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Postoperative surveillance of small appendiceal carcinoid tumors

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Abstract

BACKGROUND: The necessity and frequency of postoperative surveillance for appendiceal carcinoid tumors ≤1 cm are undetermined.

METHODS: A retrospective review was conducted of all patients with appendiceal carcinoid tumors ≤1 cm managed at an academic, tertiary referral center. Clinicopathologic characteristics, treatment, surveillance, recurrence, and survival were assessed and analyzed.

RESULTS: Over a 16-year period, 31 patients met the inclusion criteria. Appendicitis (n = 17) and pelvic mass (n = 5) were the most common presentations. Median tumor diameter was 5 mm (range, 1–10 mm). Two patients had mesoappendiceal involvement. No patients had regional lymph node involvement or distant metastasis. Postoperatively, 14 patients (45%) received follow-up recommendations, including ≥1 of the following: imaging (n = 9), medical oncology referral (n = 7), colonoscopy (n = 5), and laboratory studies (n = 5). There were no recurrences or disease-specific deaths during a median follow-up period of 5 years (range, 0–15 years).

CONCLUSIONS: Appendiceal carcinoids ≤1 cm are unlikely to recur. Therefore, postoperative surveillance may be unnecessary.

Carcinoid tumors are the most common primary neoplasms affecting the appendix, constituting 25% to 40% of all appendiceal malignancies according to the Surveillance, Epidemiology and End Results Program.[1,2] However, the overall incidence remains low, with carcinoid tumors found in as few as .3% to .9% of appendectomy specimens.[1,3] The majority of appendiceal carcinoid tumors are discovered incidentally and are <1 cm in diameter, with metastasis exceedingly rare in tumors of this size.[4,5] As a result, the prognosis is favorable, with 5-year survival rates of 71% for all appendiceal carcinoids and 81% for localized disease, among the best survival rates recorded for carcinoid tumors at any site.[2]

Current surgical management is based on the understanding that tumor size is the best prognostic indicator for appendiceal carcinoid tumors. Consequently, tumors ≤2 cm in diameter and confined to the appendix are typically treated with appendectomy alone, whereas a formal right hemicolectomy is recommended for tumors >2 cm.[6] Lymphovascular invasion, mesoappendiceal involvement, location at the appendiceal base, residual disease, and high

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mitotic indices have been used as indicators for more extensive surgery beyond an appendectomy alone, even in small tumors (<2 cm).[5,7]

The postresection surveillance for appendiceal carcinoid tumors is less clear, and physicians' practice often differs on the necessity, mode, and frequency of follow-up. Therefore, the objective of this study was to review the postresection surveillance regimens of appendiceal carcinoid tumors ≤1 cm used at our institution to determine the appropriate follow-up for this patient population.

Methods

After approval was obtained from the institutional review board, patients were identified retrospectively using an institutional pathology database, and cases were linked to the corresponding medical record. Only tumors ≤1 cm in largest diameter were included in this analysis. Patients who underwent carcinoid resection before presentation at our institution were excluded unless the pathology report from the initial procedure was available within the electronic medical record. In these cases, the pathology report from the initial resection was used for this analysis.

Data extracted from the electronic medical record included the following: patient age, sex, medical and surgical history, clinical presentation, modality of diagnosis, tumor characteristics, treatment method, complications, follow-up surveillance, recurrence, and survival. Characteristics of tumor pathology included tumor location, tumor diameter and depth of invasion, margin status, lymph node or distant metastasis, and immunohistochemistry if performed. Tumor grade and stage were defined on the basis of the American Joint Committee on Cancer criteria.[8] Patients without clinical or pathologic evidence of lymph node involvement were considered to be negative for lymph node metastasis.

The length of follow-up was calculated from the date of initial tissue diagnosis to the most recent encounter within the electronic medical record. The treating surgeon determined the timing and modality of surveillance after carcinoid resection. For patients who died during the study period, the length of survival was determined from the date of initial tissue diagnosis to the date of death.

Data were analyzed using Stata version 12 (StataCorp LP, College Station, TX) and are displayed as medians with overall ranges.

Results

Patient characteristics, surgical indications, and intervention

A total of 50 patients with appendiceal carcinoid who underwent resection between January 1994 and December 2010 were identified. Thirty-one patients had appendiceal carcinoid tumors ≤1 cm and were included in this analysis. All patients were incidentally diagnosed with carcinoid tumors after operative intervention. Appendicitis and a pelvic mass were the most common indications for surgical intervention (Table 1). More than half of the patients underwent simple appendectomy for appendicitis (Table 1), 13 (81%) of which were performed laparoscopically. After initial appendectomy, 2 patients (tumor sizes of 3 and 10 mm, respectively, and located at the appendiceal tip) underwent completion right hemicolectomy.

Fifteen patients (48%) had various pathologies other than appendicitis, necessitating alternative surgical interventions (Table 1). Ten patients (32%) underwent a combination of appendectomy, total abdominal hysterectomy, and/or salpingo-oopherectomy for uterine and/or ovarian pathology, of whom 4 had uterine or ovarian cancer. In addition, 4 patients (13%) underwent laparotomy and total proctocolectomy for ulcerative colitis, and 1 patient with malrotation underwent laparotomy, cecopexy, and appendectomy.

Table 1 Patient, clinical, and tumor characteristics

Characteristic	Value
Patient characteristics	
Age at diagnosis (y)	36 (13–76)
Women	27 (87%)
Clinical characteristics	
Surgical indication	
Appendicitis	17 (55%)
Pelvic mass	5 (16%)
Ulcerative colitis	4 (13%)
Uterine pathology	3 (10%)
Other	2 (6%)
Initial surgical procedure*	
Appendectomy alone	16 (52%)
Appendectomy with gynecologic procedure	10 (32%)
Total proctocolectomy	4 (13%)
Other	1 (3%)
Tumor characteristics	
Carcinoid tumor diameter, mm	5 (1–10)
Mesoappendix invasion	2 (6%)
Tumor depth†	
T1a (tumor ≤1 cm in greatest dimension)	31 (100%)
Regional lymph nodes	
NX (regional lymph nodes cannot be assessed)	24 (77%)
N0 (no regional lymph node metastasis)	7 (23%)
Distant metastasis	
M0 (no distant metastasis)	31 (100%)
Tumor-node-metastasis staging†	
Stage I	31 (100%)

Data are expressed as median (range) or number (percentage). Percentages may not add to 100%, because of rounding.

*See text for details.

†American Joint Committee on Cancer (AJCC) tumor-node-metatstasis (TNM) classification.