

Lymphatic Mapping Helps Define Resection Margins For Midgut Carcinoids

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Introduction

The extensive mesenteric lymphadenopathy associated with midgut carcinoids often causes lymphatic obstruction and leads to the development of alternative lymphatic drainage pathways.

Hypothesis

We hypothesized that altered lymphatic drainage makes traditional determination of resection margins inadequate.

Methods

170 patients underwent cytoreductive surgery for neuroendocrine tumors from November 2006 to August 2008. Forty-nine (49) patients underwent intraoperative lymphatic mapping with lymphazurin dye as a single agent. Twenty-seven (27) patients had midgut primaries. We reviewed operative findings and pathology to evaluate the safety and efficacy of lymphatic mapping for midgut carcinoids. Lymphatic mapping defined resection margins were compared to traditional surgical margins.

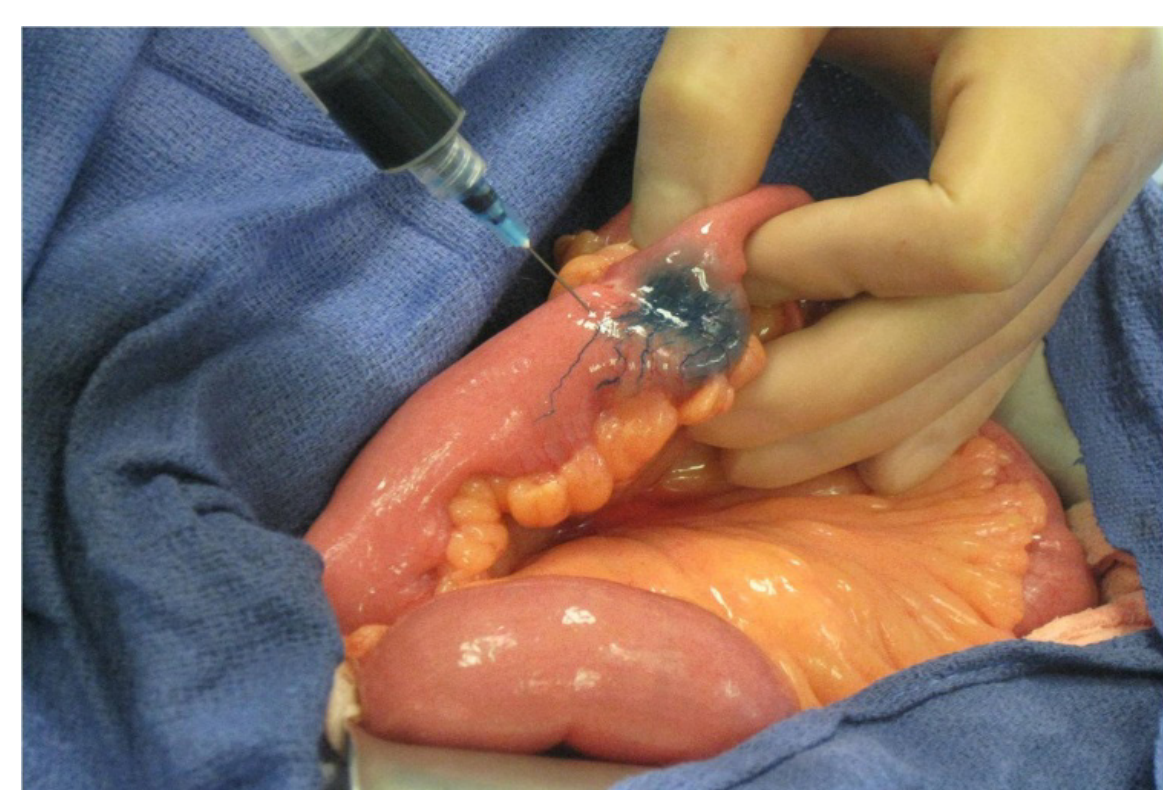


Figure 1: Injection of lymphazurin blue dye into primary tumor

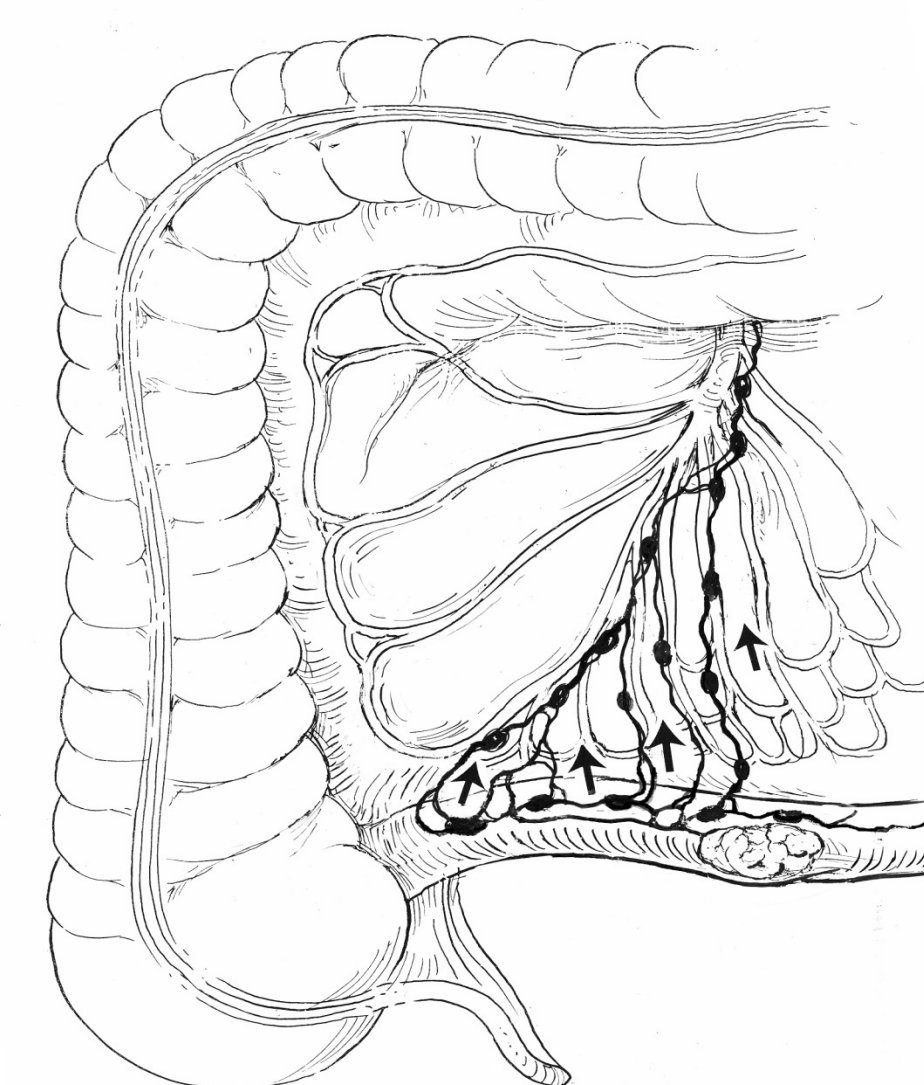


Figure 2

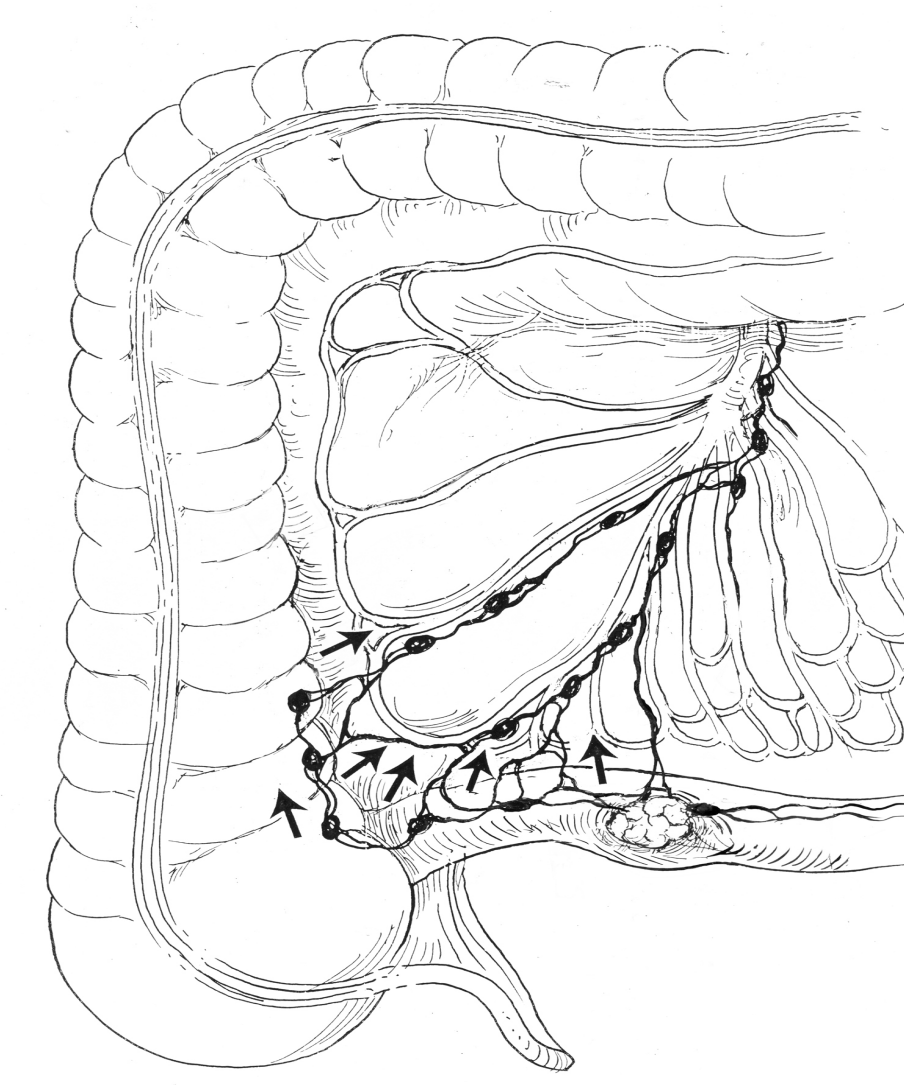


Figure 3

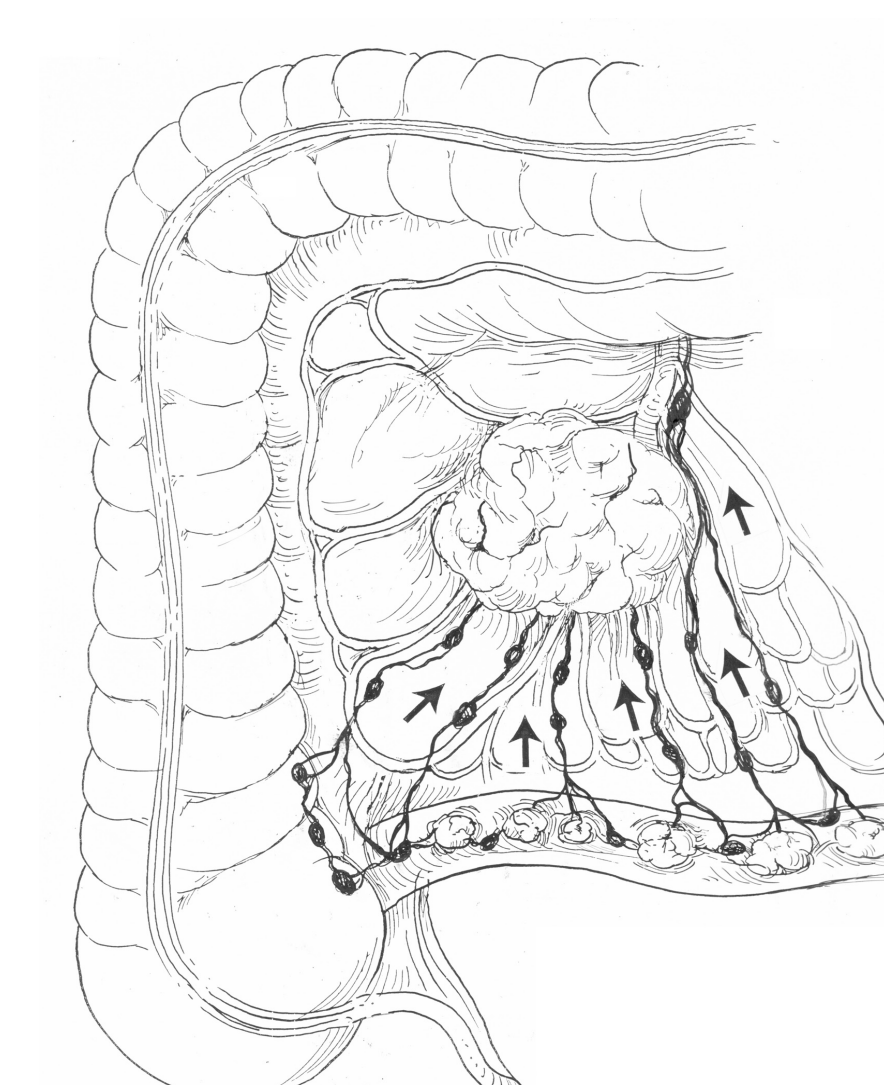


Figure 4

Figure 2: Terminal ileal carcinoid with radial lymphatic drainage proximal to the ileo-cecal valve

Figure 3: Terminal ileal carcinoid with lymphatic drainage that crosses the ileo-cecal valve

Figure 4: Multiple “drop lesions” and fibrotic mesentery with longitudinal lymphatic drainage



Figure 5

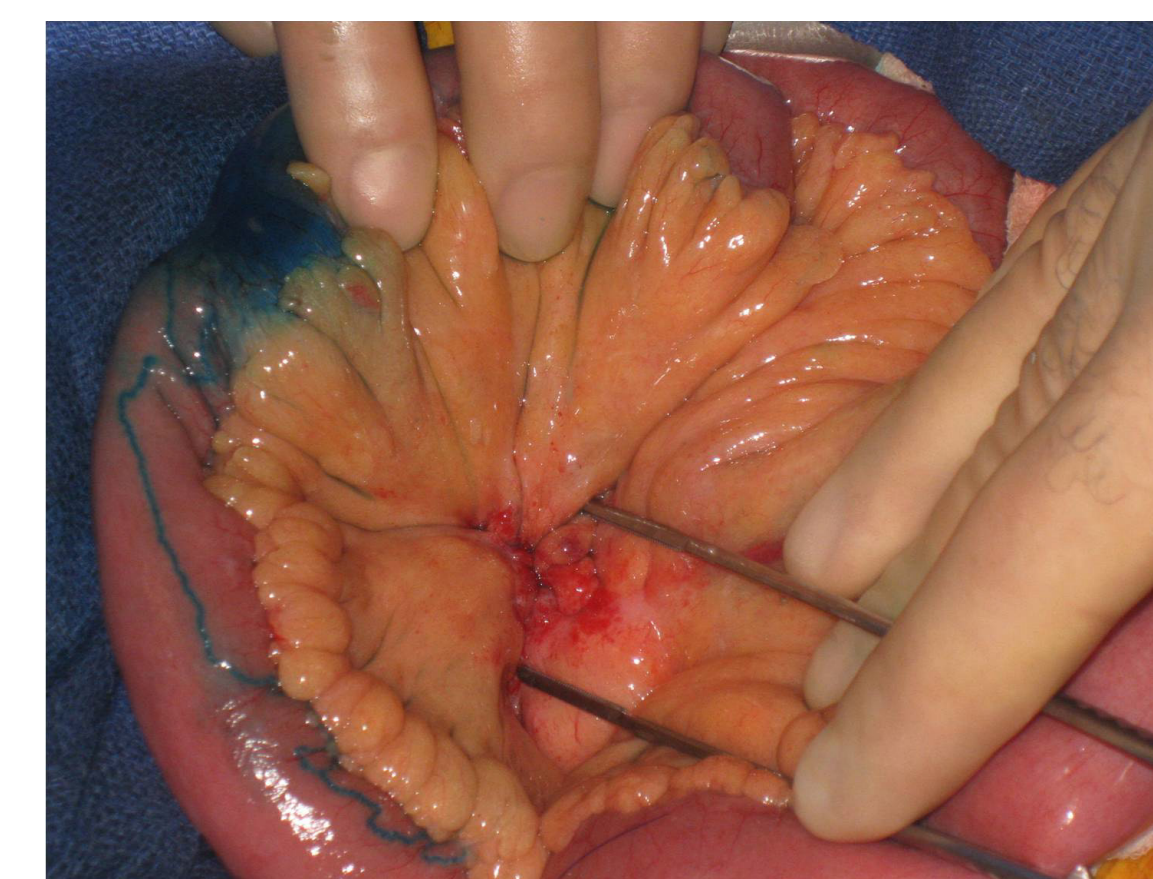


Figure 6

Figure 5: Longitudinal lymphatic drainage greater than 18 cm. proximal to the primary tumor

Figure 6: Longitudinal lymphatic drainage returns to radial drainage after bypassing the obstructed lymphatic channel

Results

Twenty five [25/27, (92%)] patients had ileal and two had jejunal primaries. Lymphatic mapping changed traditional resection margins in 88% of patients. We preserved the ileo-cecal valve in 6/15 (40%) patients with terminal ileal primaries. There were no adverse events associated with the 49 lymphatic mapping procedures.

Conclusions

Lymphatic mapping appears to be a safe, time-efficient and effective way to determine adequate resection margins for midgut carcinoids. We advocate using lymphatic mapping to identify adequate resection margins and assist in preservation of the ileocecal valve in patients with terminal ileal primary carcinoids. Lymphatic mapping was safe and effective in all patients. We believe that using lymphatic mapping to guide the choice of resection margins will reduce local and lymphatic recurrences. Furthermore, we believe in patients with terminal ileal primaries, a subset of patients can have ileocecal valve-preserving resections.

Discussion

Patients with midgut carcinoids should undergo lymphatic mapping as part of their standard surgical approach. Margins should be determined by the longitudinal travel of the dye. In patients with terminal ileal tumors, if the dye does not traverse the ileocecal valve, the patient does not require a right colectomy. This should reduce the risk of post-operative diarrhea.

