

CME RIGHT COLECTOMY

The need for homogenization and national-international registry

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TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA



CITED 4496
times

Case Reports > [Br J Surg.](#) 1982 Oct;69(10):613-6. doi: 10.1002/bjs.1800691019.

The mesorectum in rectal cancer surgery--the clue to pelvic recurrence?

[R J Heald](#), [E M Husband](#), [R D Ryall](#)

PMID: 6751457 DOI: [10.1002/bjs.1800691019](#)



> [Lancet.](#) 1986 Nov 1;2(8514):996-9. doi: 10.1016/s0140-6736(86)92612-7.

Local recurrence of rectal adenocarcinoma due to inadequate surgical resection. Histopathological study of lateral tumour spread and surgical excision

[P Quirke](#), [P Durdey](#), [M F Dixon](#), [N S Williams](#)

PMID: 2430152 DOI: [10.1016/s0140-6736\(86\)92612-7](#)

CITED 2522
times

> [J R Soc Med.](#) 1988 Sep;81(9):503-8. doi: [10.1177/014107688808100904](#).

The 'Holy Plane' of rectal surgery

[R J Heald](#) ¹

[Affiliations](#) + [expand](#)

PMID: [3184105](#) PMCID: [PMC1291757](#) DOI: [10.1177/014107688808100904](#)



- Surgery along the embryological plane
- Preservation of an intact mesorectal envelope
- Mesorectal lymphnodes retrieval
- Central ligation of afferent and efferent vessels

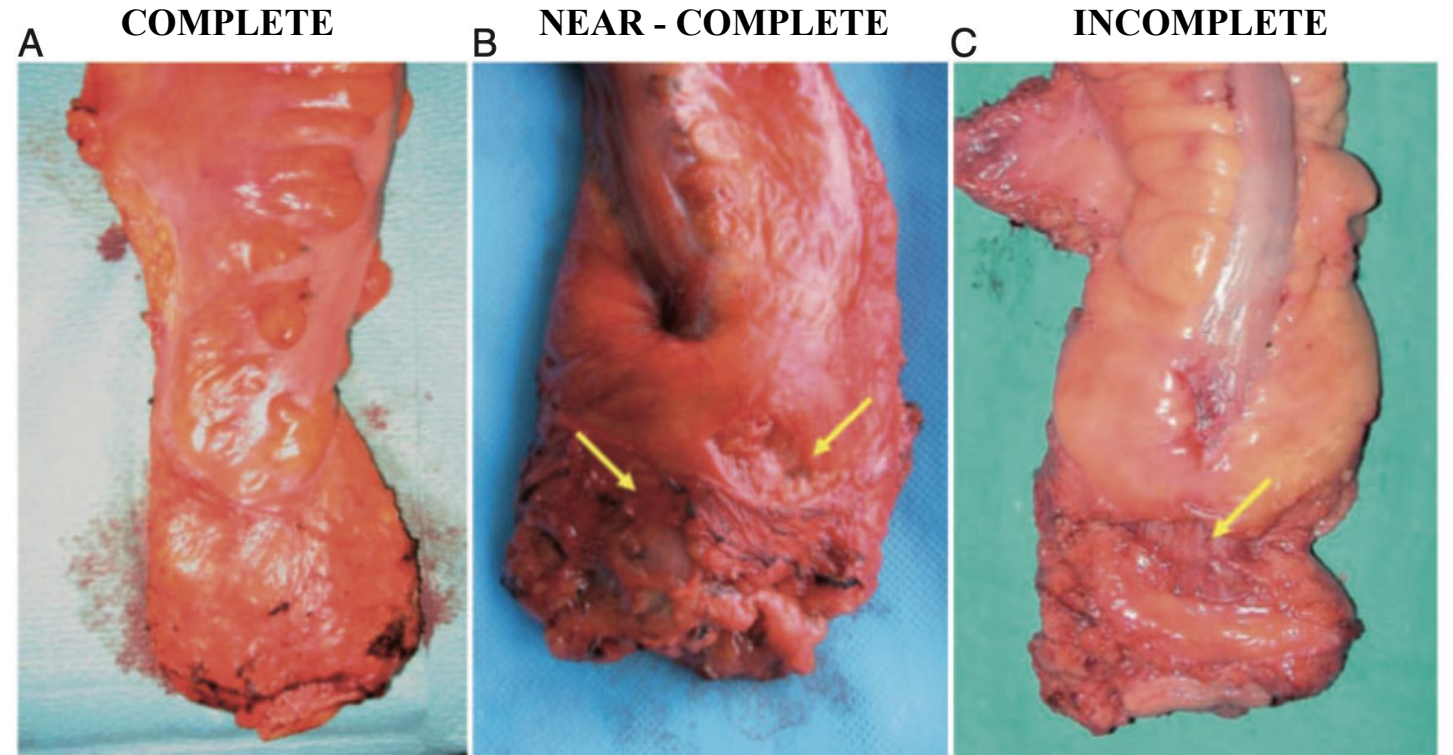


Milestones in rectal cancer surgery

Clinical Trial > JAMA Surg. 2018 Aug 1;153(8):e181607. doi: 10.1001/jamasurg.2018.1607.
Epub 2018 Aug 15.

Association of Plane of Total Mesorectal Excision With Prognosis of Rectal Cancer: Secondary Analysis of the CAO/ARO/AIO-04 Phase 3 Randomized Clinical Trial

Julia Kitz¹, Emmanouil Fokas², Tim Beissbarth³, Philipp Ströbel¹, Christian Wittekind⁴,
PMID: 29874375 PMID: PMC6142959 DOI: 10.1001/jamasurg.2018.1607



1152 pt	<i>p</i> value	930 (80.7%)	169 (14.7%)	53 (4.6%)
3-yr DFS	=.01	73.1 - 78.8%	61.6 - 76%	55.6 - 81.3%
Local recurrence	<.001	2.0 - 4.5 %	1.2 - 8.1 %	2.5 - 20.5 %
Distant recurrence	=.03	17.0 - 22.4 %	18.3 - 32.0 %	14.2 - 39.0 %
Overall survival	=.02	88.3 - 92.3 %	79.7 - 91.0 %	81.6 - 98.7 %

What about colon cancer surgery?

Practice Guideline > Ann Oncol 2020 Oct;31(10):1291-1305. doi: 10.1016/j.annonc.2020.06.022.

Epub 2020 Jul 20.

Localised colon cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up

Management of locally infiltrative colon cancers

Infiltrative colon cancers cannot be resected by colonoscopy and require surgery, with the goal of wide resection of the involved bowel segment and its lymphatic drainage [I, A]. The extent of the colonic resection is determined by the blood supply and distribution of regional lymph nodes. The resection should include a segment of colon of at least 5 cm on either side of the tumour, but wider margins are often included due to the mandatory ligation of the arterial blood supply [IV, B]. *En bloc* colonic and mesentery resection is recommended in order to clearly define stage II versus stage III and to identify and eradicate potential lymph node metastases; at least 12 lymph nodes should be resected when feasible [IV, B].⁴⁰ Likewise, *en bloc* resection of adjacent organ-invaded portions must be carried out in case of pT4b⁴¹ [I, B].

WIDE RESECTION
as determined by blood supply

≥ 12 LYMPH NODES
in order to clearly define cancer stage

5-YEAR SURVIVAL
after surgical resection alone:

STAGE I → 99%

STAGE II → 68-83%

STAGE III → 45-65%

Colon Cancer. The CME concept

Original article

Colorectal Disease 2009

doi:10.1111/j.1463-1318.2008.01735.x

Standardized surgery for colonic cancer: complete mesocolic excision and central ligation – technical notes and outcome

W. Hohenberger*, K. Weber*, K. Matzel*, T. Papadopoulos† and S. Merkel*

*Department of Surgery, University Hospital, Erlangen, Germany and †Department of Pathology, Vivantes Humboldt Hospital, Berlin, Germany

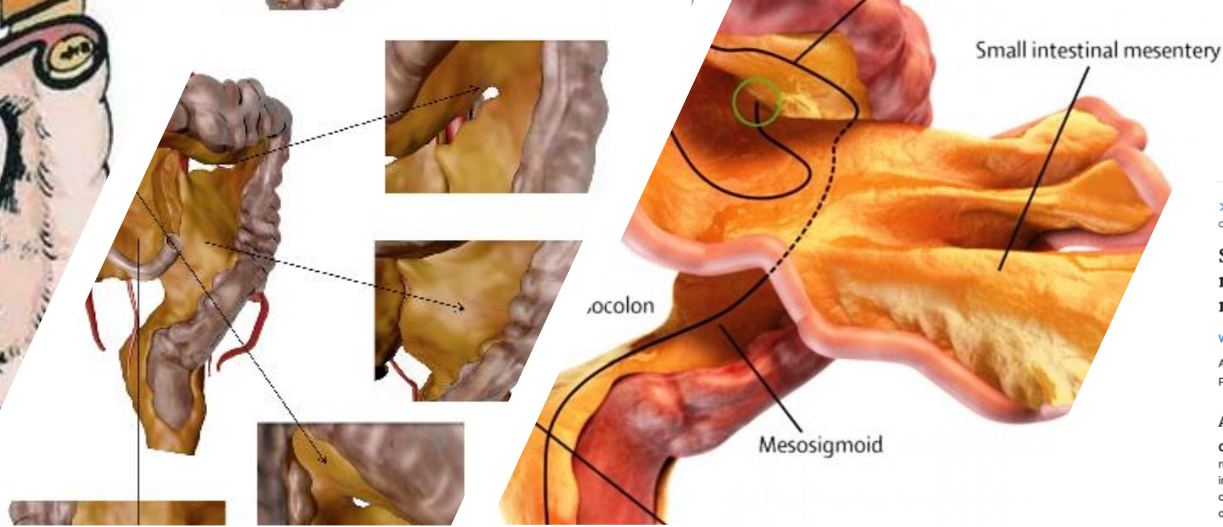
- Surgery along the embryological plane, with preservation of an intact mesocolic envelope
- Central ligation of afferent and efferent vessels
- Extended lymphadenectomy with retrieval of superior mesenteric (D3) lymph-nodes

«In 2009, we presented the concept of complete mesocolic excision (CME) and put it up for discussion as an alternative to conventional and mostly non-standardized surgery for colon cancer, which was being performed in most institutions globally at that time. This proposition was supported by oncologic outcome figures, which differed markedly from most survival and local recurrence rates published in the literature at the time»

W. Hoenberger, emeritus professor University of Erlangen, Germany



Maximum advantage in advanced tumors
5-year-survival with stage 3 disease varied from 38.5% to 74%



National Center for Biotechnology Information
PubMed.gov

complete mesocolic excision hohenberger

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Colorectal Dis. 2009 May;11(4):354-64; discussion 364-5.
doi: 10.1111/j.1463-1318.2008.01735.x. Epub 2009 Nov 5.

Standardized surgery for colonic cancer: complete mesocolic excision and central ligation--technical notes and outcome

W Hohenberger¹, K Weber, K Matzel, T Papadopoulos, S Merkel

Affiliations + expand
PMID: 19016817 DOI: 10.1111/j.1463-1318.2008.01735.x

Abstract

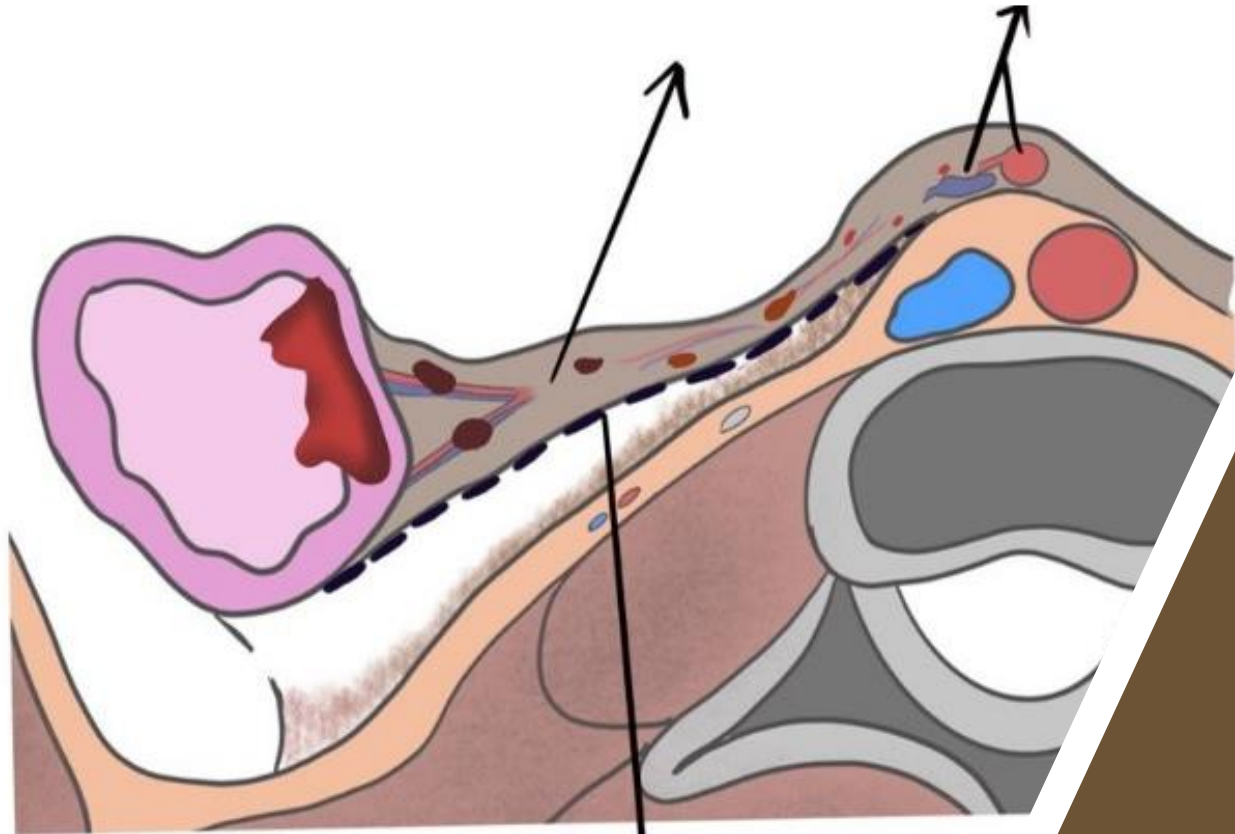
Objective: Total mesorectal excision (TME) as proposed by R.J. Heald more than 20 years ago, is nowadays accepted worldwide for optimal rectal cancer surgery. This technique is focused on an intact package of the tumour and its main lymphatic drainage. This concept can be translated into colon cancer surgery, as the mesorectum is only part of the mesenteric planes which cover the colon and its lymphatic drainage like envelopes. According to the concept of TME for rectal cancer,

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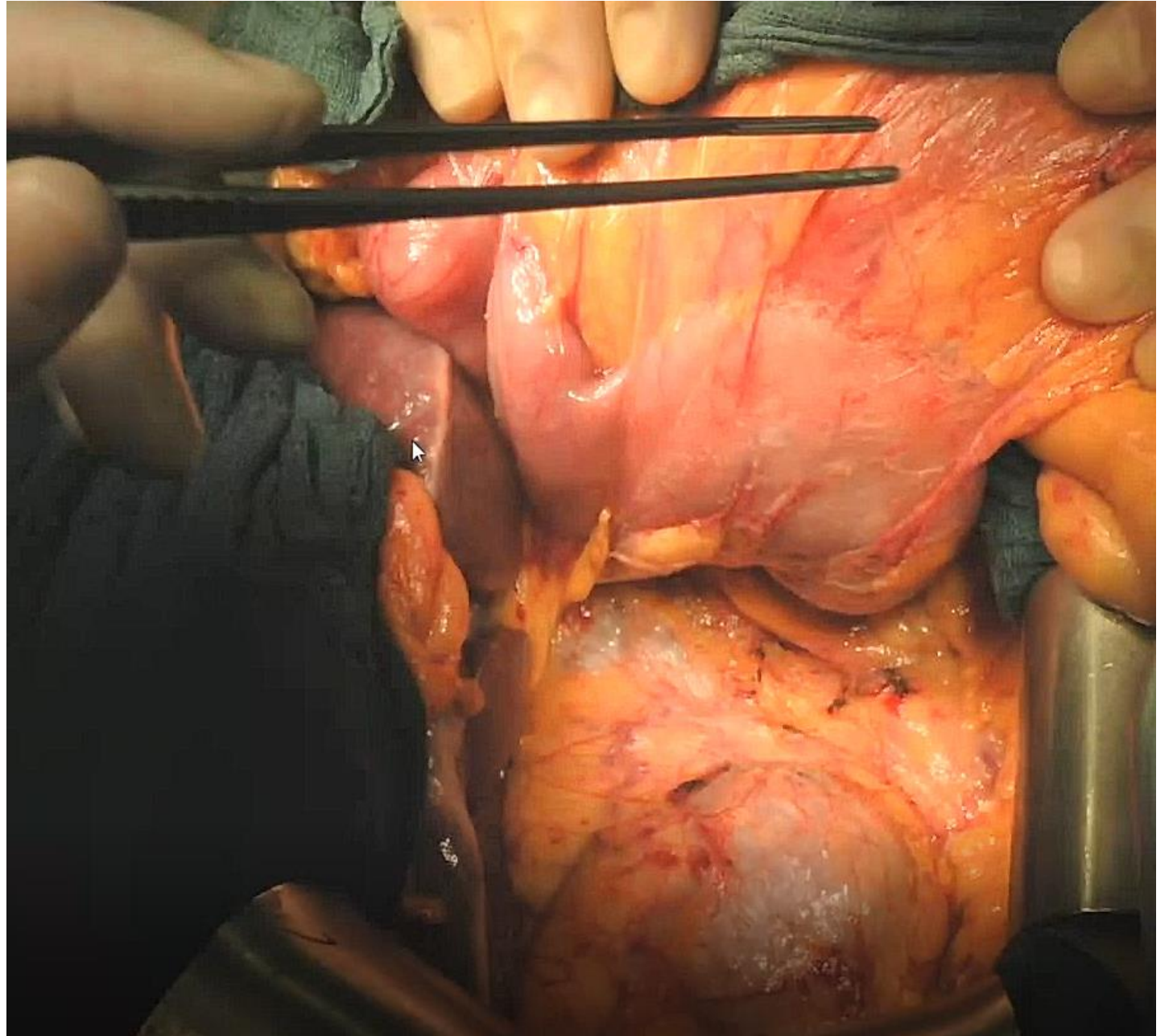
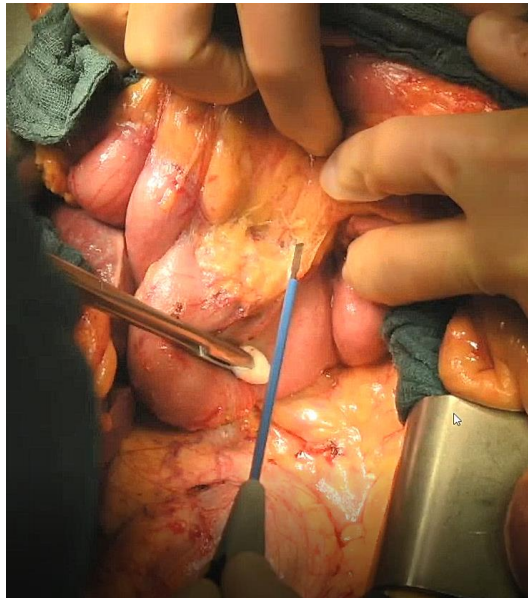
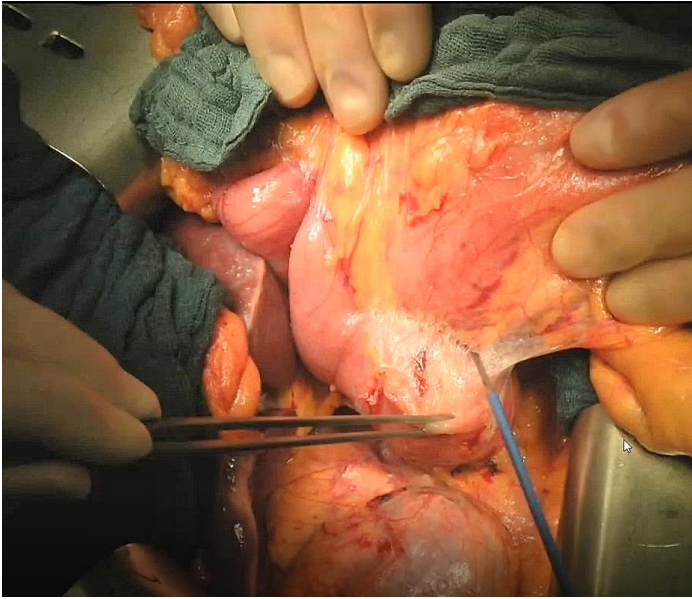
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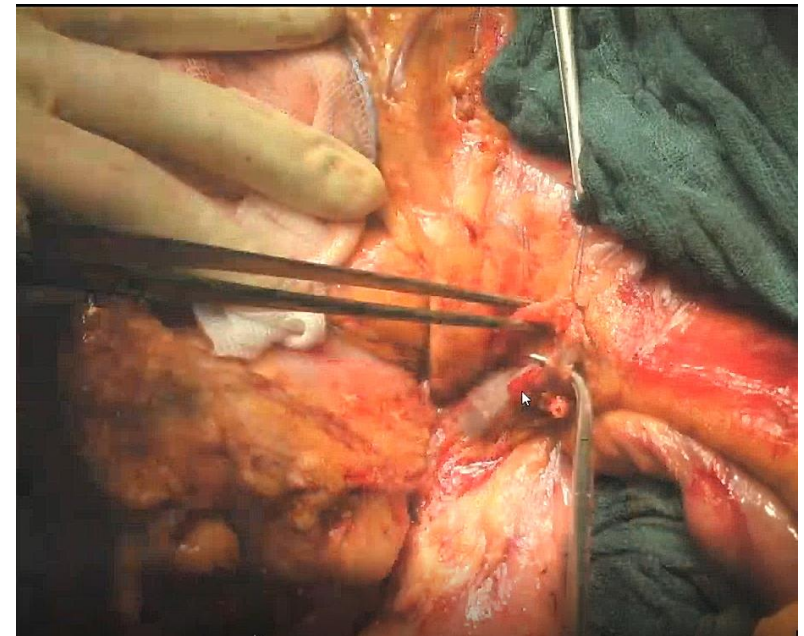
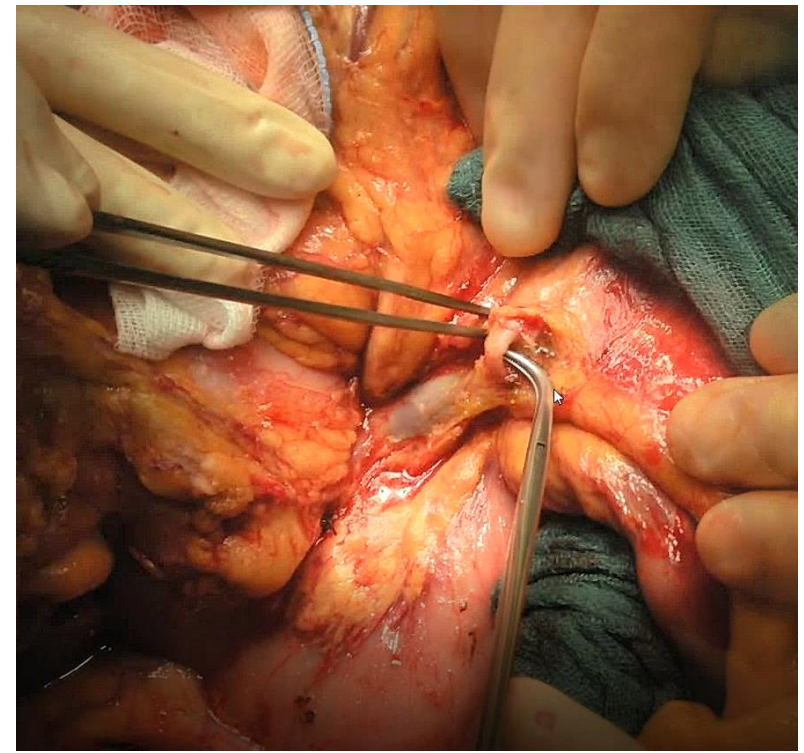
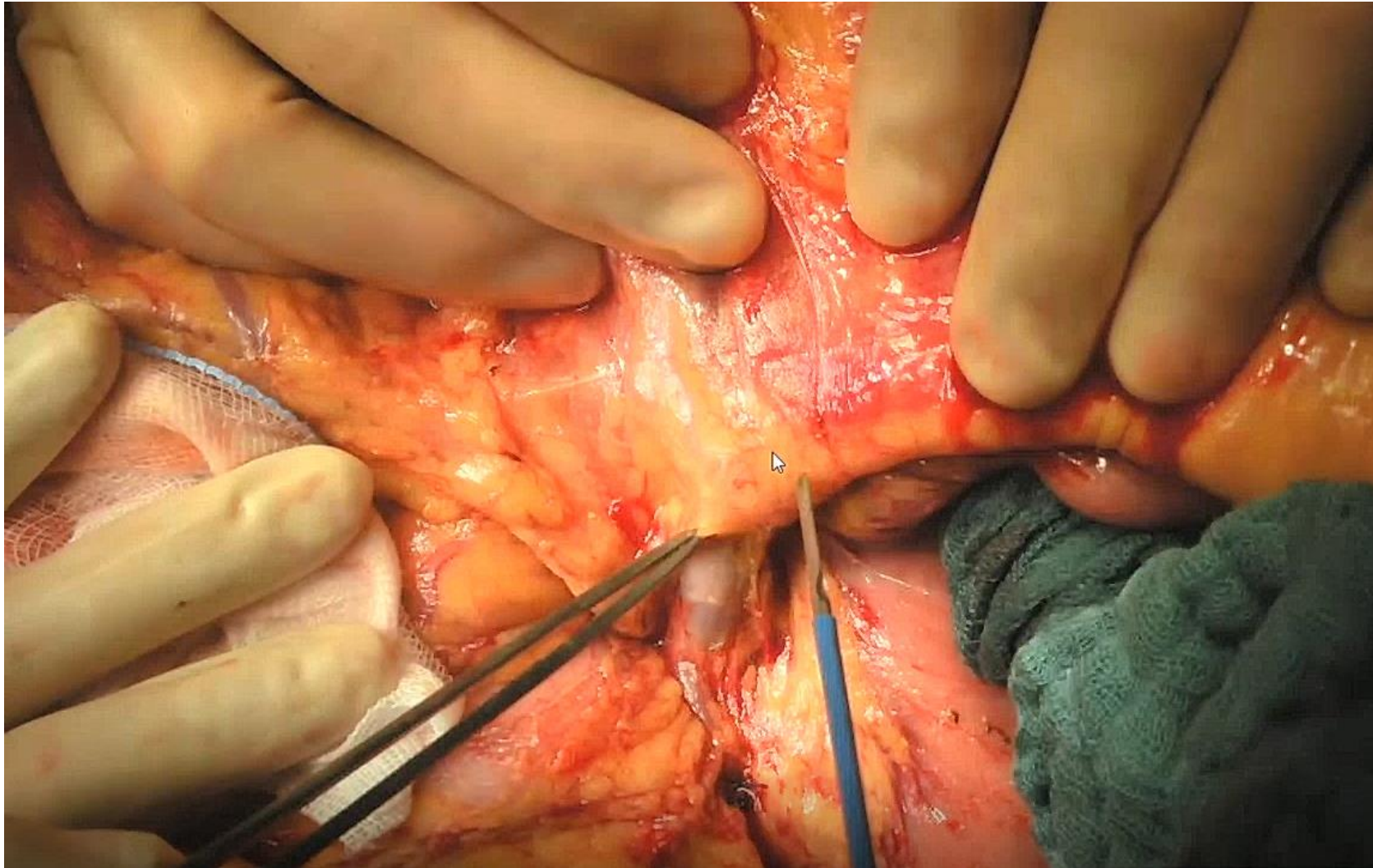
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Title & authors
Abstract



CME
for Colon Cancer



Courtesy of W. Hoemberger



Courtesy of W. Hoemberger

CME. The rationale

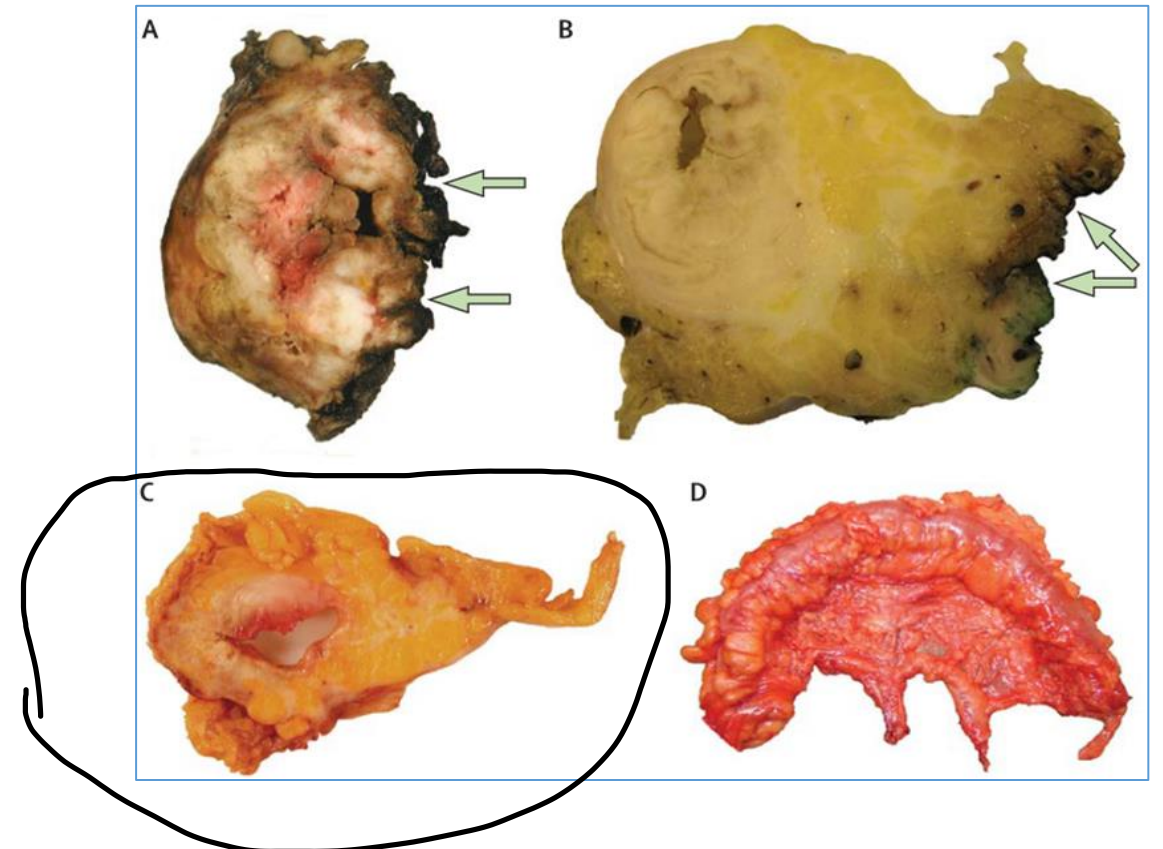
Pathology grading of colon cancer surgical resection and its association with survival: a retrospective observational study



Nicholas P West, Eva J A Morris, Olorunda Rotimi, Alison Cairns, Paul J Finan, Philip Quirke

West et al. definition of dissection plane:

1. mesocolic plane (as the optimum). C-D in the figure
2. intermesenteric plane. B
3. muscularis propria plane. A



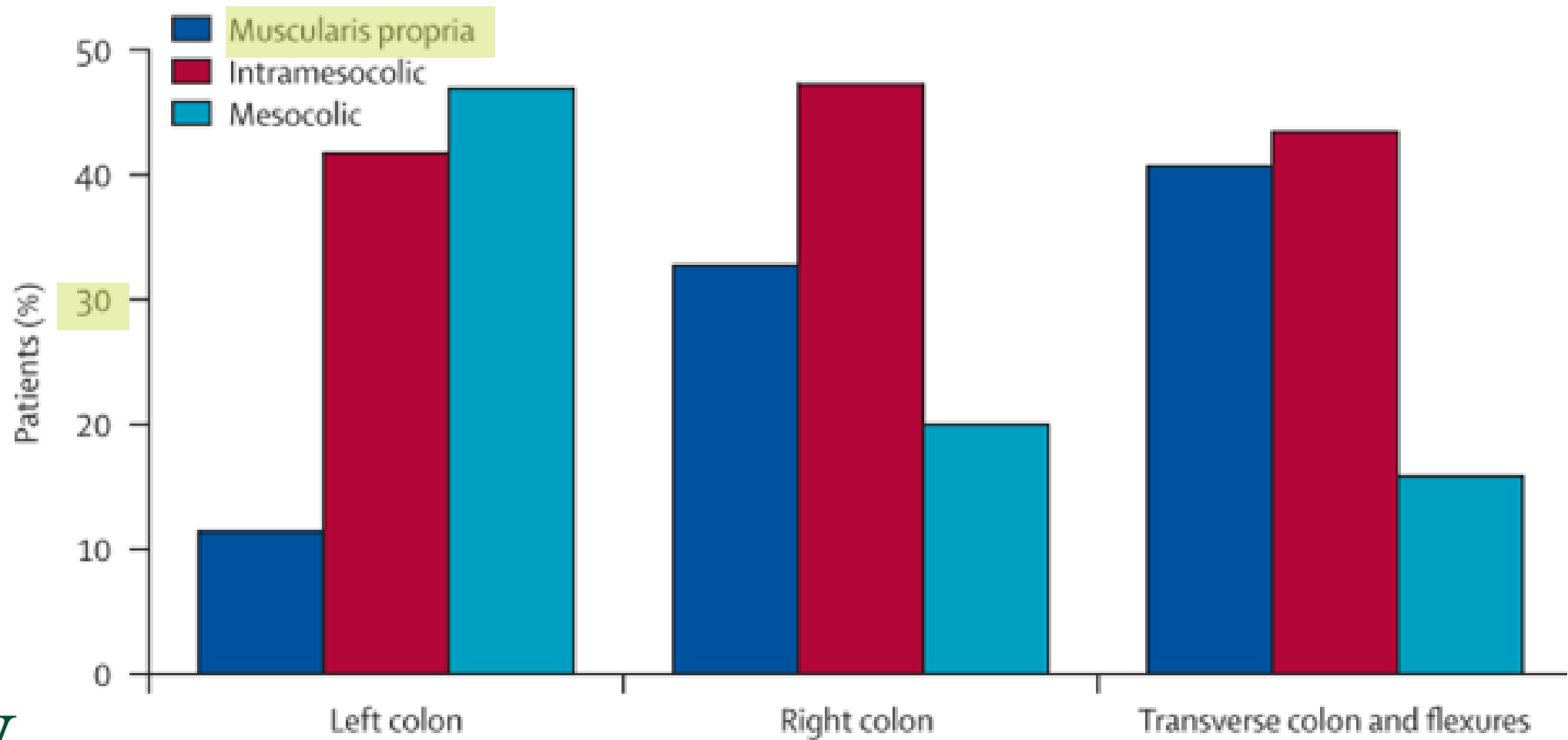
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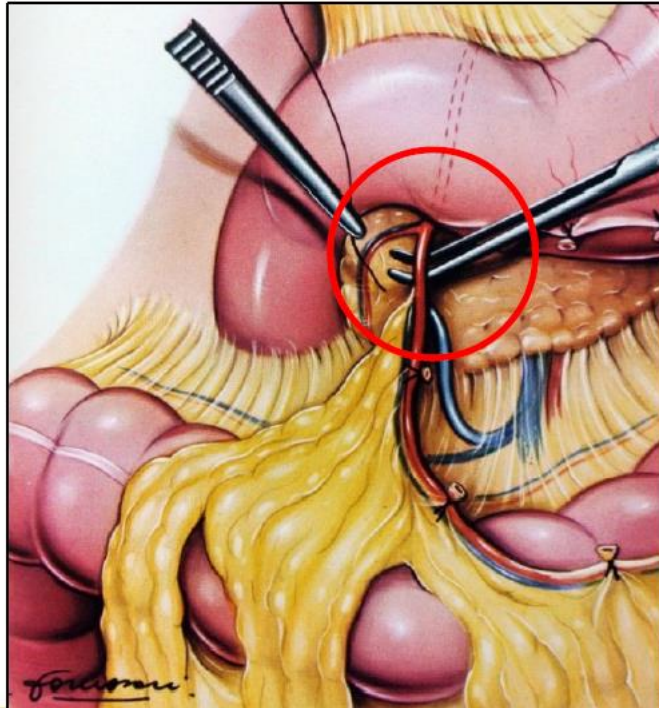
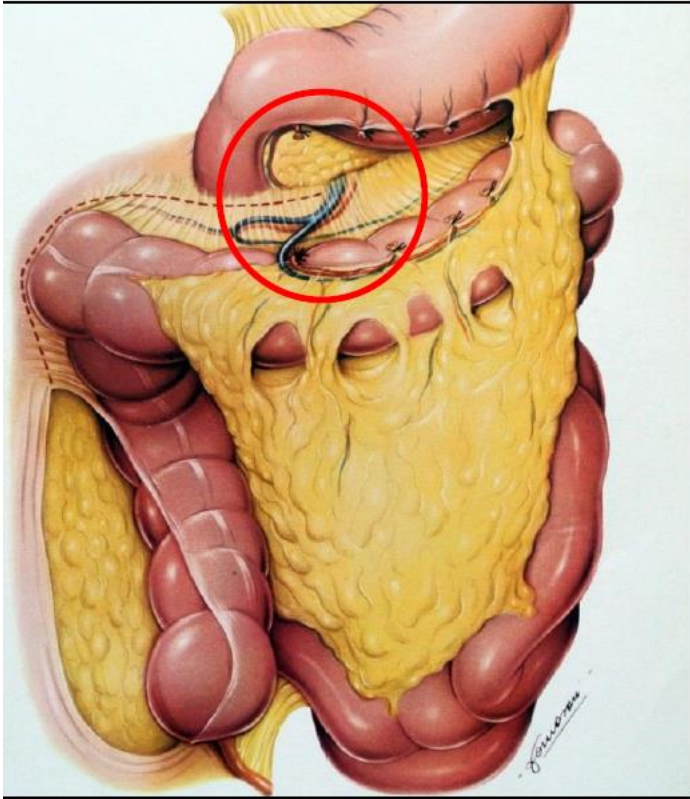
Pathology grading of colon cancer surgical resection and its association with survival: a retrospective observational study

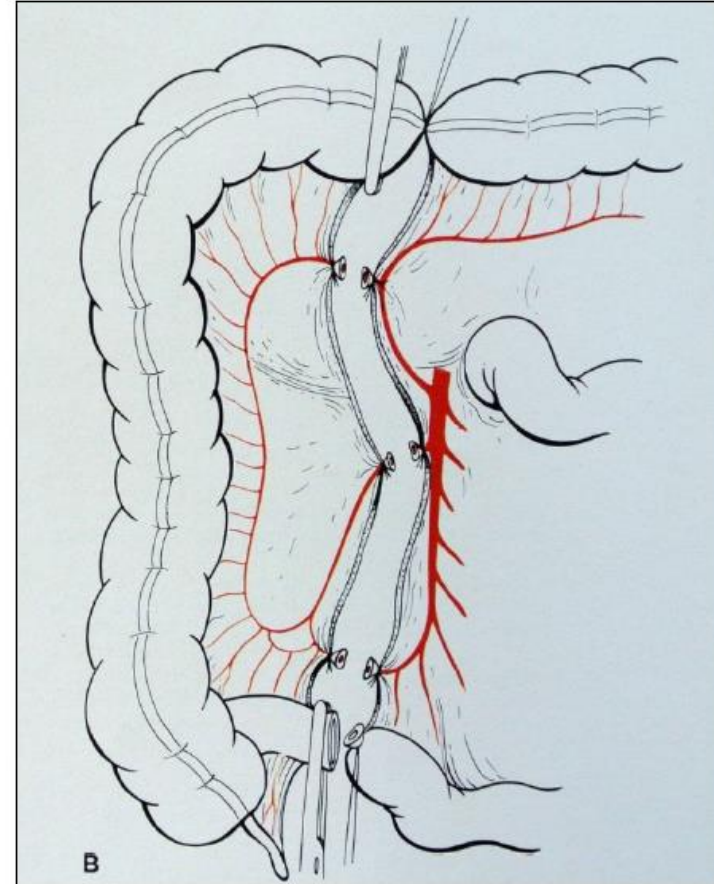
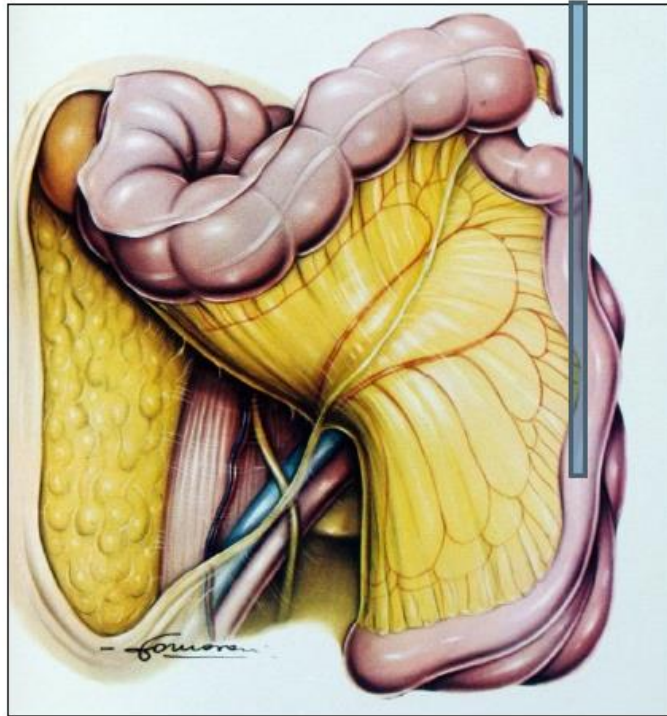
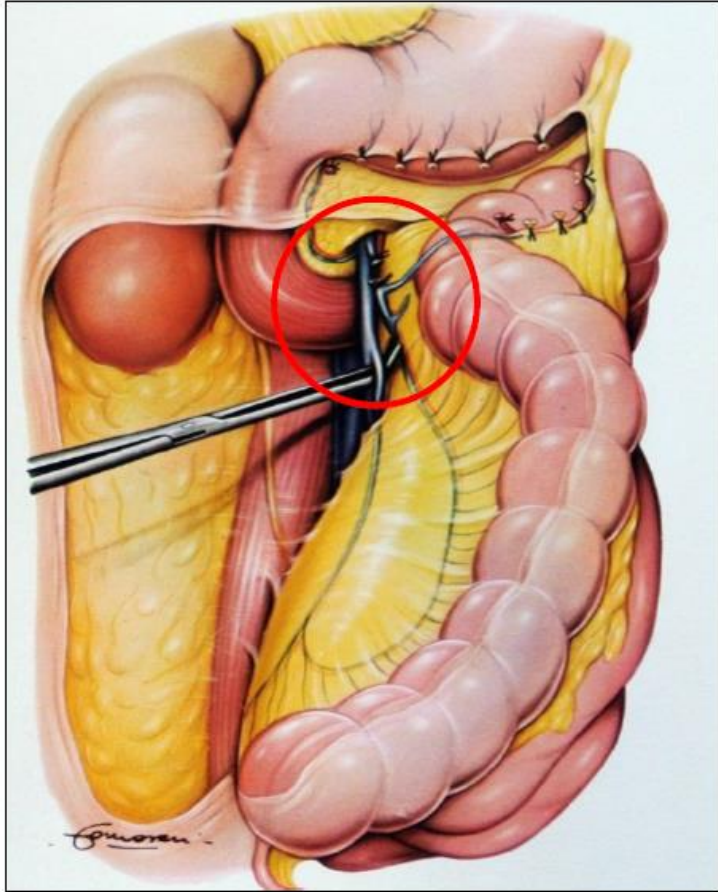
Lancet Oncology 2008



Nicholas P West, Eva J A Morris, Olorunda Rotimi, Alison Cairns, Paul J Finan, Philip Quirke

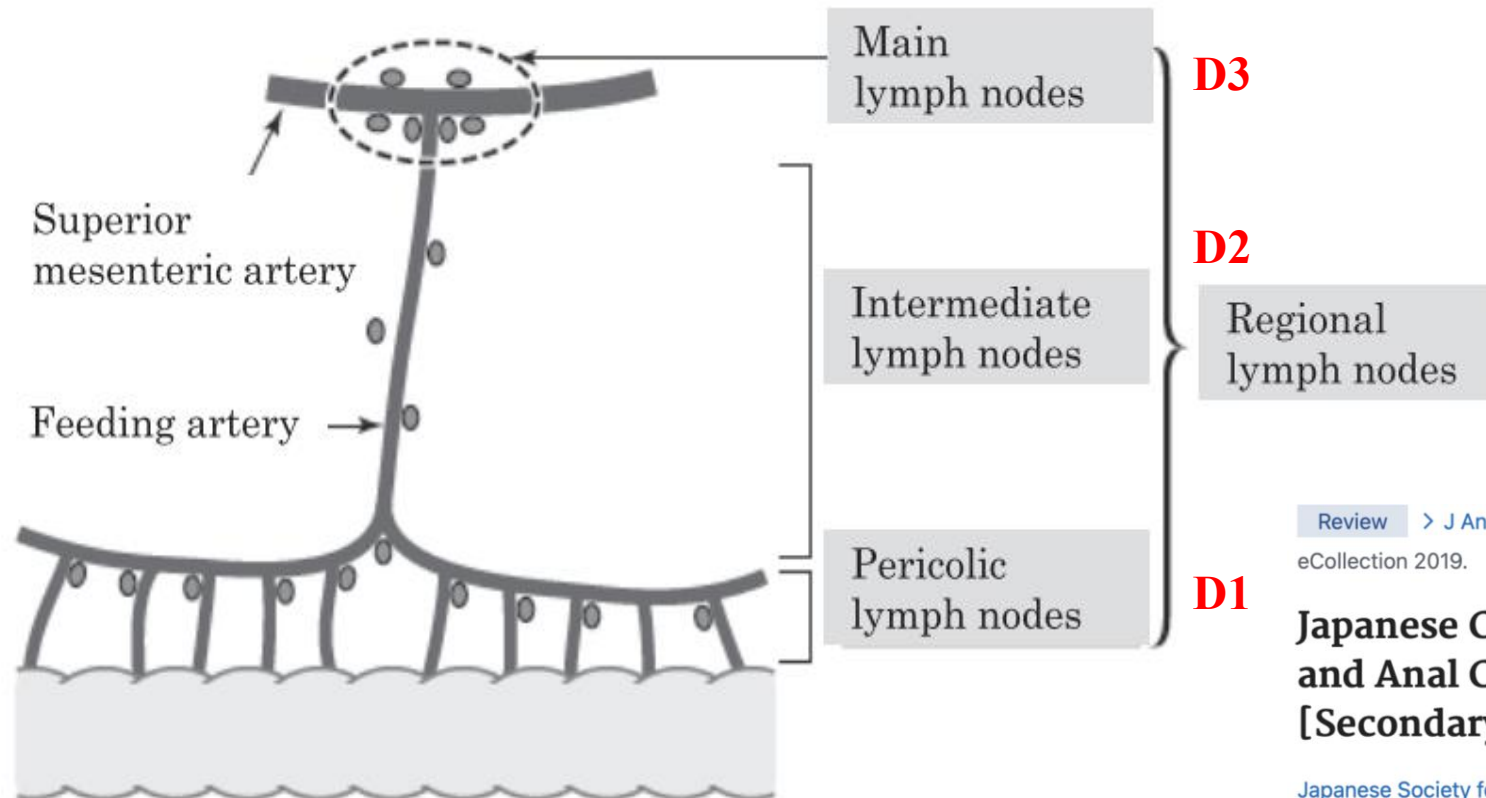






Lymph nodes retrieval

1. Pericolic lymph nodes (D1; longitudinal direction)
2. Intermediate lymph nodes (D2)
3. Main or central lymph nodes (D3, vertical direction)

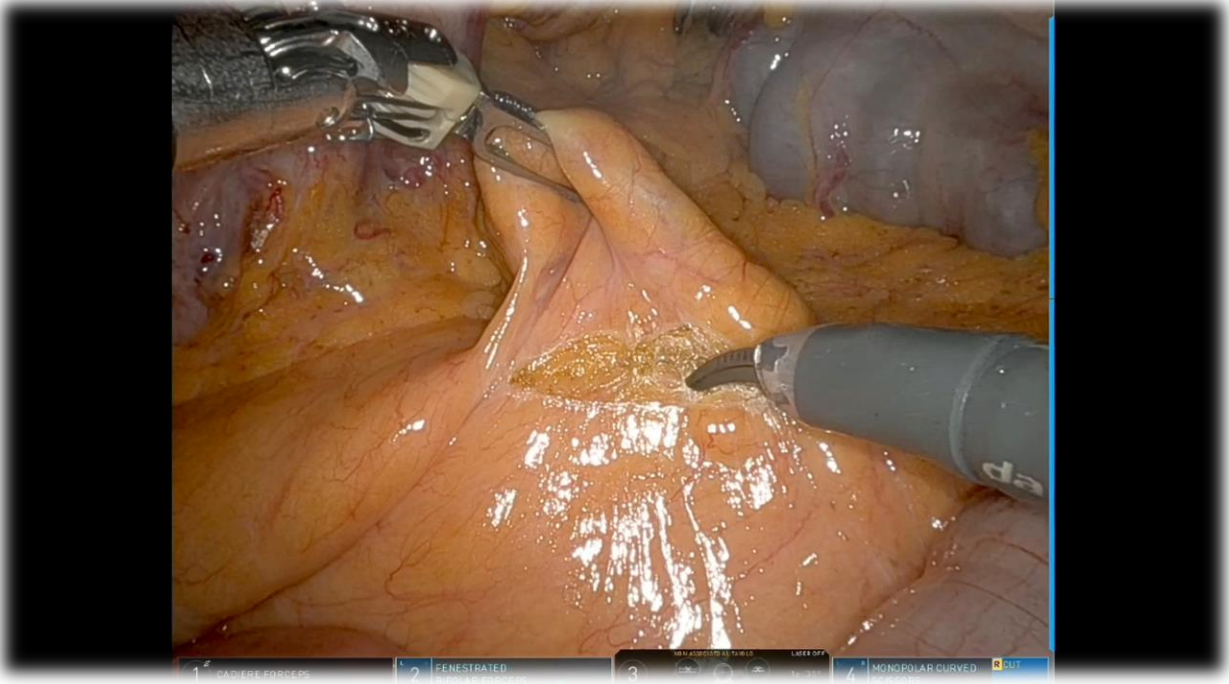


Review > J Anus Rectum Colon. 2019 Oct 30;3(4):175-195. doi: 10.23922/jarc.2019-018. eCollection 2019.

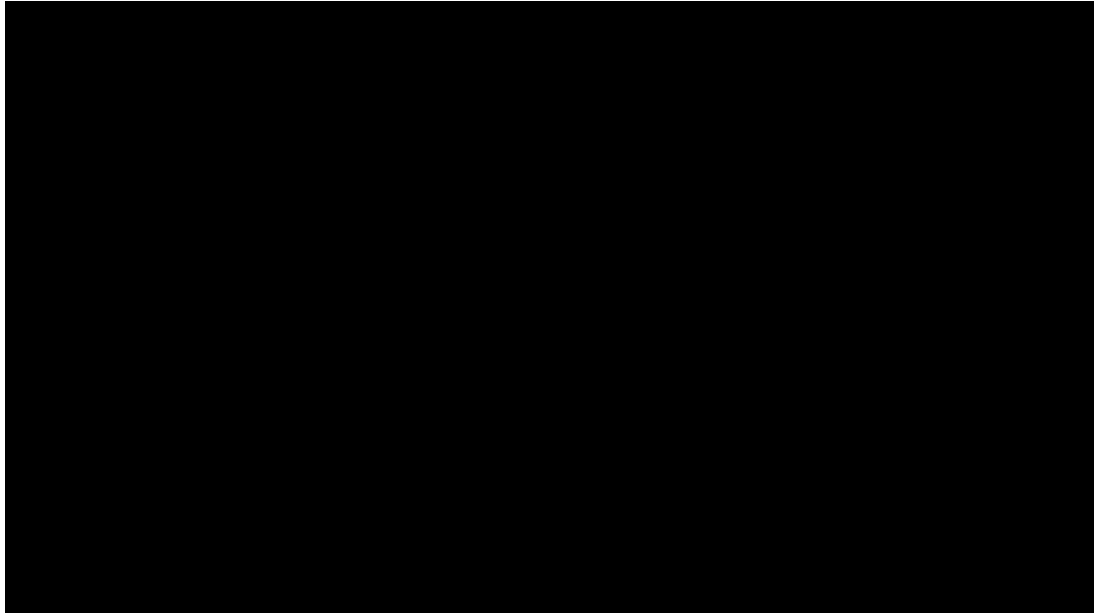
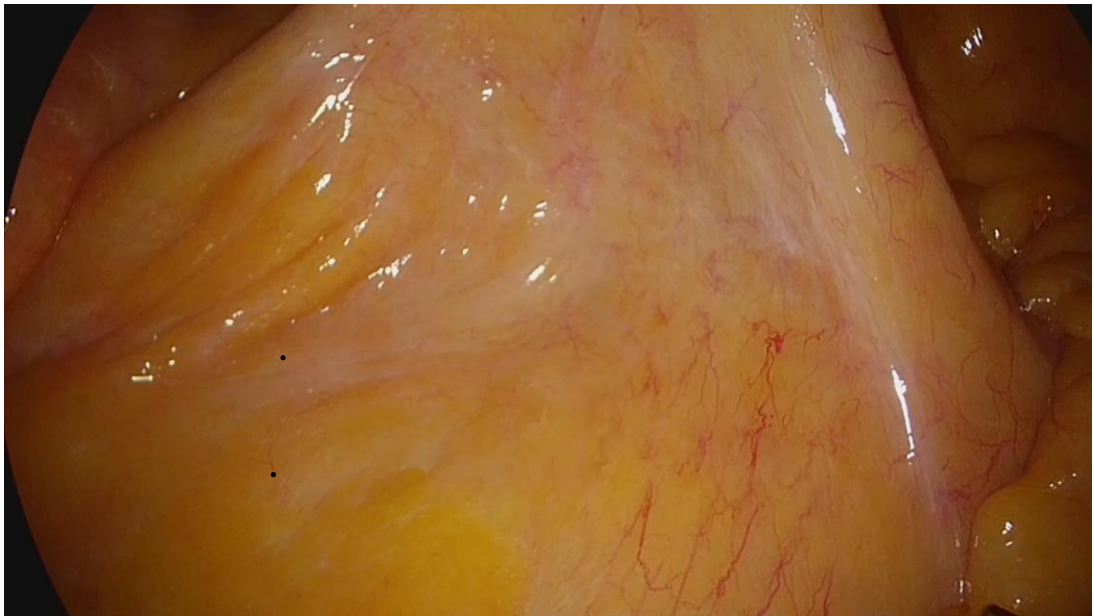
Japanese Classification of Colorectal, Appendiceal, and Anal Carcinoma: the 3d English Edition [Secondary Publication]

Japanese Society for Cancer of the Colon and Rectum

PMID: 31768468 PMID: PMC6845287 DOI: 10.23922/jarc.2019-018



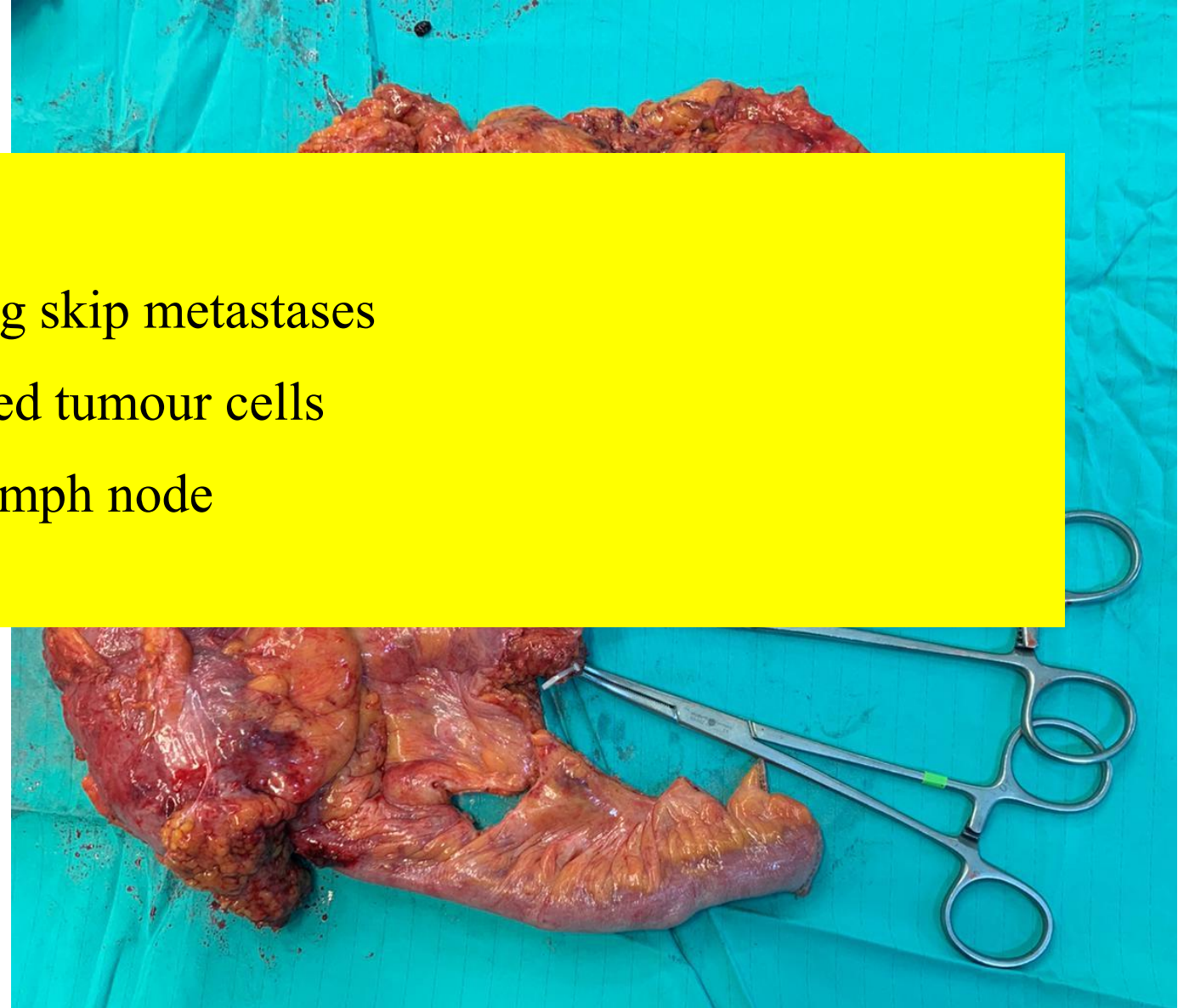
1. CADUCEUS FORCEPS 2. FENESTRATED BIPOLAR FORCEPS 3. MONOPOLAR CURVED DISSECTOR 4. MONOPOLAR CURVED DISSECTOR





Lymph nodes retrieval

1. Central metastases, including skip metastases
2. Micro metastases and isolated tumour cells
3. High number of retrieved lymph node



Short-term outcomes of complete mesocolic excision versus D2 dissection in patients undergoing laparoscopic colectomy for right colon cancer (RELARC): a randomised, controlled, phase 3, superiority trial



Lai Xu*, Xiangqian Su*, Zirui He*, Chenghai Zhang, Junyang Lu, Guannan Zhang, Yueming Sun, Xiaohui Du, Pan Chi, Ziqiang Wang, Ming Zhong, Aiwen Wu, Anlong Zhu, Fei Li, Jianmin Xu, Liang Kang, Jian Suo, Haijun Deng, Yingjiang Ye, Kefeng Ding, Tao Xu, Zhongtao Zhang†, Minhua Zheng†, Yi Xiao†, on behalf of the RELARC Study Group‡

	CME group (n=495)	D2 group (n=500)	Difference (95% CI)	p value
Area of mesocolon removed, cm ²	116.4 (89.4 to 144.8)	107.8 (84.9 to 132.7)	8.4 (3.3 to 13.5)	0.0010
Missing data	3 (1%)	2 (<1%)	..	..
Proximal clearance, mm	150.0 (120.0 to 202.3)	149.3 (109.0 to 197.0)	1.9 (-6.6 to 10.4)	0.46
Distal clearance, mm	132.0 (103.0 to 180.0)	137.0 (102.0 to 180.0)	-0.8 (-8.4 to 6.8)	0.65
Quality of specimens	..	..	..	0.0020
Grade I	453 (92%)	481 (97%)	..	..
Grade II	38 (8%)	17 (3%)	..	..
Grade III	1 (<1%)	0	..	..
Missing data	3 (1%)	2 (<1%)	..	..
Tumour differentiation	..	..	..	0.75
Well	17 (3%)	23 (5%)	..	..
Moderate	376 (76%)	362 (72%)	..	..
Poor	94 (19%)	104 (21%)	..	..
Other	8 (2%)	11 (2%)	..	..
Pathological T category	..	..	..	0.23
pT1	18 (4%)	15 (3%)	..	..
pT2	37 (7%)	37 (7%)	..	..
pT3	339 (68%)	330 (67%)	..	..
pT4a	99 (20%)	111 (22%)	..	..
pT4b	2 (<1%)	7 (1%)	..	..
Pathological N category	..	..	..	0.95
pN0	315 (64%)	320 (64%)	..	..
pN1a	59 (12%)	65 (13%)	..	..
pN1b	60 (12%)	46 (9%)	..	..
pN1c	9 (2%)	10 (2%)	..	..
pN2a	42 (9%)	33 (7%)	..	..
pN2b	10 (2%)	26 (5%)	..	..
Total pN+	180 (36%)	180 (36%)	..	0.86
Number of harvested lymph nodes	26.0 (19.0 to 35.0)	23.0 (17.5 to 29.0)	3.4 (2.0 to 4.9)	<0.0001
Metastases in central lymph nodes*				
Yes	13/394 (3%)	NA	..	..

A Randomized Phase III Trial of Complete Mesocolic Excision Compared with Conventional Surgery for Right Colon Cancer: Interim Analysis of a Nationwide Multicenter Study of the Italian Society of Surgical Oncology Colorectal Cancer Network (CoME-in trial)

Maurizio Degiuli ¹, Aridai H Resendiz Aguilar ¹, Mario Solej ¹, Danila Azzolina ², Giulia Marchiori ³, Francesco Corcione ⁴, Umberto Bracale ⁵, Roberto Peltrini ⁵, Maria M Di Nuzzo ⁵, Gianandrea Baldazzi ⁶, Diletta Cassini ⁶, Giuseppe S Sica ⁷, Brunella Pirozzi ⁷, Andrea Muratore ⁸, Marcello Calabrò ⁸, Elio Jovine ⁹, Raffaele Lombardi ¹⁰, Gabriele Anania ¹¹, Matteo Chiozza ¹¹, Wanda Petz ¹², Paolo Pizzini ¹², Roberto Persiani ¹³, Alberto Biondi ¹³, Rossella Reddavid ¹⁴

Affiliations + expand

PMID: 38087139 PMID: PMC10838239 DOI: 10.1245/s10434-023-14664-0

Gastrointestinal functions after laparoscopic right colectomy with intracorporeal anastomosis: a pilot randomized clinical trial on effects of abdominal drain, prolonged antibiotic prophylaxis, and D3 lymphadenectomy with **complete mesocolic excision**.

Sica GS, Siragusa L, Pirozzi BM, Sorge R, Baldini G, Fiorani C, Guida AM, Bellato V, Franceschilli M.

Int J Colorectal Dis. 2024 Jul 6;39(1):102. doi: 10.1007/s00384-024-04657-0.

Results: Interim data analysis is presented in this report. The study enrolled 258 patients in nine referral centers. The number of LNs retrieved was significantly higher after CME (25 vs. 20; $p = 0.012$). No differences were observed with respect to intra- or post-operative complications, postoperative mortality, or duration of surgery. The hospital stay was even shorter after CME ($p = 0.039$). Quality of surgery indicators were higher in the CME arm of the study. Survival data still were not available.

No need for ab, nor drains after CME.
ERAS Protocols not impaired.

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

Disease of the colon and rectum 2017

Jon D. Vogel, M.D. • Cagla Eskicioglu, M.D. • Martin R. Weiser, M.D.
Daniel L. Feingold, M.D. • Scott R. Steele, M.D.

3. Routine performance of extended lymphadenectomy is not recommended. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.

“Although routine performance of extended lymphadenectomy is not supported by the data available, dissection and retrieval, or at minimum, biopsy of clinically positive or suspicious lymph nodes outside the standard field of resection is recommended”.

Rationale for a RRC with CME/CVL and D3

- The Web of Science verifies close to 900 peer-reviewed publications referencing the original paper.
- On the occasion of the twentieth anniversary of colorectal disease, this article was the most frequently cited paper in the history of the journal.
- Within the last five years, over twenty reviews and meta-analyses have analyzed all papers published on CME reporting outcome data.
- Higher quality of plane preservation and a greater distance from the tumor to the central resection line.
- Longer vascular pedicles, without any relevant functional disadvantages.
- Higher lymph node yield.
- Centralization of colon cancer surgery
- Using quality-controlled CME-surgery, evaluate adjuvant chemotherapy with respect to the nodes involved.

The lack of uniformity undermines the proper evaluation of the clear benefits of any technique over the others.



[Surg Endosc.](#) 2023; 37(2): 846–861.

PMCID: PMC9944740

Published online 2022 Sep 12. doi: [10.1007/s00464-022-09548-5](https://doi.org/10.1007/s00464-022-09548-5)

PMID: [36097099](https://pubmed.ncbi.nlm.nih.gov/36097099/)

Definition and reporting of lymphadenectomy and complete mesocolic excision for radical right colectomy: a systematic review

[Giuseppe S. Sica](#),^{1,2} [Danilo Vinci](#),² [Leandro Siragusa](#),^{1,2} [Bruno Sensi](#),^{1,2} [Andrea M. Guida](#),² [Vittoria Bellato](#),^{2,3}

[Álvaro García-Granero](#),^{4,5,6} and [Gianluca Pellino](#)^{7,8}

- The only universally adopted surgical step for any RRC with the criteria described by Hoemberger seems to be central arterial ligation.
- There is great heterogeneity and consistent overlap among definitions of all RRC techniques.

Definition and reporting of lymphadenectomy and complete mesocolic excision for radical right colectomy: a systematic review

[Giuseppe S. Sica](#)^{1,2}, [Danilo Vinci](#)², [Leandro Siragusa](#)^{1,2}, [Bruno Sensi](#)^{1,2}, [Andrea M. Guida](#)², [Vittoria Bellato](#)^{2,3}, [Álvaro García-Granero](#)^{4,5,6} and [Gianluca Pellino](#)^{7,8}

PRISMA-compliant systematic literature review to identify the definitions of RRC. Primary aims were to identify surgical steps and different nomenclature for RRC. Secondary aims were description of heterogeneity and overlap among different RRC techniques.

Primary aim: RRC nomenclature

Analysis of nomenclature identified six RRC techniques: complete mesocolic excision (CME), complete mesocolic excision with central vascular ligation (CME + CVL), central vascular ligation (CVL), modified complete mesocolic excision (mCME), D3 lymphadenectomy (D3) and complete mesocolic excision with D3 lymphadenectomy (CME + D3).

Table 2

Percentage (%) of surgical steps reported for each procedure

	Central arterial ligation %	Preservation Of mesocolic integrity %	Dissection along SMV %	Dissection along SMA %	Dissection Of GCTH %	Sub-pyloric dissection	Complete kocher manoeuvre %	Omentectomy %
ALL (99)	100.0	73.0	67.0	11.0	45.0	18.0	11.0	39.0
CME (48)	100.0	83.3	66.7	4.2	35.4	20.8	12.5	41.7
CME + CVL (22)	100.0	81.8	54.5	9.1	40.9	18.2	13.6	45.5
CVL (1)	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MCME (5)	100.0	80.0	60.0	0.0	60.0	20.0	0.0	40.0
D3 (18)	100.0	33.3	83.3	38.9	66.6	16.7	5.5	22.2
CME + D3 (5)	100.0	100.0	80.0	0.0	80.0	0.0	0.0	40.0

[Open in a separate window](#)

CME complete mesocolic excision; CVL central vascular ligation; MCME modified complete mesocolic excision; SMV superior mesenteric vein; SMA superior mesenteric artery; GCTH gastrocolic trunk of Henle

35 combinations of the above mentioned surgical steps



Safe oncological and standardised (“SOS”) right hemicolectomy for colon cancer

B. P. Smalbroek¹ · A. B. Smits¹ · J. S. Khan^{2,3} 

CVL, Exposure of SMV, Excision of an intact mesocolon

Surgical Endoscopy (2022) 36:5595–5601
<https://doi.org/10.1007/s00464-021-08395-0>



Consensus statements on complete mesocolic excision for right-sided colon cancer—technical steps and training implications

Patricia Tejedor¹ · Nader Francis^{2,3,4} · David Jayne⁵ · Werner Hohenberger⁶ · Jim Khan^{1,7}  · on behalf the CME Project Working Group

DELPHI CONSENSUS

The Delphi methods assumed a pivotal role in the last few decades to develop best practice guidance using collective intelligence where research is limited, ethically/logistically difficult or evidence is conflicting.

Decided a priori:

- ✓ **Cutoff for the consensus**
- ✓ **Closing criteria**
- ✓ **Stability of the responses**
- ✓ **Evaluation point**

RROC-STAR

Radical Right Colectomy - Surgical Technique Approved Report

**RROC-STAR Delphi
consensus Standardisation of surgical
technique and reporting for radical right
colectomy (RRC)**

-
- How to Report
 - How to define
 - Which are the necessary steps

1. Reporting

Item 4

The RRoC STAR datasheet should be used to report RRC.

Consistent reporting of procedures is needed to obtain reliable conclusions in present and future trials.

Agreement 90%



RRC Surgical Steps	Performed	Not performed
Central vessels ligation	[]	[]
Preservation of mesocolic integrity	[]	[]
Dissection of the superior mesenteric vein (SMV)	[]	[]
Dissection of the gastrocolic trunk of Henle (GCTH)	[]	[]
Dissection of the superior mesenteric artery (SMA)	[]	[]
Dissection of sub-pyloric lymph-nodes	[]	[]
Complete Kocher's manoeuvre	[]	[]
Partial omentectomy	[]	[]
Others (specify):	[]	[]

2. Definitions

Item 5

Central vessels ligation should be defined as:

Ligation at the roots of the ileo-colic vessels, right colic vessels, superior right colic vein (when present) and the right branch of the middle colic vessels

Agreement 86%

Item 6

Preservation of mesocolic integrity should be defined as:

Dissection along the embryological plane and complete excision of the mesocolon conserving the integrity of its anterior and posterior sheaths and the "mesenteric sail".

Agreement 95%

Item 7

Dissection of the SMV should be defined as:

Dissection along the anterior and lateral-right face of the SMV up to the origin of the middle colic vein/Henle's trunk.

Agreement 89%

Item 8

Dissection of the SMA should be defined as:

Surgical dissection of the anterior and lateral-right face of the SMA.

Agreement 68%

Item 9

Dissection of the gastro-colic trunk of Henle should be defined as:

Dissection along the common gastro-colic trunk of Henle. Pancreatic and gastro-epiploic veins should not be divided, unless necessary.

Agreement 91%

Item 10

Dissection of sub-pyloric lymph-nodes should be defined as:

Removal of lymphoadipose tissue around the origin of the gastroepiploic artery.

Agreement 77%

Item 11

Complete Kocher's manoeuvre should be defined as:

Complete mobilization of the 1° to 3° portions of the duodenum to access retropancreatic and caval lymph nodes.

Agreement 73%

Item 12

Partial omentectomy should be defined as:

Omental division and resection of the right half of entire greater omentum.

Agreement 56%

3. Required steps

Item 13

Central vessels ligation should be considered an integral part of RRC.
Agreement 96%

Item 14

Preservation of mesocolic integrity (CME) should be considered an integral part of RRC.
Agreement 99%

Item 15

Dissection of the SMV should be considered an integral part of RRC.
Agreement 99%

Item 16

Dissection of the GCTH should be considered an integral part of RRC.
Agreement 84%

Item 17

Dissection of the SMA is not required for RRC.
Agreement 54%

Item 18

Dissection of sub-pyloric lymph-nodes is not required for RRC
Agreement 45%

Item 19

Ligation of gastro-epiploic vessels is not required for RRC
Agreement 63%

Item 20

Complete Kocher's manoeuvre is not required for RRC.
Agreement 24%

Item 21

Partial omentectomy is not required for RRC
Agreement 75%



II Round RROC-STAR Delphi consensus Standardization of surgical technique and reporting for radical right colectomy (RRC)

S.I.C.E. (Italian Society Endoscopic Surgery) EAES affiliated

Italian Radical Right Colectomy – Surgical Technique And Results
Registry

RoCC-STARR-1 Study

/Colectomia destra radicale – registro italiano di tecnica
chirurgica e risultati

Studio RoCC-STARR-1

Min 500 (550) Patients
36 months DFS





European Society of
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