



# Complete Lymph Node Dissection as a Vascular-Sparing Alternative of Complete Mesocolic Excision for Colon Cancer

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## Dear Editor;

It was a great pleasure to read an invited review “The Concept of Complete Mesocolic Excision”, written by the undisputed expert Werner Hohenberger (1). Complete mesocolic excision became a standard of surgical care, which significantly improved the survival outcomes in colon cancer surgery (2). Central vascular ligation (CVL) and lymph node dissection (LND) at the origin of the main feeding colic arteries with the mesocolon excision within the undisrupted fascial envelope has a lot in common with the principles of total mesorectal excision for rectal cancer, suggested by Bill Heald (3) and D3 LND (4), described in Japanese Society for Cancer of the Colon and Rectum (JSCCR) guidelines. However, partial mesorectal excision (PME), widely adopted in treatment of the upper rectum, was shown to be an oncologically safe procedure and recommended by ESMO and JSCCR guidelines (4,5).

CVL and the inclusion of arterial arcade demands the extensive resection of the colon outside the 10-cm borderlines (2), even though 10 cm margins were shown to be oncologically adequate regarding the tumor lymphatic spread (4). In this perspective, the term ‘tumor-specific mesocolic excision’ might be more accurate to describe the resection of the bowel in 10 cm proximally and distally with associated mesocolon and preserved fascial envelope in analogue to PME.

Yet, the bowel-sparing approach demands selective arterial ligation to ensure the blood supply of the colon. Kobayashi et al. were one of the first surgeons, who described the technical aspects of left colic artery and superior rectal artery preservation with D3 LND at the origin of inferior

mesenteric artery (IMA) (6,7). It was shown, that D3 LND at the origin of IMA and vascular preservation was associated with comparable survival rates (8,9).

Taking in account that CVL for right colon cancer is at the origin of the colic branches of SMA, the level of CVL for left colon cancer should be at the level of colic branches of IMA as well (Fig.1A).

It is crucial to not only ligate the colic vessels at their origin, but to perform LND along the arterial and venous trunks. Thus, it is important to follow standard anatomical landmarks to fully excise the lymph nodes from the apical regions and avoid the ligation of the vessels at their origin, if clinically acceptable.

- For right colon (Fig.1 B,C) the medial borders of LND are anterior and latero-posterior surfaces of superior mesenteric artery (SMA), the lower edge of the pancreas cranially and in 2 cm from ileocolic artery caudally (10).

- For tumors in the transverse colon, the surface of SMA should be exposed 1-2 cm both proximally and distally to the middle colic artery (Fig.1D).

- For splenic flexure, the LND at the root of IMA with ligation of left colic artery is performed. Also, LND at the root of middle colic artery with the preservation of the latter is performed. The left branch of MCA should be ligated. (Fig. 1 E)

- For left colon the central LND area is embordered within the horizontal part of duodenum, IMA root, medial surfaces of the splanchnic nerves

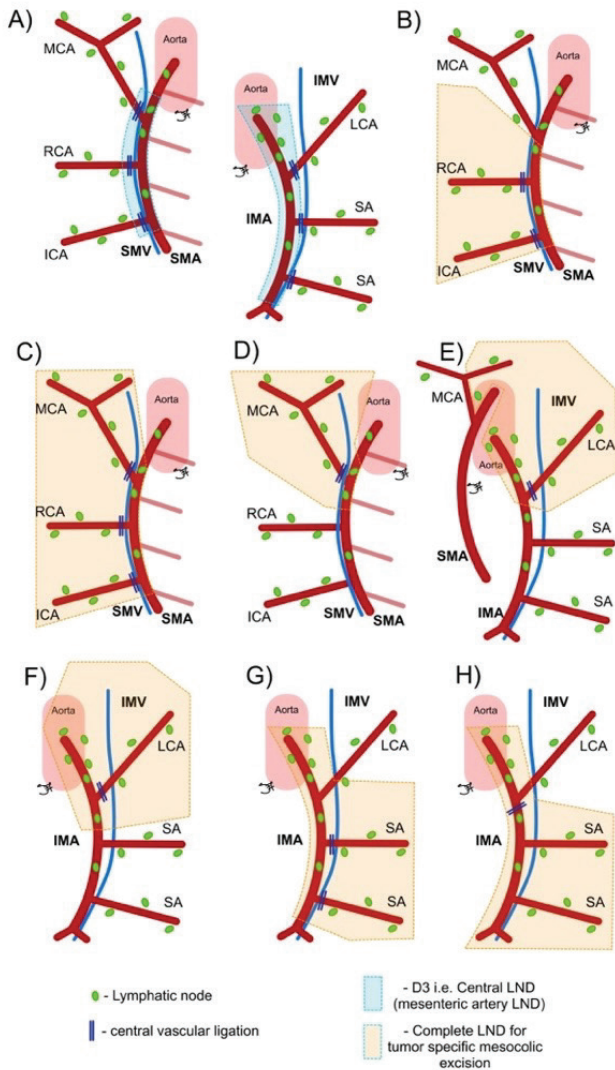
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and caudally at the point of the mesentery fixation to prehypogastric fascia (Fig. 1 F, G, H).



**Figure 1.** Schematic borders of central lymph node dissection, complete lymph node dissection and central vascular ligation for colon cancer: (A) the area of central LND for SMA and IMA (within blue area) and the level of CVL for colic branches. (B) CLND for cecal colon cancer, (C) CLND for ascending colon cancer and hepatic flexure cancer, (D) CLND for transverse colon cancer, (E) CLND for splenic flexure colon cancer, (F) CLND for descending colon cancer, (G) CLND for proximal sigmoid colon cancer, (H) CLND for distal sigmoid colon cancer. IMA: Inferior mesenteric artery, LCA: Left colic artery, SA: Sigmoid artery, IMV: Inferior mesenteric vein, SMA: Superior mesenteric artery, SMV: Superior mesenteric vein, MCA: Middle colic artery, ICA: Ileocolic artery, RCA: Right colic artery, LND: Lymph node dissection, CME: Complete mesocolic excision

These landmarks ensure not only central vascular ligation, but the completeness of central LND (Fig. 1A).

The presented approach allows to remove all regional mesenteric lymph nodes, while preserving blood flow with the help of skeletonization of non-tumor feeding arteries, i.e. to perform mesocolic complete lymph node dissection (CLND). Tumor-specific mesocolic excision with CLND results in the individualized surgery based on tumor location and arterial anatomy, ensuring oncological radicality. At the same time, vascular preservation is not associated with higher rates of short-term complications or poorer survival outcomes according to recent studies, thus can be considered in clinical practice and future studies (8,9).

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