Complete mesocolic excision (CME) and central vascular ligation (CVL) for right sided cancers: is it time to jump on board?

Authors: Vignesh Narasimhan FRACS^{1,2}, Atandril Das FRACS^{1,2}, Peadar Waters MD FRCS¹, Jacob McCormick FRACS^{1,2}, Alexander Heriot MD, MBA, FRACS^{1,2}, Satish Warriar MS, FRACS^{1,2}

Affiliations:

¹ Peter MacCallum Cancer Centre, Department of Surgical Oncology

² Sir Peter MacCallum Dept. of Oncology, University of Melbourne

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Corresponding Author:

Dr Vignesh Narasimhan

Vignesh.naras@gmail.com

Phone: +61 451121766;

Fax: +61 3 85597709

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The advent and standardisation of total mesorectal excision (TME) for rectal cancer¹ has been the single most important surgical advance that has positively influenced colorectal oncological outcomes. Based on principles of sharp dissection along embryological planes, TME involves excision of the entire mesorectal envelope of the rectum with its associated lymphovascular drainage. The adoption of TME with its resultant reduction in local recurrence best highlights the impact of a surgical technique influencing oncological outcomes. No such shift in care has occurred in colonic cancer surgery.

Studies have shown that right-sided colon cancers have a worse survival than left sided. This association is independent of stage or chemotherapy use.² From a molecular perspective, right-sided cancers are more likely to be mucinous, harbor defects in EGFR pathways, and have BRAF mutations, all poor prognostic factors.³ Surgically, the only measures of quality we utilise are ensuring an R0 resection, and achieving a nodal harvest of at least twelve lymph nodes as per the AJCC.⁴ However, unlike a left sided cancer where the inferior mesenteric artery is ligated at its origin, the ileocolic artery is taken “high”, rather than at its origin from the superior mesenteric artery. It is conceivable that a number of draining lymph nodes remain along the origin of the ileocolic vessels as a result, leading to untreated loco-regional disease. It is therefore plausible that we may be performing suboptimal surgery for right-sided cancers.

The concept of Complete Mesocolic Excision (CME) with Central Vascular Ligation (CVL) is based on complete mobilisation of the mesocolon by separating the visceral and parietal fascia, allowing safe access and exposure to the ileocolic vessels at their origin, thereby ensuring removal of the entire lymphovascular drainage as a complete package. CME with CVL ensures a D3 lymphadenectomy is performed whereby all lymphatic tissue is removed anterolateral to the superior mesenteric vein.

Hohenberger proposed the concept of CME with CVL as oncologically superior to a conventional colectomy, with stage migration also addressed by CME, wherein lymph node metastases that occur in apical lymph nodes without positive paracolic nodes are removed.⁵

Hohenberger et al⁵ demonstrated that CME carries low morbidity, offering a five year loco-regional recurrence of 3.6% compared to 6.5%, and a cancer specific survival of 89.1% compared to 82.1% with conventional colectomy. Notably, a lymph node harvest of at least 28 was an independent prognostic factor, even in lymph node negative patients. Recently, Lee et al⁶ reaffirmed in a large series that a yield of over 22 lymph nodes independently contributed to an improved survival in right-sided cancers, suggesting that an extended lymphadenectomy may offer survival benefit.

In many countries, the concept of CME is not new. In Japan, Korea and China, a D3 lymphadenectomy is the standard of care for Stage II/III colonic cancer, with five-year survival rates of up to 91.8%.⁷

The technique and benefits of CME are not widely accepted, largely due to lack of randomised data comparing CME to conventional colectomy. Numerous single institutional series have demonstrated a significantly higher nodal harvest and improved survival with CME compared to conventional colectomy for right-sided cancers. A pooled analysis comparing CME to conventional colectomy demonstrated that CME carried no added morbidity, but a significantly increased nodal yield.⁸ Furthermore, there was an improved disease specific survival and reduced local recurrence in favour of CME.

There is concern about the ability to perform a CME laparoscopically, largely due to technical difficulty, and appreciation of variable vascular anatomy and concerns that morbidity may outweigh any potential long-term oncological benefit. The only randomised trial to compare laparoscopic to open CME demonstrated that both offer an excellent five year survival of over 90%, with no difference in morbidity.⁹ A subsequent meta-analysis comparing laparoscopic to open CME demonstrated that both techniques offer similar clinical safety, with no difference in morbidity, or long-term oncological outcomes.¹⁰

A significant challenge we face in laparoscopic surgery that studies have failed to evaluate is the body habitus of the average patient in Australia. Most studies demonstrating feasibility of laparoscopic CME are from our Asian neighbors where the median BMI is under 25.¹⁰ This figure would be much higher for patients in Australia, increasing the complexity of laparoscopic CME. The increasing uptake of robotics in colorectal surgery offers benefit in challenging scenarios such as dissection in a narrow pelvis or in the obese patient.¹¹ The technical advantages offered by the robot may permit more precise dissection of vascular anatomy in CME, particularly in obese patients. This is evident with a strong uptake of CME with CVL in Europe and America, coinciding with increased uptake of robotics.¹²

CME for right-sided cancers is feasible and can be performed safely open, laparoscopically or robotically. With improved survival in rectal cancer attributed to improvements in surgical technique, it stands to reason that similar technical principles such should be followed in colonic cancers as well. While there will be a learning curve that must be overcome, it is conceivable that similar to rectal cancer, standardisation and uptake of CME for right-sided colon cancers will lead to improved oncological outcomes with time.

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Author/s:

Narasimhan, V;Das, A;Waters, P;McCormick, J;Heriot, A;Warrier, S

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