

FIGURE 16-7 (Continued).

patients with hereditary nonpolyposis colon cancer, as they have a higher incidence of synchronous and metachronous colonic tumors than do patients with sporadic colorectal cancer. As calculated by life table analysis, the risk for metachronous cancer among patients with hereditary nonpolyposis is as high as 40% at 10 years. Similarly, for colon cancer patients with familial adenomatous polyposis, surgical resection should consist of either total abdominal colectomy or total proctocolectomy. The choice between these two operations depends on the burden of polypoid disease in the rectum and the patient's preference for close surveillance.^{7,8,9} Finally, individuals who develop colon cancer in the setting of long-standing ulcerative colitis require a total proctocolectomy. The oncologic principles of colon cancer surgery as outlined in this chapter, including the attention to surgical margins and the need for proximal vascular ligation, should be adhered to bilaterally, not just for the portion of colon in which the tumor has been identified.^{10,11}

3. PROXIMAL VASCULAR LIGATION AND REGIONAL LYMPHADENECTOMY

Recommendation: Resection of the tumor-bearing bowel segment and radical lymphadenectomy should be performed en bloc with proximal vascular ligation at the origin of the primary feeding vessel(s).

Type of Data: Prospective and retrospective observational studies.

Strength of Recommendation: Moderate.

Rationale

The standard of practice for the treatment of stage I to III (nonmetastatic) colon cancer is complete margin-negative resection (R0 resection) of the tumor-bearing bowel combined with en bloc resection of the intact node-bearing mesentery (i.e., regional lymphadenectomy). Regional lymphadenectomy is guided by the anatomy of the regional blood supply to the tumor-bearing bowel segment. Complete standard lymphadenectomy is facilitated by the proximal ligation of the relevant vascular pedicle of the tumor-bearing bowel segment. The pedicles that may be ligated on the basis of tumor location include the ileocolic (Fig. 16-8A–E), right colic (Fig. 16-9A,B), middle colic

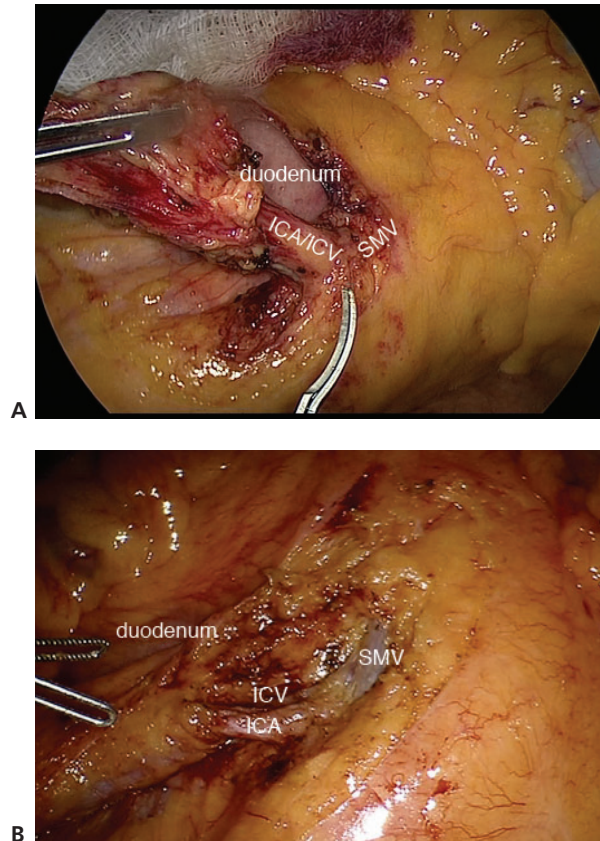


FIGURE 16-8 A–E: Intraoperative images of ileocolic vessel dissection and ligation. ICA, ileocolic artery; ICV, ileocolic vein; SMV, superior mesenteric vein.

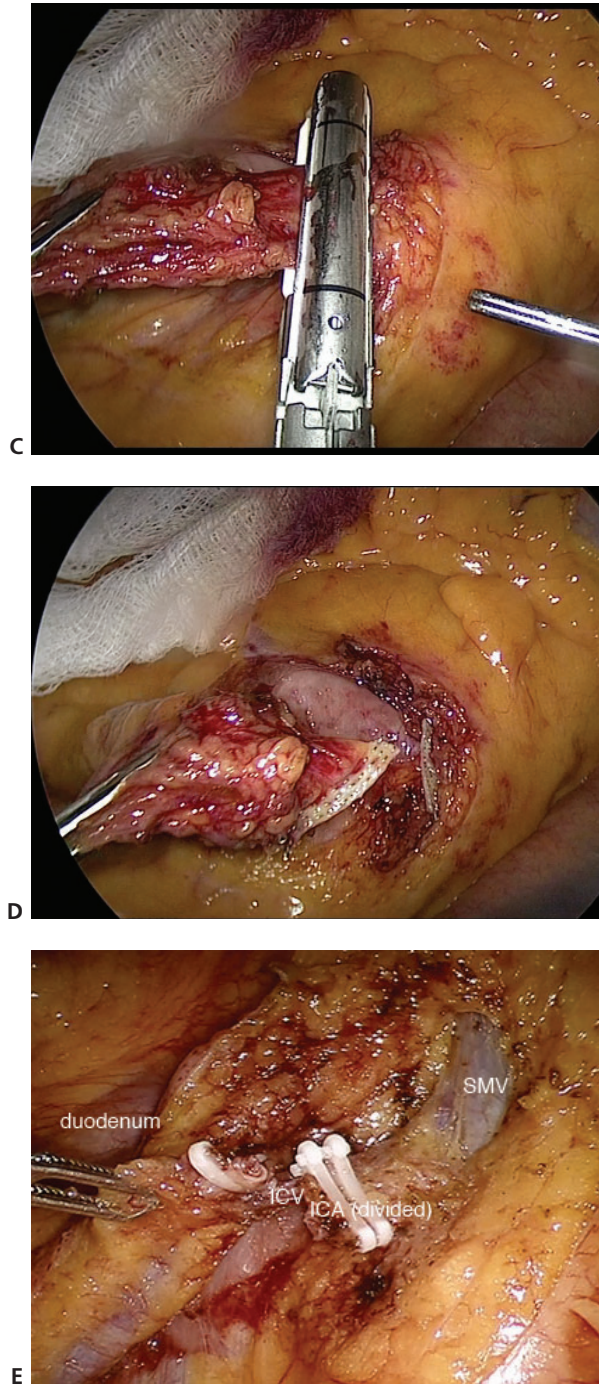


FIGURE 16-8 (Continued).

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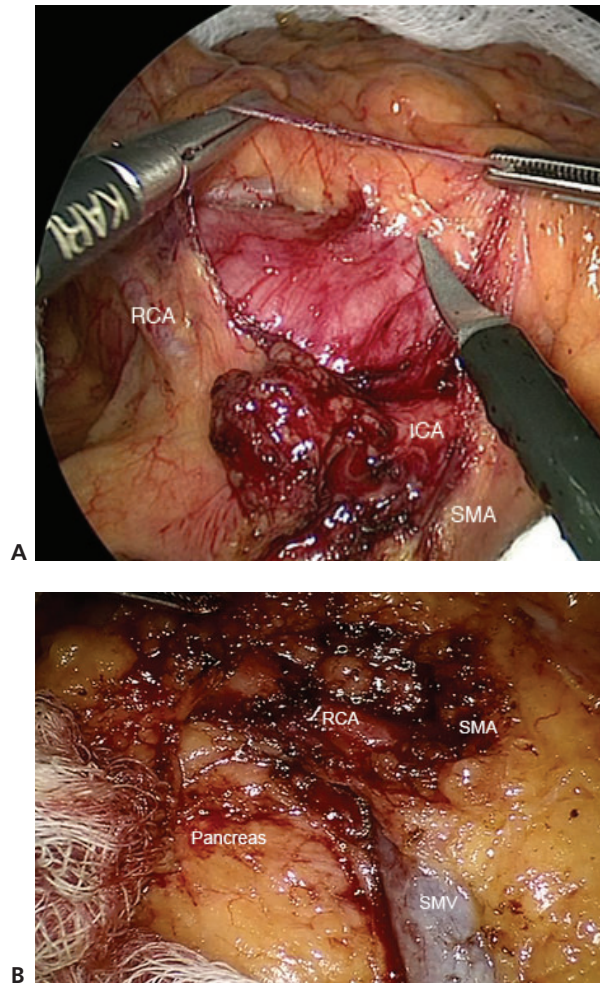


FIGURE 16-9 A,B: Intraoperative images of right colic artery dissection. ICA, ileocolic artery; RCA, right colic artery; SMA, superior mesenteric artery; SMV, superior mesenteric vein.

(Fig. 16-10A,B), left colic (Fig. 16-11), inferior mesenteric (Fig. 16-12A,B), and superior hemorrhoidal arteries and associated veins (Fig. 16-12C), which are identified centrally at the root of the colonic mesentery. Thus, the vascular anatomy of the tumor-bearing colon segment should be clearly identified, with attention to the potential anatomic variations that are commonly encountered. After the vascular ligation has been completed, the integrity of the blood supply to the remaining bowel should be carefully assessed by direct inspection of the bowel wall for adequate perfusion, visualization of pulsatile blood flow within the terminal vessels, or Doppler interrogation of the arterial supply. Although the marginal artery provides a collateral network between the primary vascular supplies, the artery may have congenital and/or acquired variations in its integrity and is subject to injury during colon mobilization.

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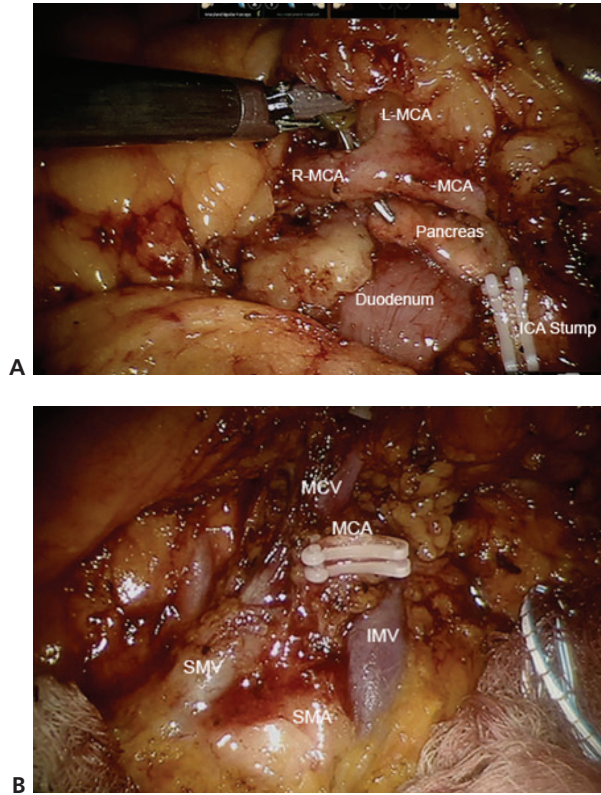


FIGURE 16-10 A,B: Intraoperative images of middle colic vessel dissection and ligation. ICA, ileocolic artery; IMV, inferior mesenteric vein; L-MCA, left middle colic artery; MCV, middle colic vein; R-MCA, right middle colic artery; SMA, superior mesenteric artery; SMV, superior mesenteric vein.

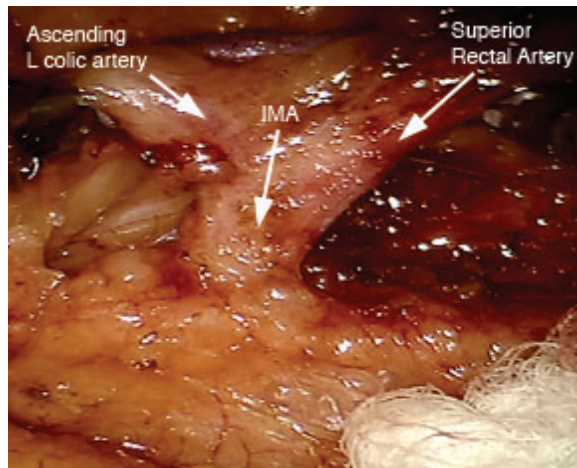


FIGURE 16-11 Intraoperative image showing the IMA giving rise to the left colic and superior rectal arteries. IMA, inferior mesenteric artery.

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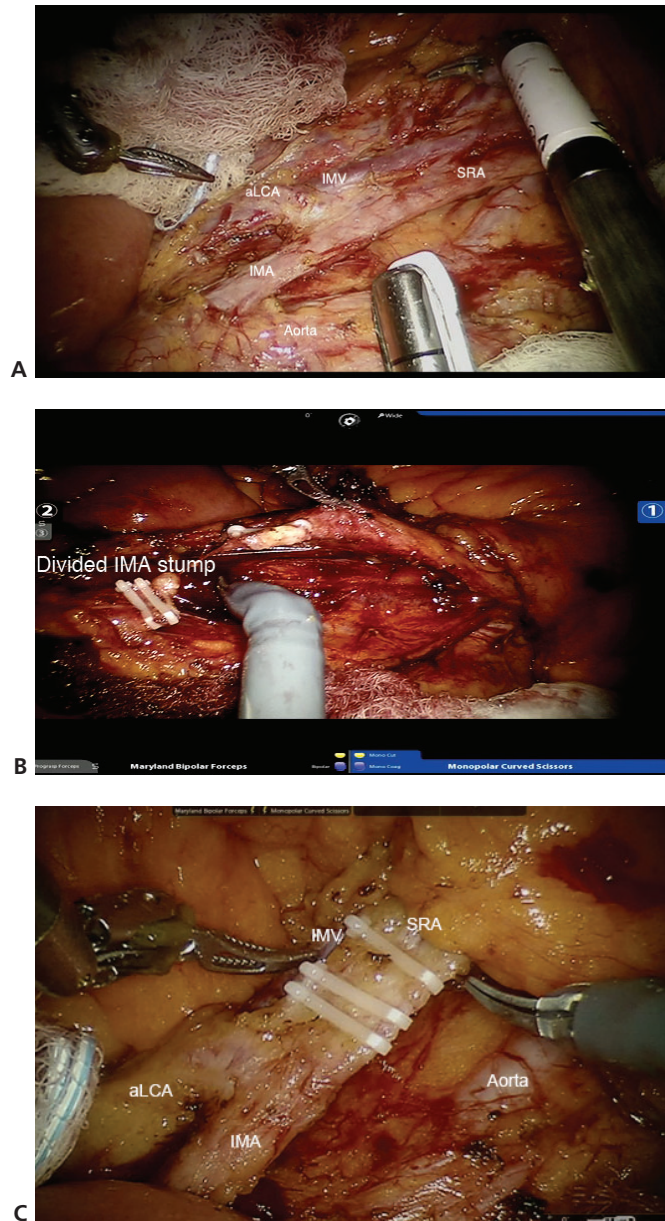


FIGURE 16-12 **A:** The inferior mesenteric artery and its branches. **B:** High ligation of the inferior mesenteric artery above left colic. **C:** Low ligation of the inferior mesenteric artery below left colic. Note complete lymphadenectomy in all cases. IMA, inferior mesenteric artery; IMV, inferior mesenteric vein; aLCA, ascending left colic artery; SRA, superior rectal artery.

Proximal vascular ligation with en bloc lymphadenectomy ensures complete resection of the associated lymph nodes for pathologic evaluation. The number of lymph nodes resected surgically and evaluated pathologically reflects the completeness of lymphadenectomy and is an indicator of surgical quality and oncologic outcome.

The term “complete mesocolic excision” (CME) has been used to describe en bloc complete resection along embryologic planes of the tumor-bearing colon and associated mesentery with its investing envelope intact and without defects. To ensure the integrity and completeness of the bowel and lymphatic excision at the time of colon cancer surgery, some groups have emphasized the practice of complete mesocolic excision (CME) and central ligation of the arteries and draining veins.¹² Observing the CME principles during resection has been associated with lower risks of margin positivity and iatrogenic tumor perforation. One retrospective review of a large, single-institution database demonstrated that the adoption of CME in colon cancer surgery decreased the 5-year local recurrence rate from 6.5% to 3.6% and improved the 5-year overall survival rate from 82.1% to 89.1%.¹³ The new terminology that accompanies the adoption of CME highlights the principles of standard oncologic resection (en bloc complete resection of the associated lymph nodes) and provides a standardized method for operative technique and pathologic evaluation.

4. MULTIVISCERAL RESECTION

Recommendation: Involved adjacent organs and structures should be removed en bloc with the primary tumor.

Type of Data: Retrospective observational studies.

Strength of Recommendation: Strong.

Rationale

Colorectal cancer involving adjacent structures (T4b disease) is reported to occur in 5% to 15% of patients^{3,14} and is often appreciated by history, examination, and/or staging studies (Fig. 16-13). En bloc resection of the primary tumor, associated lymph node basin, and involved adjacent structures is a key oncologic principle for colon cancer surgery and a key factor in maintaining local disease control. Consensus guidelines, National Cancer Institute (NCI), American Society of Colon and Rectal Surgeons (ASCRS), and the National Comprehensive Cancer Network (NCCN Guidelines 2014) recommend en bloc multivisceral resection of locally advanced disease when there is acceptable morbidity and curative potential.^{3,15}

En bloc resection requires removal of the tumor-bearing segment of bowel and attached structures as a single unit. The dissection of a tumor off the bladder followed later by the removal of the portion of bladder to which the tumor was attached is not an en bloc resection. Similarly, the removal of the surgical specimen and subsequent, separate removal of the lymph node-bearing mesentery associated with the tumor-bearing segment is not an en bloc resection.