D2 vs. D3 lymphadenectomy in colorectal cancer

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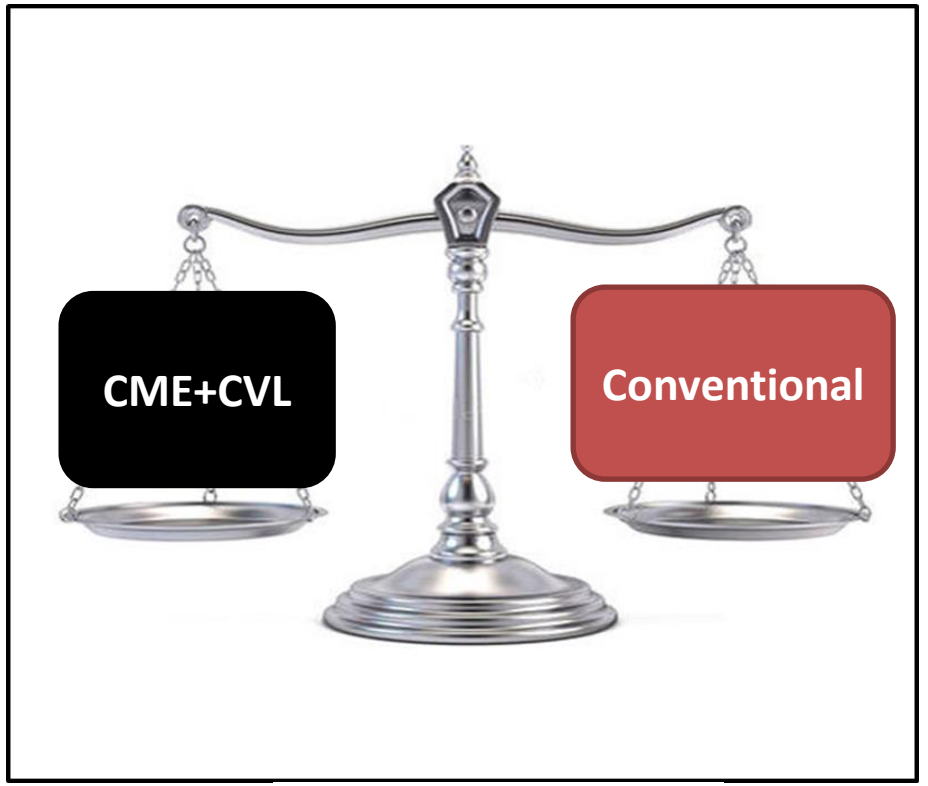
No disclosure

- **CME+CVL.**
- **D3 lymphadenectomy.**
- **D2 lymphadenectomy.**



Surgery is the mainstay in CRC treatment !

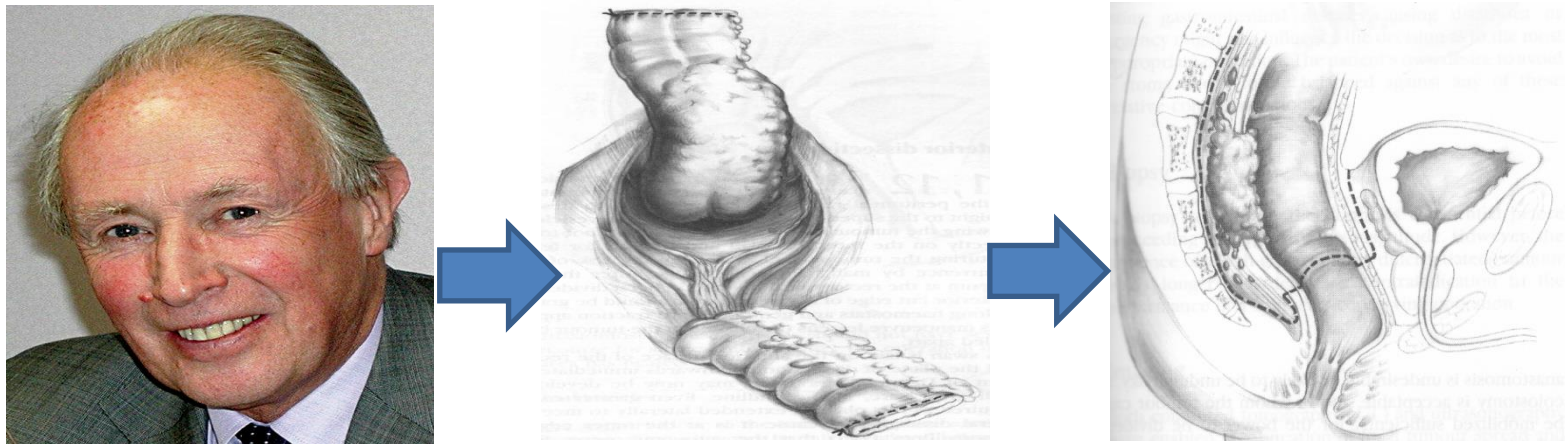
Halsted, 1896

General Principles of Surgical Oncology :

Curative operation entails **complete excision of the tumor** and **inclusion of its lymphatic bed.**

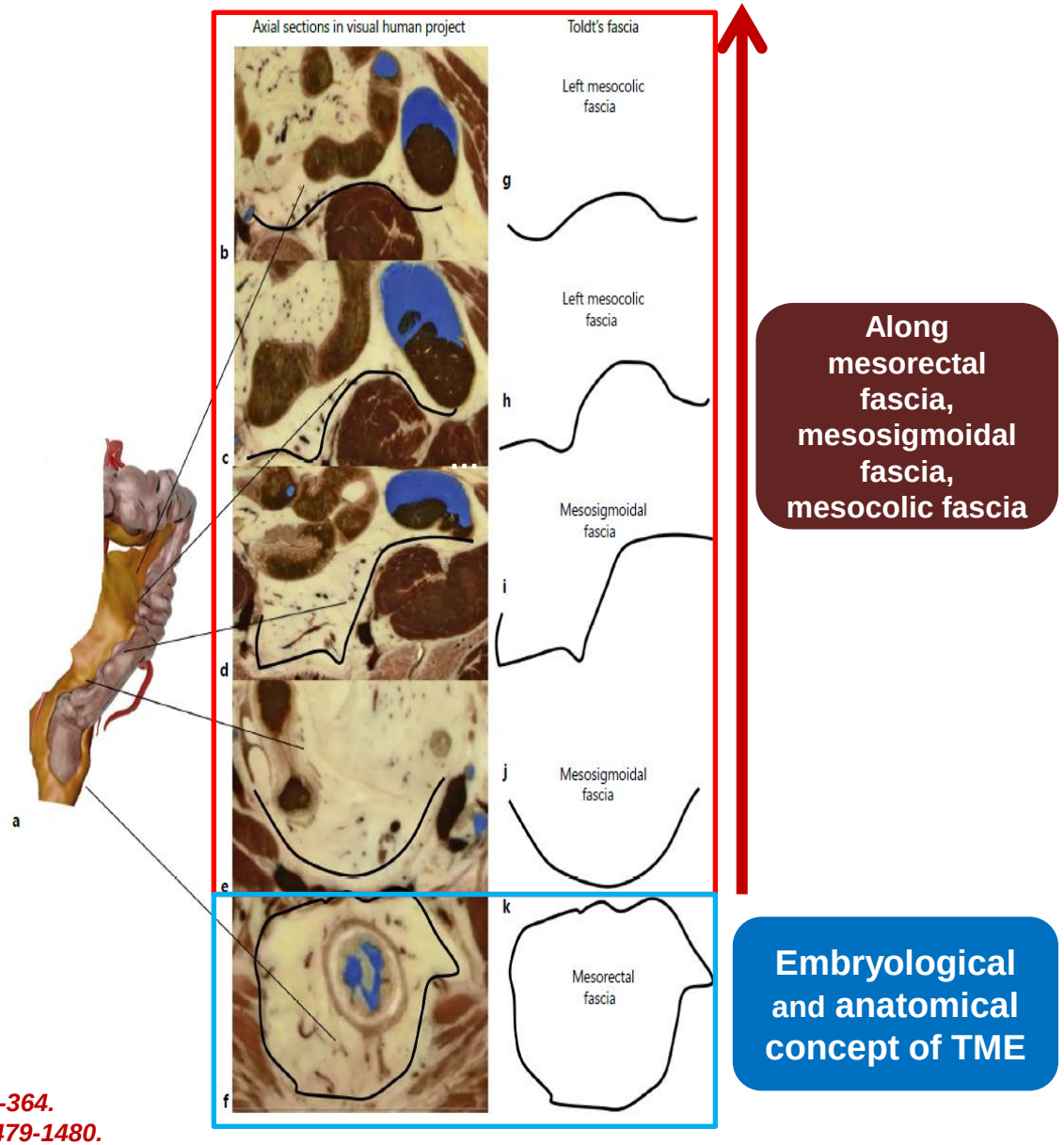
Background

- After adoption of the **TME** for rectal cancer, significant reduction in the local recurrence rate and improved survival.
- Surgeons shifted to improve the quality of surgery for colon cancer via extended surgery, including the **D3** dissection and complete mesocolic excision **(CME).**



Heald et al . Br J Surg. 1982;69:613–616.
Heald & Ryall . Lancet.1986;327:1479–1482.

CME, analogous concept to TME



Along mesorectal fascia, mesosigmoidal fascia, mesocolic fascia

Embryological and anatomical concept of TME

Color Dis.2009;11:354-364.
Lancet. 986;1(8496):1479-1480.
Dig Surg 2015;32:291–300.

1st ESCP

Main Programme

Wednesday September 13		
12:00-17:00	**Pre-meeting live surgery course - Modern management of colon cancer**	*AUDITORIUM II*
	Chairs:	*Ivan Bartha (Hungary)* *Francisco Castro-Sousa (Portugal)* *Andrew Shorthouse (UK)*
	Open colon resection	*Werner Hohenberger (Germany)* *& João Pimentel (Portugal)*
	Laparoscopic colon resection	*André D'Hoore (Belgium) & Júlio Leite (Portugal)*
	Staging	*Najib Haboubi (UK)*
	Imaging	*Filipe Caseiro-Alves (Portugal)*
	Chemotherapy	*José Manuel Nascimento Costa (Portugal)*
	Evidence based management of liver metastases	*Peer Wille-Jørgensen (Denmark)*

Complete Mesocolic Excision (CME)

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

1. Sharp dissection of the visceral plane from the retroperitoneal plane

→Avoid any breaching of the visceral fascia layer.

2. The origin of the colonic arteries can be well exposed &tied centrally.

→**Ensure maximal harvest of the regional LNs.**

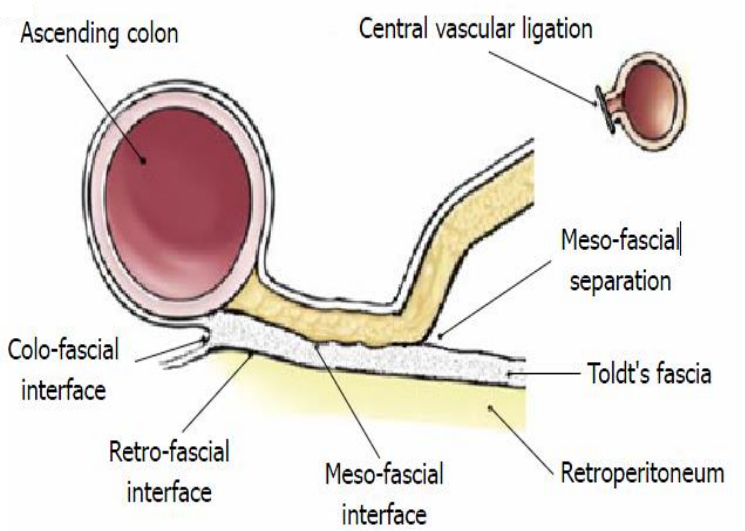
3. Outcome: Local recurrence: 3.6%.

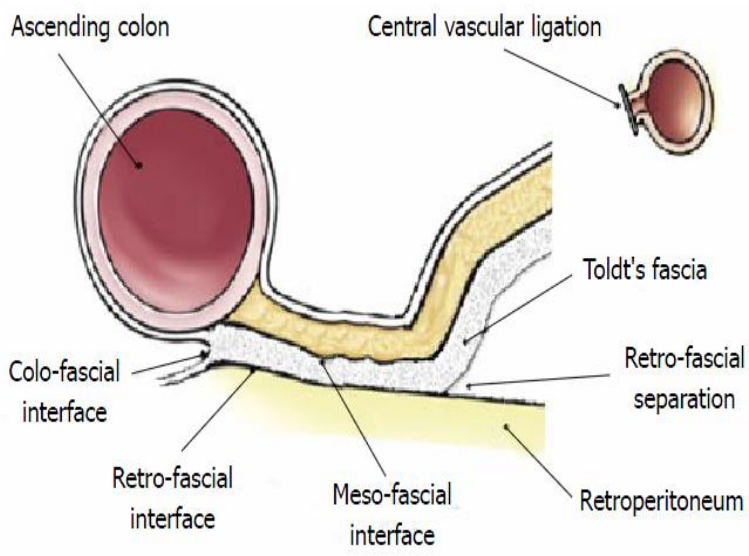
Overall survival: 89%.

Hohenberger et al. Colorectal Dis 2009;11:354-364

Main Surgical Principles of CME with CVL

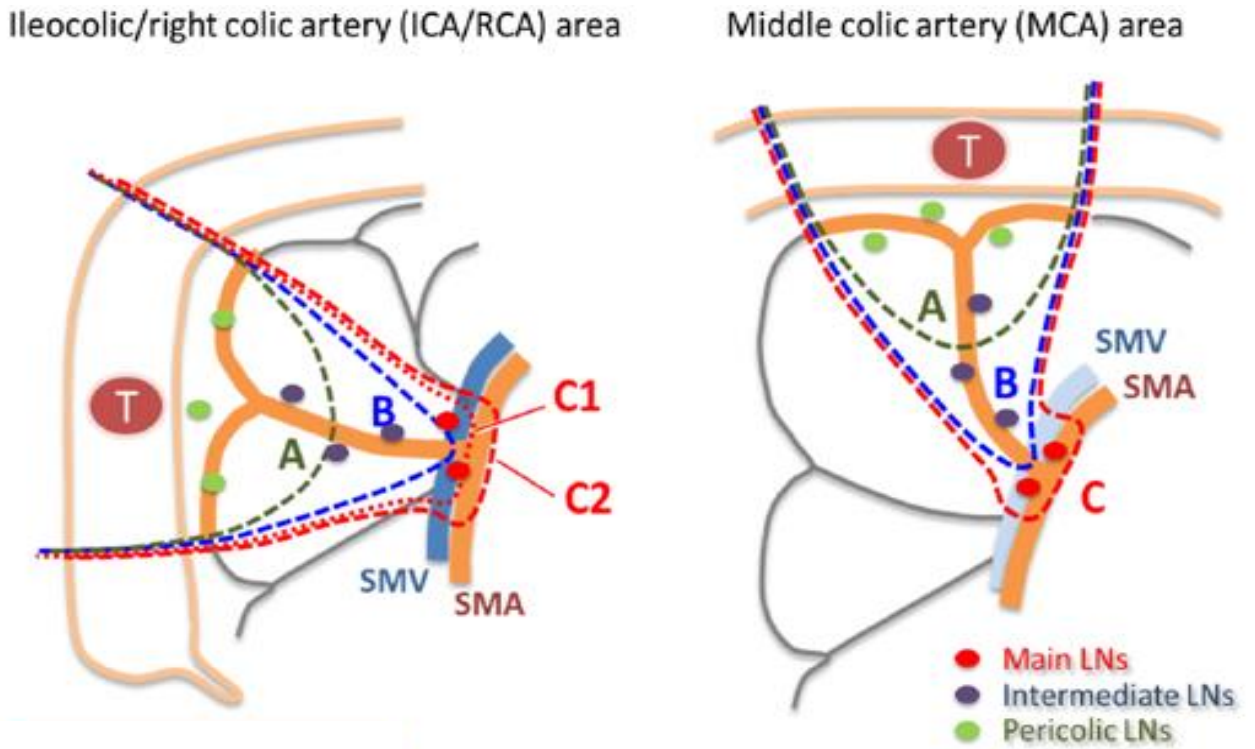
1. Removal of entire envelope of mesentery along the embryological avascular planes.



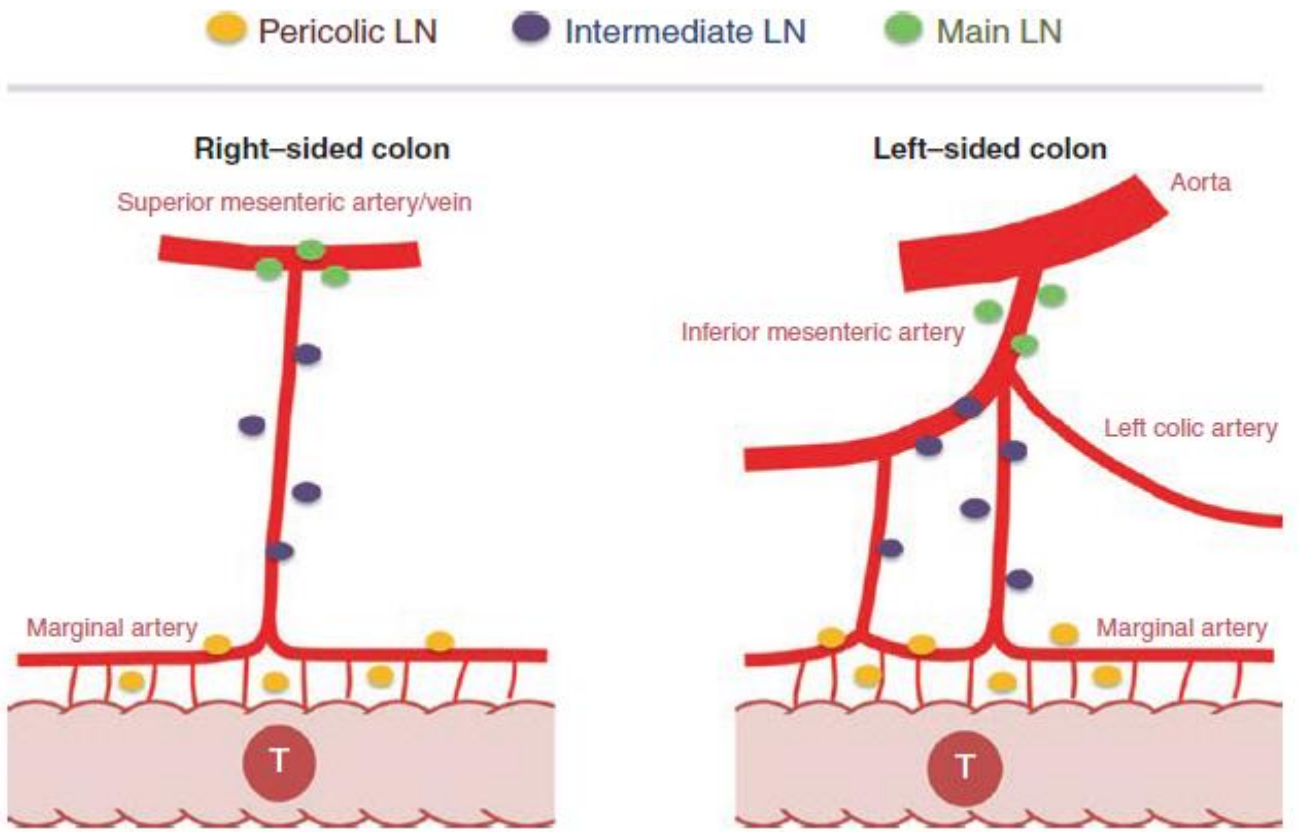


Main Surgical Principles of CME with CVL

2. CVL to maximize dissection of central LNs.



LN stations



大腸癌研究会
Japanese Society for Cancer of the Colon and Rectum

LN stations

Pathologic T stage	No. of patients	Incidence of lymph node metastasis				
		Overall (%)	Most distant lymph node station involved			
			Pericolic (%)	Intermediate (%)	Main (%)	Non-regional (%)
T1	1957	8.6	6.8	1.8	0.0	0.0
T2	1747	20.7	16.3	3.5	0.6	0.3
T3 and T4a	10,696	49.4	30.0	14.1	3.4	2.0
T4b	960	55.4	28.6	14.7	5.5	6.6
Total	15,360	41.4	25.4	11.3	2.8	1.8

National registration in Japan (2000–2004, Japanese Society of the Colon and Rectum)

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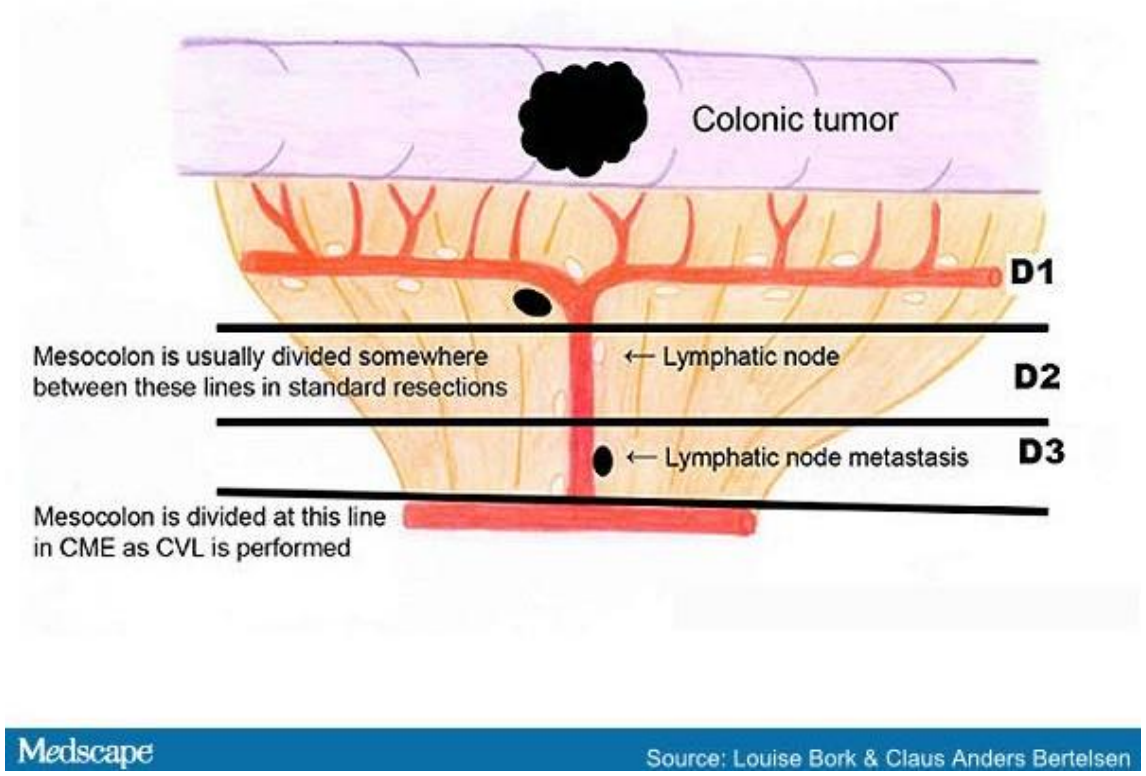
Japanese Society for Cancer of the Colon and Rectum

Japanese D3 Dissection

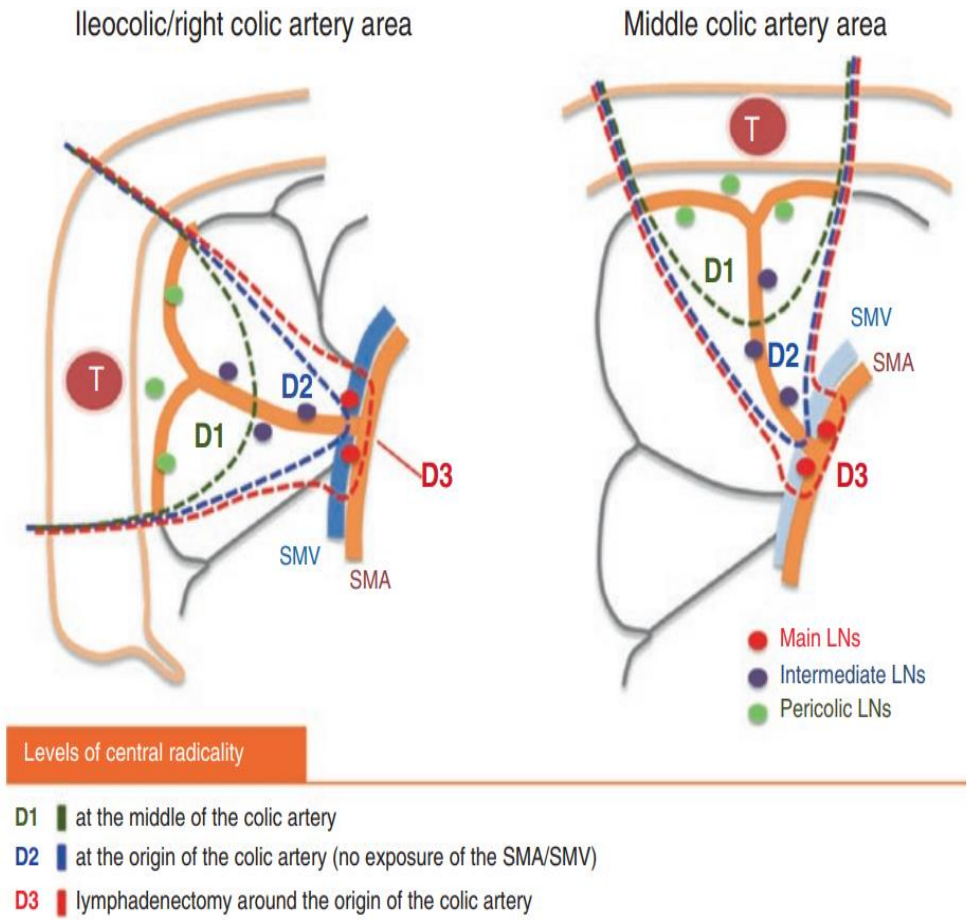
Table 23.3 Categories of the extent of lymphadenectomy for colon cancer, defined by the Japanese Society for Cancer of the Colon and Rectum

RX	The extent of lymphadenectomy cannot be assessed
D0	Incomplete dissection of the pericolic lymph nodes
D1	Complete dissection of the pericolic lymph nodes
D2	Compete dissection of the pericolic and intermediate lymph nodes
D3	Compete dissection of all regional lymph nodes



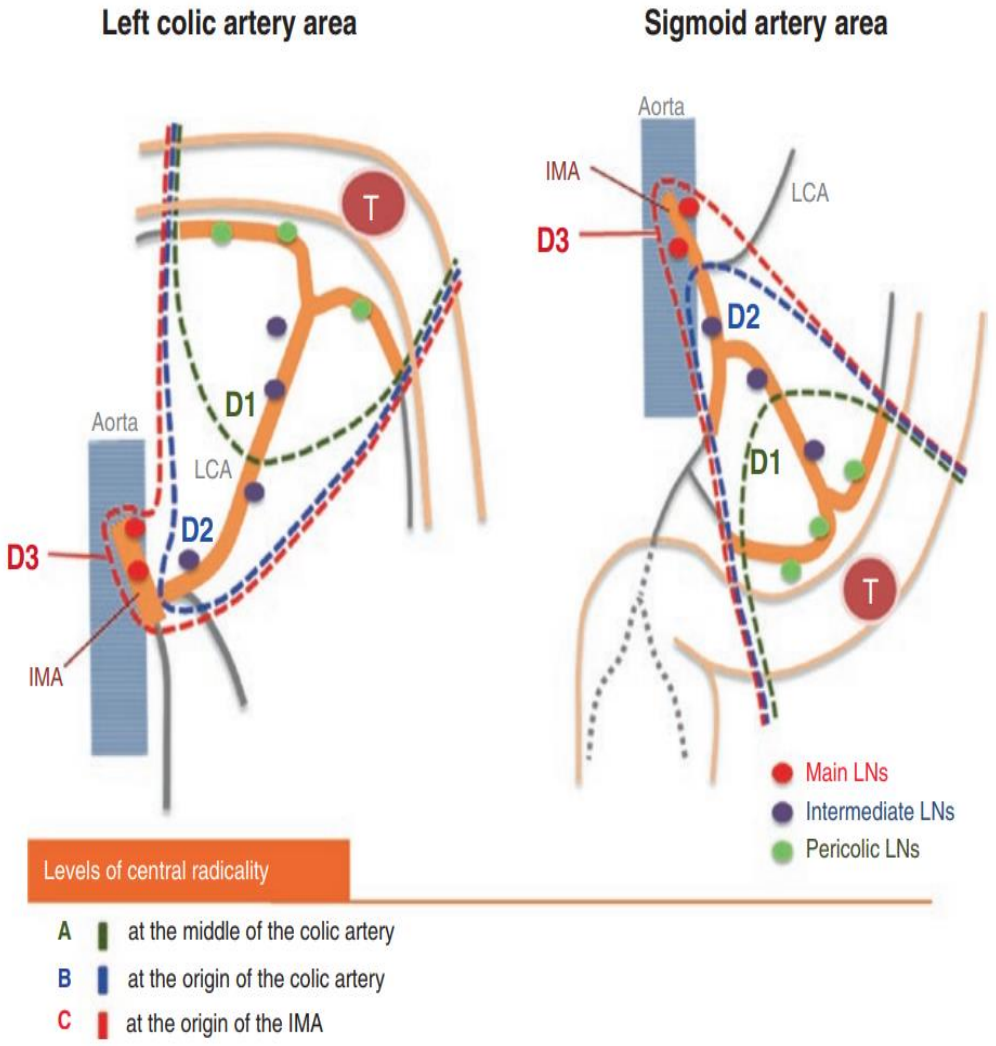
Ueno, H., & Sugihara, K. Japanese D3 Dissection. Surgical Treatment of Colorectal Cancer, 2018; 259–266.

D3 lymphadenectomy for Right-sided colon cancer



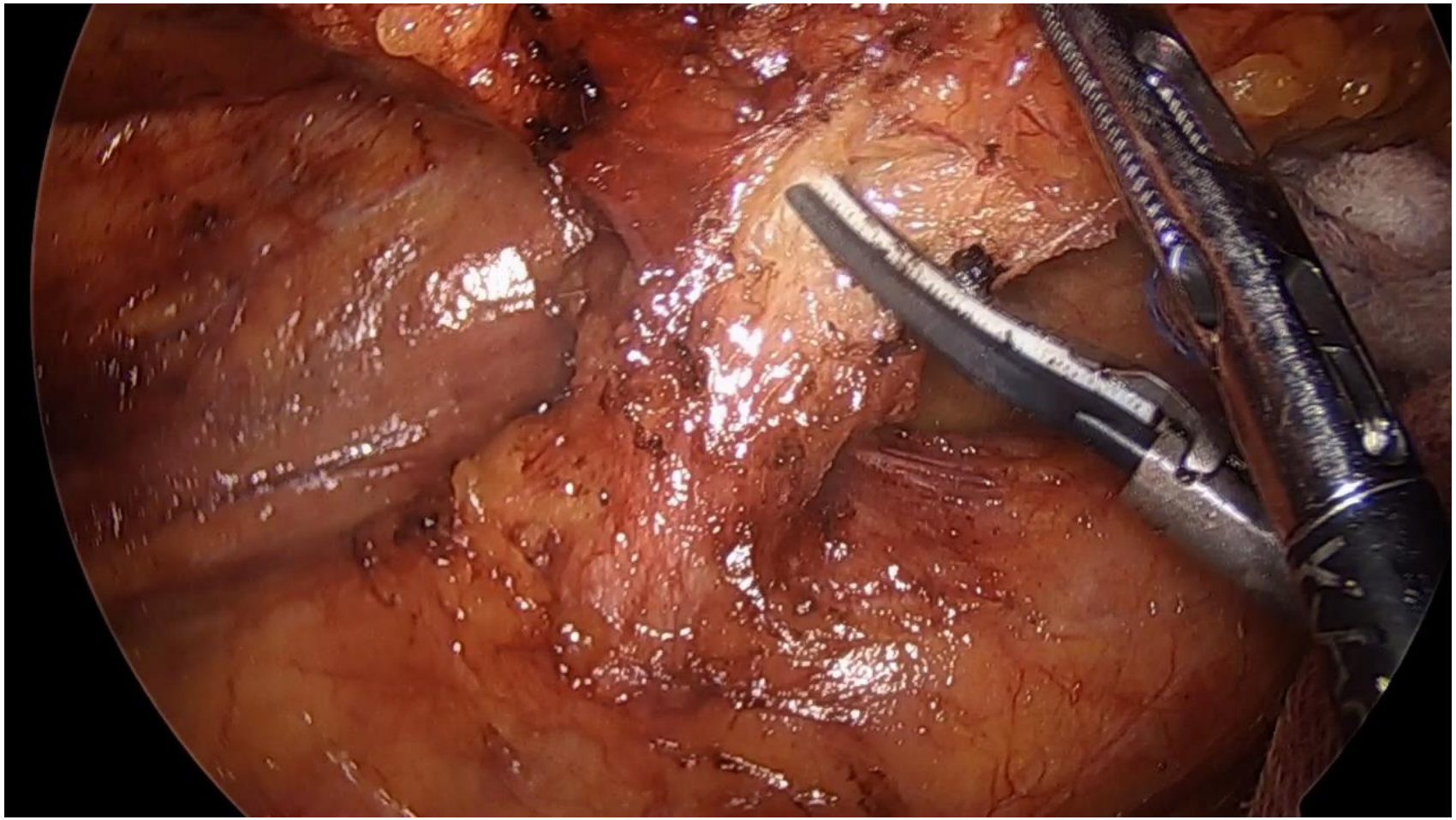
Ueno, H., & Sugihara, K. Japanese D3 Dissection. Surgical Treatment of Colorectal Cancer, 2018; 259–266.

D3 lymphadenectomy for left-sided colon cancer& rectal cancer.

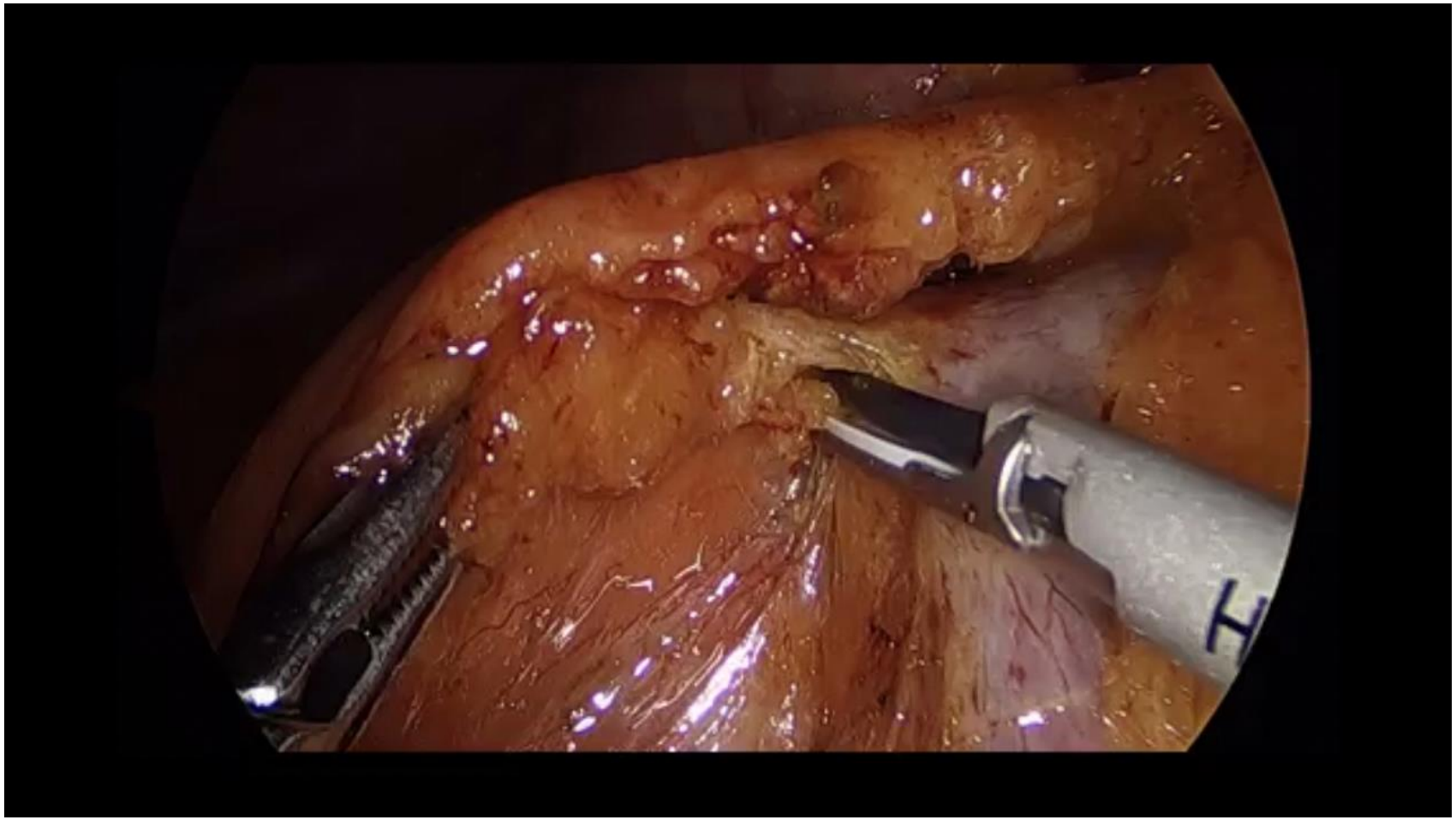


Ueno, H., & Sugihara, K. Japanese D3 Dissection. Surgical Treatment of Colorectal Cancer, 2018; 259–266.

D3 dissection around IMA with low tie



CVL with Right hemicolectomy



CME vs. Conventional resection

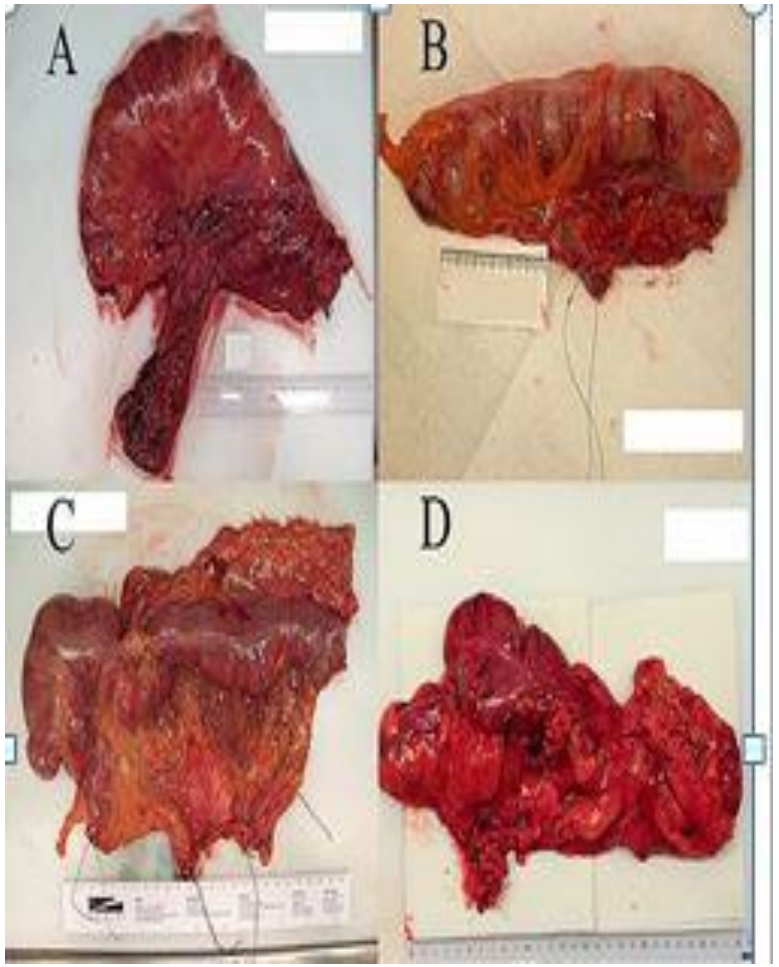
CME
Vs
Conventional resection

- **Is CME + CVL better than conventional resection?**

CME **Conventional**

Sigmoid colectomy

Right hemicolectomy



CME vs conventional resection :
*on **specimen quality***

VOLUME 28 · NUMBER 2 · JANUARY 10 2010

JOURNAL OF CLINICAL ONCOLOGY

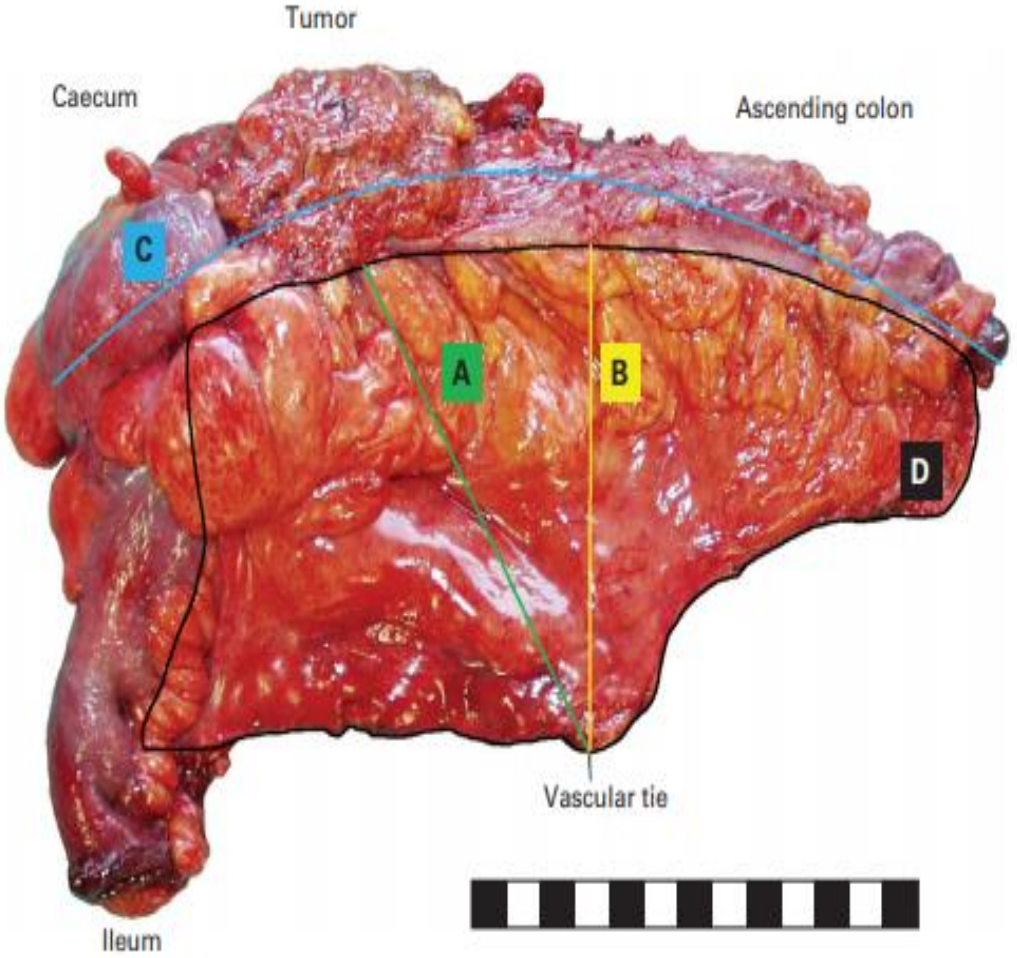
ORIGINAL REPORT

Complete Mesocolic Excision With Central Vascular Ligation Produces an Oncologically Superior Specimen Compared With Standard Surgery for Carcinoma of the Colon

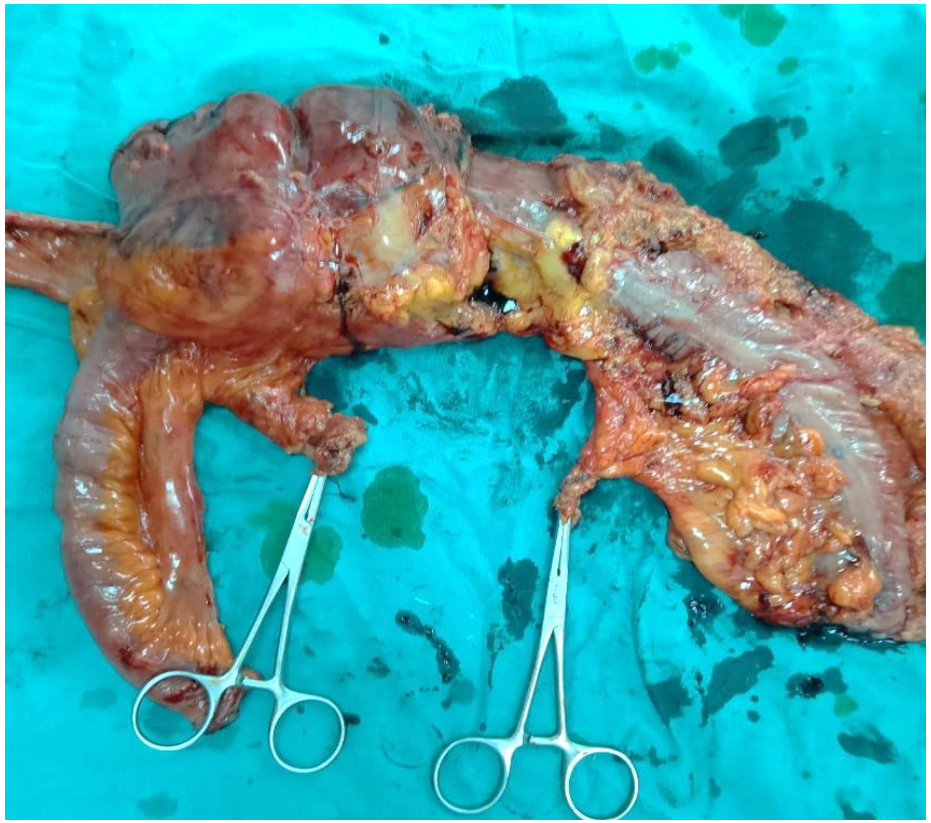
Nicholas P. West, Werner Hohenberger, Klaus Weber, Aristoteles Perrakis, Paul J. Finan, and Philip Quirke

Method of assessment of specimen quality.

- (A) distance from the tumor to the high vascular tie
- (B) closest bowel wall to the high vascular tie
- (C) length of the large bowel
- (D) area of mesentery



West, et al . J Clin Oncol.2010;28(2):272–278.



CME produces a *better quality of* resected specimen

- ✓ Larger area of mesentery removed.
  - ✓ 196cm^2 vs 118cm^2 (**P<0.0001**).
- ✓ Longer bowel segments resected.
  - ✓ 31.4cm vs 20.6cm (**P<0.0001**).
- ✓ Higher vascular tie achieved.
  - ✓ 13.1cm vs 9cm (**P<0.0001**).
- ✓ More lymph node yielded.
  - ✓ 30 vs 18 (**P<0.0001**).

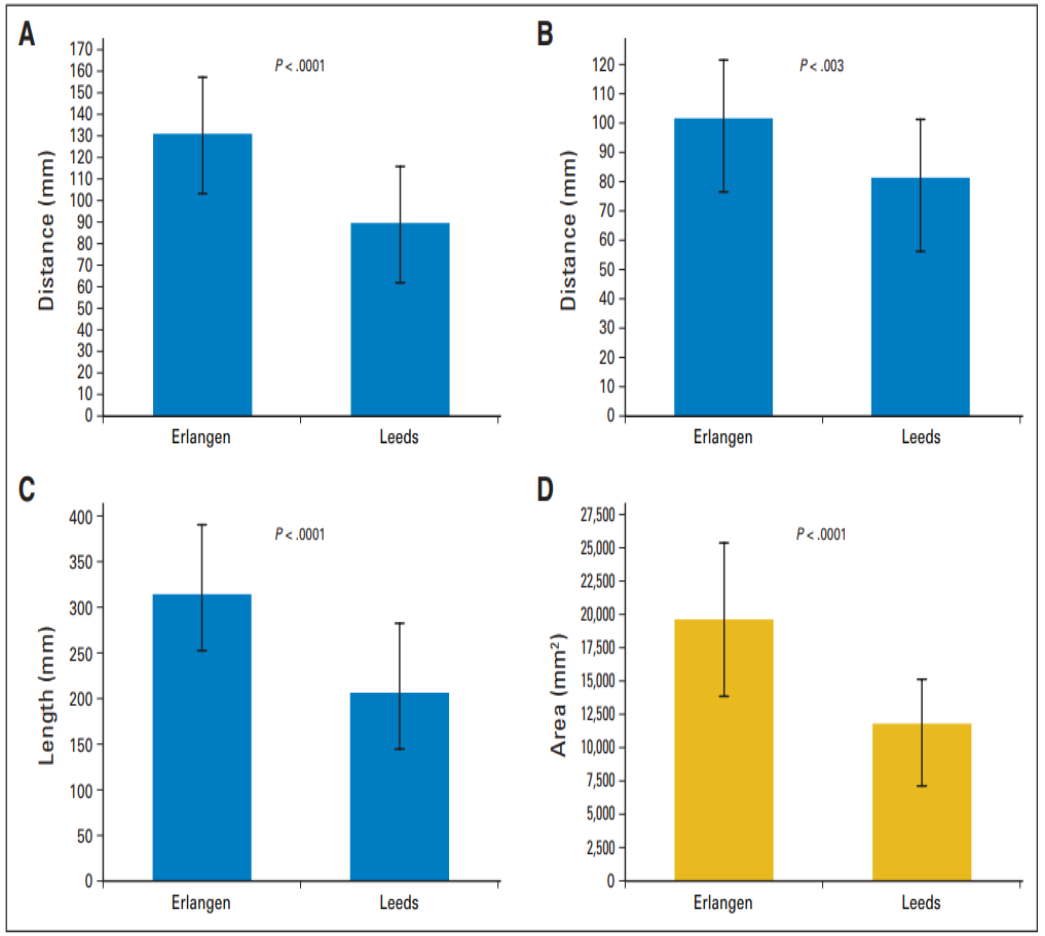


Fig 3. Median tissue morphometry measurements for patients from Erlangen and Leeds including (A) distance from the tumor to the high vascular tie, (B) closest bowel wall to the high vascular tie, (C) length of the large intestine, and (D) area of mesentery. Error bars signify the interquartile range.

CME vs. Conventional resection

Short term outcome

Original article

Short-term outcomes after complete mesocolic excision compared with 'conventional' colonic cancer surgery

C. A. Bertelsen[1], A. U. Neuenschwander[1], J. E. Jansen[1], A. Kirkegaard-Klitbo[2,4], J. R. Tenma[5], M. Wilhelmsen[6], L. A. Rasmussen[1], L. V. Jepsen[1], B. Kristensen[3] and I. Gögenur[4], on behalf of the Copenhagen Complete Mesocolic Excision Study (COMES) Group* and the Danish Colorectal Cancer Group (DCCG)

➢ Results:

- CME has higher incidence of intra-operative injury(spleen, SMV, colon)[9.1% vs 3.6%, **p<0.001**].
- CME has higher risk of post-operative sepsis requiring vasopressors[6.6% vs 3.2%, **p=0.001**].
- 30-day and 90-day mortality was similar[6.2% vs 4.9%, p=0.2].

4 large centers in Denmark, 2008-2013.

529 CME and 1701 controls.

Laparoscopic operation done in 49% CME cases and 69% conventional cases.

ARTICLES | VOLUME 22, ISSUE 3, P391-401, MARCH 01, 2021

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, MD * • Prof Xiangqian Su, MD * • Zirui He, MD * • Chenghai Zhang, MD • Junyang Lu, MD • Guannan Zhang, MD • et al. Show all authors • Show footnotes

➢ Results

- ❖ Postoperative complications: the same.
- ❖ **Less** frequent Clavien-Dindo [III–IV] complications in the CME group [1%] vs [3%], **p=0·022.**
- ❖ **More common vascular injury** in the CME group [3%] vs [1%], **p=0·045.**

➢ Conclusion

- ❖ Although CME procedure might increase the risk of **intraoperative vascular injury**, it generally seems to be safe and feasible with **experienced** surgeons.

17 hospital in china between 2016-2019.

455 CME and 500 D2

3 year disease free survival & Intraoperative or postoperative complication(30day).

CME vs. Conventional resection

Long term outcome

Disease-free survival after complete mesocolic excision compared with conventional colon cancer surgery: a retrospective, population-based study

Claus Anders Bertelsen, Anders Ulrich Neuenschwander, Jens Erik Jansen, Michael Wilhelmsen, Anders Kirkegaard-Klitbo, Jutaka Reilin Tenma, Birgitte Bols, Peter Ingeholm, Leif Ahrenst Rasmussen, Lars Vedel Jepsen, Else Refsgaard Iversen, Bent Kristensen, Ismail Gögenur, on the behalf of the Danish Colorectal Cancer Group

- **Results**
- Improved overall 4y**DFS**[86% vs 76%, **P=0.001**]
- Lower recurrence[11% vs 16%, **P=0.028**].
- Multivariate analysis showed CME as a predictor of survival for all patients (stage I-III)[**P=0.0025**].
- More stage ll patients received adjuvant chemotherapy in the CME group[24.9% vs 15%, **p=0.0053**].

4 large centers in Denmark, 2008-2011.

364 CME and 1031 controls

R1 resection and stage IV diseases excluded

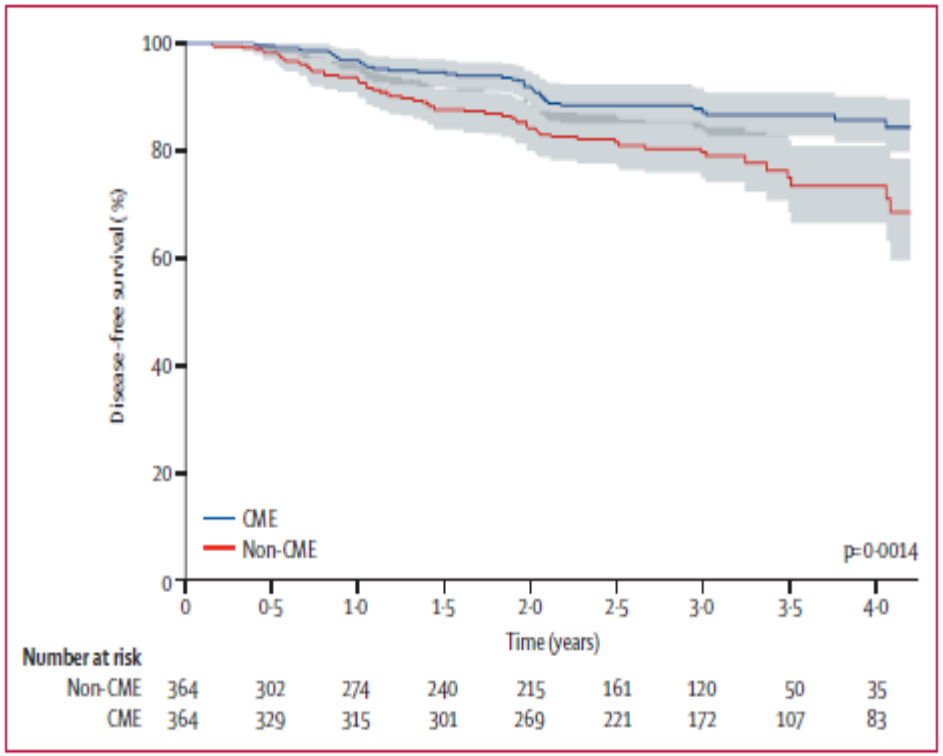


Figure 2: **Kaplan-Meier disease-free survival curves in matched pairs after propensity scoring**
p value from log-rank test. Grey shaded areas are 95% CIs.

DFS

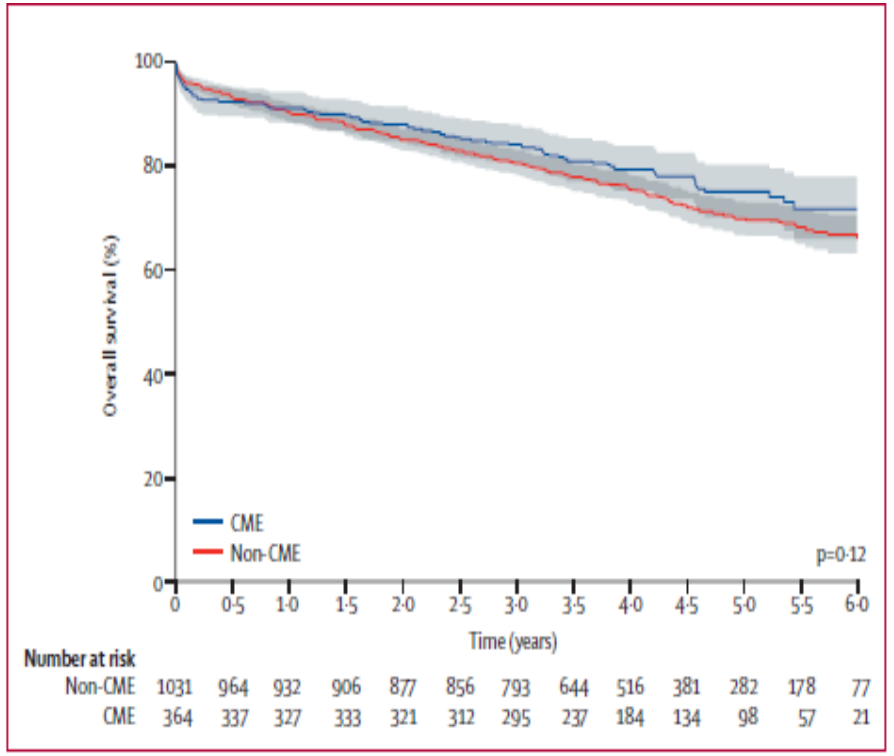


Figure 3: **Kaplan-Meier overall survival curves**
p value from log-rank test. Grey shaded areas are 95% CIs.

OS

Interpretation Our data indicate that CME surgery is associated with better disease-free survival than is conventional colon cancer resection for patients with stage I–III colon adenocarcinoma. Implementation of CME surgery might improve outcomes for patients with colon cancer.

Received: 10 November 2020 | Revised: 27 January 2021 | Accepted: 2 February 2021
DOI: 10.1111/codi.15644

META-ANALYSIS

Complete mesocolic excision versus conventional surgery for colon cancer: A systematic review and meta-analysis

Jasmine Crane[1] | Mazin Hamed[1] | Joseph P. Borucki[1] | Ahmed El-Hadi[1] | Irshad Shaikh[1,2] | Adam T Stearns[1,2]

- **31** studies: **26 640** patients(13 830 CME/D3 vs.12 810 conventional).
- 3,5Y OS was **higher** in the CME/D3 group, p= **0.016.**
- 5Y DFS also demonstrated **CME/D3 superiority, p<0.001.**
- Overall complication same.

Conclusions: Meta-analysis suggests CME/D3 may have a better overall and disease-free survival compared to conventional surgery, with no difference in perioperative complications. Quality of evidence regarding survival is low, and randomized control trials are required to strengthen the evidence base.

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journal homepage: www.ejso.com

D3-lymphadenectomy enhances oncological clearance in patients with right colon cancer. Results of a meta-analysis☆

Zutoia Balciscueta [a, *, 1], Izaskun Balciscueta [b, 1], Natalia Uribe [a], Gianluca Pellino [c, d], Matteo Frasson [e], Eduardo García-Granero [e], Álvaro García-Granero [f]

- **29** studies were enrolled (**2592** patients).
- CME &D3 had a **longer colonic resection**, a **wider resection of mesentery** and **more harvested LNs.**
- Significant decrease in **local recurrence** in patients undergoing CME + D3.
- Significant improvement in 3Y and 5Y **OS** rates.
- Improving **survival** in patients with stage II and III disease.

Conclusions: CME + D3 is a feasible surgical procedure that allows to obtain specimens with higher quality oncological resection, without greater associated morbidity, thus improving survival in patients with stage II and III right colon cancer.

CME vs. D3

- The literature has often used the terminologies D3 dissection and CME interchangeably.
- Both have **similar concept** as regard mesocolic dissection plane.
- Both have **equivalent distance** from the high vascular tie to the bowel wall.
- CME procedure requires **proximal vascular ligation**, but **does not specify dissection at the origin of the feeding vessels.**
- D3 removes the LNs depending on **tumor location(main LN).**
- **CME** technique is **more radical** because it includes removal of the nearby vascular arcade beyond 10-cm margin. Hence, large area of mesentery is obtained and longer bowel is resected.

Hashiguchi Y, et al. Br J Surg. 2011;98:1171–8.
J Clin Oncol. 2012;20;30.1763-9
West, et al . J Clin Oncol.2010;28(2):272–278.

Understanding Optimal Colonic Cancer Surgery:

Comparison of Japanese D3 Resection and European Complete Mesocolic Excision With Central Vascular Ligation

Nicholas P. West, Hirotoshi Kobayashi, Keiichi Takahashi, Aristoteles Perrakis, Klaus Weber, Werner Hohenberger, Kenichi Sugihara, and Philip Quirke

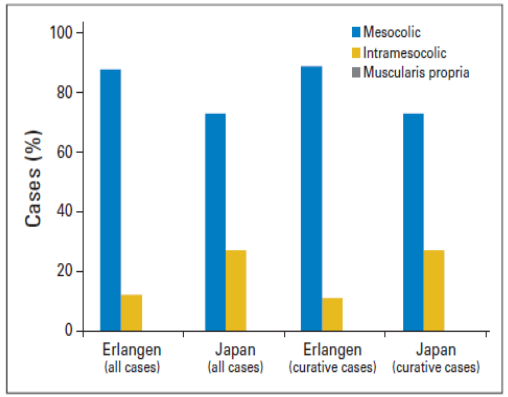


Fig 2. Plane of surgery distributions for all patient cases undergoing open resection and potentially curative patient cases undergoing open resection

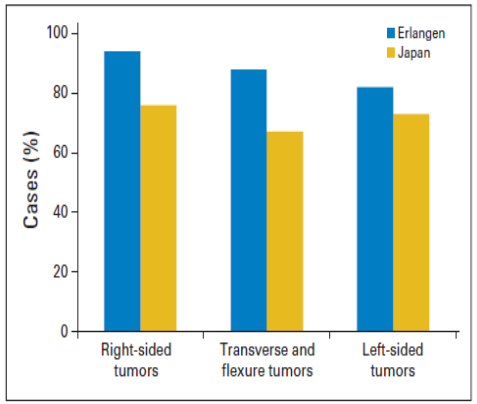


Fig 3. The mesocolic plane resection rate for all patient cases undergoing open

	CME with CVL	D3 dissection	P value
Mesocolic plane resection rate	High	High	
Length of specimen (mm)	324	162	< 0.001
Nodal yield, median (range)	32	18	< 0.001
Distance from the high vascular tie	100	99	0.605
Amount of mesentery (mm2)	17957	8309	< 0.001

J Clin Oncol. 2012;20;30.1763-9

Summary and conclusion

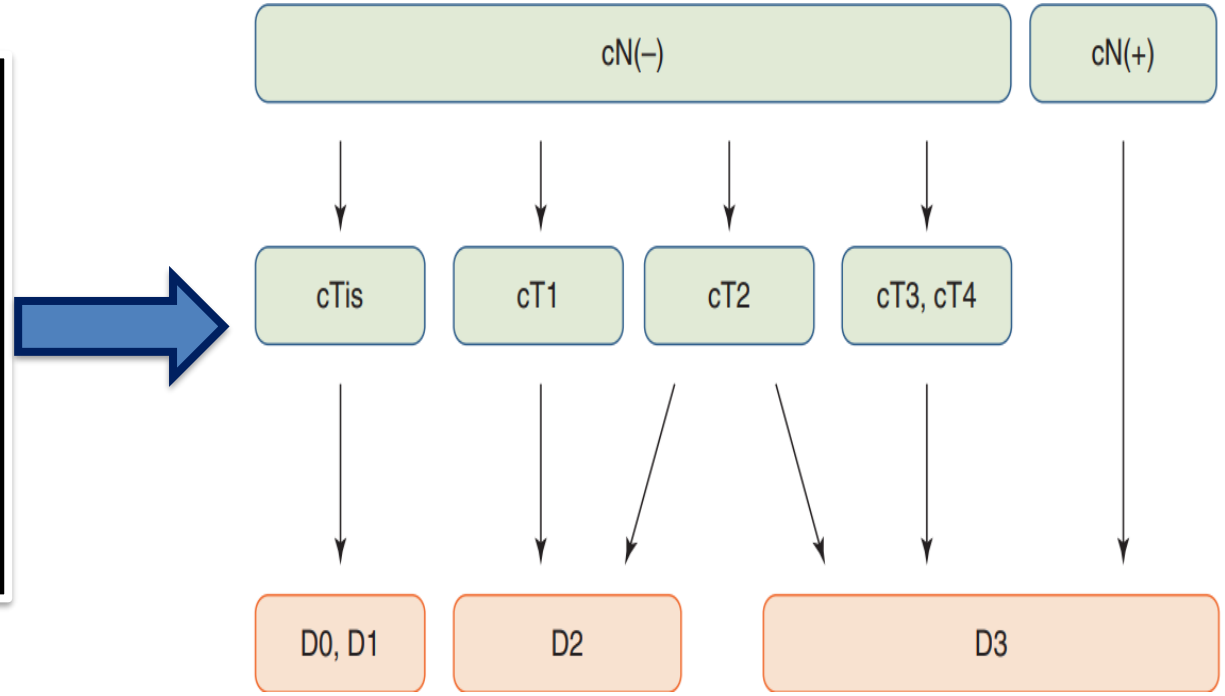
CME vs conventional resections

❖CME

- Higher operative morbidity??!!
- Better quality of surgical specimen.
- Better local control & improved survival.

Summary and conclusion

Extent of lymphadenectomy in c Stage 0-III colon cancer.



Ueno, H., & Sugihara, K. Japanese D3 Dissection. Surgical Treatment of Colorectal Cancer, 2018; 259–266.


THANK YOU