94.4)	5 (5.6)	9.7-12.2	90 (100)	<0.001
(y)pT stage	0	388 (91.5)	36 (8.5)	10.4-14.3	424 (100)	
	1	560 (93.6)	38 (6.4)	3.5-10	598 (100)	
	2	1190 (90.8)	121 (9.2)	6-11.6	1311 (100)	
	3	2210 (88.5)	286 (11.5)	4.5-8.6	2496 (100)	
	4	302 (85.6)	51 (14.4)	7.7-10.9	353 (100)	
	(Missing)	111 (88.1)	15 (11.9)		126 (100)	
(y)pN stage	0	3100 (91.0)	307 (9.0)	11-18.6	3407 (100)	<0.001
	1	1047 (88.4)	138 (11.6)	1.8-12.5	1185 (100)	
	2	612 (86.2)	98 (13.8)	6.8-18.9	710 (100)	
	(Missing)	87 (90.6)	9 (9.4)		96 (100)	
pM stage	0	4210 (89.9)	475 (10.1)	9.9-13.6	4685 (100)	0.371
	1	470 (88.5)	61 (11.5)	11.4-16.6	531 (100)	
	(Missing)	166 (91.2)	16 (8.8)		182 (100)	
R grade	0	4279 (90.5)	449 (9.5)	9.3-11	4728 (100)	0.708
	1	82 (89.1)	10 (10.9)	8.9-14.5	92 (100)	
	2	143 (88.8)	18 (11.2)	5.1-13.9	161 (100)	
	(Missing)	342 (82.0)	75 (18.0)		417 (100)	
Mandard TRG No.	Median (IQR)	3.0 (2.0-4.0)	3.0 (2.0-4.0)	3.0 (2.0-4.0)	0.379	
	(Missing)	3355 (89.8)	382 (10.2)		3737 (100)	



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Langenbeck's Archives of Surgery (2023) 408:252  
<https://doi.org/10.1007/s00423-023-02989-z>

REVIEW



## Anastomotic leak risk factors following colon cancer resection: a systematic review and meta-analysis

Juan He<sup>1</sup> · Mei He<sup>2</sup> · Ji-Hong Tang<sup>1</sup> · Xian-Hua Wang<sup>1</sup>

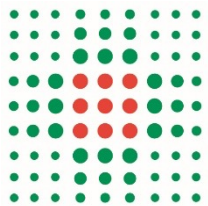
Fattori di rischio indipendenti Leak

I. Sesso maschile		non modificabile
II. BMI $\geq 25.5$ kg/m <sup>2</sup>		non modificabile
III. ASA score		non modificabile
IV. Comorbidità polmonari		non modificabile
V. Chirurgia Open		MODIFICABILE
VI. Urgenza		non modificabile
VII. Tipo di resezione		non modificabile



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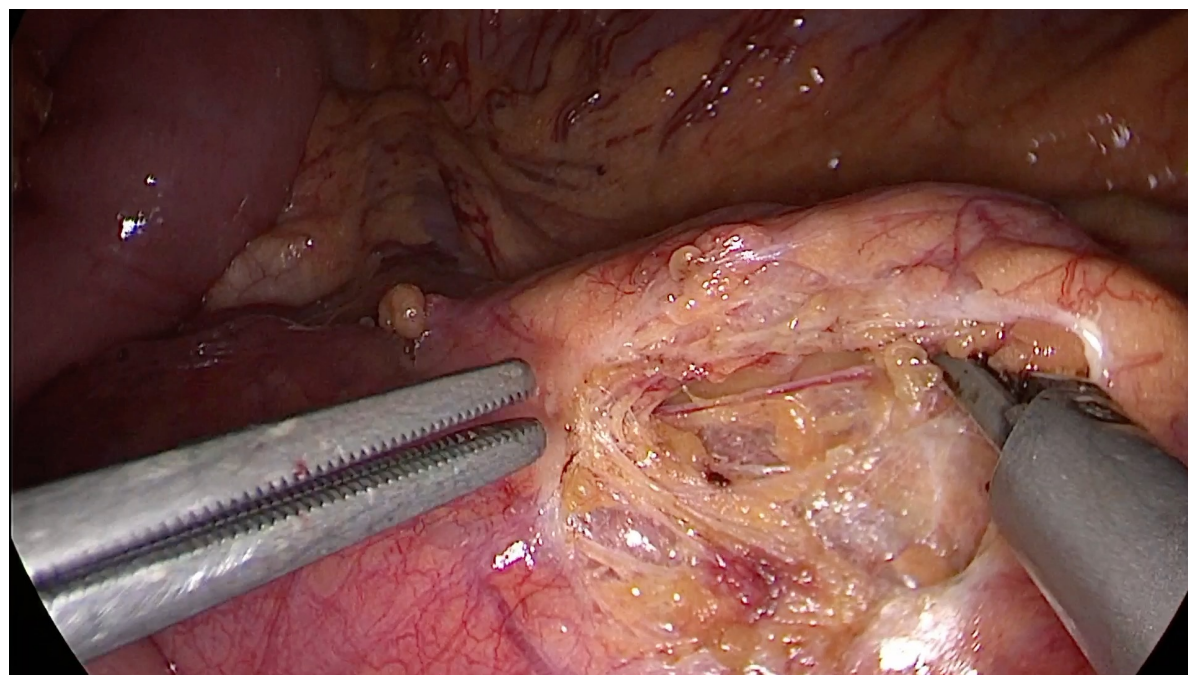
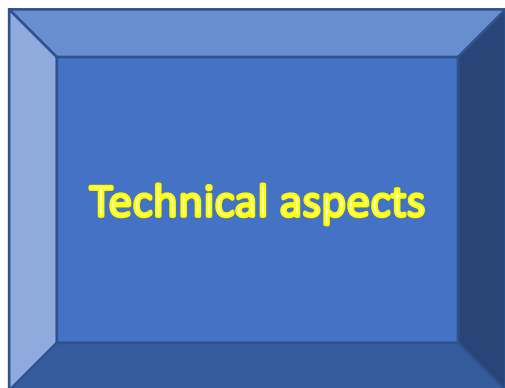
In this study, a systematic review and meta-analysis identified male sex, BMI, obesity, comorbid lung disease, anaesthetic ASA score, emergency surgery, open surgery and type of resection as risk factors for AL after colon cancer resec-



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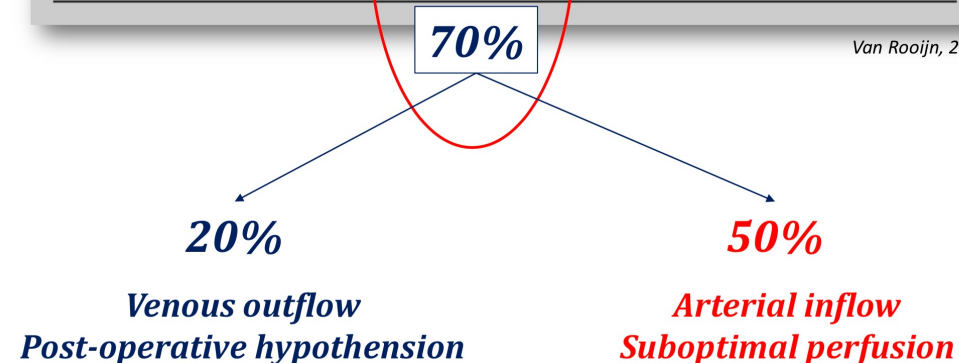
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**Table 1**  
This is an overview of literature on intraoperative modifiable risk factors CAL. Risk factors are categorized into three subgroups: general status, tissue perfusion and surgery related risk factors. Reference numbers are given (...) for each intraoperative modifiable risk factor.

General status	Tissue perfusion	Surgery related
Hyperglycemia [19–35]	Blood loss and anemia [4,34,38–57]	Antibiotics [90–96]
Temperature [31,36,37]	Tissue oxygenation [36,58–63]	Analgesia [43,79,87,97–103]
	Inotropes/Vasopressors [38,64,65]	Duration of surgery [104–109]
	Blood pressure [38,66,67]	Intraoperative events [110–114]
	Fluid management [52,68–83]	Contamination [41,84,106,115–131]
	Blood transfusion [45,84–89]	Surgical experience [45,132–136]

Van Rooijen, 2016



International Journal of Surgery 36 (2016) 183–200



Contents lists available at ScienceDirect

**International Journal of Surgery**

journal homepage: [www.journal-surgery.net](http://www.journal-surgery.net)

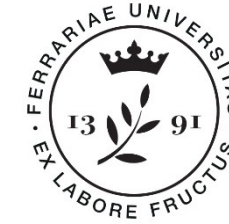
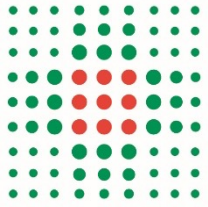


Review

**Intraoperative modifiable risk factors of colorectal anastomotic leakage: Why surgeons and anesthesiologists should act together**

S.J. van Rooijen <sup>a,\*</sup>, D. Huisman <sup>b</sup>, M. Stuijvenberg <sup>a</sup>, J. Stens <sup>b</sup>, R.M.H. Roumen <sup>a</sup>,





## Technical aspects

Perfusion

Tension

Technique

LCA preservation



**Table 1** Average elongation after each procedure

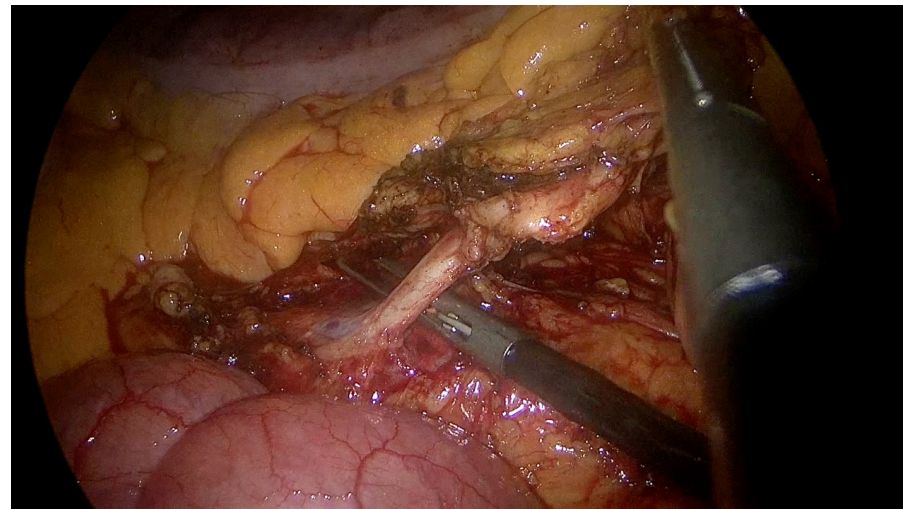
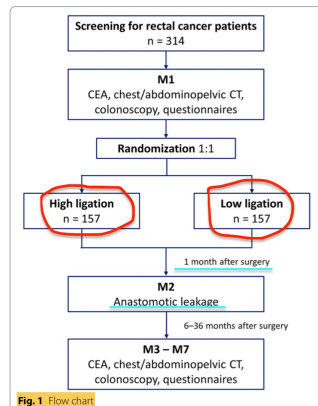
	I. Low ligation of IMA	II. High ligation of IMA	III. High ligation of IMA plus splenic flexure mobilization	IV. High ligation of IMA plus splenic flexure mobilization plus high ligation of IMV
Elongation of colosigmoid junction	2.08 ± 4.39	5.02 ± 5.51	8.20 ± 5.95	17.98 ± 6.80
Elongation of rectosigmoid junction	13.15 ± 5.60	14.73 ± 6.44	18.90 ± 4.45	28.75 ± 5.72

Lee et al. *Trials* (2022) 23:920  
<https://doi.org/10.1186/s13063-022-06862-0>

STUDY PROTOCOL Open Access

Anastomotic leak after minimally invasive anterior resection for rectal cancer with high versus low ligation of the inferior mesenteric artery: a study protocol for a multicentre randomized clinical trial

Soo Young Lee<sup>1</sup>, Sohyun Kim<sup>2</sup>, Gyung Mo Son<sup>3</sup>, Hye Jin Kim<sup>4</sup>, Soo Yeun Park<sup>5</sup>, Jun Seok Park<sup>6</sup>, Chang Hyun Kim<sup>1</sup>, Gi Won Ha<sup>7</sup>, Kyung-Ha Lee<sup>8</sup>, Jin Soo Kim<sup>7</sup>, Ki Beom Bae<sup>8</sup>, Sung Uk Bae<sup>9</sup>, Sung Il Kang<sup>9</sup> and Korean ColoRectal surgeOn Study group of the Southern province (K-CROSS)



Surgical Endoscopy (2020) 34:4593–4600  
<https://doi.org/10.1007/s00464-019-07203-0>

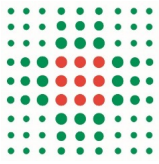
2019 SAGES ORAL

**Association of high ligation versus low ligation of the inferior mesenteric artery on anastomotic leak, postoperative complications, and mortality after minimally invasive surgery for distal sigmoid and rectal cancer**

Arman Draginov<sup>1</sup> · Tyler R. Chesney<sup>1,2</sup> · Humzah A. Quereshy<sup>3</sup> · Sami A. Chadi<sup>1,2</sup> · Fayez A. Quereshy<sup>1,2,4</sup>

**Conclusions** There was no association of level of ligation of the IMA with anastomotic leak, postoperative complications as a composite, or death. The choice of high or low ligation of the IMA should be made based on technical factors such as length for the creation of a tension-free anastomosis.

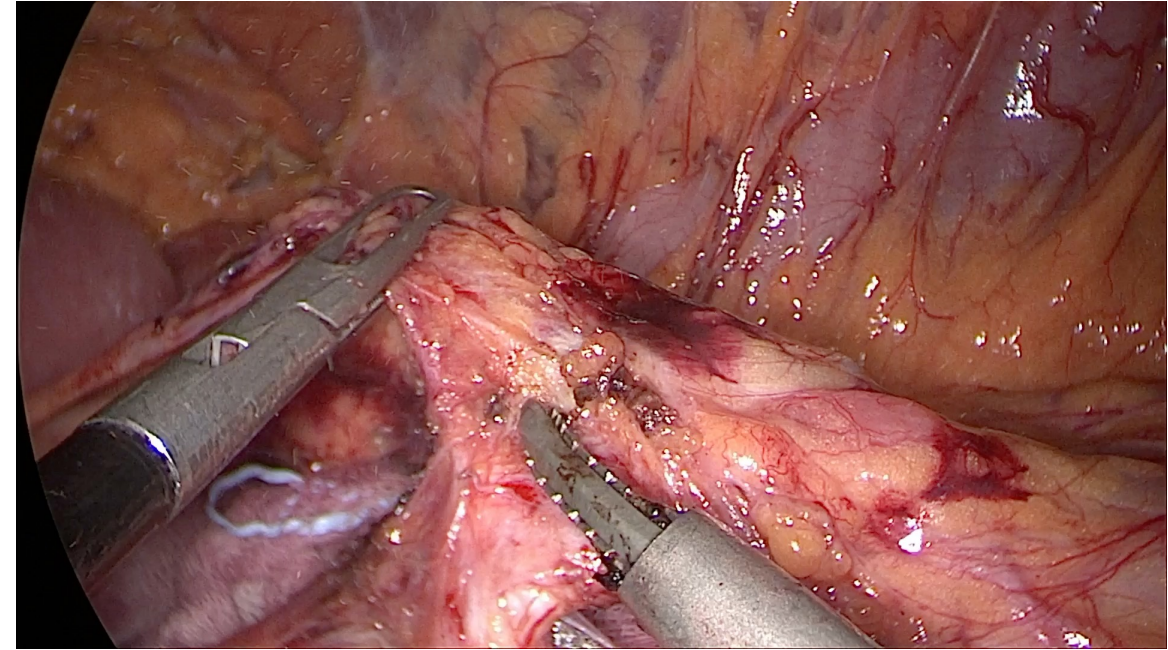




- Vascular supply/Tension free:
  - IMA ligation

Low versus high ligation of the IMA is still widely debated in the literature

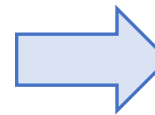
*No evidence of oncological different outcomes*



**But remember....**

Preserve the left colic artery

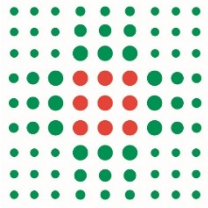
*additional blood supply to the anastomosis reducing the risks of nervous damage*



*PS: preserving left colic artery it could be unuseful left splenic flexure takedown*

Radiological positive LNs around the IMA or ultra low anterior resection

*High ligation is the choice*



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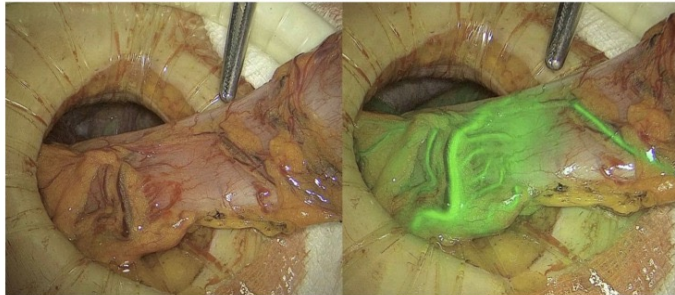
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## Technical aspects

Perfusion Tension Technique



The application of the fluorescence angiography led to reconsideration of the resection margin because of inadequate blood supply in 10.8% of cases. The AL rate was 3.5% after indocyanine green angiography and 7.4% after routine assessment of blood supply ( $P = 0.002$ )



A promising new technology today increasingly used and established is intra-operative fluorescence angiography with indocyanine green. Evidence for the impact of intraoperative fluorescence angiography in reducing AL after colorectal anastomosis is growing.



## Perfusion in rectal surgery



**Role of ICG in preventing complications after rectal cancer surgery**

**Theory**  
VS  
**Real life**

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RANDOMIZED CONTROLLED TRIAL

May 2023

ANNALS OF SURGERY

## Blood Perfusion Assessment by Indocyanine Green Fluorescence Imaging for Minimally Invasive Rectal Cancer Surgery (EssentiAL trial) A Randomized Clinical Trial

Watanabe, Jun MD, PhD<sup>1</sup>; Takemasa, Ichiro MD, PhD, FACS<sup>1</sup>; Kotake, Masanori MD, PhD<sup>1</sup>; Noura, Shingo MD, PhD<sup>2</sup>; Kimura, Kei MD, PhD<sup>3</sup>; Suwa, Hirokazu MD<sup>4</sup>; Tei, Mitsuyoshi MD, PhD<sup>5</sup>; Takano, Yoshinao MD, PhD<sup>6</sup>; Munakata, Koji MD, PhD<sup>7</sup>; Matoba, Shuichiro MD, PhD<sup>8</sup>; Yamagishi, Sigeru MD, PhD<sup>9</sup>; Yasui, Masayoshi MD, PhD<sup>10</sup>; Kato, Takeshi MD, PhD<sup>11</sup>; Ishibe, Atsushi MD, PhD<sup>12</sup>; Shiozawa, Manabu MD, PhD<sup>13</sup>; Ishii, Yoshiyuki MD, PhD<sup>14</sup>; Yabuno, Taichi MD<sup>15</sup>; Nitta, Toshikatsu MD, PhD<sup>16</sup>; Saito, Shuji MD, PhD<sup>17</sup>; Saigusa, Yusuke PhD<sup>18</sup>; Watanabe, Masahiko MD, PhD<sup>19</sup>; for the EssentiAL Trial Group

The rate of anastomotic leakage (Grade A+B+C) was significantly lower in the ICG+ group (**7.6%**) than in the ICG- group (**11.8%**) (relative risk, 0.645; 95% confidence interval 0.422-0.987; **P=0.041**).

The rate of anastomotic leakage (Grade B+C) was **4.7%** in the ICG+ group and **8.2%** in the ICG- group (P=0.044)

RANDOMIZED CONTROLLED TRIAL

May 2023

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Patients with **clinically stage 0-III rectal carcinoma less than 12 cm** from the anal verge, scheduled for **minimally invasive sphincter-preserving surgery** were preoperatively randomly assigned to receive a blood flow evaluation by ICG-FI (ICG+ group) or no blood flow evaluation by ICG-FI (ICG- group). **The primary endpoint was the anastomotic leakage rate** (Grade A+B+C, expected reduction rate of 6%) analyzed in the modified **intention-to-treat** population.

RANDOMIZED CONTROLLED TRIAL

May 2023

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after exclusion of 11 patients, 839 were subject to the modified intention-to-treat population (**422 in the ICG+ group and 417 in the ICG- group**).

RANDOMIZED CONTROLLED TRIAL

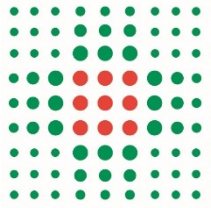
May 2023

ANNALS OF SURGERY

## Blood Perfusion Assessment by Indocyanine Green Fluorescence Imaging for Minimally Invasive Rectal Cancer Surgery (EssentiAL trial) A Randomized Clinical Trial

Watanabe, Jun MD, PhD<sup>1</sup>; Takemasa, Ichiro MD, PhD, FACS<sup>1</sup>; Kotake, Masanori MD, PhD<sup>2</sup>; Noura, Shingo MD, PhD<sup>3</sup>; Kimura, Kei MD, PhD<sup>4</sup>; Suwa, Hirokazu MD<sup>5</sup>; Tei, Mitsuyoshi MD, PhD<sup>6</sup>; Takano, Yoshinao MD, PhD<sup>7</sup>; Munakata, Koji MD, PhD<sup>8</sup>; Matoba, Shuichiro MD, PhD<sup>9</sup>; Yamagishi, Sigeru MD, PhD<sup>10</sup>; Yasui, Masayoshi MD, PhD<sup>11</sup>; Kato, Takeshi MD, PhD<sup>12</sup>; Ishibe, Atsushi MD, PhD<sup>13</sup>; Shiozawa, Manabu MD, PhD<sup>14</sup>; Ishii, Yoshiyuki MD, PhD<sup>15</sup>; Yabuno, Taichi MD<sup>16</sup>; Nitta, Toshikatsu MD, PhD<sup>17</sup>; Saito, Shuji MD, PhD<sup>18</sup>; Saigusa, Yusuke PhD<sup>19</sup>; Watanabe, Masahiko MD, PhD<sup>20</sup>; for the EssentiAL Trial Group

...the actual reduction rate of anastomotic leakage in the ICG+ group was lower than the expected reduction rate



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Technical aspects

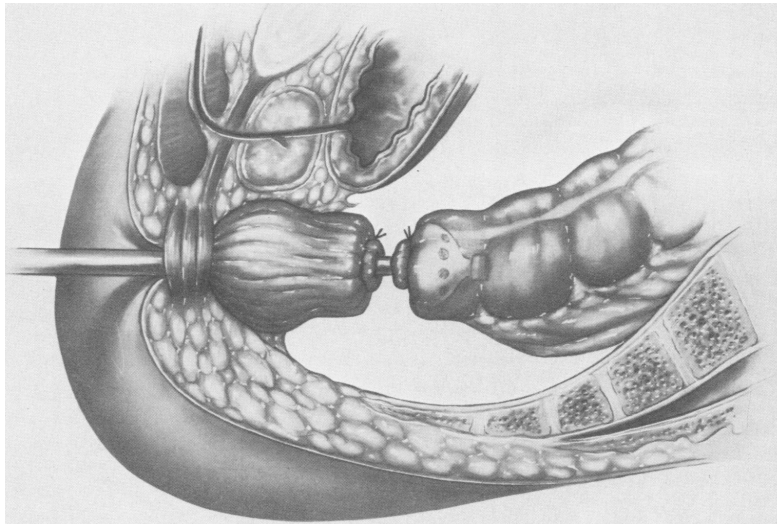
Perfusion Tension **Technique**



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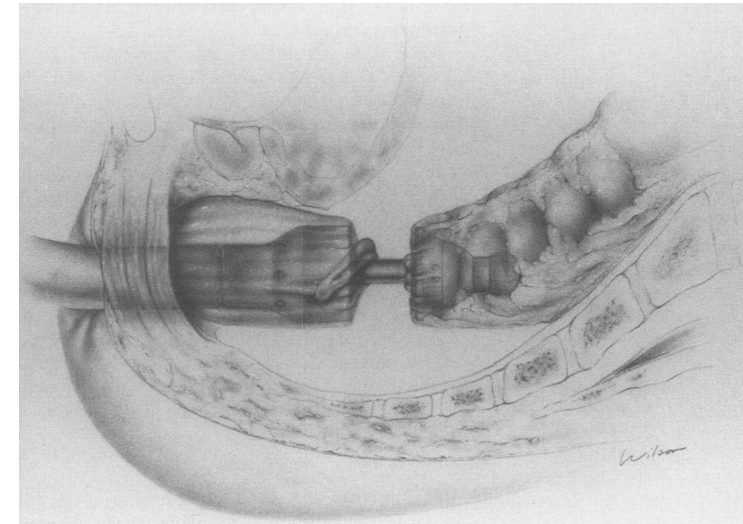
Single Stapled



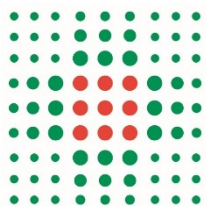
Debated

VS

Duble Stapled



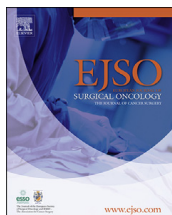
Standardized



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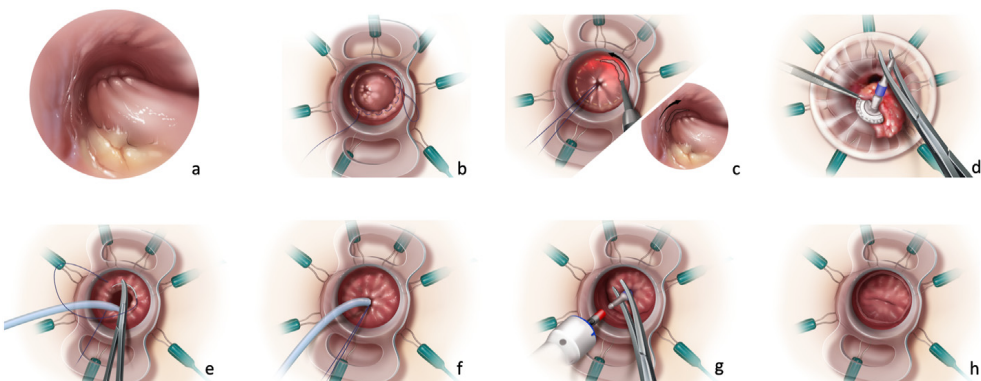


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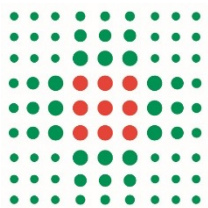
Transanal Transection and Single-Staypled Anastomosis (TTSS): A comparison of anastomotic leak rates with the double-stapled technique and with transanal total mesorectal excision (TaTME) for rectal cancer

Antonino Spinelli <sup>a, b, 1, \*</sup>, Caterina Foppa <sup>a, b, 1</sup>, Michele Carvello <sup>a, b</sup>, Matteo Sacchi <sup>b</sup>,  
Francesca De Lucia <sup>b</sup>, Giuseppe Clerico <sup>b</sup>, Francesco Maria Carrano <sup>b</sup>, Annalisa Maroli <sup>b</sup>,  
Marco Montorsi <sup>a, b</sup>, Richard J. Heald <sup>c</sup>

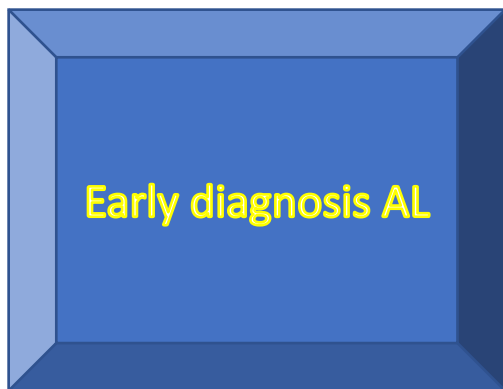


	DS 127	TaTME 100	TTSS 50	
AL	17,5%	6%	2%	p=0.005
Reintervention	12,6%	5%	2%	p=0.003

**Conclusion:** Transanal transection and double-pursestring, single-stapled anastomosis were associated with a lower anastomotic leak rate after minimally invasive total mesorectal excision for magnetic resonance imaging-defined low rectal cancer.



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**Table 1: The Dutch leakage score.**

Variables	Scores
<b>Fever &gt;38°C<sup>#</sup></b>	1
<b>Respiratory frequency &gt;30/ min</b>	1
<b>Cardiac frequency &gt; 100 /min</b>	1
<b>Oliguria (&lt;30 ml/hora o &lt;700 ml al día)</b>	1
<b>Agitation or lethargy</b>	2
<b>Clinical impairment</b>	2
<b>Íleo</b>	2
<b>Gastric retention</b>	2
<b>Surgical wound dehiscence</b>	2
<b>Abdominal pain</b>	2
<b>Leukocytosis or CRP* elevation &gt;5%</b>	1
<b>Creatinine elevation or urea &gt;5%</b>	1
<b>Enteral nutrition</b>	1
<b>Parenteral nutrition</b>	2


Definition and severity grading of anastomotic leakage (AL) after colorectal resection.

Definition	
Defect of the intestinal wall integrity at the colorectal or colo-anal anastomosis site (including suture and staple lines of neorectal reservoirs) leading to a communication between the intra- and extra-luminal compartments. A pelvic abscess close to the anastomosis is also considered as AL.	
Grade	
A	AL requiring no active therapeutic intervention
B	AL requiring active therapeutic intervention but manageable without re-laparotomy
C	AL requiring re-laparotomy

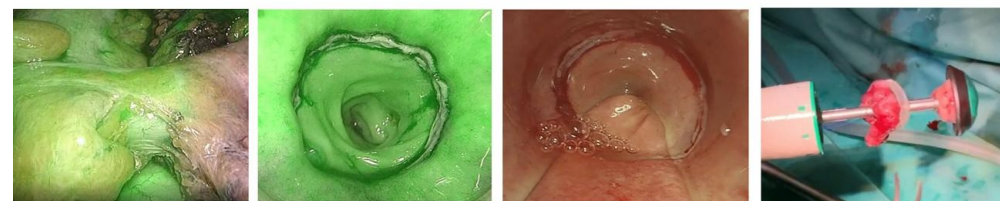
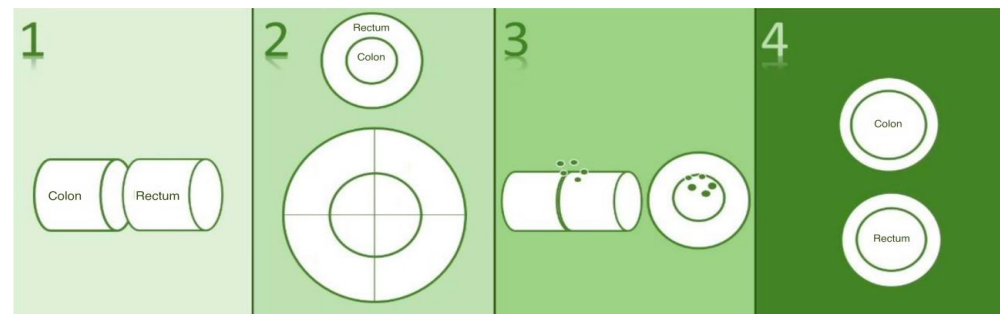


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## '4-Check' protocol for intraoperative anastomotic assessment during transanal total mesorectal excision: retrospective cohort study

Flavio Tirelli , Laura Lorenzon, Alberto Biondi\* Ilaria Neri, Gloria Santoro and Roberto Persiani

*BJS Open*, 2023, Vol. 7, No. 4



Extraluminal NIR ICG-induced FA

Intraluminal NIR ICG-induced FA

Air-leak test and reverse (intraluminal air-leak test)

Anastomotic doughnuts assessment

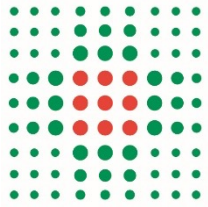
Int J Colorectal Dis (2016) 31:1409–1417

DOI 10.1007/s00384-016-2616-4

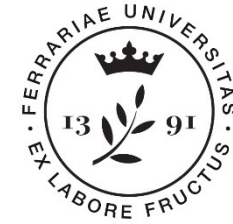


REVIEW

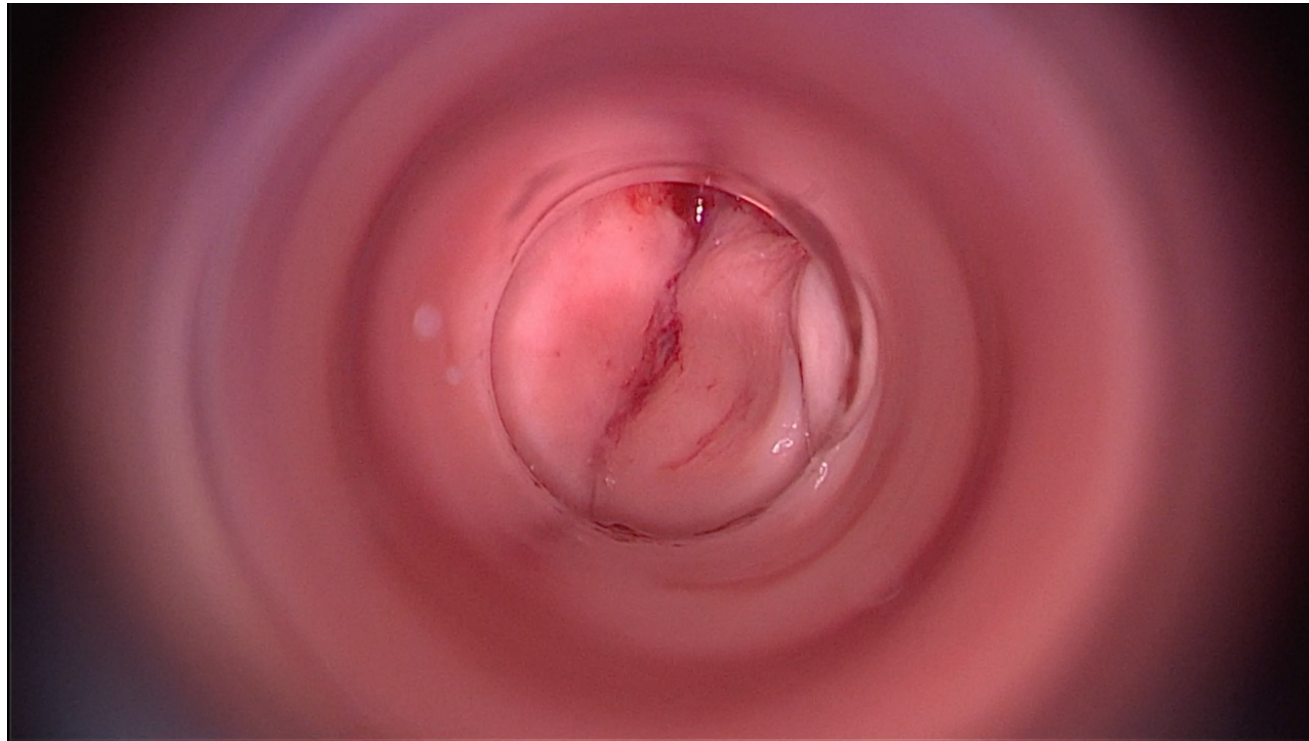
## Is the intraoperative air leak test effective in the prevention of colorectal anastomotic leakage? A systematic review and meta-analysis



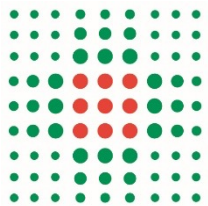
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**Controllo Endoscopico  
Con  
Bubble test**



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## ACS score

American college of surgeon risk calculation

# Diagnosi

Il riconoscimento precoce è fondamentale

ACS NSQIP® | Surgical Risk Calculator | ACS AMERICAN COLLEGE OF SURGEONS

Home | About | FAQ | ACS Website | ACS NSQIP Website

### Enter Patient and Surgical Information

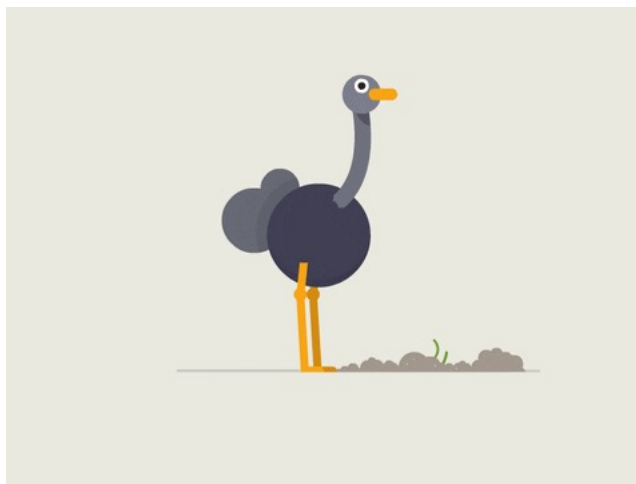
Procedure  Clear

Reset All Selections

Are there other potential appropriate treatment options?  Other Surgical Options  Other Non-operative options  None

Please enter as much of the following information as you can to receive the best risk estimates. A rough estimate will still be generated if you cannot provide all of the information below.

Age (between 18 and 112): <input type="text" value="50"/>	Diabetes: <input type="text" value="No"/>
Sex: Female	Hypertension requiring medication: <input type="text" value="No"/>
Functional Status: Independent	Congestive Heart Failure in 30 days prior to surgery: <input type="text" value="No"/>
Emergency Case: <input type="text" value="No"/>	Dyspnea: <input type="text" value="No"/>
ASA Class: Healthy patient	Current Smoker within 1 Year: <input type="text" value="No"/>
Steroid use for chronic condition: <input type="text" value="No"/>	History of Severe COPD: <input type="text" value="No"/>
Ascites within 30 days prior to surgery: <input type="text" value="No"/>	Dialysis: <input type="text" value="No"/>
Systemic Sepsis within 48 hours prior to surgery: <input type="text" value="None"/>	Acute Renal Failure: <input type="text" value="No"/>
Ventilator Dependent: <input type="text" value="No"/>	BMI Calculation: <input type="text" value=""/>



## Parametri vitali

Ipotensione-Shock,  
frequenza cardiaca, SpO2,  
Diuresi

## Esami ematochimici

Leucocitosi, anemizzazione,  
insufficienza renale, indici di  
flogosi

## Radiologia

Ecografia addome, Eco fast,  
TC addome con mdc e.v. e  
transanale

## Emogasanalisi

P/F, Lattati, Hb

## Dolore

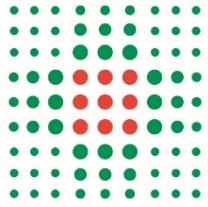
Scale dolore

Scarso controllo con  
analgescici

## Pazienti a rischio

Score rischio





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> *Surgery*. 1980 Nov;88(5):710-4.

## An improved technique for low anterior resection of the rectum using the EEA stapler

C D Knight, F D Griffen

PMID: 7434211

### Abstract

The technique using the EEA stapler for low anterior resection of the rectum has been modified to permit a low anastomosis that can be done with greater facility and safety. The method eliminates the bulky puckering of the ampullary purse string and avoids the disadvantage of joining segments of bowel of different sizes. It also decreases intraoperative contamination and minimizes chances for sepsis. Additionally, it affords an opportunity to check the integrity of the anastomosis. Success of the method seems to document the safety of stapling across a staple line. Results of this method used in a small group of patients are encouraging.

*Knight CD, Griffen FD. An improved technique for low anterior resection of the rectum using the eea stapler. Surgery. 1980;88:710–4.*

**Preoperative, intraoperative and postoperative risk factors for anastomotic leakage after laparoscopic low anterior resection with double stapling technique anastomosis**

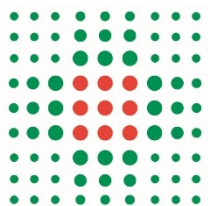
Kenji Kawada, Yoshiharu Sakai

**Table 1 Selected studies to investigate the risk factors for Anastomotic leakage after laparoscopic low anterior resection**

Ref.	Year	Sample size	AL rate	Tumor Location <sup>1</sup>	Covering stoma	Risk factors
Ito <i>et al</i> <sup>[22]</sup>	2008	180	5.0%	R, RS	+	Anastomosis level, multiple stapler firings
Kim <i>et al</i> <sup>[23]</sup>	2009	270	6.3%	R, RS, S	+	Tumor location
Huh <i>et al</i> <sup>[24]</sup>	2010	223	8.5%	R	-	Tumor location, operation time
Choi <i>et al</i> <sup>[25]</sup>	2010	156	10.3%	R, RS	-	Anastomosis level, operation time
Akiyoshi <i>et al</i> <sup>[26]</sup>	2011	363	3.6%	R, RS	+	Tumor location, abdominal drain
Yamamoto <i>et al</i> <sup>[27]</sup>	2012	111	5.4%	R	+	BMI
Park <i>et al</i> <sup>[28]</sup>	2013	1187	6.3%	R, RS	-	Male, stage, transfusion, tumor location preoperative CRT, multiple stapler firings
Kawada <i>et al</i> <sup>[29]</sup>	2014	154	12.3%	R	-	Tumor size, precompression before stapler firings
Katsuno <i>et al</i> <sup>[30]</sup>	2015	209	15.3%	R	+	Male
Kim <i>et al</i> <sup>[31]</sup>	2016	1154	6.7%	R	+	Male, smoking, alcohol intake, previous abdominal surgery, operation time, tumor location, multiple stapler firings

<sup>1</sup>R: Rectum; RS: Rectosigmoid colon; S: Sigmoid colon.

**Step by step analysis**



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## Rectal Section

> [World J Surg.](#) 2022 Nov;46(11):2817-2824. doi: 10.1007/s00268-022-06704-9.  
Epub 2022 Aug 17.

### Short-Term Outcomes of Tri-Staple Versus Universal Staple in Laparoscopic Anterior Resection of Rectal and Distal Sigmoid Colonic Cancer: A Matched-Pair Analysis

Qiang Sun # <sup>1</sup>, Anqi Wang # <sup>1</sup>, Shuxun Wei <sup>1</sup>, Yu Huang <sup>1</sup>, Hao Lu <sup>1</sup>, Zhiqian Hu <sup>2 3</sup>, Haiyang Zhou <sup>4</sup>

**Conclusion:** The usage of Tri-staple in laparoscopic anterior resection of rectal and distal sigmoid colonic cancer is associated with lower postoperative complications compared with Universal staple. Future high-quality randomized controlled trials are needed to confirm our findings.

- Perspective Study
- 270 pts
- Tristaple group 135 pts vs Universal Stapler Group 135
- AL Rate 4.5% vs 11.11 (p0.05)

*Tristaple linear stapler (laparoscopy) is associated with lower rate of Anastomotic Leak (AL)*

### Modified Double-Stapling Technique in Low Anterior Resection for Lower Rectal Carcinoma

Harunobu Sato, Koutarou Maeda, Tsunekazu Hanai, Masahisa Matsumoto, Hiroyuki Aoyama, and Hiroshi Matsuoka

Department of Surgery, Fujita Health University School of Medicine, 1-98 Dengakugakubo, Kutsukake-cho, Toyoake, Aichi 470-1192, Japan

**Surg Today  
2006**



105 pts

AL 4.7%, stricture 0.9%.

median operation time 262 minutes

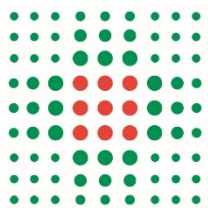
43 pts, open surgery

AL 2.3%, no strictures

**Use of the modified double-stapling technique with vertical division of the rectum during a sphincter-preserving operation for the treatment of a rectal tumor** [Asian Journal of Surgery \(2012\) 35, 110-112](#)

Masahiro Tsubaki\*, Yuichi Ito, Masanori Fujita, Hiroyuki Kato

*In male patients with narrow pelvis: Vertical stapling is a safe and easier procedure*



**Rectal Section**

• **Number of Firings**

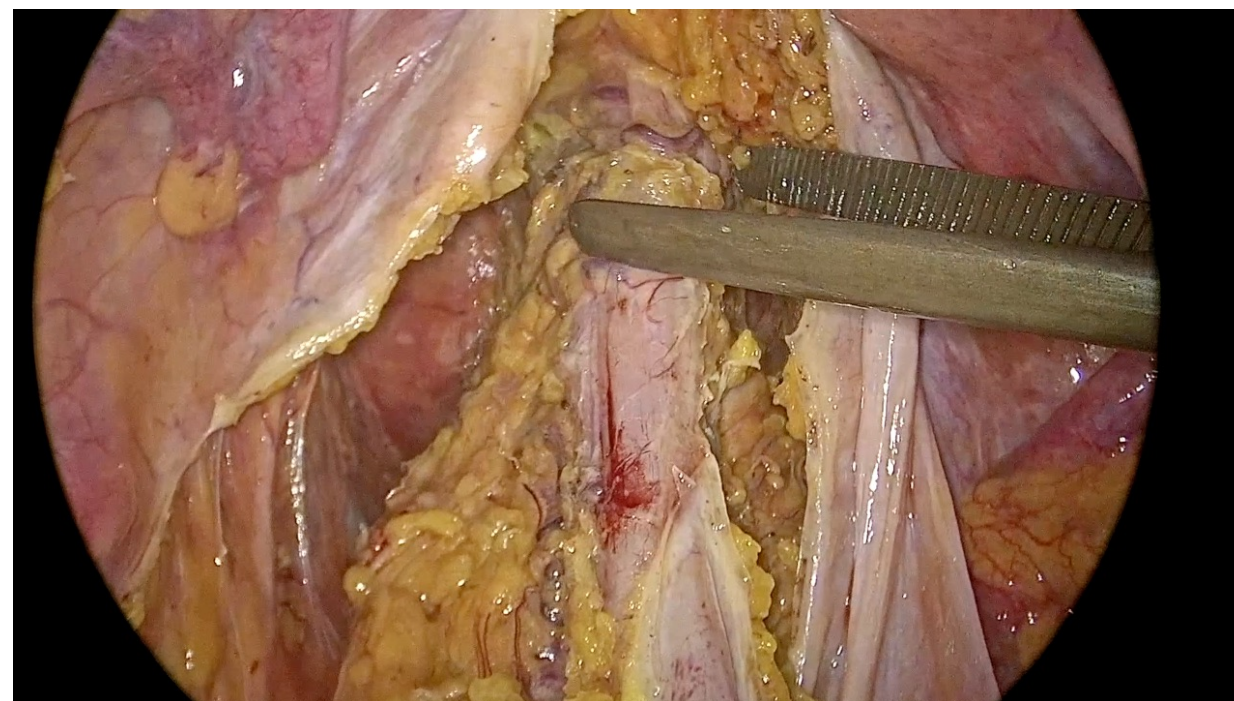
Higher modified Glasgow Prognostic Score and multiple stapler firings for rectal transection are risk factors for anastomotic leakage after low anterior resection in rectal cancer

Wataru Sakamoto, Shinji Ohki, Tomohiro Kikuchi, Hirokazu Okayama, Shotaro Fujita, Hisahito Endo, Motonobu Saito, Zenichiro Saze, Tomoyuki Momma and Koji Kono

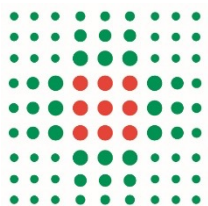
Table 4. Result of Multivariate analysis

variables	OR	95% CI	P value
mGPS (2)	19.61	2.96-125.53	<b>0.02</b>
multiple stapler firing (≥3)	18.19	2.93-112.06	<b>0.02</b>
Intraoperative bleeding (≥250 ml)	3.04	0.66-13.99	0.153

161 pts LAR  
AL rate: 6,8%(11/161)



*Number of firings ≥ 3  
➤ Risk of AL*



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## Rectal Section

### Laparoscopic Low Anterior Resection with Two Planned Stapler Fires

Koki Otsuka, MD, Toshimoto Kimura, MD, Teppei Matsuo, MD,  
Hitoshi Fujii, MD, Mizunori Yaegashi, MD, Kei Sato, MD, Suguru Kondo, MD, Akira Sasaki, MD

*JSLs* 2019

Surgical Outcomes

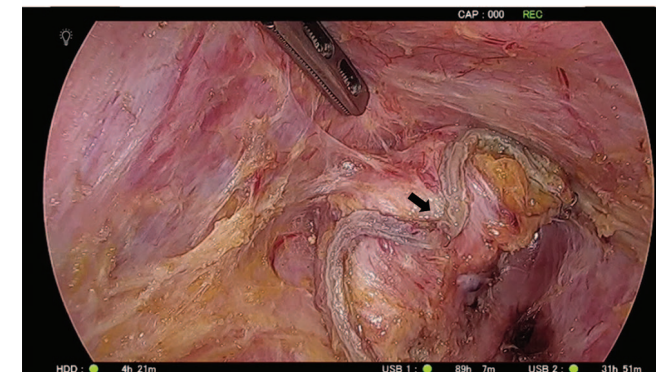
Variables	Population (n = 272)
Conversions (%), n (%)	0 (0)
Operative time (minutes)*	210 (128–447)
Blood loss (mL)*	10.5 (1–446)
Surgical procedures, n (%)	
TME	222 (81.6)
TSME	50 (18.4)
Lateral lymph node dissection, n (%)	9 (3.3)
Number of staplers for rectal transection, n (%)	
2	271 (99.6)
3	1 (0.4)
Protective diverting ileostomy or colostomy, n (%)	49 (18.0)
Anastomotic leakage, n (%)	9 (3.3)

\*, Median (range).

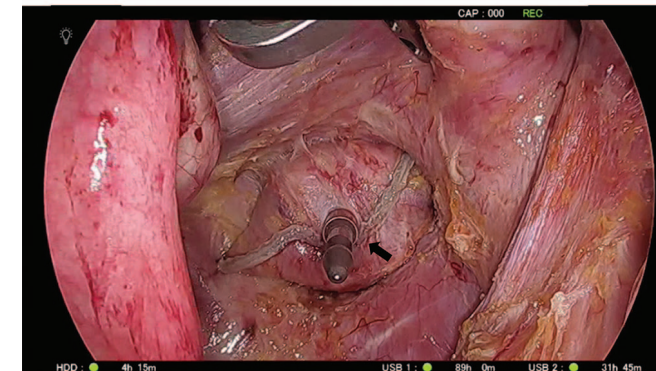
- Perspective Study
- 272 pts LapRAR

*2 planned firings could avoid  
3 or more firings and reduce AL*

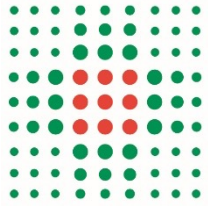
A



B



**Figure 4.** End-to-end anastomosis by DST. (A) Rectal stump from transection with 2 planned linear stapler fires. The intersection of the 2 linear staple lines is located approximately at the center of the stump of the distal rectum →: Intersection. (B) End-to-end anastomosis is performed using DST with a circular stapler. The rod of a circular stapler inserted transanally pierces the rectal stump near the intersection of the 2 linear staple lines. The intersection is easily included in the circular stapler. →: Intersection.



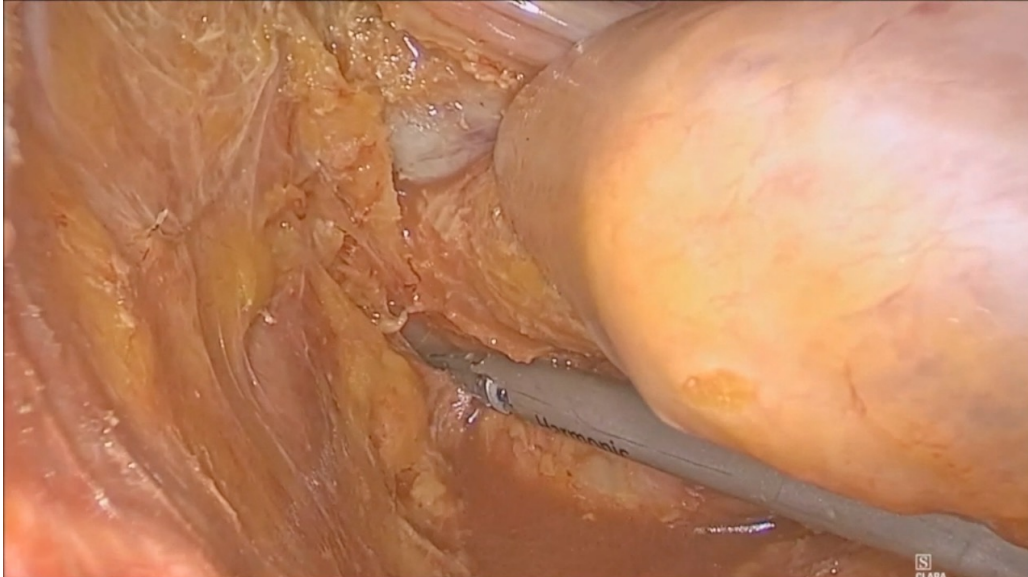
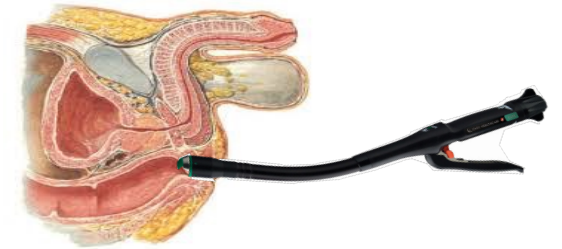
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## Colorectal Anastomosis

- Pay attention while introducing/extracting circular stapler



Questions:

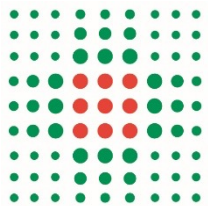
1. While introducing/stapling

- Must we close progressively circular stapler?
- How long holding pushed circular stapler?

2. While removing stapler

- How many clockwise turns?? how many degrees of device's rotation

- *do not force too much not to open rectal stump*
- *push the handle up*
- *close progressively circular stapler*
- *follow device instructions!!*



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Int J Colorectal Dis (2016) 31:1409–1417  
DOI 10.1007/s00384-016-2616-4

REVIEW

### Is the intraoperative air leak test effective in the prevention of colorectal anastomotic leakage? A systematic review and meta-analysis

Zhouqiao Wu<sup>1,2</sup> · Remondus C. J. van de Haar<sup>2</sup> · Cloë L. Sparreboom<sup>2</sup> · Geesien S. A. Boersema<sup>2</sup> · Ziyu Li<sup>1</sup> · Jiafu Ji<sup>1</sup> · Johannes Jeekel<sup>3</sup> · Johan F. Lange<sup>2,4</sup>

Surgical Endoscopy  
<https://doi.org/10.1007/s00464-018-6421-8>

2018 SAGES ORAL

### Intraoperative air leak test reduces the rate of postoperative anastomotic leak: analysis of 777 laparoscopic left-sided colon resections

Marco Ettore Allaix<sup>1</sup> · Adriana Lena<sup>1</sup> · Maurizio Degiuli<sup>1</sup> · Alberto Arezzo<sup>1</sup> · Roberto Passera<sup>2</sup> · Massimiliano Mistrangelo<sup>1</sup> · Mario Morino<sup>1</sup>

*If positive:*

- Suture
- revision of the anastomosis
- and/or proximal diversion

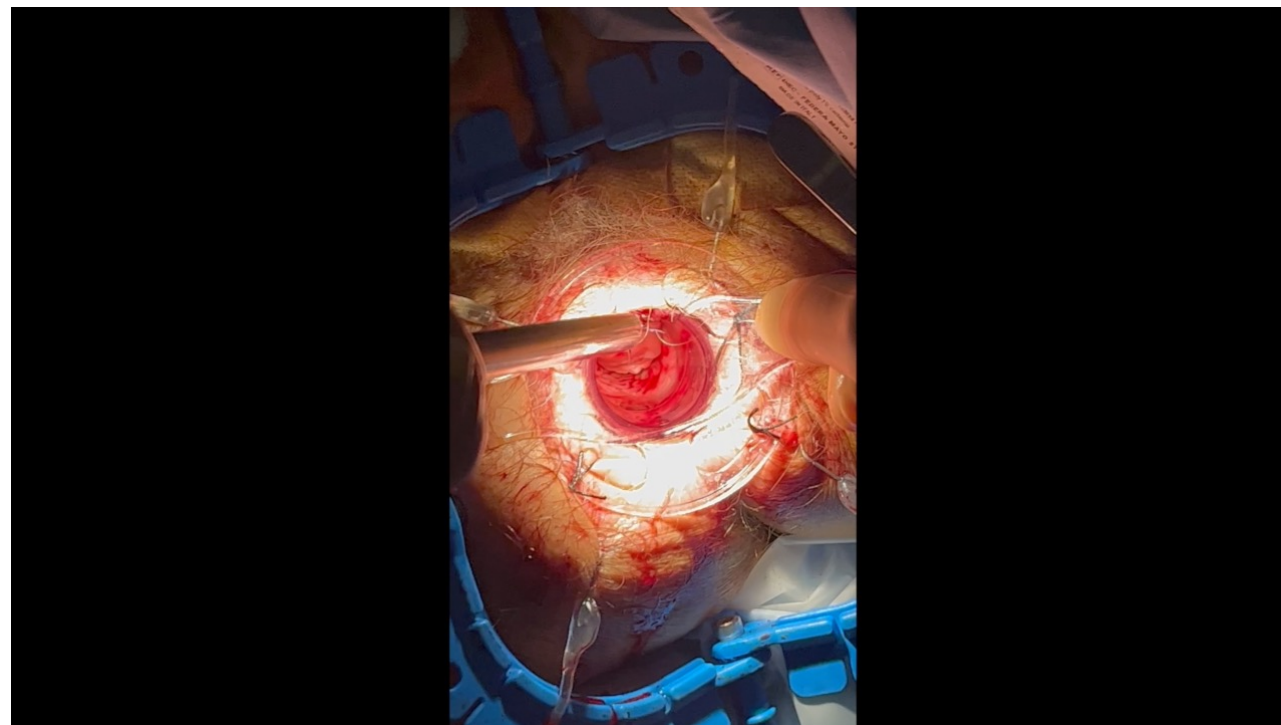
*Methylen Blue endorectal instillation + white gauze :*  
*Not first step*

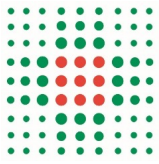
*In case of bubble test positivity to better localize site of leak*



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## Anastomotic Test





## Reinforcing Sutures

# Efficacy of reinforcing sutures for prevention of anastomotic leakage after low anterior resection for rectal cancer: A systematic review and meta-analysis

Shuanhu Wang | Yi Zhang | Song Tao | Yakui Liu | Yi Shi | Jiajia Guan |  
Mulin Liu

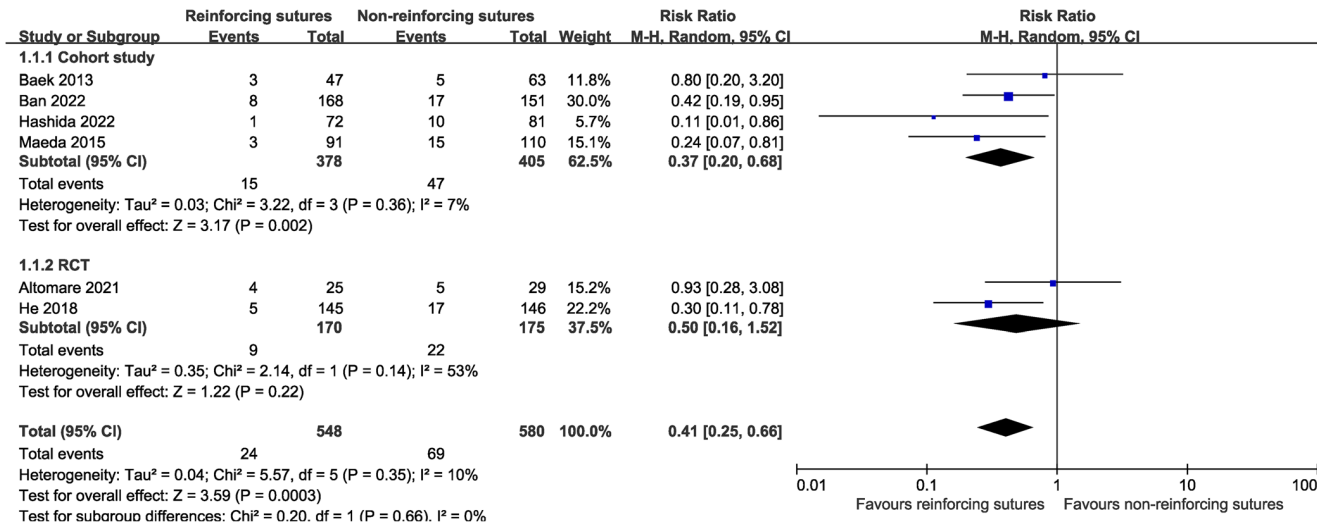


FIGURE 2 Forest plot of the incidence of anastomotic leakage.

Metanalysis 1128 pts

2 Group Reinforced (548) Not Reinforced (580)

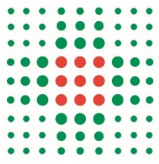
2 RCT + 4 observational studies

AL 4.4% Reinforced Group vs 11.9 % Not Reinforced

no differences in Operative Time

Interrupted suture (6/8)-Continuous barbed sutures (2/8)

*Reinforcing sutures reduce AL rate*



## Pelvic Drainage

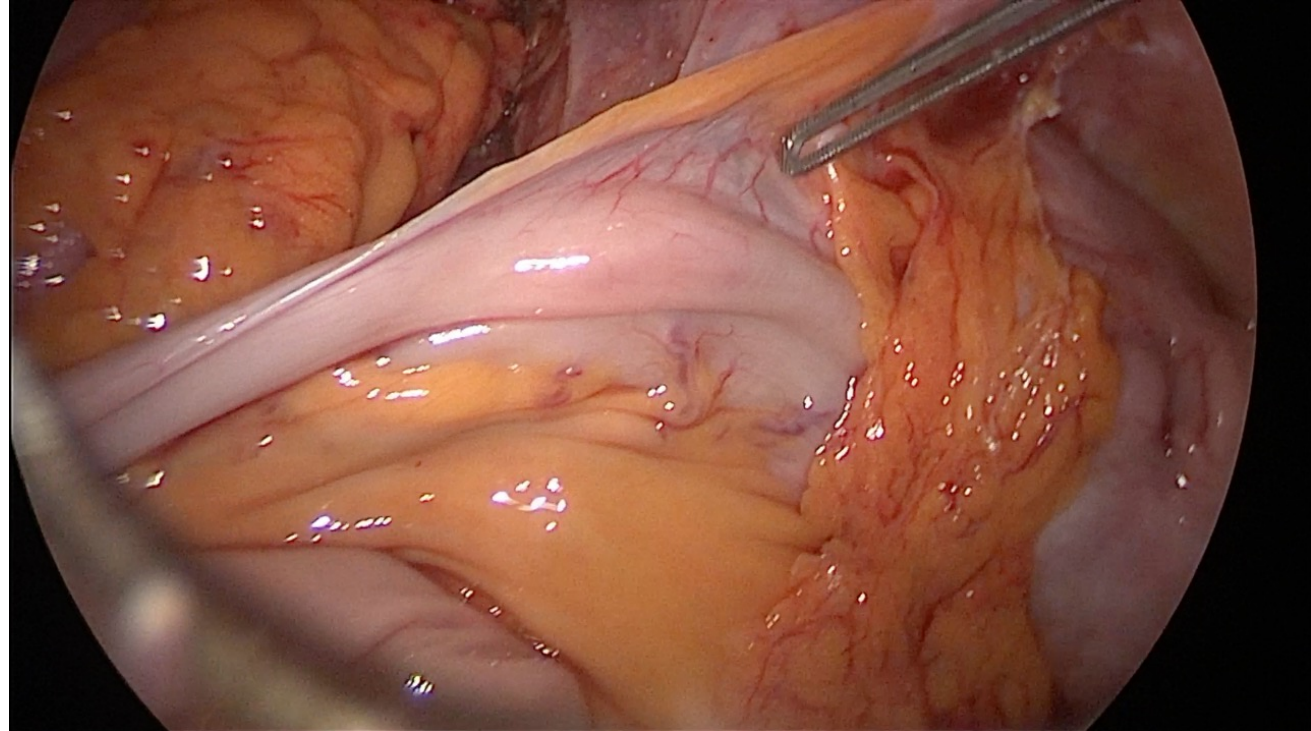
To evacuate blood or contaminated fluid

## Loop ileostomy

To reduce clinical septic consequences related to AL or obstruction related to anastomotic stricture

## Reinforcing Sutures

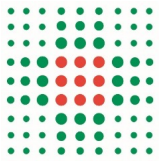
Reinforce anastomotic rim  
reduce tension  
Repair intraoperative AL  
Cover intersection lines/"dog ears"



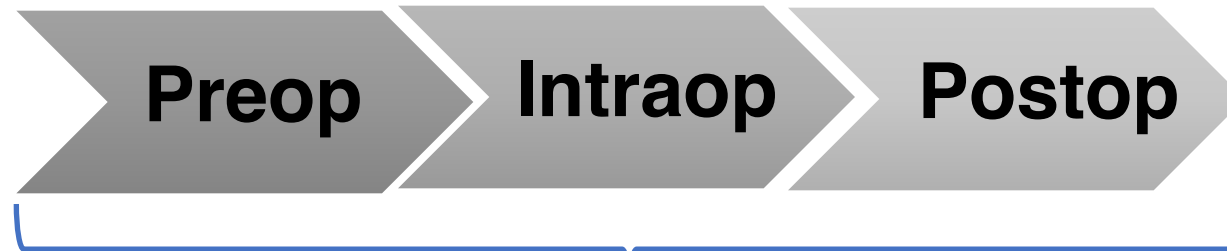
### *In our practice*

- *Closed Pelvic drain in all low rectal resections*
- *Stoma for systemic comorbidities, middle and low rectal cancer with neoCT-RT, coloanal or a less than 5 cm colorectal anastomosis*
- *Reinforcing sutures whenever possible (easier in robotic surgery) if no stoma performed*



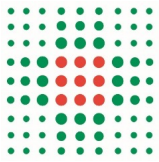


## Beyond technique...



**ERAS  
Protocol**

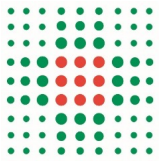
**Stop smoking  
Nutritional support  
Goal-directed fluid therapy  
Prehabilitation**



## Intraop

# Pillars of colorectal anastomosis

- Vascular supply
  - Evaluation of color of colic stump
  - Evaluation of vascularization of colic stump
  - Near Infrared ICG Firefly Imaging
  - No torsion of left mesocolon
  - IMV/IMA ligation
- Tension-free
  - Intracorporeal left mesocolic section
  - Adequate length of proximal colic stump (related to pubis)
  - Splenic Flexure Takedown
  - IMV/IMA ligation



## Final Check

**ABSENCE** of tension on the anastomosis (reduce Trendelenburg position)

**ABSENCE** of torsion on the mesocolon

**CORRECT** position of small bowel

**ABSENCE** of incomplete doughnuts

Updates in Surgery (2024) 76:2095–2096  
<https://doi.org/10.1007/s13304-024-01890-8>

LETTER TO THE EDITOR

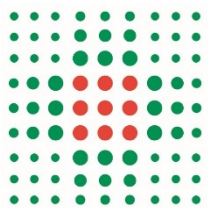


## Benchmarks in low anterior rectal resection to prevent anastomotic leakage: the BASIC checklist

Roberto Peltrini<sup>1</sup> · Francesco Ferrara<sup>2</sup> · Vincenzo Pilone<sup>1</sup>

### THE BASIC checklist

- A**rtery ligation (low tie if needed)
- B**owel prep + Oral Antibiotics
- C**omplete splenic flexure mobilization
- D**iverting loop ileostomy
- E**dge of pancreas for IMV ligation
- F**luorescence (ICG)
- G**et test (air-leak test)



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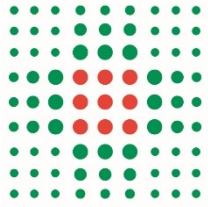


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2025  SICE  
Società Italiana  
di Chirurgia Endoscopica  
e Nuove Tecnologie

XXII CONGRESSO NAZIONALE  
*Chirurgia*  
TRA SCIENZA, UMANESIMO E UMANITÀ

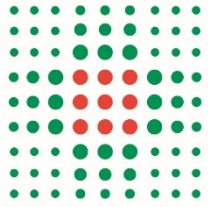
**FIRENZE  
18-19  
SETTEMBRE  
2025**



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