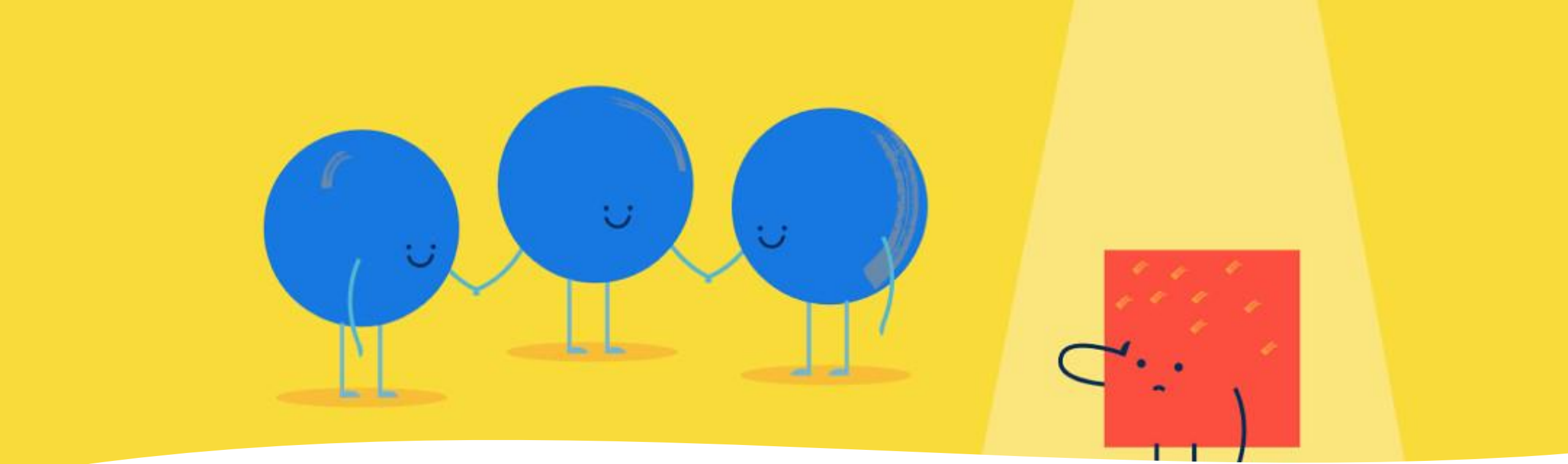
Technical Considerations in the Treatment of Transverse Colon Cancers

Marylise Boutros, MD, FACS, FRCRS

Vice-Chair and Regional Director & Vice Chair Research DDI Cleveland Clinic Florida, Clinical Affiliate Professor of Surgery Florida Atlantic University,
Professor of Surgery McGill University

Disclosures

- Johnson & Johnson Teaching honorarium for Canadian Colorectal Residents' Bootcamp



Transverse Colon Cancers

- <10% of all colon cancers
- Exclusion from clinical trials
- Lack of high-quality data on technical details, surgical and oncologic outcomes
- Inconsistent nomenclature
- Higher complication rates and poorer long-term survival

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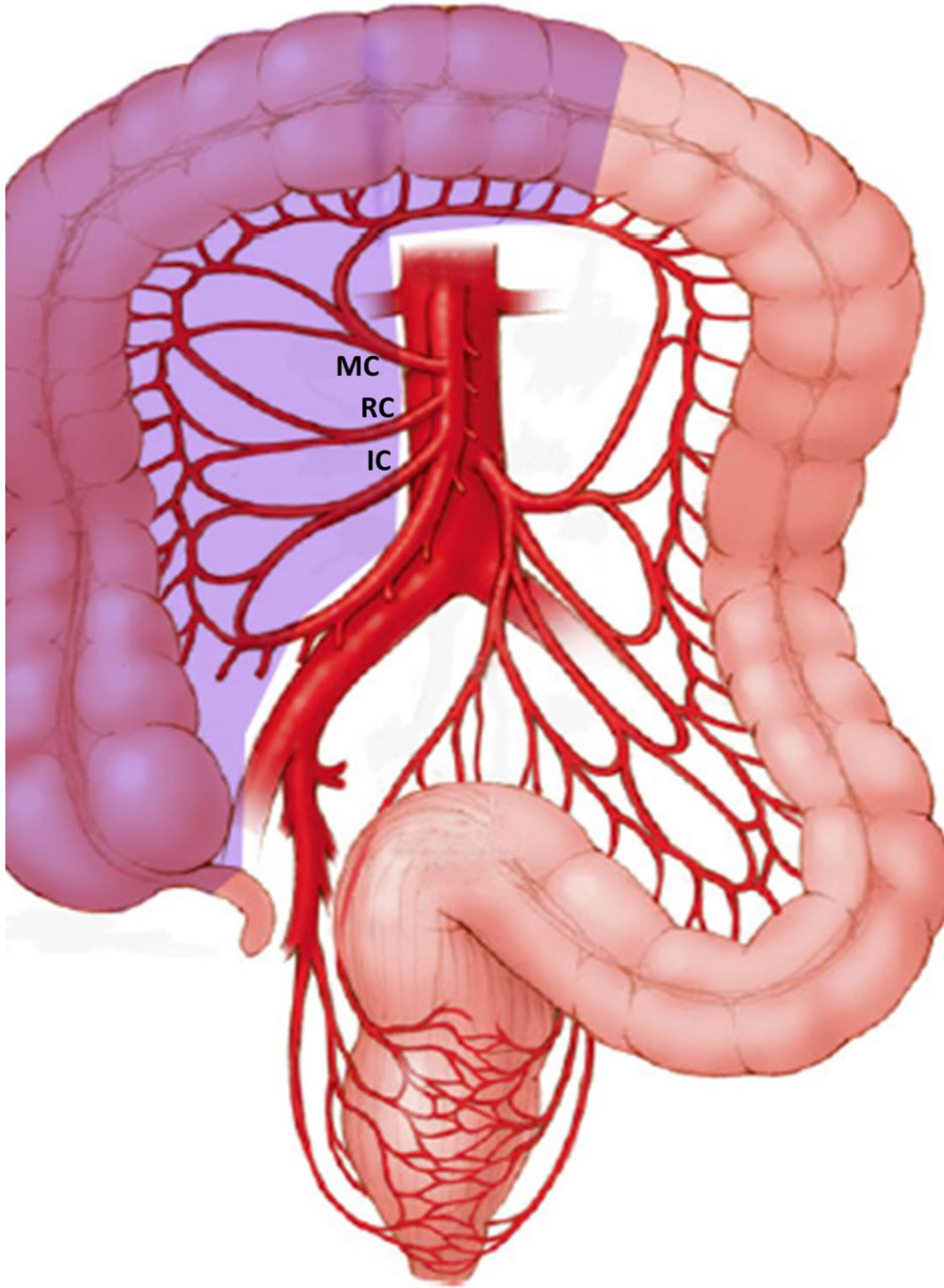
Anatomy

- Central position
- Originates from 2 distinct embryologic development planes: midgut and hindgut
- Midline vascularization and lymphatic drainage patterns are highly variable
- Prevents definition of a standard operative approach for proper oncological resection



LOCATON, LOCATION, LOCATION

Up to 20% inaccurate localization by colonoscopy

Extent of resection

Vascular ligation

Lymphatic drainage

Anastomosis configuration

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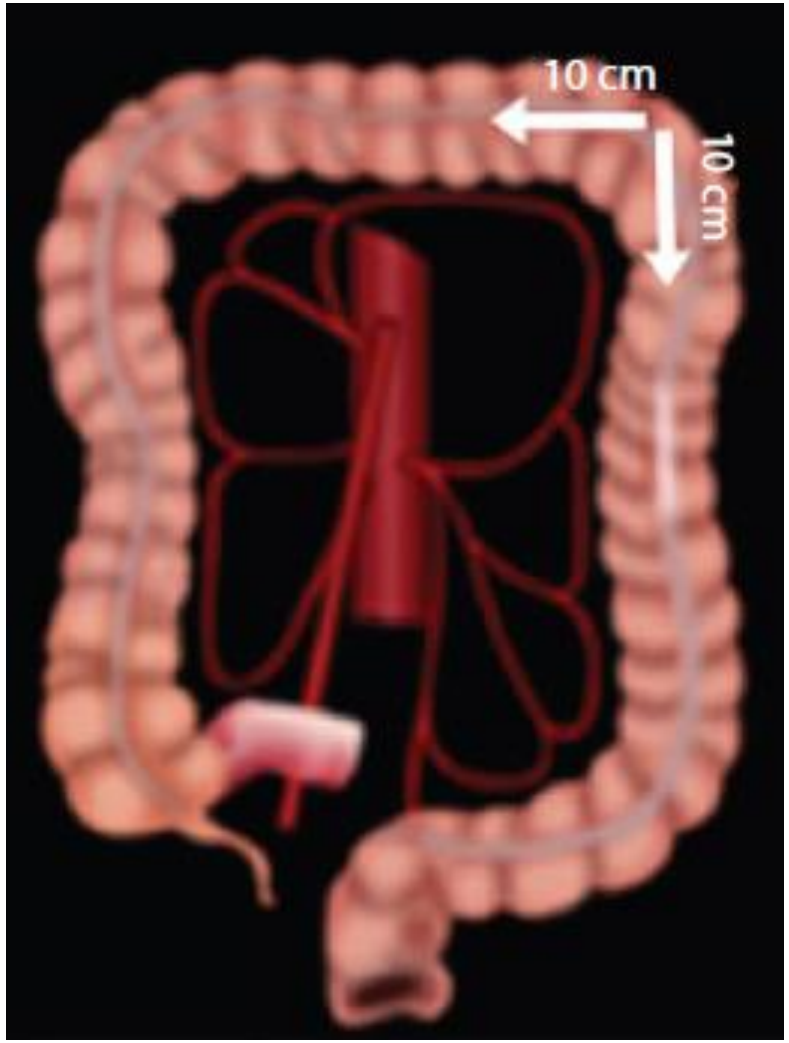
Vaziri K et al. Surg Endosc. 2010. Lee J et al. World J Gastrointest Surg. 2010; Manigrasso M et al. , Milone M, Musella M, et al Updates Surg. 2022.

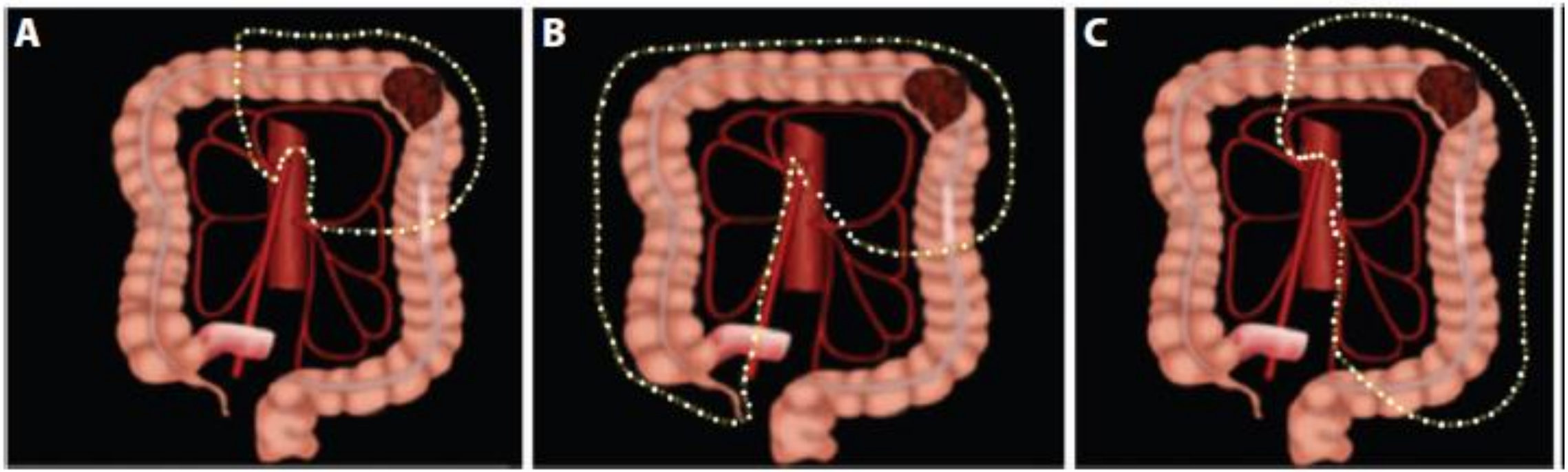
Extended right hemicolectomy. Extended left hemicolectomy. Subtotal colectomy. Transverse colectomy. Splenic flexure resection.

Distal Transverse Colon Cancers = Splenic Flexure Cancers



within 10cm of the splenic flexure

Operative Options for Distal Transverse Colon Cancers



Splenic Flexure Resection or Segmental Resection

Subtotal Colectomy
"extended right hemicolectomy"

Extended Left Hemicolectomy

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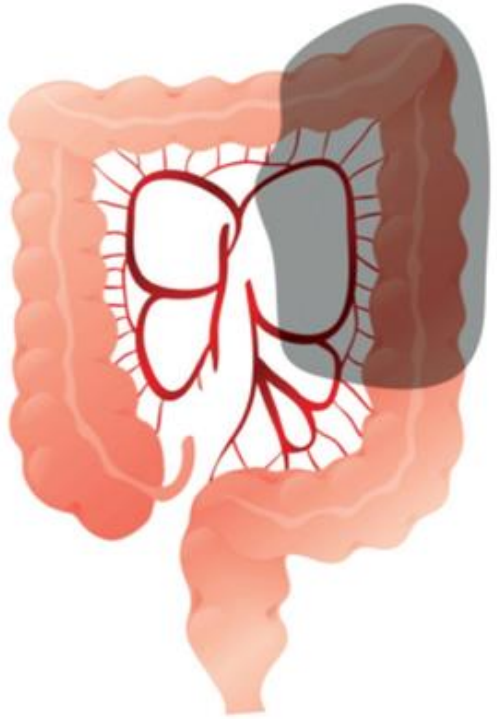
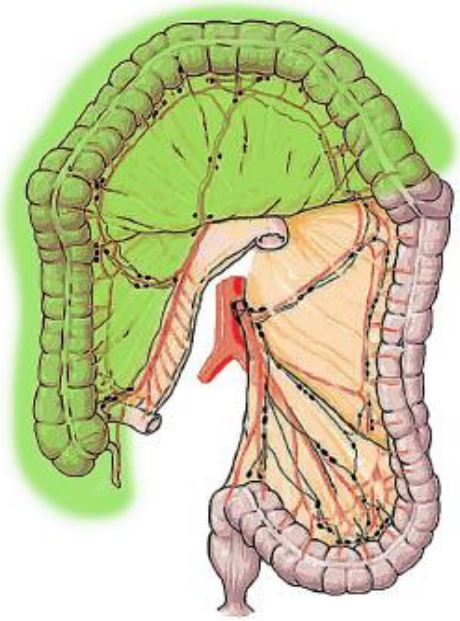
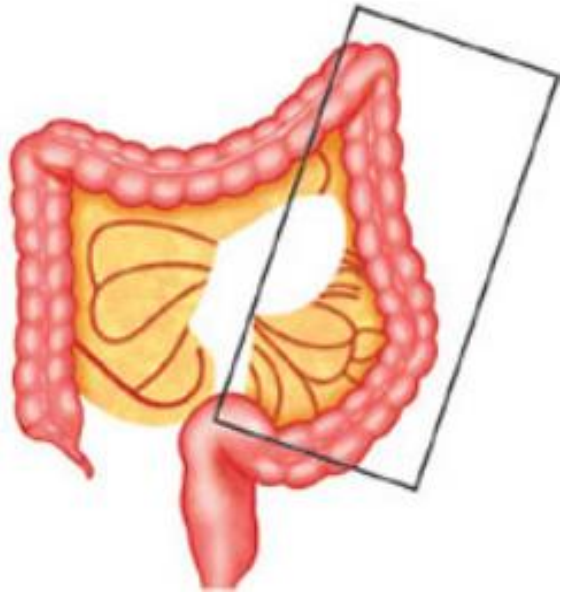
Italian Society of Surgical Oncology-Colorectal Cancer Network Collaborative Group



n=791

VS





n = 513
100 subtotal and 413 extended left hemicolectomy

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Degiuli et al. DCR 2020

TABLE 1. Demographics

Type of procedure	*SFR (arm A)*	*ERC*	*ELC*	*p (overall)*	*Arm B*	*Total*	*p (arm A vs B)*
No. (%)	791 (60.61)	100 (7.66)	413 (31.67)		513 (39.34)	1304	
Sex, n (%)							
Male	445 (56.25)	57 (57)	244 (59.07)	0.62	301 (58.67)	746 (57.20)	0.37
Female	346 (43.74)	43 (43)	169 (40.92)		212 (41.32)	558 (42.79)	
Age, mean (SD)	69.6 (10.8)	67.3 (11.9)	67.7 (11.0)	0.006	67.6 (11.2)	68.9 (11.0)	0.0015
BMI mean (SD)	25.63 (4.15)	24.69 (3.95)	25.51 (3.79)	0.13	25.85 (3.83)	25.52 (4.02)	0.32
>30, n (%)	67 (11.88)	4 (5.71)	31 (10.76)	0.29	35 (9.68)	102 (11.06)	0.32
ECOG score							
0–1	532 (67.25)	82 (82)	262 (63.28)	0.06	344 (67.05)	876 (67.12)	0.17
≥2	175 (2.14)	13 (13)	80 (19.32)		93 (18.12)	268 (20.53)	
Missing	84 (10.61)	5 (5)	71 (17.19)		76 (14.81)	160 (12.26)	
ACCI							
Mean ± SD	4.87 (1.4)	4.63 (1.58)	4.66 (1.45)	0.02	4.66 (1.48)	4.78 (1.43)	0.006
2	33 (4.17)	7 (7)	29 (7.02)	0.08	36 (7.01)	99 (7.59)	0.02
3	87 (10.99)	16 (16)	59 (14.28)		75 (14.61)	162 (12.42)	
4-5	422 (53.35)	45 (45)	214 (51.81)		259 (50.48)	681 (52.22)	
≥6	247 (31.22)	32 (32)	111 (26.87)		143 (27.87)	390 (29.9)	
Missing	2 (0.25)	0	0		0	2 (0.15)	
ASA score, n (%)							
I	72 (9.1)	13 (13)	31 (7.5)	0.10	44 (8.57)	116 (8.89)	0.19
II	390 (49.3)	45 (45)	212 (51.33)		257 (62.22)	647 (49.61)	
III	284 (35.9)	39 (39)	111 (26.87)		150 (29.23)	434 (33.28)	
IV	14 (1.76)	3 (3)	11 (2.66)		14 (2.72)	28 (2.14)	
Missing	31 (3.91)	0	48 (11.62)		48 (9.35)	79 (6.05)	

ACCI = Age-adjusted Charlson Comorbidity Index; ECOG = Eastern Cooperative Oncology Group; ELC = extended left colectomy; ERC = extended right colectomy; SFR = splenic flexure resection;

Older and more comorbid in SFR

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SFR had more MIS and shorter OR

TABLE 2. Type of procedure performed, surgical approach and duration of operation.

Type of procedure	*SFR (arm A)*	*ERC*	*ELC*	*Arm B*	*Total*	*p (arm A vs B)*
No.	791	100	413	513	1304	
Emergency surgery	43 (5.43)	12 (12)	20 (4.84)	32 (6.23)	75 (5.75)	0.55
Type of approach						<0.001
Minimally invasive, n(%)	491 (62.07)	39 (39)	221 (53.51)	260 (50.68)	751 (57.54)	
Laparoscopic, n (%)	472 (59.67)	39 (39)	220 (53.26)	259 (50.48)	731 (56.01)	
Robotic, n (%)	19 (2.4)	0	1 (0.24)	1 (0.19)	20 (1.53)	
Data missing	6 (0.75)	1 (1)	1 (0.24)	2 (0.38)	8 (0.61)	
Total anesthetic time, min, median (IQR).	165 (120–210)	189.5 (132–235)	187 (145–240)	189 (140–240)	175.0 (125–220)	<0.0001
EBL, mL, median (IQR)	50 (0–100)	100 (0–200)	0 (0–150)	25 (0–150)	50 (0–150)	0.84
Diverting ileostomy, n (%)	4 (0.5)	1 (1)	9 (2.17)	10 (1.94)	14 (1.07)	0.01
Hartmann procedure, n (%)	9 (1.13)	1 (1)	7 (1.69)	8 (1.55)	17 (1.3)	0.51
Combined multivisceral resection						
Splenic resection, n (%)	20 (2.52)	1 (1)	9 (2.17)	10 (1.94)	30 (2.3)	0.5
Others, n (%)	5 (0.63)	0	5 (1.21)	5	10 (0.76)	0.49
Adjuvant chemotherapy, n (%)	256 (32.36)	26 (26)	115 (27.84)	141 (27.48)	397 (30.44)	0.06

EBL = estimated blood loss; ELC = extended left colectomy; ERC = extended right colectomy; SFR = splenic flexure resection.

SFR had adequate path outcomes (shorter specimens & less LNs)

TABLE 3. Pathological data

Type of procedure	*SFR (arm A)*	*ERC*	*ELC*	*p (overall)*	*Arm B*	*Total*	*p (arm A vs B)*
No.	791	100	413		513	1304	
pT stage, n (%)							
1	117 (14.79)	14 (14)	46 (11.13)	0.51	60 (11.69)	177 (13.57)	0.30
2	145 (18.33)	17 (17)	71 (17.19)		88 (17.15)	233 (17.86)	
3	425 (53.72)	52 (52)	240 (58.11)		292 (59.97)	717 (54.98)	
4	94 (11.88)	16 (16)	54 (13.07)		70 (13.64)	164 (12.57)	
Missing pT stage	11 (1.39)	1 (1)	2 (0.48)		3 (0.58)	14 (1.07)	
pN stage, n (%)							
N0	520 (65.73)	64 (64)	268 (64.89)	0.45	332 (64.71)	852 (65.33)	0.71
N1	170 (21.49)	19 (19)	102 (24.69)		121 (23.58)	291 (22.31)	
N2	90 (11.37)	15 (15)	41 (9.92)		56 (10.91)	146 (11.19)	
Missing pN stage	11 (1.39)	2 (2)	2 (0.48)		4 (0.77)	15 (1.15)	
pTNM stage, n (%)							
1	219 (27.68)	26 (26)	100 (24.21)	0.63	126 (24.54)	345 (26.45)	0.27
2	301 (38.05)	38 (38)	168 (40.67)		206 (40.15)	507 (38.88)	
3	260 (32.86)	34 (34)	143 (34.63)		177 (34.5)	437 (33.51)	
Missing pTNM stage	11 (1.39)	2 (2)	2 (0.48)		4 (0.77)	15 (1.15)	
R grade, n (%)							
R0	755 (95.44)	96 (96)	378 (91.52)	0.18	474 (92.39)	1229 (94.24)	0.53
R1	7 (0.88)	1 (1)	4 (0.96)		5 (0.97)	12 (0.92)	
R2	0	1 (1)	0		1 (0.19)	1 (0.07)	
Missing R grade	29 (3.66)	2 (2)	31 (7.5)		33 (6.43)	62 (4.75)	
Lymphatic invasion, n (%)	200 (25.28)	23 (23)	96 (23.24)	0.57	119 (23.19)	319 (24.46)	0.56
Missing L	118 (14.91)	30 (30)	61 (14.76)		91 (17.73)	209 (16.02)	
Vascular invasion, n (%)	189 (23.89)	17 (17)	98 (23.72)	0.31	115 (22.41)	304 (23.31)	0.65
Missing V	68 (8.59)	10 (10)	43 (10.41)		53 (10.31)	121 (9.27)	
Length of the specimen, cm, median (IQR)	20 (15–26)	41 (29–55)	24 (18.5–33)	<0.0001	26 (19.8–37.75)	22 (17–30)	<0.0001
Missing DM	143 (18.07)	18 (18)	89 (21.54)		107 (20.85)	250 (19.17)	
DM median, cm (IQR)	6 (4–8.25)	6 (4–11)	8 (5–14)	<0.0001	7.65 (4.5–13)	6 (4–10)	<0.0001
DM, cm, mean (SD)	7.1 (5.2)	10.6 (11.7)	10.9 (9.8)		10.9 (10.2)	8.6 (7.76)	
DM, adequate, n (%)	439 (67.75)	54 (65.85)	247 (76.23)	0.0164	301 (74.14)	740 (70.21)	0.0273
PM, cm, median, (IQR)	8 (5.5–12)	21 (7–37)	7.5 (5.5–13.5)	<0.0001	8 (6–16)	8 (5.6–13)	0.0037
PM, cm, mean, (SD)	9.29 (5.29)	24.74 (19.2)	10.45 (8.23)		13.35 (12.71)	10.82 (9.05)	
LN retrieved				<0.0001			<0.0001
Mean (SD)	16.85 (8.09)	25.87 (11.84)	18.62 (9.45)		20.08 (10.37)	18.10 (9.17)	
Median (IQR)	15 (12–20)	25 (16.5–33)	17 (12–23)		18 (13–26)	16 (12–22)	
LN positive				0.99			0.96

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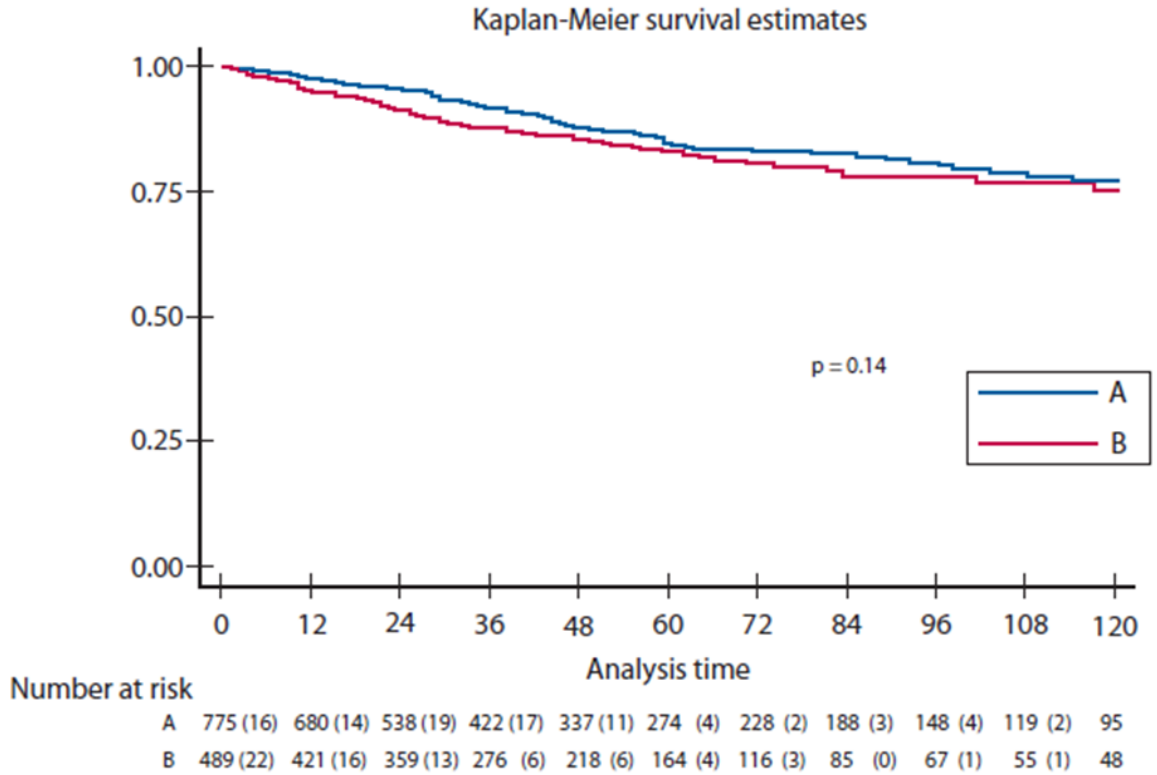
Similar 5-year Progression-Free Survival

0.85 vs 0.84 (95% CI, 0.80–0.88), p = 0.14



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Similar morbidity *even on MVA

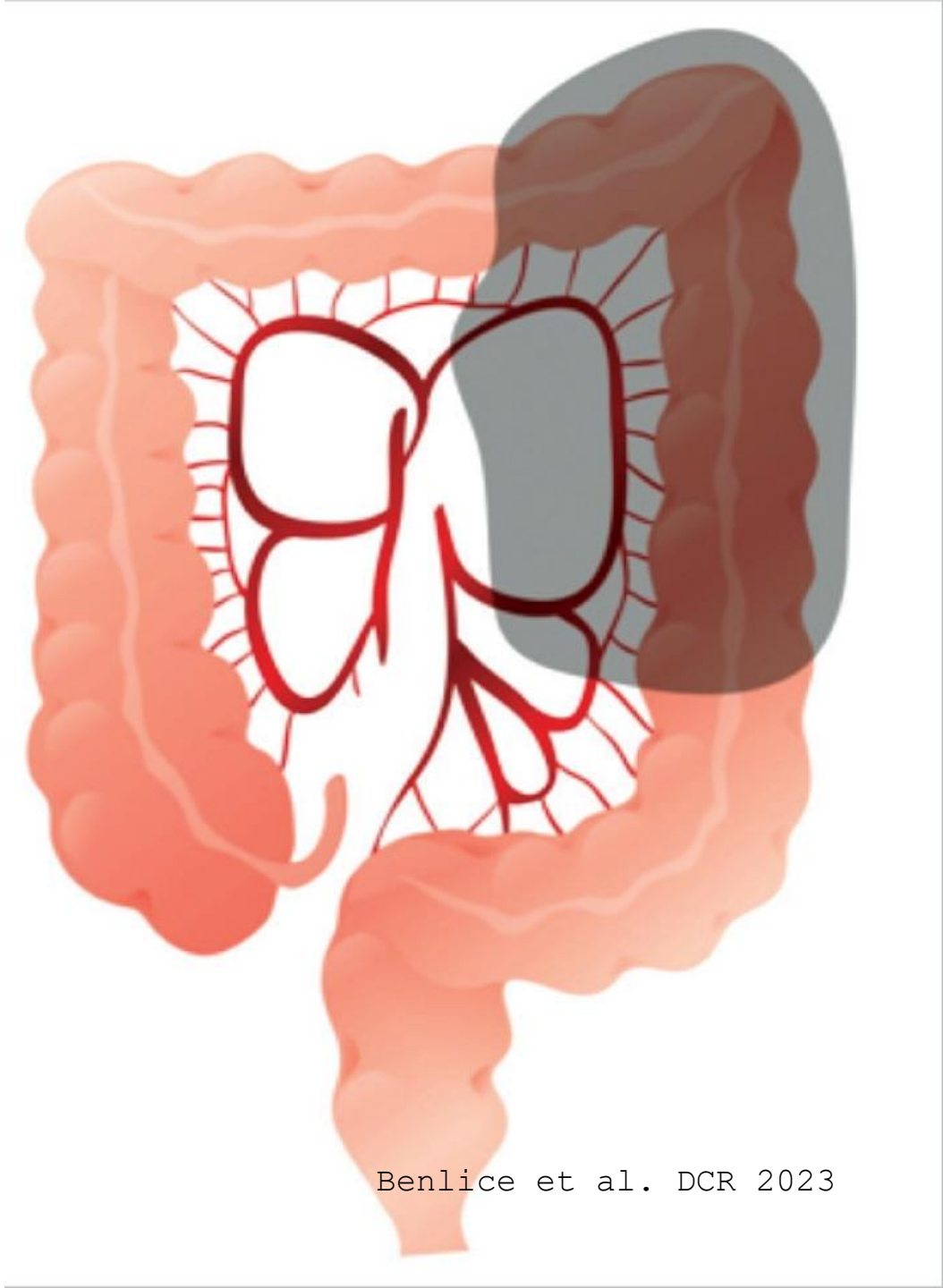
TABLE 4. Postoperative outcomes

Type of procedure	*SFR (arm A)*	*ERC*	*ELC*	*p (overall)*	*Arm B*	*Total*	*p (arm A vs B)*
No.	791	100	413		513	1304	
Clavien-Dindo grade ≥3 postoperative complications, n (%)	51 (6.44)	5 (5)	28 (6.77)	0.81	33 (6.43)	84 (6.44)	0.99
Respiratory complication	2 (0.25)	0	4 (0.96)		4 (0.77)	6 (0.46)	
Cardiac complication	3 (0.37)	0	0			3 (0.23)	
Leak	25 (3.16)	4 (4)	9 (2.17)	0.74	13 (2.53)	38 (2.91)	0.71
Anastomotic hemorrhage	2 (0.25)	0	1 (0.24)		1 (0.19)	3 (0.23)	
Abdominal collection	4 (0.5)	0	1 (0.24)		1 (0.19)	5 (0.38)	
Bowel obstruction	3 (0.37)	0	2 (0.48)		2 (0.38)	5 (0.38)	
Pancreatic fistula	1 (0.12)	0	2 (0.48)		2 (0.38)	3 (0.23)	
Significant hemorrhage	1 (0.12)	0	6 (1.45)		6 (1.16)	7 (0.53)	
Surgical site infection	1 (0.12)	0	3 (0.72)		3 (0.58)	4 (0.3)	
Intestinal ischemia	1 (0.12)	0	0		0	1 (0.07)	
Sepsis	1 (0.12)	0	0		0	1 (0.07)	
Others	7 (0.88)	1 (1)	0		1 (0.19)	9 (0.69)	
30-day mortality, n (%)	5 (0.63)	1 (1)	1 (0.24)	0.46	2 (0.38)	7 (0.53)	0.71
Reoperation, n (%)	42 (5.3)	6 (6)	25 (6.05)	0.84	31 (6.04)	73 (5.59)	0.60
Length of stay, median (IQR)	7 (6–10)	9 (6–12)	8 (6–10)	0.02	8 (6–10)	8 (6–10)	0.09

ELC = extended left colectomy; ERC = extended right colectomy; IQR: interquartile range; SFR: splenic flexure resection.

International Consensus on Splenic Flexure Cancers

- Segmental splenic flexure resection (78%)
- MIS approach to segmental colectomy (88%)
- Ligate the root of the left branch of middle colic and left colic (60%)



Benlice et al. DCR 2023

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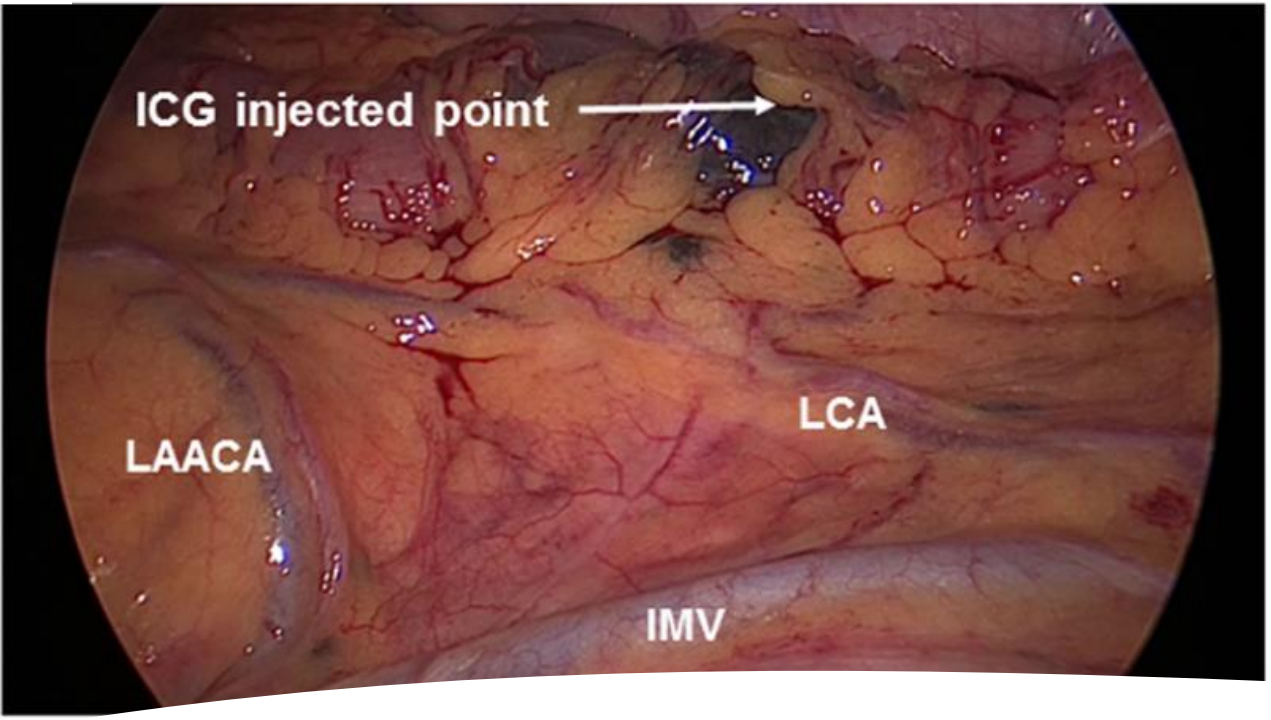
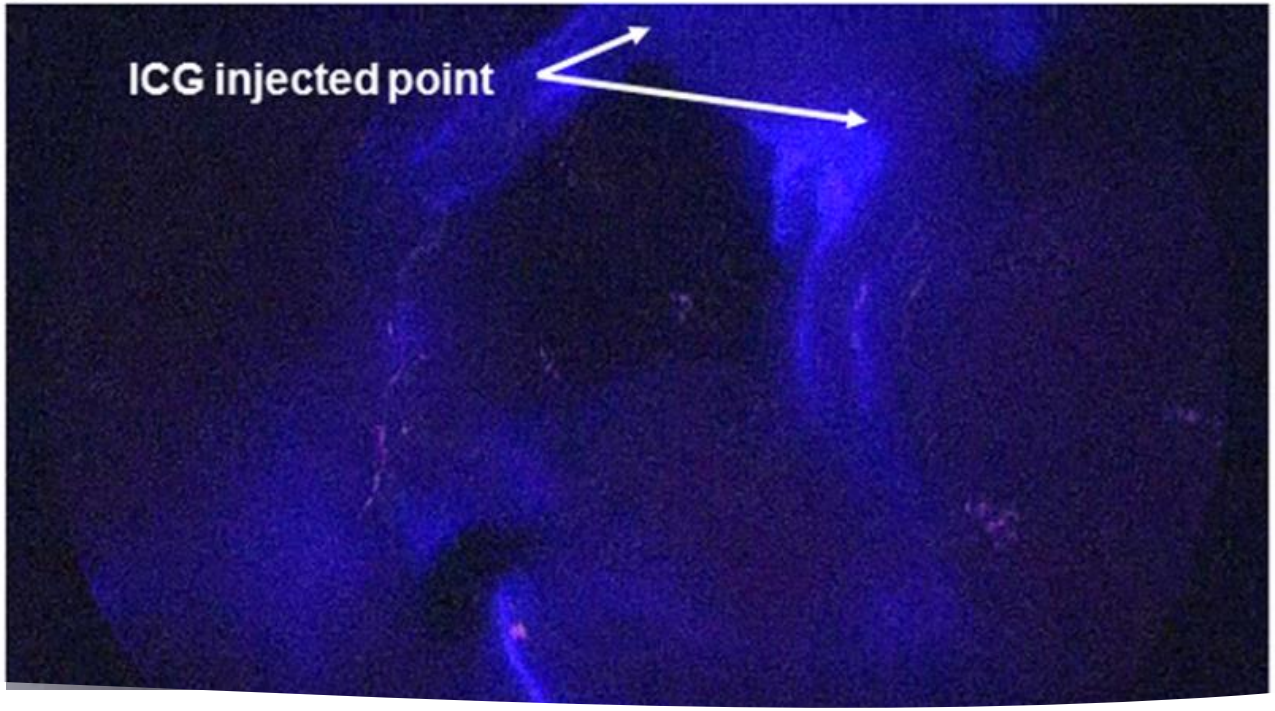
CLINICAL PRACTICE GUIDELINES

The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the Management of Colon Cancer

Jon D. Vogel, M.D.[1] • Seth I. Felder, M.D.[2] • Anuradha R. Bhama, M.D.[3]
Alexander T. Hawkins, M.D.[4] • Sean J. Langenfeld, M.D.[5] • Virginia O. Shaffer, M.D.[6]
Amy J. Thorsen, M.D.[7] • Martin R. Weiser, M.D.[8] • George J. Chang, M.D.[9]
Amy L. Lightner, M.D.[3] • Daniel L. Feingold, M.D.[10] • Ian M. Paquette, M.D.[11]

Cancers of the Splenic Flexure "Retrospective studies and a meta-analysis suggest segmental resections are a reasonable alternative to extended colectomy." (DCR 2022)





Root of the IMV is important

- ICG lymph flow correlated with +ve LNs
- 61% along IMV
- Left colic **OR (not and)** left branch of middle colic
- **Left branch of middle colic in all distal transverse colon cancers**

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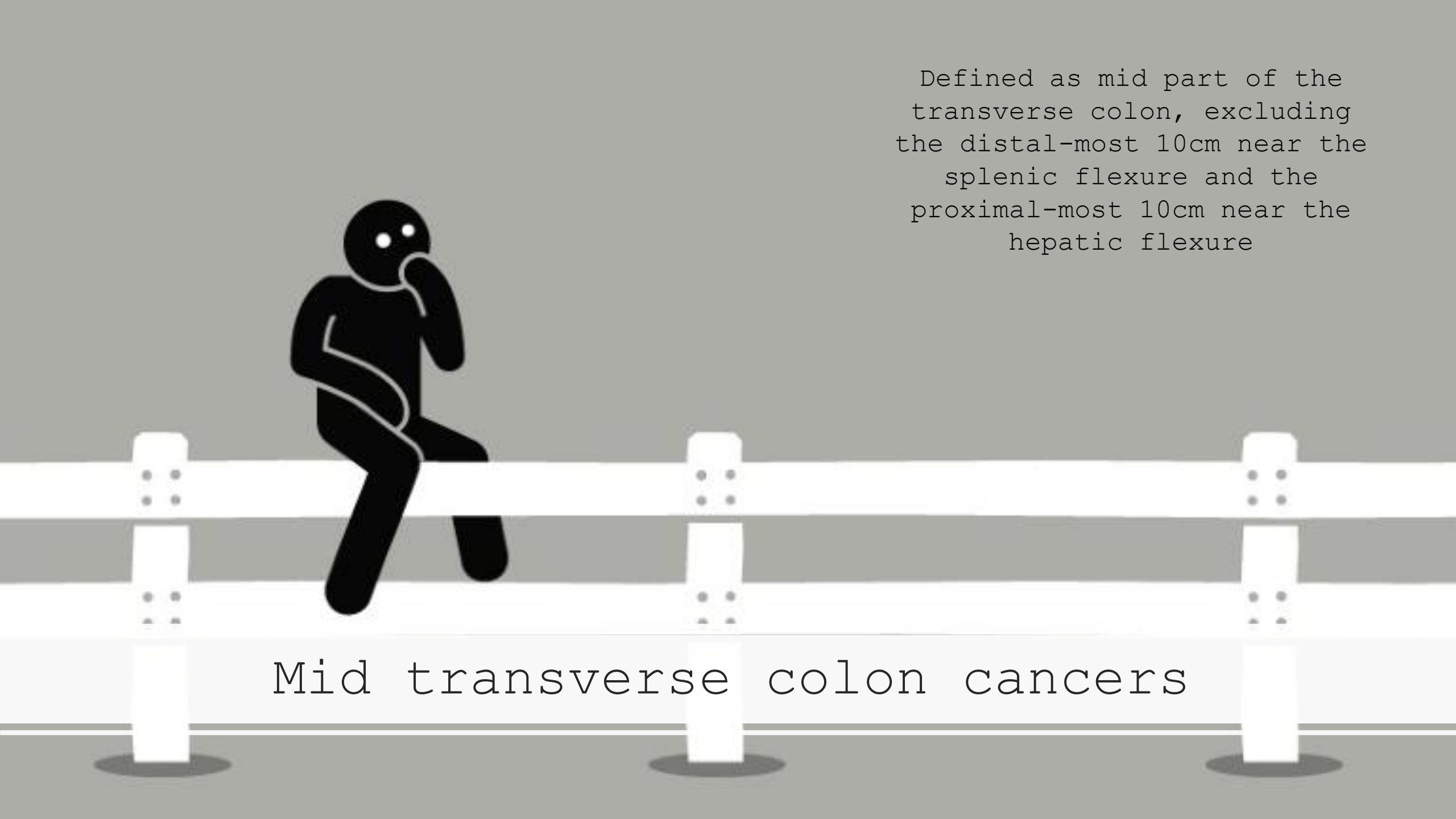
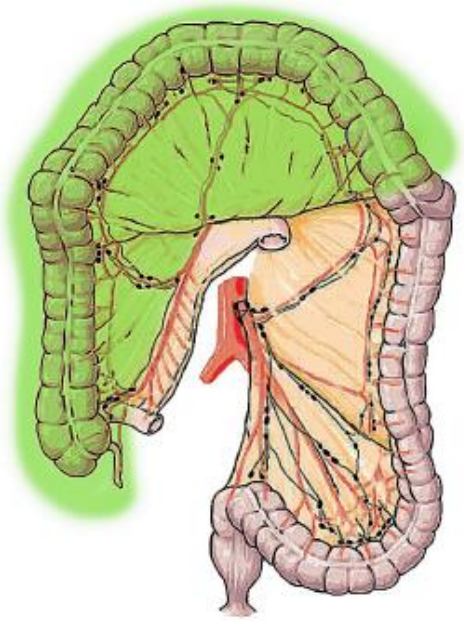
Watanabe et al. Int J Colorectal Dis 2017



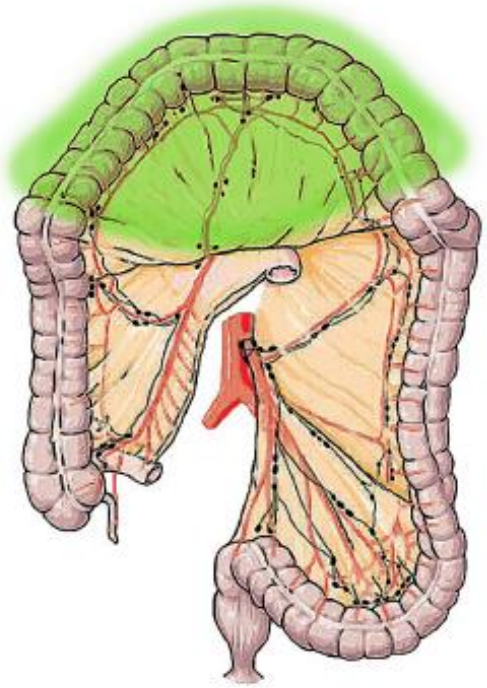
Defined as mid part of the transverse colon, excluding the distal-most 10cm near the splenic flexure and the proximal-most 10cm near the hepatic flexure

Mid transverse colon cancers

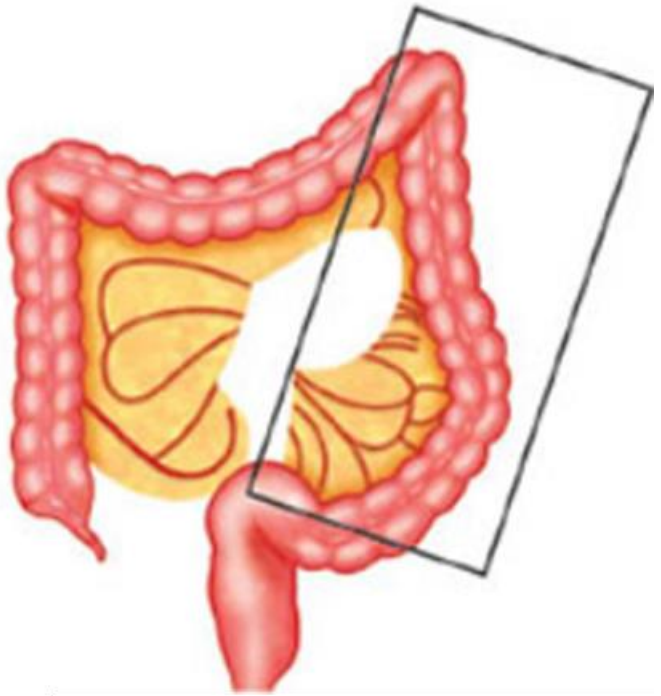
Operative Options for Mid Transverse Colon Cancers



Extended Right Hemicolectomy



Transverse Colectomy



Extended Left Hemicolectomy

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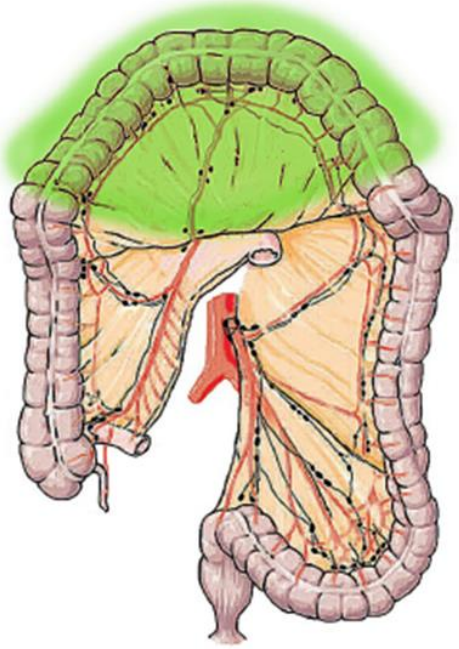
Italian society of surgical oncology colorectal cancer network (SICO CCN) multicenter collabo



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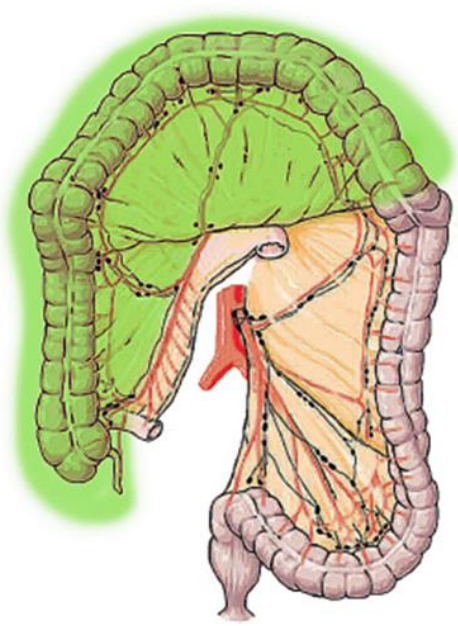
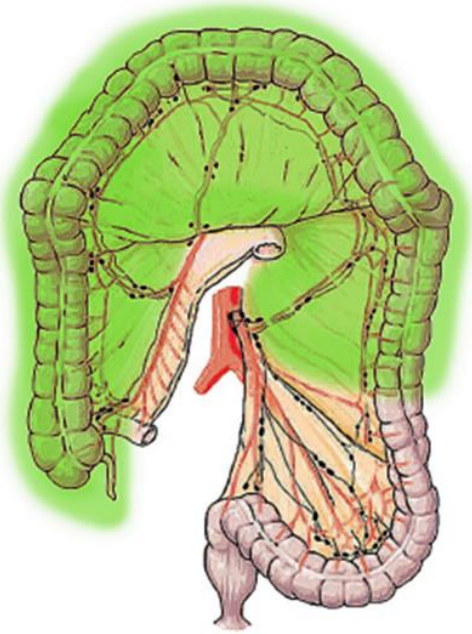
vs





n=1141

1017 extended right hemicolectomies and
*117 extended left hemicolectomies, 7 total colectomies

Milone et al. ESJO 2020

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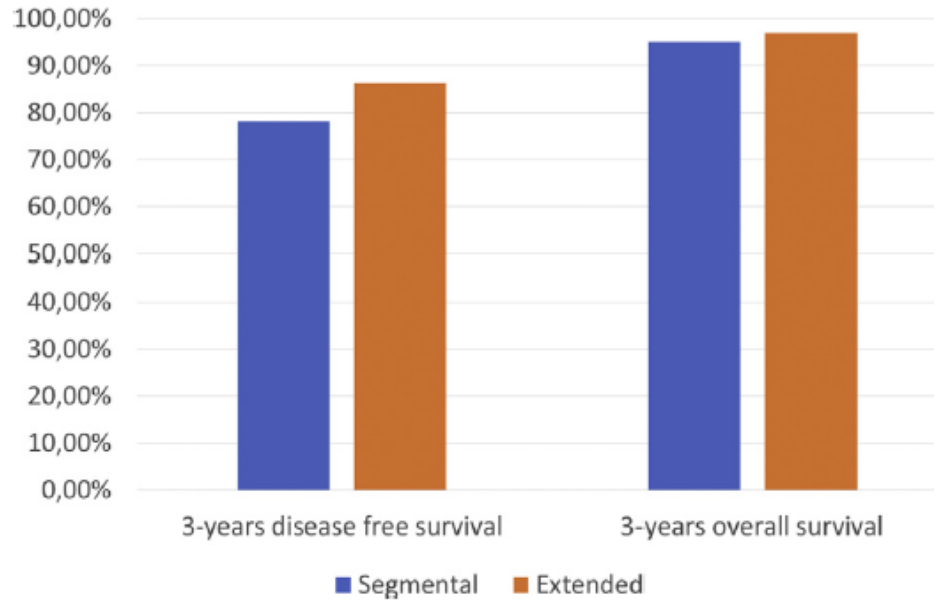
Relatively balanced groups

Patient characteristics.

	Segmental	Extended	p value
Age	71.72 ± 12.88	70.46 ± 11.03	0.063
Sex			0.023
Male	194/388 (50.3%)	617/1141 (54.1%)	
Female	192/388 (49.7%)	524/1141 (45.9%)	
BMI	43.69 ± 68.14	42.56 ± 175.98	0.902
ASA score			0.738
I	42/388 (11.1%)	129/1141 (11.2%)	
II	189/388 (49.2%)	594/1141 (51.9%)	
III	142/388 (36.9%)	394/1141 (34.5%)	
IV	11/388 (2.8%)	27/1141 (2.4%)	
T stage			0.384
T0	26/388 (6.7%)	71/1141 (6.2%)	
T1	31/388 (8.2%)	114/1141 (9.9%)	
T2	55/388 (14.4%)	193/1141 (16.9%)	
T3	210/388 (54.6%)	567/1141 (49.5%)	
T4	62/388 (16.1%)	200/1141 (17.5%)	
N stage			0.515
N0	258/388 (67.3%)	755/1141 (65.9%)	
N1	92/388 (23.7%)	265/1141 (23.2%)	
N2	34/388 (9%)	125/1141 (10.9%)	
M stage			0.175
M0	348/388 (89.7%)	1058/1141 (92.7%)	
M1	40/388 (10.3%)	83/1141 (7.3%)	

Pathological outcomes.

	Segmental	Extended	p value
Lymph nodes harvested	15.03 ± 9.93	24.58 ± 13.90	<0.001
Metastatic lymph nodes	1.05 ± 2.33	1.25 ± 2.90	0.216
Specimen length	22.84 ± 11.49	35.05 ± 15.09	<0.001
Proximal margin	8.25 ± 6.45	10.16 ± 9.13	<0.001
Distal margin	10.55 ± 8.54	20.84 ± 13.27	<0.001



3-year DFS was 78.1% for transverse colectomy and 86.2% for hemicolectomy (p 0.001)

Extended right hemicolectomy had better oncologic outcomes

Complications.

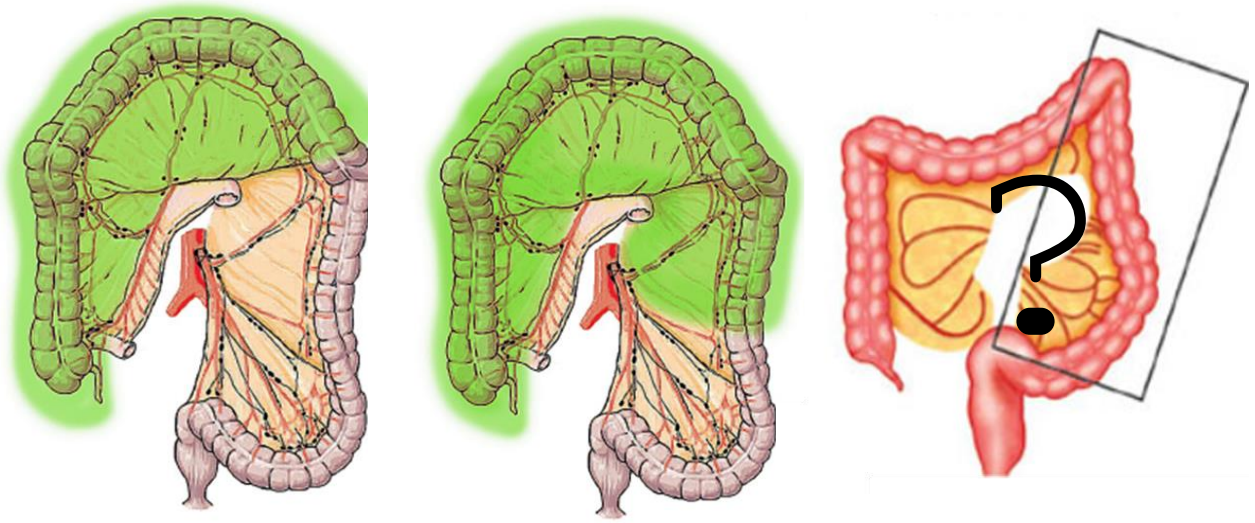
	Segmental	Extended	p value
Complications:			0.010
Yes	117/388 (30.1%)	269/1141 (23.6%)	
No	271/388 (69.9%)	872/1141 (76.4%)	
Anemia:			0.025
Yes	8/388 (2.1%)	5/1141 (0.4%)	
No	380/388 (97.9%)	1134/1141 (99.6%)	
Nausea:			0.416
Yes	11/388 (2.8%)	47/1141 (4.1%)	
No	377/388 (97.2%)	1092/1141 (95.9%)	
Wound infection:			0.026
Yes	17/388 (4.4%)	32/1141 (2.8%)	
No	371/388 (95.6%)	1107/1141 (97.2%)	
Bleeding:			0.746
Yes	19/388 (4.9%)	50/1141 (4.4%)	
No	369/388 (95.1%)	1080/1141 (95.6%)	
Anastomotic leak:			0.020
Yes	17/388 (4.4%)	25/1141 (2.2%)	
No	371/388 (95.6%)	1114/1141 (97.8%)	
Prolonged ileus:			0.316
Yes	3/388 (0.8%)	22/1141 (1.9%)	
No	385/388 (99.2%)	1117/1141 (98.1%)	

Recovery after surgery.

	Segmental	Extended	p value
Time to flatus	3.74 ± 1.61	3.49 ± 1.76	0.014
Time to food tolerance	4.02 ± 1.60	3.90 ± 2.02	0.216
Time to mobilization	1.55 ± 0.85	1.44 ± 0.90	0.040
Hospital stay	9.69 ± 6.17	8.42 ± 5.27	<0.001

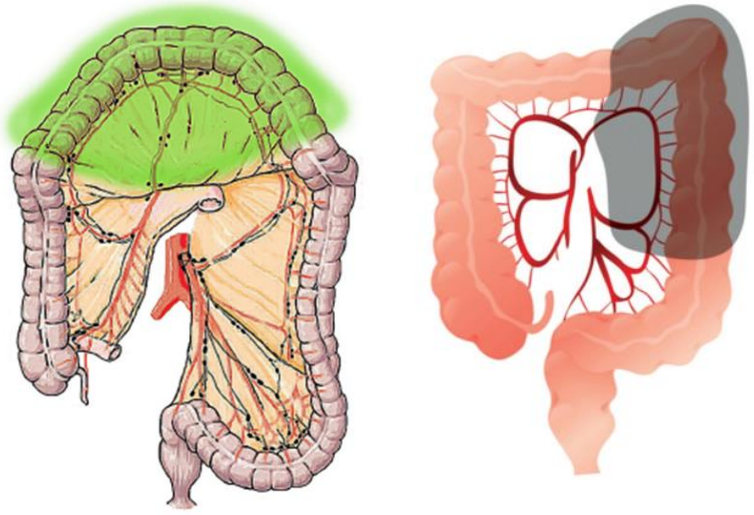
Extended right hemicolectomy had better recovery & less morbidity

US National Cancer Database



n=44,417

“total right or left colon and a portion of transverse colon

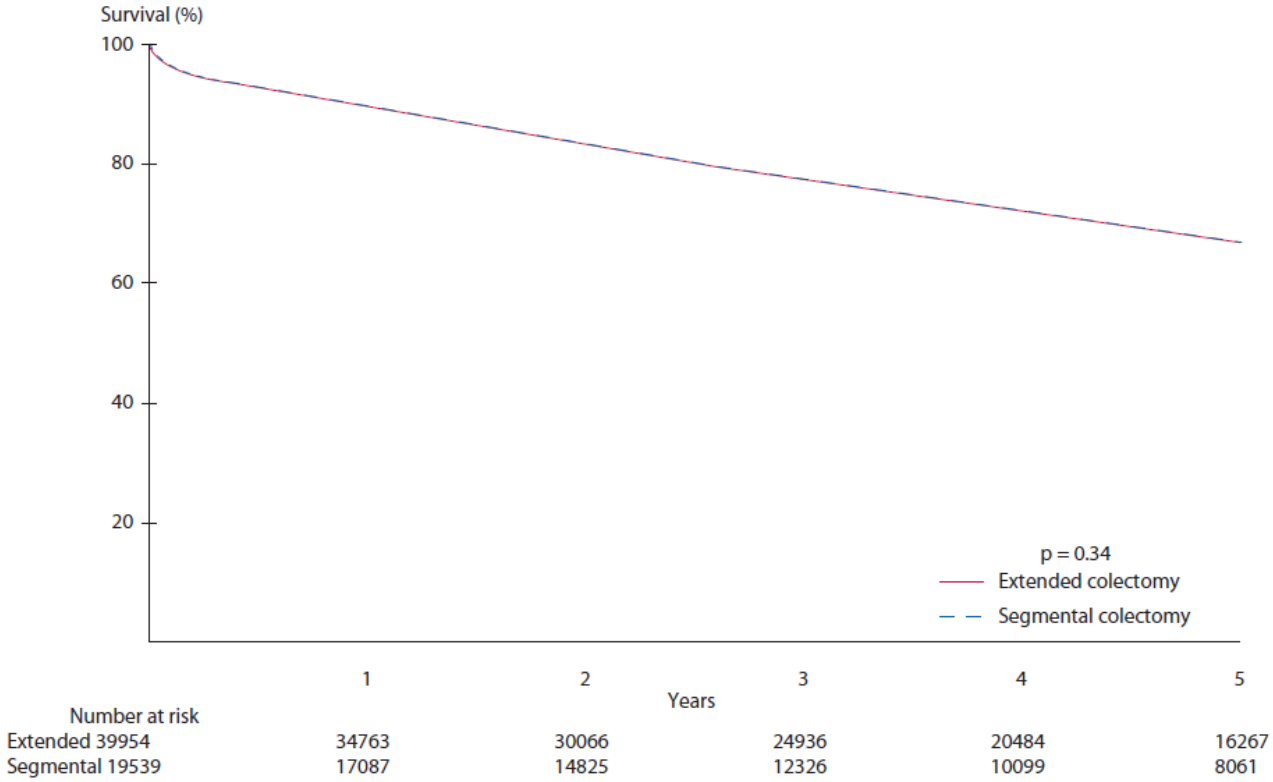


n=21,645

Crippa J et al. DCR 2021

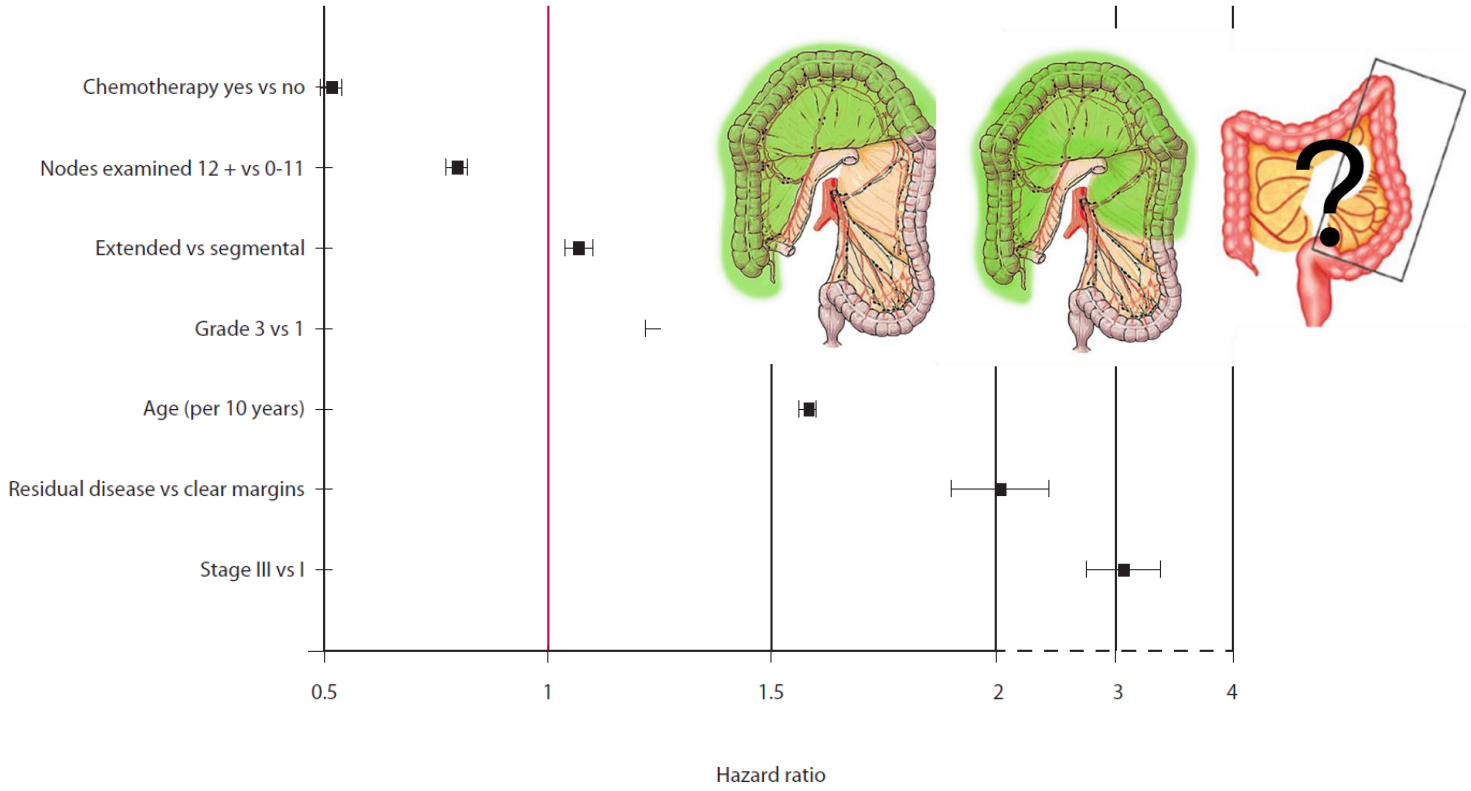
Extended resection did not improve overall survival

- ✓ Extended colectomy was the preferred approach for Proximal (86.6%), Mid (60.1%), and Distal (58.4%)
- ✓ Higher LNs harvested for extended colectomies 18 vs 14



Mid transverse Colon Cancer Subgroup

Extended resection had poorer survival =(HR, 1.08; 95% CI, 1.04-1.12; $p < 0.001$)



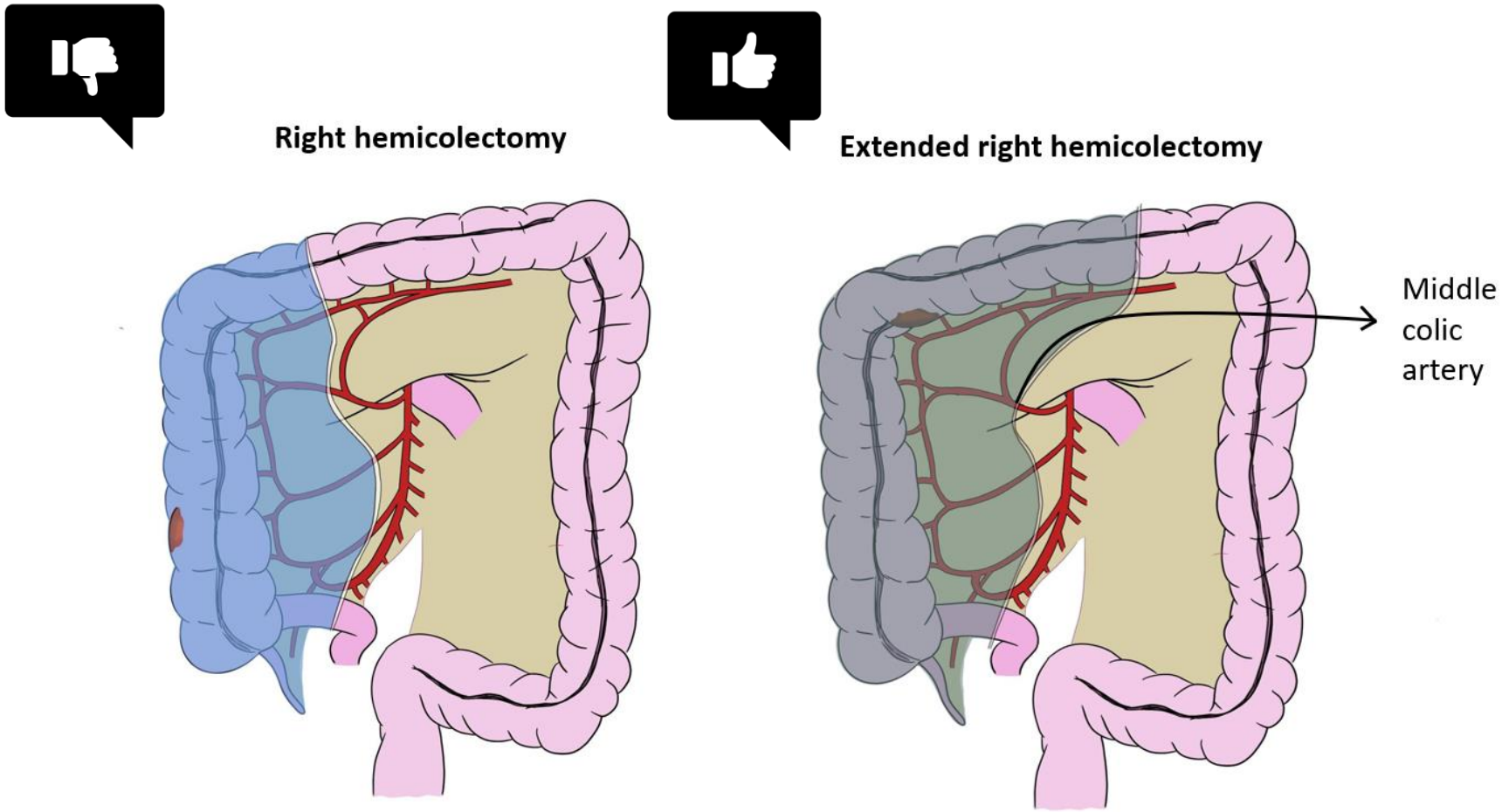
CLINICAL PRACTICE GUIDELINES

The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the Management of Colon Cancer

Jon D. Vogel, M.D.[1] • Seth I. Felder, M.D.[2] • Anuradha R. Bhama, M.D.[3]
Alexander T. Hawkins, M.D.[4] • Sean J. Langenfeld, M.D.[5] • Virginia O. Shaffer, M.D.[6]
Amy J. Thorsen, M.D.[7] • Martin R. Weiser, M.D.[8] • George J. Chang, M.D.[9]
Amy L. Lightner, M.D.[3] • Daniel L. Feingold, M.D.[10] • Ian M. Paquette, M.D.[11]

Cancers of the Transverse Colon " With this inconsistency in the reported data, an individual determination of resection extent based upon careful inspection of the tumor and its feeding vessel(s) and consideration of the functional outcomes related to each resection type is recommended." (DCR 2022)

Proximal Transverse Colon Cancers



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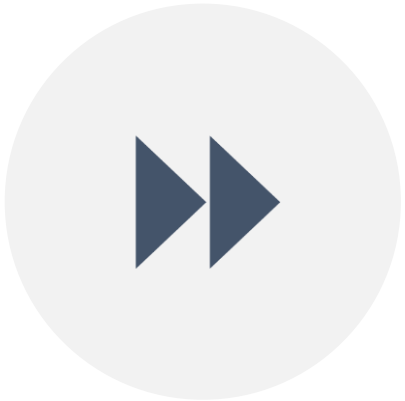
Extent of Lymphadenectomy



LYMPH NODE METASTASES = MOST COMMON MODE OF SPREAD

ONCOLOGICAL OUTCOMES GREATLY INFLUENCED BY LYMPHADENECTOMY

EXTENT OF RESECTION CLOSELY TIED TO EXTENT OF LYMPHADENECTOMY

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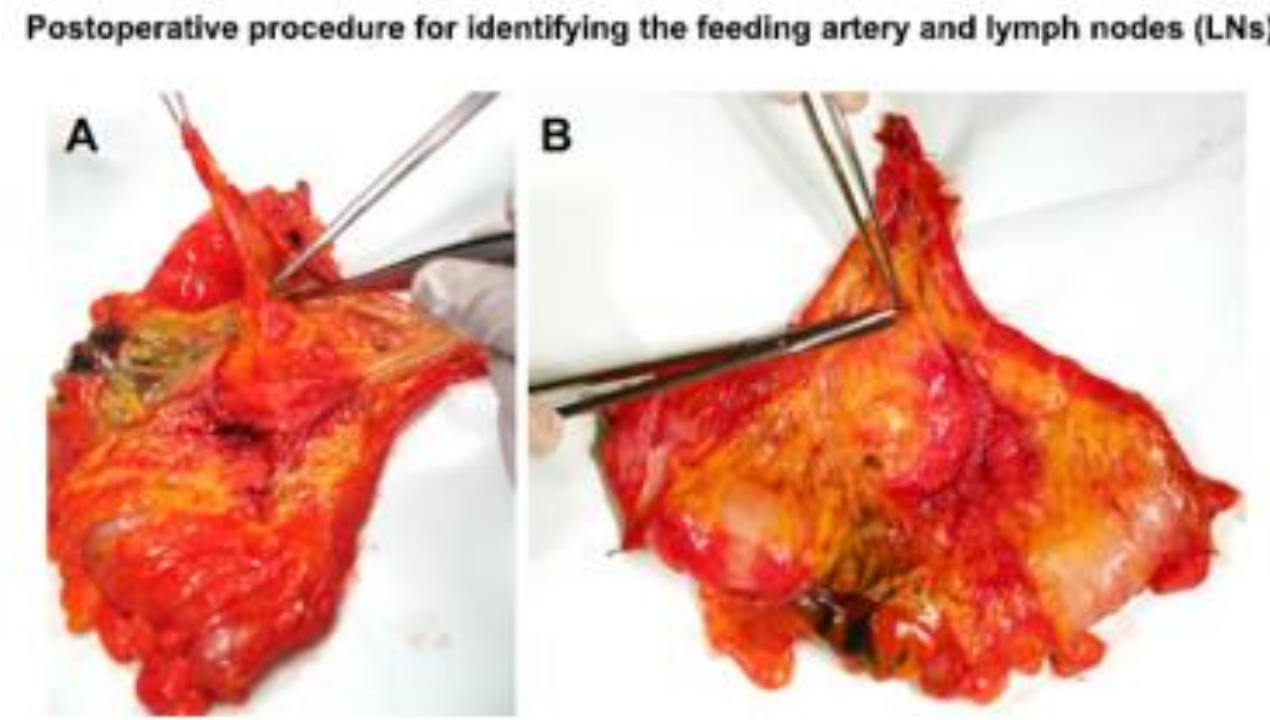
Pericolic lymph nodes & feeding vessels

n=2,996, median harvest of 20 LNs, 4-year fu

- Assessed metastatic LN distribution from the primary tumour
- Distance of primary tumor from the feeding artery



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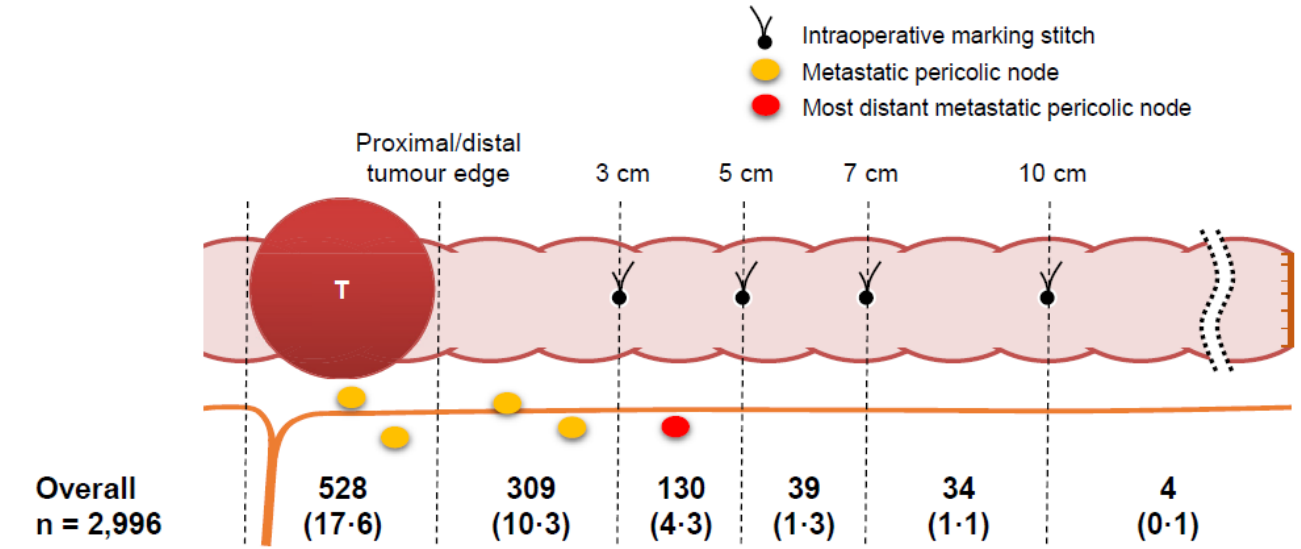
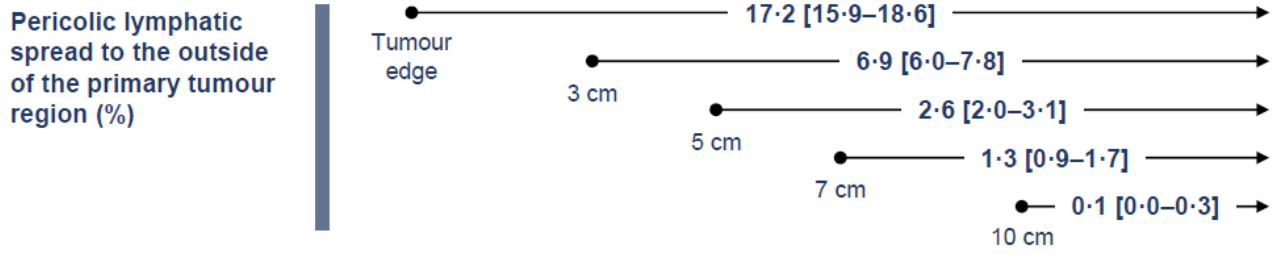
Ueno et al. Lancet 2023

Positive LNs decreased with distance from the primary tumour

<1% metastatic foci in pericolic nodes located >10 cm from the primary tumour



Subgroups according to the pathological T-stage						
T1, n = 574	32 (5·6)	20 (3·5)	12 (2·1)	3 (0·5)	1 (0·2)	0
T2, n = 440	48 (10·9)	39 (8·9)	14 (3·2)	4 (0·9)	6 (1·4)	0
T3, n = 1,443	277 (19·2)	155 (10·7)	65 (4·5)	17 (1·2)	18 (1·2)	2 (0·1)
T4a, n = 449	138 (30·7)	84 (18·7)	33 (7·3)	12 (2·7)	8 (1·8)	2 (0·4)
T4b, n = 90	33 (36·7)	11 (12·2)	6 (6·7)	3 (3·3)	1 (1·1)	0



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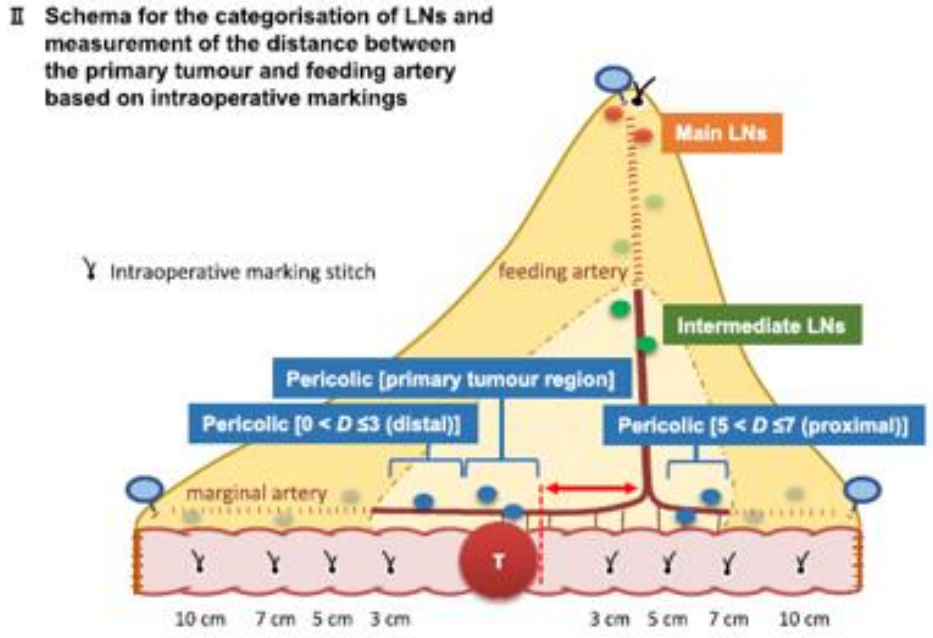
Location of the feeding artery impacted the incidence of central spread along the supplying arteries

Cecum/Ascending & Sigmoid had highest risk of central LN mets



Location of the primary tumour and primary feeding artery	Total number of patients (%)	No metastasis in pericolic LNs	Pericolic tumour spread (location of the most distant metastatic pericolic LN)						
			Primary tumour region	$0 < D \leq 3$	$3 < D \leq 5$	$5 < D \leq 7$	$7 < D \leq 10$	$D > 10$	*P*-value
Tumour location [categorization 1]									
Cecum	137 (12.3)	9 (6.6)	72 (52.6)	37 (27.0)	15 (10.9)	2 (1.5)	1 (0.7)	1 (0.7)	0.27[b]
Ascending colon	369 (33.1)	15 (4.1)	165 (44.7)	109 (29.5)	50 (13.6)	16 (4.3)	12 (3.3)	2 (0.5)	
Transverse colon	148 (13.3)	20 (13.5)	62 (41.9)	39 (26.4)	19 (12.8)	5 (3.4)	3 (2.0)	0	
Descending colon	78 (7.0)	3 (3.8)	36 (46.2)	28 (35.9)	8 (10.3)	1 (1.3)	2 (2.6)	0	
Sigmoid colon	384 (34.4)	25 (6.5)	193 (50.3)	96 (25.0)	38 (9.9)	15 (3.9)	16 (4.2)	1 (0.3)	
Tumour location [categorization 2]									
Non-flexure site	974 (87.3)	53 (5.4)	470 (48.3)	272 (27.9)	108 (11.1)	36 (3.7)	32 (3.3)	3 (0.3)	0.19[c]
Hepatic flexure	91 (8.2)	18 (19.8)	38 (41.8)	19 (20.9)	13 (14.3)	0	2 (2.2)	1 (1.1)	
Splenic flexure	51 (4.6)	1 (2.0)	20 (39.2)	18 (35.3)	9 (17.6)	3 (5.9)	0	0	
Location of the primary feeding artery									
Primary tumour region	709 (63.5)	48 (6.8)	322 (45.4)	209 (29.5)	79 (11.1)	23 (3.2)	25 (3.5)	3 (0.4)	0.31[d]
≤5 cm from the primary tumour	377 (33.8)	23 (6.1)	195 (51.7)	89 (23.6)	46 (12.2)	16 (4.2)	7 (1.9)	1 (0.3)	
5–10 cm from the primary tumour	28 (2.5)	1 (3.6)	10 (35.7)	11 (39.3)	4 (14.3)	0	2 (7.1)	0	
>10 cm from the primary tumour	2 (0.2)	0	1 (50.0)	0	1 (50.0)	0	0	0	

D: distance from the closest primary tumour edge (cm), LN: lymph node. [a]Metastasis in intermediate and/or main LNs. [b]*P*-value obtained by chi-square test is shown for 1 pericolic LNs, in which groups of '$5< D \leq 7$', '$7< D \leq 10$' and '$D > 10$' are combined. [c]*P*-value obtained by chi-square test is shown for 1044 patients with positive pe of '$5 < D \leq 7$', '$7 < D \leq 10$' and '$D > 10$', and groups 'hepatic flexure' and 'splenic flexure' are combined, respectively. [d]Test of Spearman's rank correlation coefficient. [e]Chi-squ trend test.

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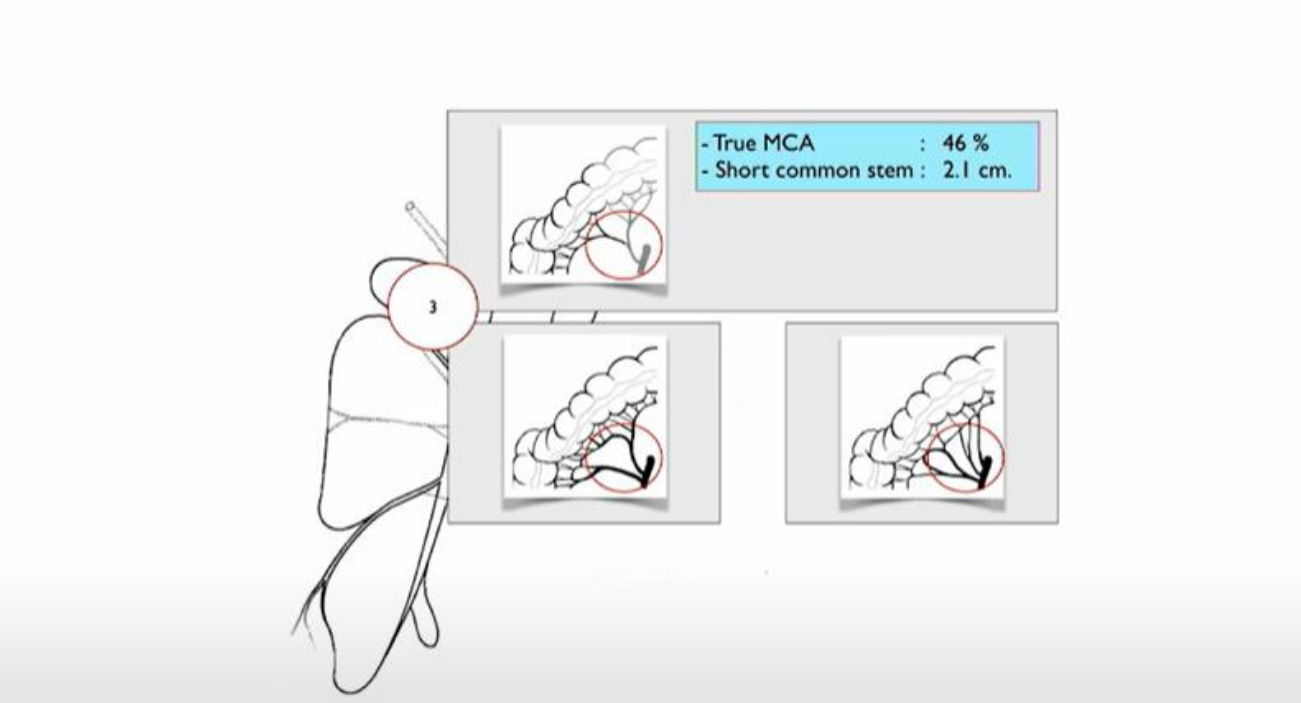
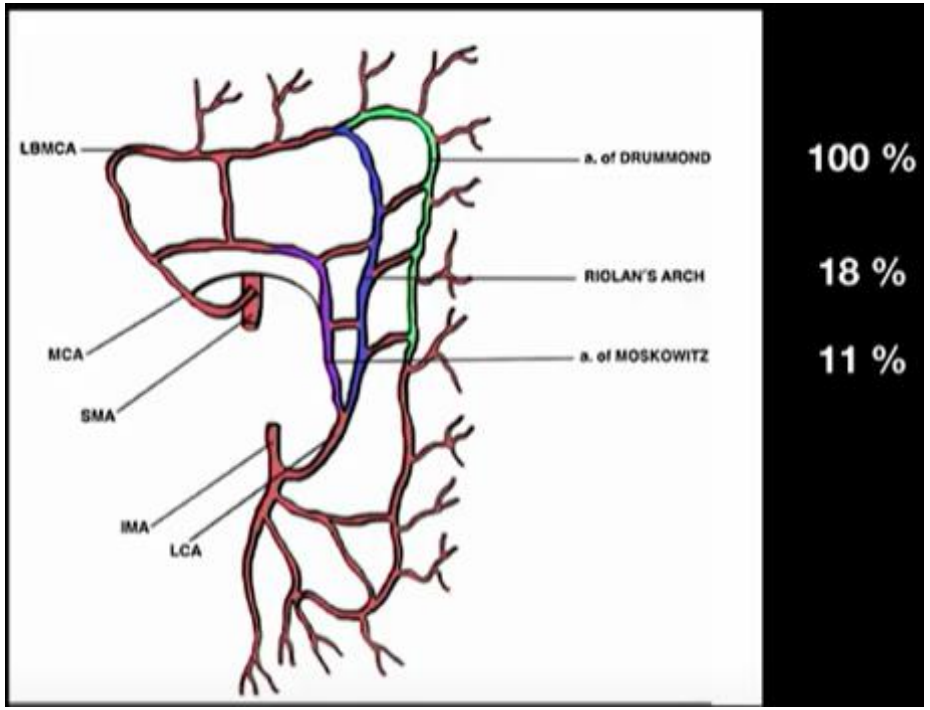
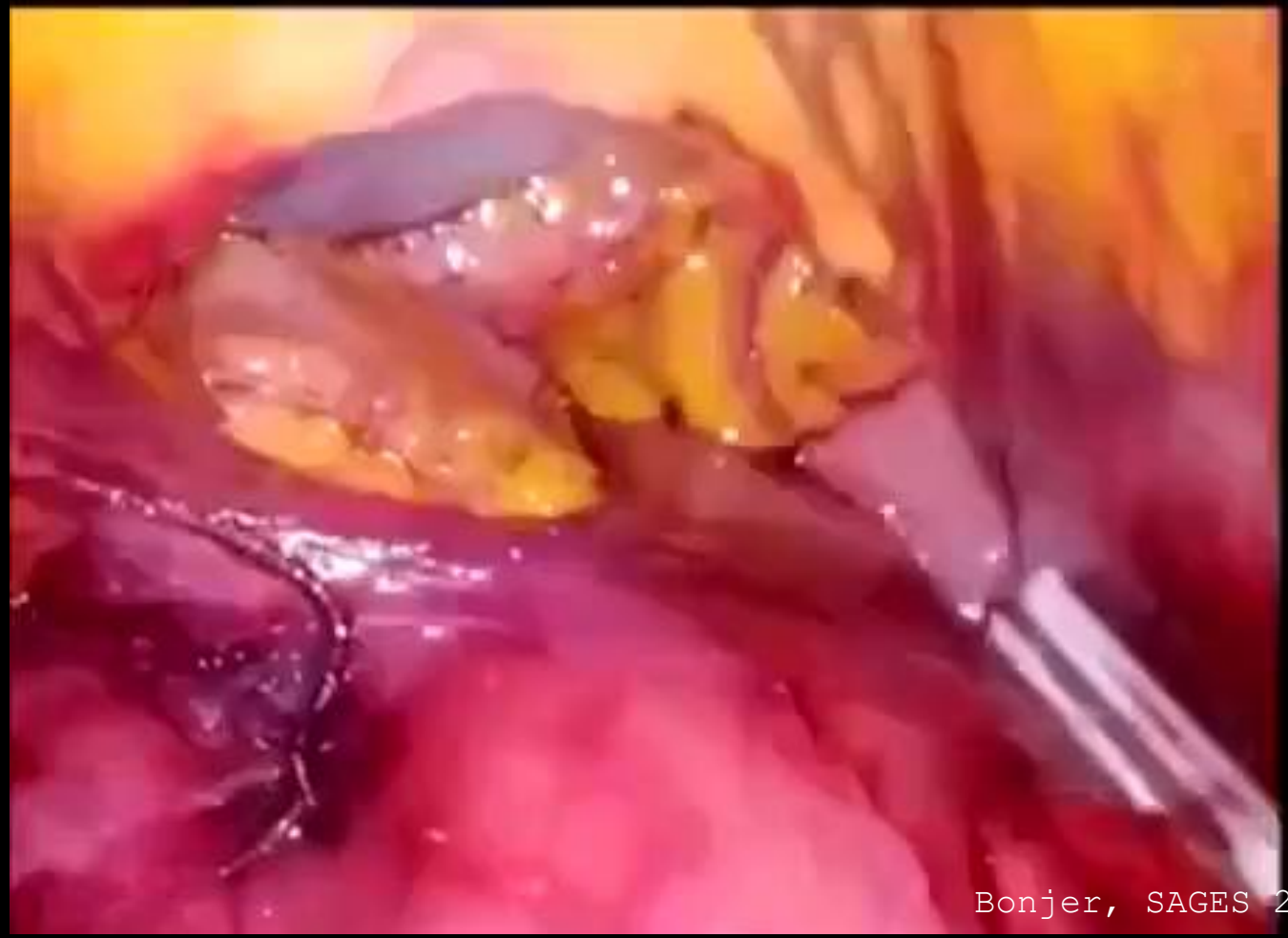
Middle colic artery and vein



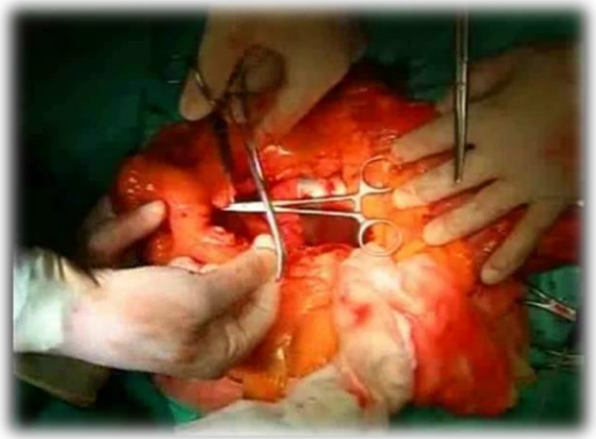


Bonjer, SAGES 2019

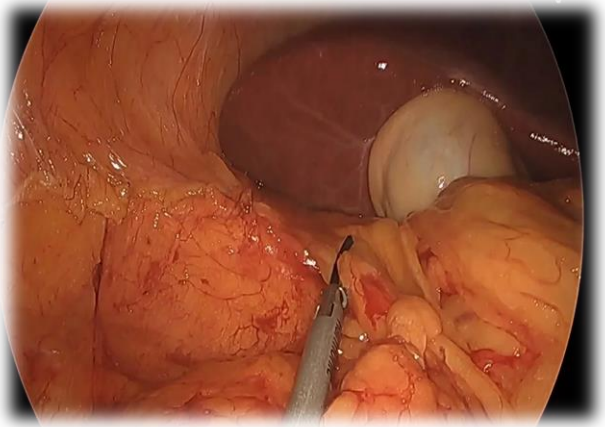

Bonjer, SAGES 2019

Italian Society of Surgical Oncology Colorectal Cancer Network (SICO CCN) Group

MIS vs. Open Mid Transverse Colon



n=224 (57.7%) Open



n=164 (42.3%) MIS

33 (22.6%) ICA & 131 (77.4%) ECA

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Milone et al. Updates in Surgery 2022

MIS had better recovery

- Recurrence rate at 3.5 years: Open 22.8% vs MIS 18.3%; *p* = 0.28
- Mortality at 3.5 years: Open 6.7% vs MIS 5.5%; *p* = 0.62

Table 1 Comparison between conventional open approach and minimally invasive surgery

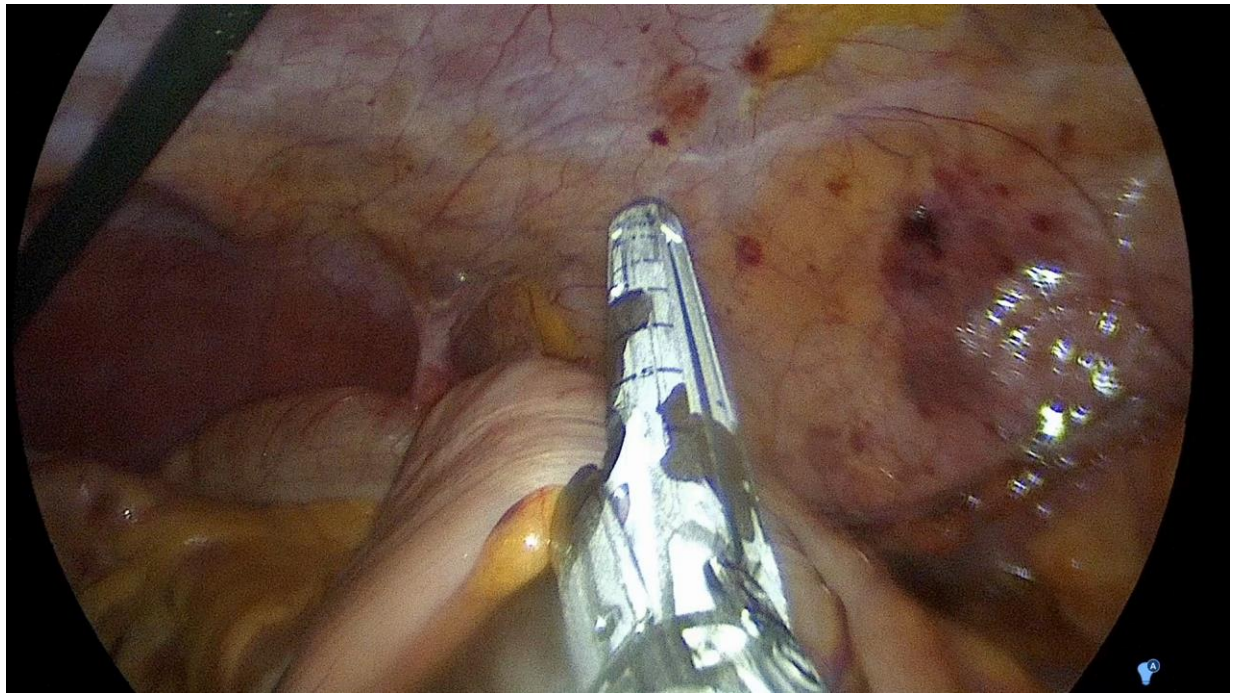
	Open ($n=224$)	Minimally ($n=164$)	*p*
Males (*n*, %)	120 (53.57%)	72 (43.9%)	0.2
Age (median, IQR)	72 (22.5)	72 (21.5)	0.1
BMI (median, IQR)	19 (21)	19 (19)	0.1
ASA score (median, IQR)	2 (1)	2 (1)	0.5
T (median, IQR)	3 (0)	3 (1)	0.1
N (median, IQR)	0 (1)	0 (1)	0.8
M (median, IQR)	0 (0)	0 (0)	0.3
Complications (*n*, %)	71 (31.7%)	46 (28%)	0.43
Anemia (*n*, %)	5 (2.2%)	3 (1.8%)	0.78
Nausea (*n*, %)	7 (3.1%)	4 (2.4%)	0.68
Infections (*n*, %)	10 (4.4%)	7 (4.2%)	0.91
Bleeding (n, %)	12 (5.3%)	7 (4.2%)	0.62
Leakage (*n*, %)	11 (4.9%)	6 (3.6%)	0.55
Ileus (*n*, %)	2 (0.9%)	1 (0.6%)	0.75
Recurrences (*n*, %)	51 (22.8%)	30 (18.3%)	0.28
Death (*n*, %)	15 (6.7%)	9 (5.5%)	0.62
Operative time (median, IQR)	157 (80)	140 (75)	0.102
Clavien (median, IQR)	0 (1)	0 (1)	0.036
Time to first flatus (median, IQR)	4 (2)	3 (2)	0.001
Solid diet (median, IQR)	4 (3)	4 (2)	0.017
Mobilization (median, IQR)	2 (1)	1 (1)	0.001
Hospital stay (median, IQR)	9 (5)	7.5 (4)	0.004
Lymph nodes + (median, IQR)	0 (1)	0 (1)	0.19
Total lymph nodes (median, IQR)	13 (8)	15 (7)	0.33
Specimen length (median, IQR)	20 (11.6)	20 (12)	0.65
Proximal margin (median, IQR)	7 (7)	7 (5)	0.46
Distal margin (median, IQR)	8 (7)	10 (6.5)	0.14

IQR interquartile range, *BI*: body mass index, *ASA* American Society of Anesthesiologists

ICA has *even better* recovery

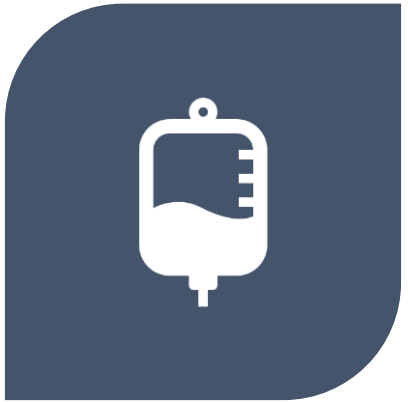
	Intracorporeal ($n=33$)	Extracorporeal ($n=33$)
Complications (n, %)	4 (12.1%)	15 (48.5%)
Anemia (n, %)	1 (3%)	2 (1.5%)
Nausea (n, %)	1 (3%)	2 (1.5%)
Infections (n, %)	1 (3%)	6 (18.1%)
Bleeding (n, %)	1 (3%)	6 (18.1%)
Leakage (n, %)	0	6 (18.1%)
Ileus (n, %)	0	1 (3%)
Recurrences (n, %)	6 (18.2%)	6 (18.2%)
Death (n, %)	0	2 (6.1%)
Operative time (median, IQR)	160 (105)	185 (70)
Clavien (median, IQR)	0 (0)	0 (1)
Time to first flatus (median, IQR)	3 (1)	4 (1)
Solid diet (median, IQR)	4 (1)	5 (1)
Mobilization (median, IQR)	1 (1)	2 (1)
Hospital stay (median, IQR)	7 (3)	8 (4)
Lymph nodes + (median, IQR)	0 (2)	0 (0)
Total lymph nodes (median, IQR)	11 (8)	11 (9)
Specimen length (median, IQR)	21 (9)	19 (7)
Proximal margin (median, IQR)	8 (4)	7 (4)
Distal margin (median, IQR)	10 (8)	8 (5)

IQR interquartile range, *BMI* body mass index, *ASA* American Society of Anesthesiologists



In Summary

TAILORED OPERATION TYPE & EXTENT OF RESECTION



LYMPHATIC DRAINAGE & VASCULAR LIGATION

MIS APPROACH AND ICA ARE WORTH IT!

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