



# Laparoscopic complete mesocolic excision (CME) with completely medial approach for right-hemi colon cancer

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**Abstract:** Laparoscopic complete mesocolic excision (CME) has the potential to become the standard procedure of colon cancer surgery for its lower local recurrence rate and improved prognosis. Completely medial approach (CMA) is a promising access of laparoscopic CME in right hemicolectomy. A 45-year-old female patient was diagnosed as right-hemi colon cancer. Based on this case, we share the surgical strategies of laparoscopic CME with completely medial access combined with our previous study. Laparoscopic CME emphasized on en bloc resection of mesocolon without defections to the planes. Besides, further dissection is needed for cancer at the hepatic flexure, which involves subpyloric lymph nodes and of greater omentum that is within 15 cm of the tumor and along the greater curvature. The operation time was 128 min and the blood loss was 10 mL. The total number of central lymph nodes retrieved was 19. The time for passage of flatus and hospitalization were 2 and 12 days respectively. Laparoscopic CME with completely medial access is technically feasible, and should be conducted by experienced hand in right hemicolectomy.

**Keywords:** Right-hemi colon cancer; complete mesocolic excision (CME); completely medial approach (CMA)

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## Introduction

Surgical strategies of complete mesocolic excision (CME) includes two concepts based on embryonic anatomy and surgical oncology: sharp separation of the mesocolic visceral and parietal plane; radical lymph nodes dissection and ligation colon-feeding vessels at their roots for a larger range of longitudinal enterotomy (1). The feasibility and survival benefit of CME for the patients with colon cancer has been demonstrated recent years (2-5). Lateral and medial accesses are two modes of CME procedure. Conventional laparoscopic CME utilizes lateral access. Previous study has indicated that laparoscopic CME via medial access and traditional colectomy are technically comparative (4).

Completely medial approach (CMA) and hybrid medial approach (HMA) are two different approaches for medial access proposed by our medical center. CMA involves

several bottom-to-top approaches including the entrance of intermesenteric space (IMS) via transverse retrocolic space (TRCS), the dissection of the middle colic vessels (MCV), the gastrocolic trunk of Henle (Henle trunk, HT) and the inferior margin of pancreas. Previous research has demonstrated that CMA is technically feasible, and is the better choice for right hemicolectomy (6). The main goal of this article is to illustrate the surgical procedures and anatomic strategies of CMA in details based on this case.

## Method

Patients with clinical stage II, III right-hemi colon cancer and whose important vessels in the surgical area are free from the invasion of tumor can be the candidate for CMA. Patients should have a well tolerability for laparoscopic



**Figure 1** Laparoscopic CME with CMA for right-hemi colon cancer (7).

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surgery, and without severe cardiopulmonary insufficiency. In the present video (*Figure 1*), the patient is a 45 years old woman who was diagnosed adenocarcinoma of ascending colon proximal to hepatic flexure by colonoscope and histological test (*Figure 2*). The tumor stage was assessed to be cT4N1M0 by CT scan preoperation (*Figure 3*).

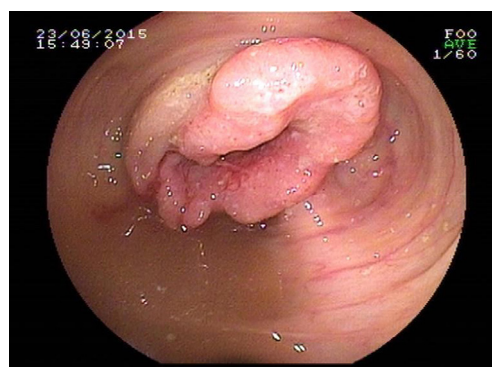
### *Surgical position*

The patient was placed in supine position after the administration of general anesthesia, with both legs split and arms folded, and at a head-down left side tilt position. The surgeon stood on the left side of the patient, while the first assistant was on the right. The camera operator was positioned between two legs of the patient.

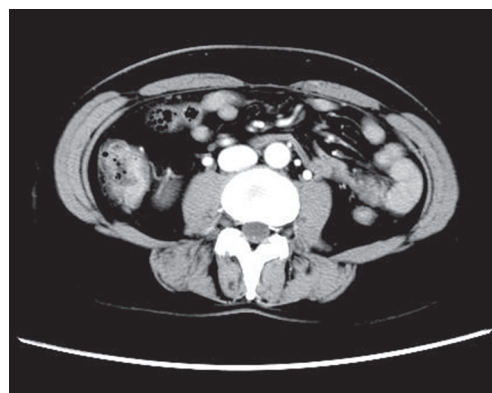
### *Surgical procedures*

Pneumoperitoneum maintained not higher than 12 mmHg, and was built via the Veress needle. Five trocars were required in this surgery. One 10-mm trocar was placed on the upper left abdomen; the other was placed at the infraumbilical area with an inserted 30-degree laparoscope. One 5-mm trocar was on the lower left abdomen, and another two 5-mm trocars were on the upper and lower right abdomen respectively (*Figure 4*).

The surgical procedure of CMA starts at the ileocolic vessel and proceeds along superior mesenteric vein (SMV) to enter the TRCS from bottom to top. A bottom-to-top fashion is used to extend from pancreatic inferior edge. Middle colon vessels and the HT were dissected afterwards. TRCS is extended laterally to commute RRCS and



**Figure 2** Coloscope.



**Figure 3** Abdominal CT scan.

superiorly to enter the IMS. Extending the inborn surgical plains to avoid mesocolon from defection. The surgery was conducted as follow (*Figures 4-13*).

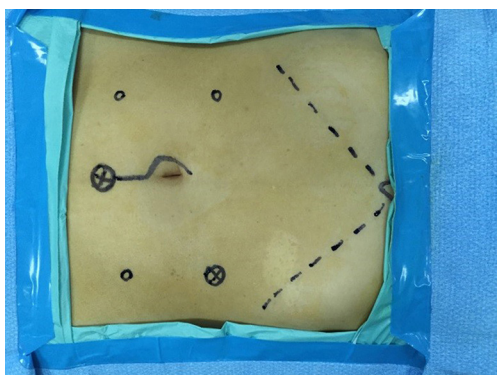
## **Results**

It took 128 min to finish this surgery, intraoperative bleeding was about 10 mL. Nineteen central lymph nodes were retrieved. The pathology outcome after the surgery shows it the adenocarcinoma staging T4N1M0. Besides, the time to first passing flatus and discharge were 2 and 12 days respectively.

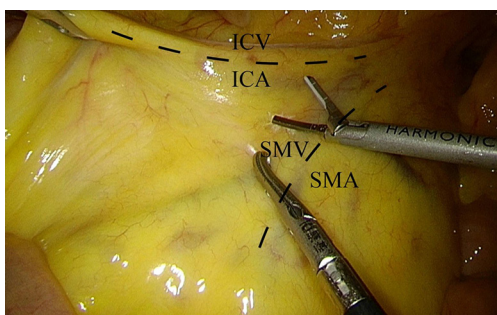
## **Discussion**

### *Anatomic strategies of CMA*

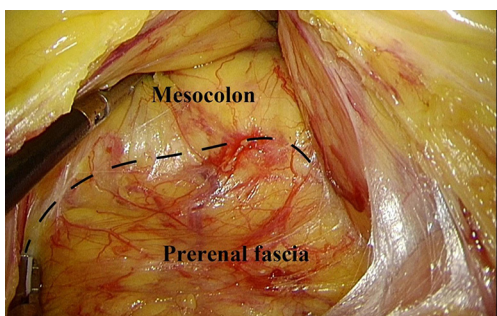
Laparoscopic CME via medial access completes the dissection of surgical trunk and the ligation of central vessel to mobilize colon, involving an approach of inferior



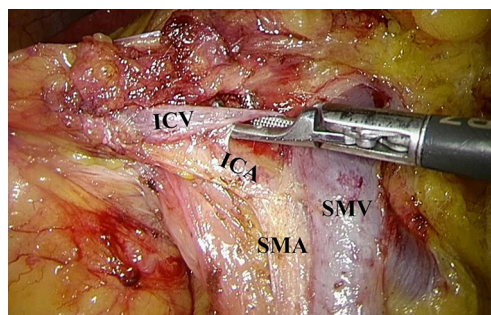
**Figure 4** Trocars position.



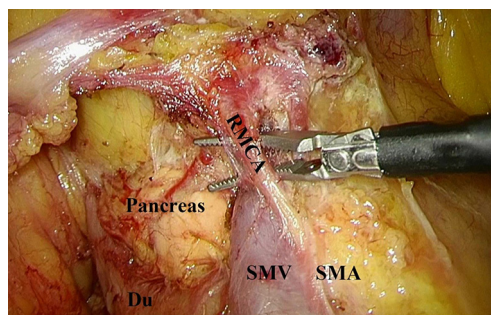
**Figure 5** Initiation: the anatomic projection of ileocolic vessels (ICA and ICV) served as the initiation.



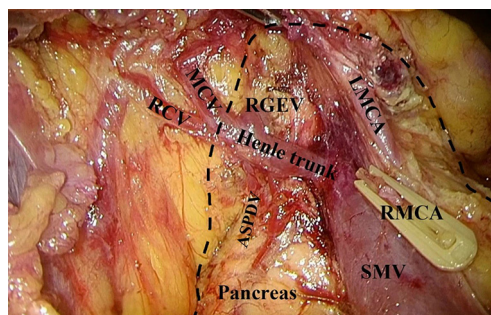
**Figure 6** Identification and extension of RRCS: sharp separation of the mesocolic plane. The visceral plane of mesocolon and prerenal fascia (PRF) remains intact.



**Figure 7** Identification of superior mesenteric vessels (SMV/SMA) and ileocolic vessels (ICV/ICA), lymph nodes dissection at the root of these vessels.

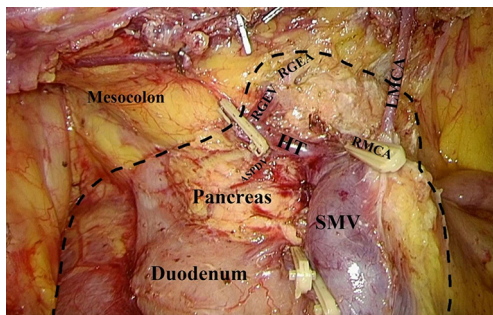


**Figure 8** Identification and extension of the TRCS: TRCS is extended to commute with the RRCS. Proceed along the SMV/SMA or surgical trunk to conduct the ligation of right colic vessels (RCA/RCV) and right branch of middle colic artery (RMCA).

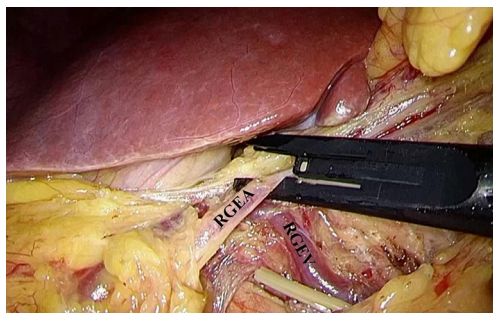


**Figure 9** Ligation of Henle trunk (HT): HT's branches are of high variability. In this case, HT consists of RCV, ASPDV, RGEV and MCV.





**Figure 10** Extension of TRCS, section of right branch of middle colic artery (RMCA) right branch, mesocolon was excised without deflections.



**Figure 11** Identify the right gastroepiploic artery (RGEA), dissection of subpyloric lymph nodes is required for advanced colon cancer located at the hepatic flexure.

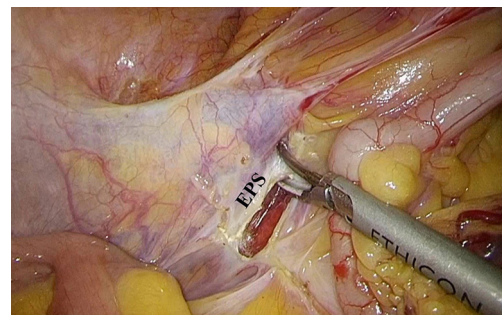
medial to superior lateral. Three avascular spaces (TRCS, RRCS and IMS), and one surgical plane consists of gut, prerenal fascia (PRF) and nearby structure is essential to the mobilization of right-hemi colon (6).

IMS is located superior to the transverse mesocolon and posterior to the greater omentum. It communicates with the TRCS via the root of the transverse mesocolon. Thus, the entrance of the IMS is necessary for the mobilization of transverse mesocolon. CMA requires a bottom-to-top approach during the mobilization, which has the advantage of fewer vessel-related complications and reducing operation time.

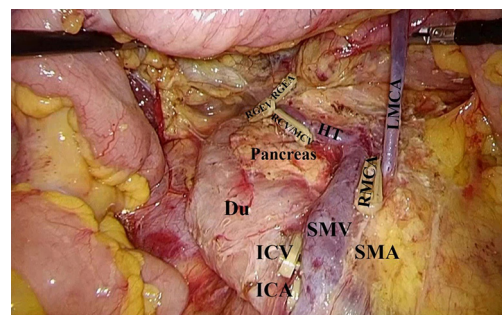
### *Difficulties and obstacles in CMA to the CME*

#### **Recognize the TRCS**

The TRCS is an inborn surgical space located posterior to the transverse mesocolon and anterior to the pancreatic inferior margin. We propose two ways to identify the TRCS. First,



**Figure 12** Extend the extraperitoneal space (EPS) to mobilize the right-hemi colon.



**Figure 13** The surgical field after completely medial approach (CMA).

SMV can serve as a landmark for TRCS. In CMA, the range to dissect mesocolon can be clearly defined by the surface of SMV sheath, and the entrance of TRCS can be achieved after dissection. Second, TRCS can be successfully entered by superior extension of RRCS by dissecting the ventral part of the pancreas and the horizontal portion of duodenum.

#### **“Climbing” the pancreatic inferior edge**

Hemorrhage of pancreatic injuries is a potential complication of CMA. Therefore, it's vital to recognize the pancreatic inferior edge and the timing for “climbing”. We regard emergence of the HT as the symbol of close to the pancreatic inferior edge. Meanwhile, the extension of the avascular space should be converted into a climbing procedure from bottom to top. Besides, it's also feasible to dissect along the left margin of right gastroepiploic vein (RGEV) get entrance to IMS.

### **Conclusions**

Laparoscopic CME for CMA is safe, technically feasible

and highly recommended for the tumor locates in the right-hemi colon. Whereas, it's also a difficult surgery that should be conducted in an experienced medical center.

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## Footnote

**Conflicts of Interest:** All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jxym.2017.04.08>). The authors have no conflicts of interest to declare.

**Ethical Statement:** The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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