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Surgical management of rectal carcinoids: trends and outcomes from the Surveillance, Epidemiology, and End Results database (1988 to 2012)

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Abstract

BACKGROUND: Local excision of small (<10 mm) rectal carcinoids is a standard treatment. Actual patterns of care and outcomes are understudied because of the rarity of this tumor.

METHODS: Surveillance, Epidemiology, and End Results database (1988 to 2012) was interrogated for rectal carcinoid patients. Chi-square testing and Kaplan-Meier survival analysis were used to compare survival outcomes.

RESULTS: Of all, 11,329 patients were identified—9,605 with only localized disease. The majority (77%) underwent local excision only. Full rectal resection was performed more frequently for tumors greater than 10 mm (11.7% to 12.2%) than for tumors less than 10 mm (4.5% to 4.9%, $P < .001$), and for higher T stage (T1: 4.0%, T2: 11.4%, T3/4:30.4%, $P < .001$). Nonoperative management was more common after year 2000 (11.2% to 13.7%) than prior (7.4% to 8.5%, $P < .001$). Cancer-specific survival improved across time periods but did not differ between nonoperative, local excision, or surgical resection.

CONCLUSIONS: Nonexcisional management of small, localized rectal carcinoids is becoming more common and may offer equivalent survival to excision or resection.

Carcinoid tumors arise throughout the gastrointestinal tract and bronchial tree, with an overall age-adjusted incidence of 1.31 to 4.48 per 100,000.[1] These tumors arise from neuroendocrine cell lineage and are identifiable histologically as solid nests of small uniform cells that stain for chromogranin A and/or synaptophysin, and generally have a low mitotic index. They generally have indolent behavior but high-grade variants do arise—characterized by high mitotic rate, necrosis, and poorly differentiated histology. Some carcinoid tumors, particularly those arising from the midgut, can produce substantial quantities of serotonin, leading to a "carcinoid syndrome" of flushing, profuse diarrhea, and eventual right heart failure, if sufficient levels of serotonin reach the systemic circulation.

Carcinoid tumors arising in the rectum form a small but important subgroup of this larger classification. The age-adjusted incidence of rectal carcinoid is .31 to 1.22 per 100,000,[1] making it the most common site for carcinoid occurrence in the hindgut. The incidence of rectal carcinoid appears to be increasing, likely due to increased detection on screening endoscopy.[2] In the great majority of cases, rectal carcinoid tumors remain localized (65% to 90%)

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and only a small percentage develop metastases to regional lymph nodes (2% to 3%) or distant sites (1% to 2%).[1,3] This translates into better long-term outcomes than other sites of carcinoid. Historically, 5-year survival for rectal carcinoid has been 75% to 97%, compared with 51% to 78% for other gastrointestinal sites of disease.[1,3] These data are from the 1990s and earlier but contributed to the recent trend toward managing rectal carcinoids with local excision or close observation alone. These approaches, aided by the development of improved techniques for transanal excision, avoid many of the short- and long-term morbidity risks associated with traditional rectal resection. But they run the risk of leaving residual disease in situ, either at the primary site or in adjacent lymph nodes, which may contribute to worse survival outcomes in the long term.

With the recent release of Surveillance, Epidemiology, and End Results (SEER) data for patients diagnosed between 2008 and 2012, much larger cohorts of rarer tumors are now available for analysis. The aim of this study was therefore to use the updated SEER database to evaluate trends in the demographics, staging, and management of rectal carcinoid, and to examine the associated survival outcomes.

Methods

Individual case data were extracted from the SEER database for patients diagnosed with rectal carcinoid tumor between January 1, 1988 and December 31, 2012. Codes used to identify these patients were a rectal primary site (C20.9) and *International Classification of Diseases for Oncology, 3rd edition* code 8240/3—"carcinoid tumor, malignant".

For the resulting cohort of 11,329 patients, data were extracted for age at diagnosis, gender, race, extent of disease and stage at presentation, size of primary lesion, and surgical procedure for the primary lesion. Data regarding lymphovascular invasion and tumor grade were also extracted but were missing for more than 80% of patients, and hence excluded from further analysis. Tumor-specific and surgical data in the SEER database have been abstracted by trained and audited coding professionals based on information gathered from clinical, radiologic, operative, and pathologic reports. Critical reviews suggest that SEER data accurately reflect surgical cancer management, both when operative resection is undertaken and when it is avoided.[4]

Variables

Age at diagnosis was classified into 3 categories ($\leq$49, 50 to 69, and $\geq$70 years) based on clinically relevant thresholds for decision-making regarding rectal resection. The SEER coding for 3 categories of race—white, black, and other—was used.

The extent of disease at presentation was classified as "local", "regional", or "distant" based on the maximal value from the SEER fields "EOD 10 - extent (1988 to 2003)", "EOD 10 - nodes (1988 to 2003)", "SEER summary stage 1977 (1995 to 2000)", and "Summary stage 2000 (1998+)". Nodal status, derived from SEER fields "derived AJCC N, 7th edition (2010+)", "EOD 10 - nodes (1988 to 2003)", and "CSlymphnodes2004", was used to check the designation of "regional" disease to include only those with lymph node involvement but without distant metastatic disease or only localized disease.

Primary tumor size was collated, where available, from the SEER fields "EOD 10 - size (1988 to 2003)" and "CS tumor size (2004+)". Tumor size was then classified into 4 groups, based on clinically relevant thresholds and previous reports of worse outcomes for tumors 10 to 19 and 20 mm or more in size.[3,5]

T stage was derived from the SEER fields "derived AJCC T, 7th edition (2010+)", "EOD 10 - extent (1988 to 2003)" and "CS extension (2004+)". Where data coding indicated only depth of invasion, the AJCC 7th edition definitions for T stage were applied. Given the small number of patients with T3 or T4 tumors, these categories were combined for analysis.

Data regarding definitive surgical procedure were derived from the SEER fields "RX Summ–Surg Prim Site (1998+)", "site specific surgery (1983 to 1997)", and "RX Summ–Scope Reg LN Sur (2003+)". Patients were classified as having undergone "biopsy only" if their diagnosis was made by needle biopsy but no cancer-directed polypectomy, surgical excision, destruction, or resection was undertaken. Any patient who underwent excisional biopsy, including polypectomy, or any other form of local excision or destruction without traditional rectal resection, was classified as "local excision". Any patient with record of a traditional resection and/or resection of regional lymph nodes, was classified as having undergone "rectal resection".

Univariate analysis by year of diagnosis

Patients were grouped into evenly spaced time periods based on their year of diagnosis, to allow comparisons over time. Data from each period cover several SEER coding changes and changes in field names. As described previously, these were integrated and summary fields used for analysis. Also as described previously, the number of missing data points were analyzed to assess for potential gaps because of unrecognized coding changes and to enable transparent communication of the limitations of the available data.

For each clinical and demographic factor, univariate analysis was undertaken to compare time periods using chi-square analysis. For the end point of surgical procedure, multivariate logistic regression was performed, incorporating all available clinical and pathologic parameters.