

Breast Cancer: Presentation and Intervention in Women With Gastrointestinal Metastasis and Carcinomatosis

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Background: Breast cancer metastatic to the gastrointestinal tract or peritoneum is rare. We reviewed the natural history of ductal and lobular carcinoma in women with breast cancer metastatic to the gastrointestinal tract, peritoneum, or both.

Methods: We performed a retrospective review of all patients (1985–2000) with a pathologic diagnosis of breast cancer metastatic to the gastrointestinal tract or peritoneum. Patients were categorized into three groups: those with gastrointestinal metastasis, carcinomatosis, or both.

Results: Of 73 patients, 23 (32%) had gastrointestinal metastasis only, 32 (44%) had carcinomatosis only, and 18 (25%) had both. The median age at initial breast cancer diagnosis was 55 years. The mean interval between the primary diagnosis and metastatic presentation was 7 years. Sites of gastrointestinal metastases included the esophagus (8%), stomach (28%), small intestine (19%), and colon and rectum (45%). Infiltrating lobular carcinoma represented 34 (64%) of the 53 gastrointestinal metastases. The median overall survival after diagnosis was 28 months. Palliative surgical intervention in 47 patients (64%) did not affect overall survival. Some survival benefit may have accrued to select patients with gastrointestinal metastasis who underwent surgical palliation (44 vs. 9 months). Advanced age at diagnosis and gastric metastases had a negative effect on survival, whereas treatment with systemic chemotherapy or tamoxifen had a positive effect on survival.

Conclusions: Gastrointestinal metastasis occurred more often in patients with invasive lobular carcinoma. Surgical intervention did not significantly extend overall survival but may be considered in a select group of patients.

Key Words: Gastrointestinal metastasis—Carcinomatosis—Breast cancer—Palliative surgery—Survival.

Breast cancer is the most common malignancy affecting women in the United States. One in eight women will be affected in their lifetime.¹ It is estimated that 211,240 new female breast cancer cases and 40,410 female deaths will have occurred in the

United States during 2005.² Common sites of breast cancer metastasis include the lungs, liver, bones, soft tissue, and adrenal glands.^{3,4}

Gastrointestinal (GI) tract metastasis and carcinomatosis from primary breast cancer are rare. One autopsy series reported an occurrence rate of 8% to 35%.^{5–9} The metastatic patterns of lobular and ductal carcinoma have been reported to differ considerably. Most series report a greater propensity for lobular carcinoma to metastasize to the GI tract, gynecological organs, or peritoneum.^{10,11} Most reports in the medical

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literature on the clinical presentation and outcome of patients with GI metastasis, carcinomatosis, or both consist of individual case reports or small series.

This study was undertaken to review the clinical presentation, treatment, and outcome in patients with breast cancer metastatic to the GI tract or peritoneum. We also compared the metastatic patterns of infiltrating lobular carcinoma and infiltrating ductal carcinoma. In addition, we analyzed the factors associated with prolonged survival in this unique group of patients.

PATIENTS AND METHODS

After approval by the Mayo Foundation Institutional Review Board, a retrospective review was conducted of the records of all patients with a pathologic diagnosis of metastatic disease secondary to breast cancer who were treated between 1985 and 2000 at Mayo Clinic (Scottsdale, AZ, or Rochester, MN). Patients with breast cancer metastatic to the GI tract or peritoneum were classified into one of three groups: GI metastasis only (group 1), carcinomatosis only (group 2), or both GI metastasis and carcinomatosis (group 3). GI metastases were defined as one or more subserosal metastases to a hollow viscus, such as the esophagus, stomach, small intestine, colon, or rectum. Clinical data were collected about both the primary breast cancer and the metastases.

A specific histological subtype was not specified in 30% of the initial breast cancer pathologic diagnoses. Pathologic slides from these patients were reviewed and subtyped by a single pathologist with expertise in breast carcinoma. Pathologic criteria for the diagnosis of invasive lobular carcinoma included single-file strands of infiltrating small tumor cells with relatively little nuclear pleomorphism, loosely dispersed throughout the fibrous matrix, with or without the presence of signet-ring cells. Pathologic criteria for diagnosis of invasive ductal carcinoma included tumor cells disposed in tubules, cords, solid cell nests, or aggregate masses with invasion of the surrounding stroma. Original breast cancer presentations were staged according to the 2003 American Joint Committee on Cancer staging system.

Median survival was calculated for the overall study group and for the three subgroups. The calculations were performed by using Kaplan-Meier estimates. Survival time periods were compared for patients who had palliative surgery versus those who did not, and statistical significance was assessed by using Wilcoxon statistics. Several variables were also

tested by Cox multivariate analysis for their effect on survival.

RESULTS

During the 15-year study period, 12,001 patients were diagnosed with metastatic disease secondary to breast cancer. Seventy-three patients were found to have pathologic confirmation of metastatic disease to the GI tract or peritoneum: 23 in group 1 (GI metastases only), 32 in group 2 (carcinomatosis only), and 18 in group 3 (GI metastases and carcinomatosis). The median age at the time of the primary breast cancer diagnosis was 55 years, and 26 patients were diagnosed before age 50 (Table 1). There was no significant difference in age at presentation among the three groups ($P = .14$). Two patients (3%) presented with synchronous bilateral breast cancers, and six patients (8%) had a second, contralateral invasive breast cancer that developed before metastatic presentation. Overall, infiltrating lobular carcinoma in the original breast cancer histology was diagnosed in 44 (54%) tumors (Table 1).

During the same 15-year period, 12,550 women were diagnosed with primary invasive breast cancer: 1,516 (12%) with infiltrating lobular carcinoma, 10,334 (82%) with infiltrating ductal carcinoma, 387 (3%) with mixed infiltrating ductal and lobular carcinoma, and 313 (2%) with other histological subtypes of infiltrating breast carcinoma. Compared with the 12% frequency of infiltrating lobular carcinoma in women with primary breast cancer, the prevalence of infiltrating lobular carcinoma was significantly increased (54%) in women with GI metastasis and carcinomatosis ($P < .001$).

Staging and histological classification of the initial breast cancer in each group are listed in Table 1. Most of the 73 patients initially presented with stage II cancer according to the 2003 American Joint Committee on Cancer staging system: stage I, 14%; stage II, 45%; stage III, 8%; and stage IV, 12%. We were unable to stage 15 patients (21%) because of unknown tumor size, lymph node status, or both.

Treatment at the time of diagnosis reflected the standard therapy for breast cancer in the 1970s and 1980s. Seventy-two of the 73 patients had surgical procedures for 81 invasive breast cancers. Fifty-seven patients (79%) were treated with a modified radical mastectomy. Twenty-two patients (31%) received adjuvant systemic chemotherapy, 23 (32%) received

TABLE 1. Patient demographics and original breast cancer characteristics

Characteristic	Group 1: GI metastasis (n = 23)	Group 2: carcinomatosis (n = 32)	Group 3: GI metastasis and carcinomatosis (n = 18)	Overall (n = 73)
Median age, y	59	53	52	55
< 50 y of age, n (%)	5 (22)	15 (45)	6 (33)	26 (32)
Total no. of invasive breast cancers	24	37	20	81
Bilateral cancer, n (%) ^a	1	5	2	8 (11)
Histological findings, n (%)				
Ductal	9 (38)	16 (43)	7 (35)	32 (40)
Lobular	14 (58)	19 (51)	11 (55)	44 (54)
Mixed	0 (0)	0 (0)	2 (10)	2 (2)
Other	1 (4)	2 (5)	0 (0)	3 (4)
Stage, n (%)				
I	4 (17)	1 (3)	5 (28)	10 (14)
II	8 (35)	19 (59)	6 (33)	33 (45)
III	3 (13)	3 (9)	0 (0)	6 (8)
IV	1 (4)	4 (13)	4 (22)	9 (12)
Unknown	7 (30)	5 (16)	3 (17)	15 (21)

GI, gastrointestinal.

^aIncludes synchronous or metachronous tumors diagnosed before the diagnosis of metastatic disease.**TABLE 2.** Signs and symptoms at the time of metastatic presentation

Sign or symptom	Group 1: GI metastasis	Group 2: carcinomatosis	Group 3: GI metastasis and carcinomatosis	Overall, n (%)
Abdominal pain, RUQ pain, dyspepsia	10	19	7	36 (49)
Bloating, increased girth	2	9	4	15 (21)
Irregular BM, melena, GI hemorrhage	5	7	3	15 (21)
Obstruction	1	9	3	13 (18)
Nausea and vomiting, hematemesis	3	4	4	11 (15)
Early satiety	3	3	3	9 (12)
Dysphagia	5	1	2	8 (11)
Weight loss	3	2	3	8 (11)
Anemia, fatigue	1	2	4	7 (10)
Mass	1	4	0	5 (7)
Other	0	3	2	5 (7)
Asymptomatic	1	1	2	4 (5)

GI, gastrointestinal; RUQ, right upper quadrant; BM, bowel movement.

adjuvant hormonal therapy, and 14 (19%) received postmastectomy irradiation.

The mean interval between the primary diagnosis of breast cancer and GI metastatic presentation was 7 years. Twelve patients (16%) were found to have GI or peritoneal metastatic disease at the time of their breast cancer diagnosis. The clinical presentation of GI or peritoneal metastatic disease varied substantially. Most signs and symptoms were nonspecific. Abdominal pain was the most common symptom, followed by bloating, melena, GI hemorrhage, bowel obstruction, nausea and vomiting, early satiety, dysphagia, weight loss, anemia or fatigue, and palpable

mass (Table 2). Metastatic disease was found in asymptomatic patients (5%) during routine surveillance. GI metastasis or carcinomatosis was the first manifestation of metastatic disease in 32 patients (44%). In this subset of patients, the mean disease-free interval from primary diagnosis to metastatic diagnosis was 8.8 years.

Fifteen patients (21%) presented with metastatic disease masquerading as an alternate disease process (Table 3). Patients with carcinomatosis only (group 2) had a higher incidence of such metastatic disease than the other 2 groups. The most common initial diagnosis was ovarian cancer (five patients). Three

TABLE 3. Presentation, management, and outcome of intra-abdominal metastatic disease

Variable	Group 1: GI metastasis (n = 23)	Group 2: carcinomatosis (n = 32)	Group 3: GI metastasis and carcinomatosis (n = 18)	Overall (n = 73)
Mean interval to diagnosis, y	9	5	7	7
First site of metastatic disease, n (%)	12 (52)	15 (47)	5 (28)	32 (44)
Masquerading presentation, n (%)	3 (13)	10 (31)	2 (11)	15 (21)
Treatment, n (%)				
Systemic chemotherapy	13 (57)	16 (50)	14 (78)	43 (59)
Hormonal therapy	14 (61)	17 (53)	11 (61)	42 (58)
Radiotherapy	4 (17)	1 (3)	1 (6)	6 (8)
Palliative surgery ^a	12 (52)	22 (69)	13 (72)	47 (64)
Multiple operations	0	8 (25)	3 (17)	11 (15)
Mean no. of operations	NA	2	2	2
Survival (mo)				
Median survival	29	17	32	28
Median survival after palliative surgery	44	14	49	28
Median survival with no palliative surgery	9	26	30	26
P value	.1	.6	.7	.3

GI, gastrointestinal; NA, not applicable.

^a Gastrointestinal bypass, resection, or debulking.

patients were assumed to have biliary tract disease, and two patients were assumed to have endometrial cancer. Other initial diagnoses included rectal cancer, gastric cancer, lymphoma, renal failure, and alcoholic cirrhosis (one patient each).

Eight cases (11%) were not diagnosed as metastatic breast cancer until exploratory laparotomy. One patient underwent an abdominal perineal resection for a rectal mass biopsy initially interpreted as rectal adenocarcinoma 2 years after her breast cancer diagnosis. This patient had a 1-year history of breast cancer metastatic to the lung. Two cases were diagnosed at the time of a total abdominal hysterectomy and bilateral salpingo-oophorectomy after the patients presented with vaginal bleeding. Endometrial biopsy samples were interpreted as endometrial cancer 10 and 12 years after their breast cancer diagnoses; neither had prior metastatic disease. A fourth case was diagnosed as metastatic breast cancer at the time of exploratory celiotomy for endoscopic biopsy samples interpreted as gastric adenocarcinoma after a 9-year disease-free interval from the time of the original breast cancer diagnosis.

Two patients presenting with right upper quadrant pain 3 and 6 years after diagnosis were assumed to have cholecystitis on the basis of their sonographical findings. A third patient with assumed choledocholithiasis 12 years after a breast cancer diagnosis presented with right upper quadrant abdominal pain and ultrasonographical and radiographical evidence of a

dilated common bile duct and intrahepatic ducts. All three patients underwent open cholecystectomy, during which metastatic disease was discovered.

Metastatic breast cancer was mentioned in the differential diagnosis of four of the five patients thought to have ovarian cancer. One patient with a disease-free interval of 13 years, who presented with 3 months of abdominal pain, a 20-pound weight loss, and radiographical evidence of a complex cystic ovarian mass, was considered to have ovarian cancer until the total abdominal hysterectomy and bilateral salpingo-oophorectomy pathologic specimens were evaluated.

A total of 53 GI metastases were found in 41 patients with GI metastases (groups 1 and 3). Ten patients (24%) had metastases to two or more GI sites. The distribution by histological findings is listed in Table 4. The most common site of metastasis was the colon or rectum, followed by the stomach, small intestine, or esophagus. GI metastases in patients with invasive lobular carcinoma outnumbered 2-fold those found in patients with invasive ductal carcinoma.

The most common additional sites of metastatic disease were the bone marrow (29 patients; 40%), lung (17 patients; 23%), liver (11 patients; 15%), and ovary (10 patients; 14%). Other sites of metastasis included the uterus (six patients; 8%), skin (four patients; 5%), brain (one patient; 1%), bladder (one patient; 1%), and contralateral breast (one patient;

TABLE 4. Sites and histological findings of gastrointestinal metastases

Histological finding	Site of involvement				Overall, n (%)
	Esophagus	Stomach	Small intestine	Colon and rectum ^a	
GI metastasis (group 1)					
Lobular	2	6	2	8	18 (34)
Ductal	0	4	2	3	9 (17)
Mixed	0	0	0	0	0
Unknown	0	0	0	1	1 (2)
GI metastasis and carcinomatosis (group 3)					
Lobular	2	4	4	6	16 (30)
Ductal	0	1	2	5	8 (15)
Mixed	0	0	0	1	1 (2)
Unknown	0	0	0	0	0
Overall (groups 1 and 3)					
Lobular	4	10	6	14	34 (64)
Ductal	0	5	4	8	17 (32)
Mixed	0	0	0	1	1 (2)
Unknown	0	0	0	1	1 (2)
Total, n (%)	4 (8)	15 (28)	10 (19)	24 (45)	53

GI, gastrointestinal.

^a One patient had a rectal metastasis of ductal origin.

1%). GI metastasis or carcinomatosis was the only known site of metastatic disease in 11 (15%) patients. Nineteen (73%) of 26 patients in the surgical group had metastasis outside the GI tract, compared with 43 (91%) of 47 patients in the nonsurgical group.

After the discovery of GI metastatic disease, most patients were treated with systemic chemotherapy (59%) or hormonal therapy (56%). Very few patients were treated with radiotherapy (8%). Surgical palliation in the form of GI resection, debulking, or GI bypass was performed in 47 patients (64%). Seven patients (10%) had exploratory laparotomy with immediate closure because of widespread disease. The indication for surgical intervention in these patients was primarily for obstructive symptoms or mass effect. Of the patients who underwent surgical palliation, the following operations were performed: 28 GI resections with primary anastomosis, 3 GI resections with ostomy, 8 GI bypasses, 13 diverting ostomies, 10 extensive debulkings of metastatic disease, and 17 bilateral salpingo-oophorectomies.

The overall median survival after diagnosis of GI or peritoneal metastatic disease was 28 months (Fig. 1). The overall subgroup median survival was 29, 17, and 32 months for groups 1, 2, and 3, respectively (Table 3). Twenty-four patients (33%) survived > 30 months and had a median survival of 84 months. Overall, advanced age, gastric metastases, and systemic or hormonal therapy after diagnosis of

metastatic disease had a significant effect on patient survival (Table 5). A 1-year increase in age led to a greater chance of death (odds ratio [OR], 1.03; $P = .02$). Systemic chemotherapy or hormonal therapy was found to have a positive effect on survival (OR, .39; $P = .003$). By GI site, gastric metastases were found to have a negative effect on survival (OR, 2.32; $P = .02$). The following factors did not affect survival significantly: stage at primary diagnosis, adjuvant chemotherapy or radiotherapy at primary diagnosis, interval from primary diagnosis to GI or peritoneal metastatic diagnosis, GI metastasis as the first metastatic recurrence, GI metastasis as the only site of recurrence, or lobular versus ductal histological findings.

With few exceptions, the sample size was too small to allow assessment of the effect of any contributing factors on survival within the subgroup analysis. For patients with GI metastasis only (group 1), hormonal therapy after the diagnosis of metastatic disease was found to have a positive effect on survival, whereas gastric metastasis had a negative effect. For patients with carcinomatosis only (group 2), systemic chemotherapy or hormonal therapy was found to have a positive effect on survival, whereas advanced age had a negative effect (Table 5). There were no significant contributing factors on survival in patients with both GI metastasis and carcinomatosis (group 3).

Overall, surgical palliation had no statistically significant effect on the median length of survival (28

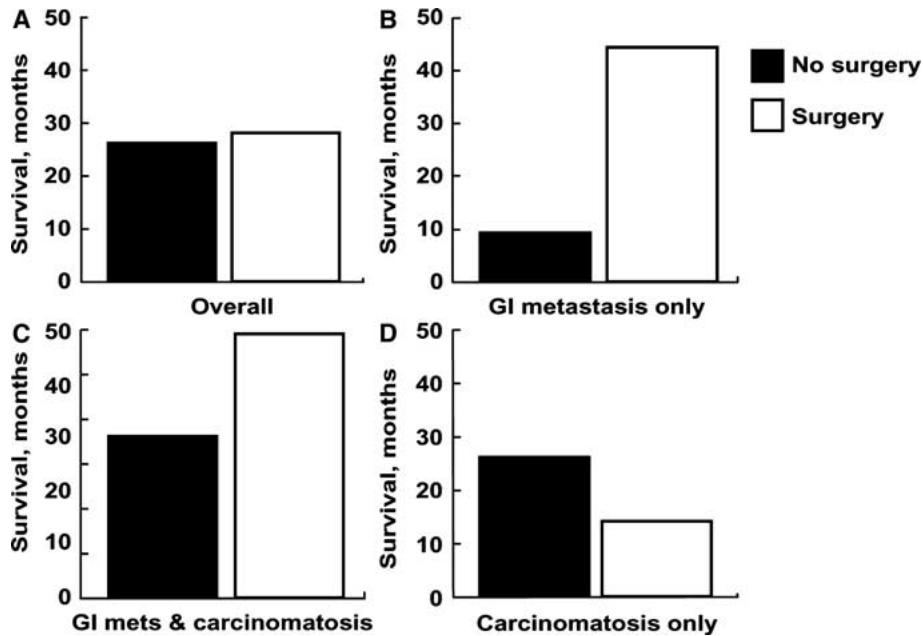


FIG. 1. The length of survival after a diagnosis of metastasis to the gastrointestinal tract or peritoneum was compared for patients who had palliative surgical intervention versus those who did not. Median survival was calculated on the basis of Kaplan-Meier estimates for (A) all patients, (B) patients with gastrointestinal metastasis only, (C) patients with gastrointestinal metastasis and carcinomatosis, and (D) patients with carcinomatosis only. GI, gastrointestinal; mets, metastases.

TABLE 5. Factors that significantly affected survival

Variable	Effect on survival	Odds ratio	P value	95% CI
Overall				
Advanced age at diagnosis	Negative	1.03	.02	1.01–1.05
Treatment with chemotherapy or tamoxifen	Positive	.39	.003	.21–.72
Treatment with chemotherapy	Positive	.44	.004	.25–.77
Gastric site of metastasis	Negative	2.32	.02	1.16–4.61
GI metastasis (group 1)				
Treatment with tamoxifen	Positive	.22	.03	.06–.86
Gastric site of metastasis	Negative	4.62	.01	1.36–15.64
Carcinomatosis (group 2)				
Advanced age at diagnosis	Negative	1.05	.02	1.01–1.09
Treatment with chemotherapy or tamoxifen	Positive	.37	.02	.15–.88
Treatment with chemotherapy	Positive	.35	.01	.16–.76

CI, confidence interval; GI, gastrointestinal.

vs. 26 months; $P = .31$). However, patients with only GI metastasis who underwent palliative surgical intervention tended to have a much more prolonged median survival (44 vs. 9 months; $P = .1$). The difference in median values between the two groups, however, was not great enough to exclude the possibility that the difference was due to random sampling variability or patient selection (Table 3).

DISCUSSION

Most reports reviewing secondary tumors of the GI tract have been autopsy series or single case reports

of rare tumors or unusual presentations.^{12–15} Some studies have analyzed the metastatic patterns of breast carcinoma. However, few reports specify the histological subtype.

A landmark study by Borst and Ingold¹⁰ reporting the metastatic patterns of invasive lobular carcinoma versus invasive ductal carcinoma was published in 1993. The series analyzed 2604 cases of breast cancer with subsequent metastatic disease over an 18-year period. When compared with other breast cancer subtypes, infiltrating lobular carcinoma was found to metastasize more frequently to the GI tract, gynecological organs, peritoneum, retroperitoneum, adrenal glands, or bone marrow. In this large series, only 17

TABLE 6. Published reports of breast cancer metastatic to the gastrointestinal tract or peritoneum^a

Reference	No. of patients	All GI metastases	Site of involvement					Comments
			Esophagus	Stomach	SI	Colon	Peritoneum	
Autopsy series								
Washington and McDonagh ⁵	20	26	1 (3)	6 (27)	9 (35)	10 (38)		Autopsy (14) and clinical reports (6) of GI metastases only; some patients had more than 1 metastasis
Lamovec and Bracko ¹⁹								All sites evaluated
IDC	195	11 (6)		7 (4)		4 (2)	30 (15)	
ILC	25	15 (60)		5 (20)		10 (40)	15 (60)	
Harris et al. ¹¹								All sites evaluated
IDC	76	5 (7)		2 (3)		3 (4) ^b	16 (21) ^c	
ILC	14	10 (73)		6 (43)		4 (29)	13 (93)	
Clinical series								
Taal et al. ¹⁸								All lesions evaluated by endoscopy
IDC	46	46		10 (22)				
ILC				36 (78)				
Winston et al. ²⁰								Abdominal CT evidence of metastasis only
ILC	57	18 (32)		9 (16)	6 (11)	15 (26)	17 (30)	All sites evaluated; data obtained from tumor registry
Borst and Ingold ¹⁰								
IDC	2246	3 (<1)		1 (<1)	2 (<1)	0 (0)	13 (<1) ^b	
ILC	359	13 (3)		3 (1)	8 (2)	3 (1)	11 (3)	
Taal et al. ¹⁶								All lesions evaluated by endoscopy
IDC	16	16				1 (6)		
ILC						15 (94)		

GI, gastrointestinal; SI, small intestine; IDC, infiltrating ductal carcinoma; ILC, infiltrating lobular carcinoma; CT, computed tomography.

^a Values are n (%) unless otherwise indicated.

^b Combined small-intestine and colorectal metastases.

^c Combined peritoneal and retroperitoneal metastases.

patients (<1%) were found to have metastasis to the GI tract; this reflects the rare nature of metastases to this site.

The largest case series in the medical literature that reports GI metastasis secondary to breast cancer was published in 1968 by Asch et al.⁷ This autopsy series reported 52 cases of GI metastasis secondary to breast cancer. The distribution of these metastases was as follows: esophagus (25%), stomach (25%), small intestine (28%), colon (19%), and rectum (4%). There was no mention of the primary histological subtype in this series.

Taal and colleagues^{16,17} from the Netherlands Cancer Institute published reports in 1992 of two series of patients with GI metastasis secondary to breast cancer. The first series presented 27 patients with breast carcinoma metastatic to the stomach.¹⁶ The second series presented 17 patients with colorectal metastases secondary to breast cancer. Both reports noted a greater frequency of primary infiltrating lobular carcinoma (88%) compared with infiltrating ductal carcinoma (74%).¹⁷ Eight years later, these authors published a subsequent report

that expanded the series of breast carcinoma metastatic to the stomach to 51 cases.¹⁸ Infiltrating lobular carcinoma again outnumbered infiltrating ductal carcinoma (72%). These case reports and other well-known articles are listed in Table 6.

The diagnosis of breast cancer metastatic to the GI tract or peritoneum is often difficult because of the relative unlikelihood of an isolated GI metastasis compared with a benign disease process or second primary cancer. In addition, there is often a prolonged disease-free interval before metastatic presentation. Metastatic breast cancer may also masquerade as a GI primary tumor. In one case series, seven women with metastatic breast cancer who were initially thought to have a GI primary cancer were reviewed over a 3-year period at Memorial Sloan-Kettering Cancer Center.¹ Four patients (57%) had histological findings of infiltrating lobular breast cancer. Six patients had gastric lesions, and one had a colonic lesion.

For patients with a history of breast cancer and a new diagnosis of a GI neoplasm, Schwarz and colleagues¹ have recommended making a histopatho-

logical and immunohistochemical comparison between the initial primary breast cancer and the GI neoplasm. Immunohistochemical markers for the estrogen receptor, gross cystic disease fluid protein, and the differential expression of cytokeratin 7 and 20 can facilitate an accurate diagnosis and prompt initiation of appropriate antineoplastic therapy.^{15,21}

The present study from Mayo Clinic is the largest nonautopsy case series of women with breast cancer metastatic to the GI tract and peritoneum in the United States. This study differs from other clinical studies of metastatic breast cancer in that it focused on all sites of GI tract metastases and included an evaluation of patients with carcinomatosis. Forty-one patients with GI metastasis secondary to breast cancer presented with 53 metastatic sites. Ten patients presented with two or more sites of GI metastasis. Most GI metastases were found in the colon and rectum (45%) or stomach (28%).

Favorable prognostic features regarding survival after the diagnosis of metastatic disease were the use of systemic chemotherapy ($P = .004$) and the use of systemic chemotherapy or hormonal therapy ($P = .003$). Poor prognostic features included advanced age and gastric metastatic disease. The finding of advanced age as a poor prognostic factor may be due to the possibility that some patients were not given the option of chemotherapy because of advanced age.

Overall, surgical intervention did not have a significant effect on the median length of survival (28 vs. 26 months). Patients with GI metastasis only who underwent palliative surgical intervention tended to have a more prolonged median survival (44 vs. 9 months). This difference, however, was not statistically significant, and the observed difference in survival may have been due to other factors, such as biased patient selection for palliative surgical intervention. Surgery has a role in palliative care for relief of symptoms and in supportive care of the patient with incurable disease. The decision-making process of whether to treat these patients surgically should be based on the clinical presentation and symptoms, the availability of chemotherapeutic options, and a quality-of-life discussion.²²

One limitation of our study is that it investigated only women who had a pathologic diagnosis of metastatic disease. It is possible that a larger percentage of GI metastasis or carcinomatosis developed in women with breast cancer and that they were diagnosed radiographically rather than with a diagnostic pathologic specimen. This group of patients is somewhat unique, as reflected by their delayed clin-

ical presentation of intra-abdominal metastatic disease (7 years). Most patients presented with vague symptoms. Because of the delayed clinical presentation and vague symptoms, all patients underwent biopsy to confirm the diagnosis. The diagnostic difficulty in these patients is demonstrated by the fact that 21% were thought to have a different disease process, and 11% patients did not receive a diagnosis until they had exploratory laparotomy. The patients who presented with intra-abdominal disease early after their original diagnosis or the patients who had multiple other sites of metastatic disease consistent with a primary breast cancer would probably not be captured in our study. Finally, some GI metastasis, in particular, metastasis to the mid portion of the small intestine, may have been inaccessible endoscopically.

In summary, the diagnosis of GI metastasis or carcinomatosis secondary to breast cancer is rare. Diagnosis is often difficult because of a prolonged disease-free interval before metastatic presentation. Despite the much greater prevalence of infiltrating ductal carcinoma among women with breast cancer, GI metastasis occurred more often in patients with invasive lobular carcinoma than in patients with invasive ductal carcinoma. This finding concurs with those of other series, which have reported a greater prevalence of lobular carcinoma metastatic to the GI tract.

The median overall survival in our patients after a diagnosis of GI metastasis or carcinomatosis was 28 months, which is consistent with the median survival of all women with metastatic disease secondary to breast cancer (range, 24–36 months).²³ Surgical intervention did not significantly extend overall survival and should be considered palliative. Although it was not statistically significant, there was some improved survival for patients with GI metastasis who underwent surgical palliation (44 vs. 9 months).

REFERENCES

1. Schwarz RE, Klimstra DS, Turnbull AD. Metastatic breast cancer masquerading as gastrointestinal primary. *Am J Gastroenterol* 1998;93:111–4.
2. Jemal A, Murray T, Ward E, et al. Cancer statistics, 2005. *CA Cancer J Clin* 2005;55:10–30.
3. Cifuentes N, Pickren JW. Metastases from carcinoma of mammary gland: an autopsy study. *J Surg Oncol* 1979;11:193–205.
4. Saphir O, Parker ML. Metastasis of primary carcinoma of the breast: with special reference to spleen, adrenal glands and ovaries. *Arch Surg* 1941;42:1003–18.

5. Washington K, McDonagh D. Secondary tumors of the gastrointestinal tract: surgical pathologic findings and comparison with autopsy survey. *Mod Pathol* 1995;8:427-33.
6. Abrams HL, Spiro R, Goldstein N. Metastases in carcinoma: analysis of 1000 autopsied cases. *Cancer* 1950;3:74-85.
7. Asch MJ, Wiedel PD, Habif DV. Gastrointestinal metastases from carcinoma of the breast: autopsy study and 18 cases requiring operative intervention. *Arch Surg* 1968;96:840-3.
8. Caramella E, Bruneton JN, Roux P, Aubanel D, Lecomte P. Metastases of the digestive tract: report of 77 cases and review of the literature. *Eur J Radiol* 1983;3:331-8.
9. Hartmann WH, Sherlock P. Gastroduodenal metastases from carcinoma of the breast: an adrenal steroid-induced phenomenon. *Cancer* 1961;14:426-31.
10. Borst MJ, Ingold JA. Metastatic patterns of invasive lobular versus invasive ductal carcinoma of the breast. *Surgery* 1993;114:637-41.
11. Harris M, Howell A, Chrissohou M, Swindell RI, Hudson M, Sellwood RA. A comparison of the metastatic pattern of infiltrating lobular carcinoma and infiltrating duct carcinoma of the breast. *Br J Cancer* 1984;50:23-30.
12. Cormier WJ, Gaffey TA, Welch JM, Welch JS, Edmonson JH. Linitis plastica caused by metastatic lobular carcinoma of the breast. *Mayo Clin Proc* 1980;55:747-53.
13. Davis HL Jr, Murray RK, Korbitz BC. Breast carcinoma metastatic to the stomach: report of a case in a male and review of an autopsy series. *Am J Dig Dis* 1968;13:868-73.
14. Koos L, Field RE. Metastatic carcinoma of breast simulating Crohn's disease. *Int Surg* 1980;65:359-62.
15. Raju U, Ma CK, Shaw A. Signet ring variant of lobular carcinoma of the breast: a clinicopathologic and immunohistochemical study. *Mod Pathol* 1993;6:516-20.
16. Taal BG, Hartog Jager FC, Steinmetz R, Peterse H. The spectrum of gastrointestinal metastases of breast carcinoma: I. Stomach. *Gastrointest Endosc* 1992;38:130-5.
17. Taal BG, den Hartog Jager FC, Steinmetz R, Peterse H. The spectrum of gastrointestinal metastases of breast carcinoma: II. The colon and rectum. *Gastrointest Endosc* 1992;38:136-41.
18. Taal BG, Peterse H, Boot H. Clinical presentation, endoscopic features, and treatment of gastric metastases from breast carcinoma. *Cancer* 2000;89:2214-21.
19. Lamovec J, Bracko M. Metastatic pattern of infiltrating lobular carcinoma of the breast: an autopsy study. *J Surg Oncol* 1991;48:28-33.
20. Winston CB, Hadar O, Teitcher JB, et al. Metastatic lobular carcinoma of the breast: patterns of spread in the chest, abdomen, and pelvis on CT. *AJR Am J Roentgenol* 2000;175:795-800.
21. Tot T. The role of cytokeratins 20 and 7 and estrogen receptor analysis in separation of metastatic lobular carcinoma of the breast and metastatic signet ring cell carcinoma of the gastrointestinal tract. *APMIS* 2000;108:467-72.
22. Easson AM, Asch M, Swallow CJ. Palliative general surgical procedures. *Surg Oncol Clin North Am* 2001;10:161-84.
23. Greenberg PA, Hortobagyi GN, Smith TL, Ziegler LD, Frye DK, Buzdar AU. Long-term follow-up of patients with complete remission following combination chemotherapy for metastatic breast cancer. *J Clin Oncol* 1996;14:2197-205.