

Euro Surgery 2020: Complete Mesocolic Excision and Central Vascular Ligation in Colon Cancer Surgery, Feasibility and Outcome

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Background: Colon cancer continues to be a major health problem worldwide. Being the third most common type of cancer in men and the second in women. Standard treatment of colon cancer is based on surgical resection. An adequate number of lymph nodes harvested are important for a correct stabilization of the disease; thereby the extension of the colonic resection remains controversial. Complete mesocolic excision (CME) with central vascular ligation (CVL) has recently been found to improve oncological outcomes in patient with colonic cancer. Complete mesocolic excision is based on a correct identification of the dissection plan between the mesofascial plane and the retroperitoneal fascia, central vascular ligation of the vessels to remove vertical lymph nodes and resection of the affected colonic segment. **Methods:** This is a prospective study done at general surgery department of Fayoum University hospitals from January 2015 to January 2019 including 60 patients with operable colonic cancer operated with adequate surgical margin, complete mesocolic excision and high vascular ligation. **Results:** The number of dissected lymph node was 27.7 ± 4.2 and this number is more than that dissected in the conventional colectomy mentioned in many studies in literature, more over larger mesocolon area, longer distance from vascular high ligation point to intestinal wall, and longer distance from vascular high ligation point to tumor center were observed. **Conclusion:** Surgery in colon cancer patients remains the only curative treatment and applying the principles of complete mesocolic excision and central vascular ligation in colon cancer surgery can improve cancer outcomes without increase the incidence of postoperative complications.

The colonic mesentery or mesocolon contains the vascular and the lymphatic drainage systems of the colon, so adequate clearance is necessary for colon cancer to have the same oncologic benefit as a total mesorectal excision for the treatment of patients with rectal cancer. In 2009, Hohenberger et al. [1] introduced a new concept trying to translate survival advantages to patients with colon cancer. This new concept of a complete mesocolic excision (CME) with a central vascular ligation (CVL) in the management of patients with colon cancer represents a kind of evolution in operative technique. The concept of a CME as a surgical technique with sharp dissection of the visceral plane from the retroperitoneal (parietal = somatic) one aims to avoid any breaching of the visceral fascia layer, which potentially may lead to tumor spread within the peritoneal cavity. With this procedure, the origin of the colonic arteries can be well exposed and tied centrally at their origins to ensure maximal harvesting of regional lymph nodes. CME and CVL surgery remove more tissue compared with standard surgery in terms of the distance between the tumor and the highly vascular region, the length of large bowel and ileum removed, and the area of the mesentery. In addition, CME and CVL surgery are associated with more mesocolic plane resections and greater lymph node yields [2, 3].

In terms of oncologic outcomes, Hohenberger et al. [1] reported excellent cancer-specific survival rates after CME surgery (stage I, 99.1%; stage II, 91.4%; and stage III, 70.2%) [1]. Moreover, CME surgery is associated with better disease-free survival than is a conventional colon cancer resection for patients with a stage I–III colon adenocarcinoma: the 4-year disease-free survivals were 85.8% after CME and 75.9%

after non-CME surgery ($P = 0.0010$). The 4-year disease-free survival for patients with Union for International Cancer Control (UICC) stage I disease in the CME group was 100% compared with 89.8% in the non-CME group ($P = 0.046$). For patients with UICC stage II disease, the 4-year disease-free survival was 91.9% in the CME group compared with 77.9% in the non-CME group ($P = 0.0033$), and for patients with UICC stage III disease, it was 73.5% in the CME group compared with 67.5% in the non-CME group ($P = 0.13$). After propensity score matching, the disease-free survival was significantly higher after CME, irrespective of UICC stage, with 4-year disease-free survivals of 85.8% (95% CI, 81.4–90.1) after CME and 73.4% (95% CI, 66.2–80.6) after non-CME ($P = 0.0014$) [4].

The mean operative times ranged from 156 to 178 minutes [5–7], with the operative times for CME surgery being longer than those for non-CME surgery [5, 6]. The postoperative morbidity rates ranged from 11% to 28% [1, 5–7], but did not differ between the CME and the non-CME groups [7, 8]. Similarly, no significant differences in outcomes between the CME (4.5%) and the standard (4.8%) colectomy groups regarding postoperative mortality were reported by 2 studies [4, 9]. In particular, the rates of anastomotic leakage were also similar in 2 studies (CME surgery, 8.6% and 4.4%; standard surgery, 7.6% and 5.2%) [4, 5].

Applying laparoscopy to a CME for patients with colon cancer is difficult, mainly due to vascular dissection and splenic flexure mobilization [10]. Various laparoscopic and open techniques have been introduced in the literature for performing a CME with a CVL for patients with right-sided colon cancer. The laparoscopic approach is performed under the same CME principle as a laparotomy. Accordingly, skepti-

cism exists as to whether the favorable outcomes of an open CME can be reproduced with a laparoscopic CME [11–14]. In a recent randomized trial, a laparoscopic D3 lymphadenectomy for patients with colon cancer showed shortterm surgical safety and clinical benefits when compared to the patients who had undergone open surgery. Yamamoto et al. [15] performed a randomized controlled trial comparing laparoscopic ($n = 533$) and open D3 ($n = 524$) dissections for patients with clinical stages II/III colon cancer. Conversion to open surgery occurred in 29 patients (5.4%). The laparoscopic CME showed longer operative time (211 minutes vs. 153 minutes). However, shortterm advantages were observed in terms of less blood loss, shorter time to flatus, diminished analgesics use, shorter length of hospital stay, and lower postoperative complication rate (14.3% vs. 22.3%). When laparoscopic and open CMEs were compared, the overall survival rates (laparoscopy, 70.4% vs. open, 67%) [16] and recurrence rates (laparoscopy, 8.6% vs. open, 9.1%) were similar [17]. Cho et al. [18] reported similar overall and disease-free survival rates between the minimally invasive approaches (laparoscopy and robot) and an open CME. Bae et al. [19] reported a better overall survival rate in the laparoscopic CME group.

In conclusion, a CME with a CVL can be safely performed compared with non-CME surgery. CME surgery is associated with better disease-free survival than is conventional colon cancer resection for patients with a stages I–III colon adenocarcinoma. Thus, implementation of CME surgery might improve outcomes for patients with colon cancer. Although a laparoscopic CME is a technically demanding procedure and requires a steep learning curve due to technical difficulty, this approach may confer shortterm advantages, such as lower complication rates, shorter time to diet, and reduced hospital stay.