



Complete mesocolic excision as a standard surgical treatment for colon cancer: a consensus

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Complete mesocolic excision (CME) with central vascular ligation (CVL) has become popular in recent years. However, the indications and operational guidelines for CME are still debated. Zheng *et al.* (1) published a valuable report highlighting the role of CME in colon cancer. This study contains several key questions exploring the CME technique and responses from expert colorectal surgeons worldwide.

CME was described first by Hohenberger *et al.* (2) and performed in conjunction with CVL via true central ligation of the main arteries and veins at their root, and the sharp dissection along the mesocolic plane. Similar to the rectum, even in colon cancer, except in very advanced cases, the lymphatic spread primarily follows the lymph drainage along the supplying arteries. Within these compartments, the mesocolon is enveloped by the visceral fascia bilaterally. This observation invoked the concept of CME as a surgical technique with sharp dissection of the visceral plane from the retroperitoneal (parietal = somatic) one, to avoid any breach of the visceral fascia layer, which may potentially lead to tumor spread within the peritoneal cavity. The origin of the colonic arteries might be adequately exposed and tied centrally at the origin to ensure maximal harvest of the regional lymph nodes via CME. In fact, the CME surgery increased the number of nodes retrieved compared with non-CME (3,4). Improved outcomes post-CME can be explained partly by the concept of stage migration (5). Sufficient lymph node examination facilitates accurate nodal staging and prognosis. However, the increased number of nodes, per se, may not improve outcomes. Increased lymph

node count may be a byproduct of CME and ultimately, improved outcomes can be achieved by en bloc resection of the primary tumor and mesocolon as one entity while preserving visceral and retroperitoneal mesocolon fascia.

The operative principles underlying the laparoscopic approach were similar to those of CME through laparotomy. Many studies suggested the absence of any difference between open CME and laparoscopic CME, and laparoscopic CME is not significantly different from open CME in terms of specimen status and oncologic outcome. However, the procedure is performed only by experts. Japanese D3 lymphadenectomy has been performed in many Asian countries, which are based on principles similar to CME with CVL, and impressive outcomes have been reported, including in stage III disease (6). According to the Japanese Society for Cancer of the Colon and Rectum, D2 lymphadenectomy is defined as removal of D1 lymph nodes (epicolic, and paracolic) and D2 nodes (intermediate), whereas D3 lymphadenectomy entails removal of D3 nodes (main) at the root in addition to D1 and D2 nodes (7). Both D3 and CME specimens involve higher rates of mesocolic surgery and long distance from the high vascular tie to the bowel wall (8,9) whilst the bowel length tends to be shorter in D3 lymphadenectomy.

The absolute indications for CME have not been clearly defined to date. However, CME appears to be more beneficial in cases of advanced tumors such as direct invasion of the surrounding tumor tissue and grossly suspicious lymph node metastasis. Although a few studies suggested that CME was no different from non-CME in postoperative complications,

it is obvious that CME is a challenging technique for non-specialty surgeons, and may be accompanied with serious surgical complications occasionally. Therefore, it is still debated whether CME should be performed at all stages. The CME technique is based on a sound oncologic principle, and robust evidence is needed for appropriate indications and standardized guidelines. Well-designed multinational studies are needed to investigate the extent of resection based on the differences between eastern and western countries in terms of CME concepts.

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