Persistent Problems in Colorectal Cancer Reporting

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KEYWORDS

• Colorectal cancer staging • TNM • Prognostic features • Neoadjuvant

Key points

- Failure to distinguish serosal penetration (pT4a) from those confined to subserosal fat is a common problem.
- Lymph node metastases smaller than 0.2 mm in diameter are staged as pN0.
- Tumor deposits are counted and reported; an additional pN1c designation is appropriate if all other lymph nodes are negative.
- Acellular mucin is not used to assign pT or pN stage; tumor regression is assessed only in primary tumor.

ABSTRACT

Tumor stage, as determined by the Tumor, Node, Metastasis (TNM) staging system, is the single most influential factor determining treatment decisions and outcome among patients with colorectal cancer. Several stage-related elements in pathology reports consistently pose diagnostic challenges: recognition of serosal penetration by tumor (ie, pT3 vs pT4a), evaluation of regional lymph nodes, distinction between tumor deposits and effaced lymph nodes, and assessment of tumor stage in the neoadjuvant setting. This article discusses each of these issues in detail and provides practical tips regarding colorectal cancer staging.

OVERVIEW

Colorectal carcinoma is the third most frequent malignancy and second leading cause of cancer-related death in the United States; it is estimated that there were slightly more than 95,000 new colon cancer and 39,000 new rectal cancer cases diagnosed in the United States in 2016.[1] Tumor stage is the most powerful predictor of outcome and influences treatment decisions; lymph node–negative (ie, stage I and II) tumors are generally treated with surgery alone, whereas most patients with regional lymph node or distant metastases (ie, stage III or IV) are offered some form of adjuvant chemotherapy.[2] However, high-risk features (eg, colonic obstruction or perforation through the tumor, tumoral penetration of the serosa, close or positive resection margins, inadequate lymph node sampling, high-grade cytologic features associated with mismatch proficiency, lymphovascular or venous invasion, and perineural invasion) may prompt adjuvant chemotherapy among patients with stage II tumors as well.[3,4]

The Tumor, Node, Metastasis (TNM) staging system was developed by the American Joint Committee on Cancer (AJCC) and the Union for International Cancer Control to provide standardized, data-driven criteria for cancer reporting.

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This classification scheme provides pathologists, clinicians, and radiologists with a common language for uniform reporting and is continually updated as new elements prove to be of prognostic and/or therapeutic importance. The most recent eighth edition of the AJCC Cancer Staging Manual defines criteria for TNM stage assessment, as well as several other clinically relevant parameters.[5] Although the manual enumerates concrete guidelines for cancer staging, it does not detail interpretive issues that arise when assessing colectomy specimens. The purpose of this article is to discuss and illustrate some of the diagnostic challenges pathologists face when applying staging criteria to colorectal cancer specimens, particularly with respect to high-risk features that influence treatment.

ASSIGNING TUMOR STAGE TO LOCALLY ADVANCED CANCERS

DEFINITIONS OF TUMOR STAGE (PT)

The T category of the TNM staging system denotes pathologic tumor stage and describes the deepest point of penetration in the colonic wall, pericolorectal fat, or adjacent structures (**Table 1**). Colorectal carcinomas that do not breach the muscularis mucosae are staged as in situ lesions (pTis), whereas tumors that extend into the submucosa, muscularis propria, or pericolorectal connective tissue are classified as pT1, pT2, or pT3, respectively. The pT4 category is subdivided into pT4a and pT4b to denote penetration of the visceral peritoneum and invasion into noncontiguous organs or structures, respectively. The pT4a subclassification applies only to carcinomas that occur near peritoneal surfaces; it is not relevant to tumors that invade posteriorly in the ascending and descending colon, or rectal cancers below the peritoneal reflection.[5]

DEFINITION OF SEROSAL PENETRATION (PT4A)

The most problematic aspect of pathologic tumor stage assignment is distinction between tumors confined to pericolonic adipose tissue (pT3) and those that penetrate the serosa (pT4a). Detection rates of serosal penetration depend on careful gross examination, meticulous sampling, and a clear understanding of microanatomy (**Box 1**).

Table 1
Summary of pathologic stage classification scheme for colorectal cancer

Definition of primary tumor stage (T)	
pT1	Tumor invades, but limited to, submucosa
pT2	Tumor invades the muscularis propria
pT3	Tumor invades through muscularis propria into pericolorectal soft tissue
pT4	Tumor penetrates visceral peritoneum or invades adjacent organs or structures
pT4a	Tumor penetrates visceral peritoneum, including gross perforation through tumor and continuous invasion of tumor through inflammation to peritoneal surface
pT4b	Tumor directly invades, or is adherent to, other organs or structures
Definition of regional lymph node stage (N)	
pN1	Metastases (tumor spanning $\geq$0.2 mm) in 1–3 regional lymph nodes, or tumor deposits are present when all lymph nodes are negative
pN1a	Metastases in 1 regional lymph node
pN1b	Metastases in 2–3 regional lymph nodes
pN1c	Tumor deposits in pericolic tissues without regional lymph node metastases
pN2	Metastases in 4 or more regional lymph nodes
pN2a	Metastases in 4–6 regional lymph nodes
pN2b	Metastases in 7 or more regional lymph nodes
Definition of distant metastasis (M)	
pM1	Distant metastasis to 1 or more other organs or the peritoneum
pM1a	Metastasis confined to 1 organ without peritoneal metastasis
pM1b	Metastases to more than 1 organ or site without peritoneal metastasis
pM1c	Metastasis to peritoneum alone, or in addition to other organs

Data from Jessup JM, Goldberg RM, Asare EA, et al. Colon and Rectum. In: Amin MB, editor. AJCC Cancer Staging Manual. 8th edition. Chicago (IL): Springer; 2017. 251–74.