D2 vs. D3 lymphadenectomy in colorectal cancer

Ahmed Sakr. MD, Ph.D.
Lecturer of general& colorectal surgery
Mansoura faculty of Medicine
Former fellow at Severance hospital, Yonsei university health system, South Korea
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**).

Along mesorectal fascia, mesosigmoidal fascia, mesocolic fascia

CME, analogous concept to TME

## Main Programme

**Wednesday September 13**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>12:00-17:00</td>
<td>Pre-meeting live surgery course - Modern management of colon cancer</td>
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<tr>
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<td>Chairs:</td>
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<tr>
<td></td>
<td>Open colon resection</td>
</tr>
<tr>
<td></td>
<td>Laparoscopic colon resection</td>
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<tr>
<td></td>
<td>Staging</td>
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<td>Imaging</td>
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<td></td>
<td>Chemotherapy</td>
</tr>
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<td>Evidence based management of liver metastases</td>
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</tbody>
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**AUDITORIUM II**

- Ivan Berths (Hungary)
- Francisco Castro-Sousa (Portugal)
- Andrew Shorttouse (UK)
- Werner Hohenberger (Germany)
- André D’hoore (Belgium) & Ji-Jo Leite (Portugal)
- Nabi Haboubi (UK)
- Filipe Coelho-Aires (Portugal)
- José Manuel Nascimento Costa (Portugal)
- Peer Wille-Jargensen (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%.

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
## LN stations

<table>
<thead>
<tr>
<th>Pathologic T stage</th>
<th>No. of patients</th>
<th>Incidence of lymph node metastasis</th>
<th>Most distant lymph node station involved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Overall (%)</td>
<td>Pericolic (%)</td>
</tr>
<tr>
<td>T1</td>
<td>1957</td>
<td>8.6</td>
<td>6.8</td>
</tr>
<tr>
<td>T2</td>
<td>1747</td>
<td>20.7</td>
<td>16.3</td>
</tr>
<tr>
<td>T3 and T4a</td>
<td>10,696</td>
<td>49.4</td>
<td>30.0</td>
</tr>
<tr>
<td>T4b</td>
<td>960</td>
<td>55.4</td>
<td>28.6</td>
</tr>
<tr>
<td>Total</td>
<td>15,360</td>
<td>41.4</td>
<td>25.4</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>RX</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RX</td>
<td>The extent of lymphadenectomy cannot be assessed</td>
</tr>
<tr>
<td>D0</td>
<td>Incomplete dissection of the pericolic lymph nodes</td>
</tr>
<tr>
<td>D1</td>
<td>Complete dissection of the pericolic lymph nodes</td>
</tr>
<tr>
<td>D2</td>
<td>Compete dissection of the pericolic and intermediate lymph nodes</td>
</tr>
<tr>
<td>D3</td>
<td>Compete dissection of all regional lymph nodes</td>
</tr>
</tbody>
</table>

D3 lymphadenectomy for Right-sided colon cancer

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

D3 dissection around IMA with low tie
CVL with Right hemicolecctomy
CME vs. Conventional resection
CME Vs Conventional resection

- Is CME + CVL better than conventional resection?
CME vs conventional resection: on specimen quality

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

CME produces a **better quality of** resected specimen

- Larger area of mesentery removed.  
  196cm² vs 118cm² (**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**).
CME vs. Conventional resection

*Short term outcome*
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.
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

CME vs conventional resection:
on long-term outcome

➢ Results
❖ Improved overall 4yDFS [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 II 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
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.
Complete mesocolic excision versus conventional surgery for colon cancer: A systematic review and meta-analysis

Jasmine Crane | Mazin Hamed | Joseph P. Borucki | Ahmed El-Hadi | Irshad Shaikh | Adam T. Stearns

- **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.
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.

J Clin Oncol. 2012;20:30.1763-9
Understanding Optimal Colonic Cancer Surgery:

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

Nicholas P. West, Hirosashi Kobayashi, Keitichi Takahashi, Aristoteles Petrakis, Klaus Weber, Werner Hohenberger, Kenichi Sugihara, and Philip Quirke

<table>
<thead>
<tr>
<th>CME with CVL</th>
<th>D3 dissection</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesocolic plane resection rate</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Length of specimen (mm)</td>
<td>324</td>
<td>162</td>
</tr>
<tr>
<td>Nodal yield, median (range)</td>
<td>32</td>
<td>18</td>
</tr>
<tr>
<td>Distance from the high vascular tie</td>
<td>100</td>
<td>99</td>
</tr>
<tr>
<td>Amount of mesentery (mm²)</td>
<td>17957</td>
<td>8309</td>
</tr>
</tbody>
</table>
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.

THANK YOU