Rectal cancer presenting with synchronous intraperitoneal spread of disease

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ABSTRACT

There are differing definitions regarding what portion of the large intestine should be considered “rectum” as opposed to “colon.” The transition from intra- to extraperitoneal rectum results in potentially disparate patterns of spread for rectal cancer dependent on tumor location relative to the peritoneal reflection. Here we report the case of a 50-year-old woman with a mid to upper rectal adenocarcinoma who presented with a synchronous biopsy-proven tumor implant in the peritoneal cavity. Her case highlights issues of varying definitions of organ anatomy within the literature, the role of primary tumor localization within different compartments of the abdominopelvic cavity for predicting potential routes of tumor spread, and the implications for adjuvant therapies.

KEYWORDS Colon cancer; intraperitoneal metastases; rectal cancer

An estimated 39,910 new cases of rectal adenocarcinoma are expected in the United States in 2017.¹ Surgery maintains a critical role in the radical management of both rectal and colon adenocarcinomas. However, whereas radiation is commonly used as neoadjuvant treatment for rectal cancer, it is rarely employed in colon cancer management. The reason for this difference lies in the patterns of tumor recurrence. True local recurrence, amenable to a focused radiation target volume, is rare following colon cancer resection.² Prior to the introduction of total mesorectal excision (TME), recurrence after rectal cancer resection was common in the pelvis as a consequence of its tight anatomical constraints, and radiation was rationally applied as an adjunctive therapy.^{3,4} Even with routine use of TME, however, radiation was still shown to reduce local-regional treatment recurrence, with possible positive impact on survival in patients with more advanced disease.⁵ Some tumors blur any strict distinction between colon and rectum. Tumor location may impact patterns of spread, and upper rectal cancers are at risk for intraperitoneal seeding of cancer, similar to colon cancers.⁶

CASE PRESENTATION

A 50-year-old woman with hypertension, rheumatoid arthritis, and gastroesophageal reflux disease presented for evaluation of a new rectal mass. She previously presented to

an outside hospital with hematochezia, 30-lb unintentional weight loss, and progressive pelvic pain of 4 months' duration. On digital rectal exam, a firm mass was palpated at ~8 cm from the anal verge. Colonoscopy revealed a nonobstructing, ulcerated, upper rectal mass measuring 4 cm × 5 cm; biopsy demonstrated moderately differentiated adenocarcinoma with intact mismatch repair proteins via immunohistochemistry.

Following the biopsy and confirmation of malignancy, initial staging with computed tomography of the chest, abdomen, and pelvis showed rectal wall thickening and perirectal lymphadenopathy without distant metastases. Subsequent magnetic resonance imaging (MRI) of the pelvis revealed a 5-cm rectal tumor of the mid to upper rectum 8 cm above the anal verge with tumor extension beyond the muscularis propria 8 mm anterolaterally. There was also evidence for tumor involvement of the anterior peritoneal reflection (*Figure 1a*), >3 perirectal nodal metastases, and a left anterior pelvis peritoneal nodule suspicious for tumor implant. Thus, the MRI-based local-regional stage was T4N2. A computed tomography-guided fine needle aspiration of the intraperitoneal lesion demonstrated malignant cells consistent with rectal adenocarcinoma. With the diagnosis of metastatic disease, the patient subsequently initiated XELOX (oxaliplatin plus capecitabine) systemic chemotherapy, with no immediate plans for radiation or surgery.

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Figure 1. (a) Axial small field view of T2-weighted fast spin echo MRI demonstrates the peritoneal reflection as a dark curvilinear band on the left invaded by the rectal tumor (arrow). The mesorectal fat is the high-signal-intensity tissue surrounding the rectum laterally and posteriorly. (b) A well-circumscribed peritoneal lesion in the left anterior pelvis concerning for tumor deposit (circle). This is distant from the primary tumor in the rectum (arrow).

DISCUSSION

Adjuvant treatment paradigms for colon and rectal cancer differ significantly despite the fact that the colon and rectum are contiguous sections of the same organ. To understand why, one must appreciate the relative freedom of maneuvering in the abdomen in contrast to the tight anatomical confines of the pelvis where local recurrence is a significant problem related to the challenges associated with oncologic en bloc resection.⁴ Much attention has been focused on the radial/circumferential resection margin for rectal cancer. TME is the surgical solution to this problem, but the Dutch TME rectal trial showed that preoperative short course radiation nonetheless improved local-regional recurrence rates relative to TME alone.⁵ Interestingly, subgroup analysis indicated that this improvement was most significant in tumors 5 to 10 cm from the anal verge and suggested that there was no benefit to neoadjuvant radiation in patients with low or high rectal tumors. Thus, should a distance-based measurement be used to define the “rectum” to aid in the purely practical effort of selecting patients most likely to benefit from adjuvant local therapy? Indeed, the National Comprehensive Cancer Network uses a definition of distal margin of 12 cm or less from the anal verge to define the rectum.^{7–9}

Another suggestion has been to use the location of the peritoneal reflection to distinguish between colon and rectal tumors.¹⁰ The mid to upper rectum is at least partially covered by the peritoneum anteriorly and is laterally dependent on rectal height, whereas the lower rectum and anal canal are completely extraperitoneal.¹¹ Therefore, a tumor in the mid-rectum, such as demonstrated in the case presentation, can grow laterally and posteriorly into the mesorectum but also anteriorly to its serosa (peritoneum). Direct trans-serosal spread of tumors growing through the bowel and into the peritoneal cavity is generally considered to be a major pathway for intraperitoneal dissemination of disease.^{12,13} The result is risk for both “true” or classic pelvic local recurrence following surgery as well as risk for intraperitoneal seeding, the latter similar to what is seen for true colon cancers with serosal involvement. Rates of peritoneal involvement are as high as 27% for mid and upper rectal tumor in some series, with limited risk for low rectal tumors.¹⁴ This rate approaches that seen for stage II

(T3–T4N0) colon cancer of ~30%.¹⁵ As shown in our patient, high-resolution MRI can identify the peritoneal reflection and whether or not it is involved by mid to upper rectal tumors (Figure 1a). MRI is also able to demonstrate synchronous peritoneal seeding distant from the primary lesion (Figure 1b).

Strict anatomical classification of tumors (e.g., “rectum” versus “colon”) facilitates algorithmic clinical decision making but may obscure the risks of disease spread inherent to actual tumor location in the large bowel. The patient in our case clearly had a rectal cancer by accepted definitions and would have been a candidate for neoadjuvant radiation therapy based on the distance of the distal tumor margin to the anal verge but also demonstrated seeding of the peritoneal cavity likely due to anterior growth of the tumor and involvement of the intraperitoneal segment of the rectum. Patients presenting with advanced tumors with peritoneal involvement or circumferential margin involvement may benefit from incorporation of intensive systemic therapy as part of their neoadjuvant course.¹⁶ Much emphasis in the literature has been appropriately placed on the radial spread of rectal cancer and the risk of local recurrence within the pelvis.^{2,17} However, physicians must also appreciate the risk of other, noncanonical patterns of spread, such as intraperitoneal dissemination in patients with rectal cancer. High-resolution MRI for local staging of rectal cancer provides important patient-specific anatomical information.

1. Siegel RL, Miller KD, Ahmedin J. Cancer statistics, 2017. *CA Cancer J Clin.* 2017;67:7–30.
2. Sugarbaker PH. Update on the prevention of local recurrence and peritoneal metastases in patients with colorectal cancer. *World J Gastroenterol.* 2014;20:9286–9291.
3. Swedish Rectal Cancer Trial, Cedermark B, Dahlberg M, et al. Improved survival with preoperative radiotherapy in resectable rectal cancer. *N Engl J Med.* 1997;33:980–987.
4. Quirke P, Durdey P, Dixon MF, et al. Local recurrence of rectal adenocarcinoma due to inadequate surgical resection. Histopathological study of lateral tumor spread and surgical excision. *Lancet.* 1986;2:996–999.
5. Van Gijn W, Marijnen CA, Nagtegaal ID, et al. Preoperative radiotherapy combined with total mesorectal excision for resectable rectal cancer: 12-year follow-up of the multicenter, randomised controlled TME trial. *Lancet Oncol.* 2011;12:575–582.
6. Shepherd NA, Baxter KJ, Love SB. Influence of local peritoneal involvement on pelvic recurrence and prognosis in rectal cancer. *J Clin Pathol.* 1995;48:849–855.

7. Nelson H, Petrelli N, Carlin A, et al. Guidelines 2000 for colon and rectal surgery. *J Natl Cancer Inst.* 2001;93:583–596.
8. National Comprehensive Cancer Network. Rectal Cancer. Version 3.2017. https://www.nccn.org/professionals/physician_gls/pdf/rectal.pdf. Published March 13, 2017. Accessed December 7, 2017.
9. Salerno G, Sinnatamby C, Branagan G, et al. Defining the rectum: surgically, radiologically, and anatomically. *Colorectal Dis.* 2006;8(Suppl 3):5–9.
10. Tepper JE. Reflections in rectosigmoid: retro-peritoneal vs. intra-peritoneal. *Int J Radiat Oncol Biol Phys.* 1988;14:1043–1046.
11. Dujovny N, Quiros RM, Saclarides TJ. Anorectal anatomy and embryology. *Surg Oncol Clin N Am.* 2004;13:277–293.
12. Koppe MJ, Boerman OC, Oyen WJ, et al. Peritoneal carcinomatosis of colorectal origin: incidence and current treatment strategies. *Ann Surg.* 2006;243:212–222.
13. Shepherd NA, Baxter KJ, Love SB. The prognostic importance of peritoneal involvement in colonic cancer: a prospective evaluation. *Gastroenterology.* 1997;112:1096–1102.
14. Mitchard JR, Love SB, Baxter KJ, et al. How important is peritoneal involvement in rectal cancer? A prospective study of 331 cases. *Histopathology.* 2010;57:671–679.
15. Lennon AM, Muclahy HE, Hyland JM, et al. Peritoneal involvement in stage II colon cancer. *Am J Clin Pathol.* 2003;119:108–113.
16. Chau I, Brown G, Cunningham D, et al. Neoadjuvant capecitabine and oxaliplatin followed by synchronous chemoradiation and total mesorectal excision in magnetic resonance imaging–defined poor-risk rectal cancer. *J Clin Oncol.* 2006;24:668–674.
17. Heald RJ, Moran BJ, Ryall RD, et al. Rectal cancer: the Basingstoke experience of total mesorectal excision, 1978–1997. *Arch Surg.* 1998;133:894–899.