

Laparoscopy in the Management of Gastric Adenocarcinoma

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Objective

The authors determined the accuracy of laparoscopy in detecting metastatic disease in patients with gastric adenocarcinoma.

Summary Background Data

The majority of patients with gastric adenocarcinoma in the United States present with advanced disease. They are at high risk for intraabdominal metastatic spread.

Methods

One hundred eleven patients with gastric adenocarcinoma underwent laparoscopy at Memorial-Sloan Kettering Cancer Center from December 1991 to December 1995. All were judged to be free of intra-abdominal metastatic disease on preoperative computed tomographic scan imaging.

Results

Laparoscopic exploration was successful in 110 of 111 patients and accurately staged 94% of the patients with respect to metastatic disease with a sensitivity of 84% and a specificity of 100%. The prevalence rate of metastatic disease was 37%. Twenty-four patients underwent laparoscopy only and were discharged in an average 1.4 days *versus* 6.5 days in patients undergoing exploratory laparotomy without resection ($p < 0.05$). No patients undergoing laparoscopy only have returned for palliative surgery.

Conclusions

Laparoscopy should be performed in nonobstructed, nonbleeding patients with advanced gastric cancer in the United States. More than one third of these patients have unsuspected metastatic disease at time of operation. Laparoscopy is highly accurate in detecting occult metastases and identifies a unique population of stage IV patients who may benefit from newer induction chemotherapeutic approaches while avoiding unnecessary laparotomy.

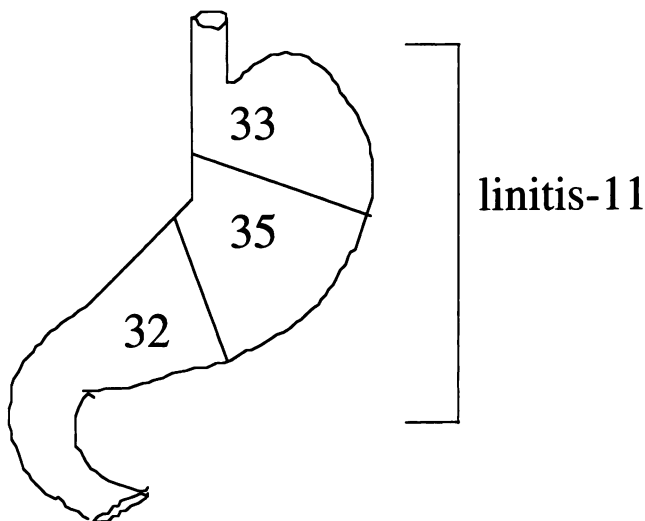


Figure 1. Distribution of primary tumor in patients with gastric cancer undergoing laparoscopy.

The majority of patients presenting with gastric cancer in the United States have advanced disease. These patients are at high risk to have metastatic disease in the abdomen. Although surgical resection provides excellent palliation for the obstructed or hemorrhaging patient, palliative resections do little to advance their survival time. Induction chemotherapy before resection provides an option that deals directly with the issue of survival.¹ Preoperative detection of metastases with current imaging techniques is imperfect, and metastatic disease is first diagnosed at laparotomy in a significant number of patients. Identifying metastatic disease by laparoscopy will better serve this population of patients with advanced gastric cancer. We reviewed our experience of 111 consecutive laparoscopies in patients with gastric adenocarcinoma to determine: 1) the prevalence of unsuspected metastatic disease, 2) the sensitivity, specificity, and accuracy of laparoscopy in detecting these metastases, 3) the number of patients spared open exploration without resection, and 4) the fate of those patients explored but not resected secondary to metastatic disease.

PATIENTS AND METHODS

From December 1990 to December 1995, laparoscopy was attempted in 111 patients with newly diagnosed gastric adenocarcinoma to assess metastatic disease in the

abdominal cavity. This represented 15% of all patients operated on for gastric cancer during this period. Distribution of the cancers is as illustrated (Fig. 1). Demographic data, pathologic data, and follow-up data were entered into a prospective gastric database in the Department of Surgery at Memorial-Sloan Kettering Cancer Center. All were deemed candidates for possible curative resection before surgery on the basis of physical examination, laboratory values, and modern generation computed tomographic imaging of the abdomen and pelvis. Patients undergoing emergent exploration secondary to bleeding, obstruction, or perforation were not laparoscoped. A retrospective review was performed analyzing the results of laparoscopic staging, curative intent, postoperative length of stay, complications, survival status, operative times, and subsequent operation.

A control group of nonemergent patients who underwent exploratory laparotomy only (with or without biopsy) for assessment and possible treatment of gastric adenocarcinoma during this same time interval also was reviewed to compare operative times, length of stay, complications, and survival status. A total of 60 patients in this group were identified from the gastric database.

Laparoscopy was performed with the patient under general anesthesia. Insufflation was performed after placing a Hasson trocar under direct vision in the patient. A 30-degree telescope was used for exploration (Fig. 2). The liver, diaphragm, serosal surfaces, peritoneum, omentum, bowel, mesentery, and pelvic organs were inspected care-

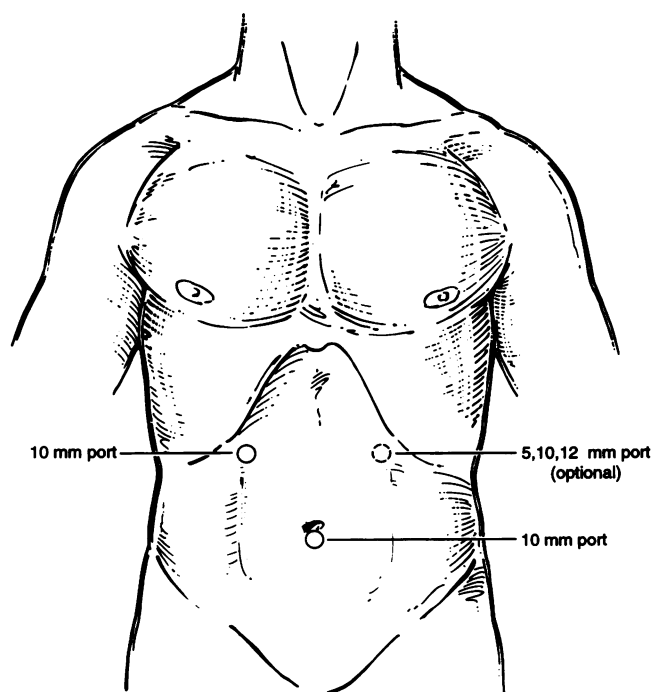


Figure 2. Laparoscopic port placement.

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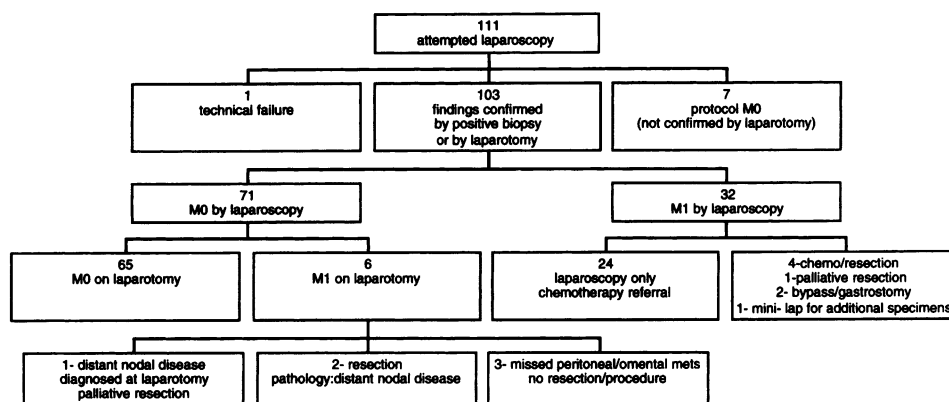


Figure 3. Distribution of patients undergoing laparoscopy.

fully. A second port was placed in the right upper quadrant for palpation, exploration, and biopsy of suspicious lesions. Peritoneal washings also were obtained. Cytologic data were not used in the decision to proceed to open laparotomy and are not included in the analysis. A third port (5, 10, or 12 mm) was placed to more thoroughly evaluate the ligament of Trietz and porta hepatis for N3 disease. During this period, some patients also were examined with laparoscopic ultrasound primarily to stage the primary tumor and examine the liver parenchyma. A biopsy of the metastatic disease tissue was done and documented pathologically by frozen section. Histologic confirmation of metastases or findings at laparotomy were considered definitive. If the patient was asymptomatic, nothing further was done. In symptomatic patients and those without evidence of metastatic disease, open exploration and evaluation for resection was performed.

Statistical analysis of means between groups was calculated using a one-way analysis of variance. Prevalence rate, sensitivity, and specificity were calculated from Bayes' theorem model. Survival curves were generated using the Kaplan–Meier estimate.

RESULTS

One hundred eleven patients underwent laparoscopy for evaluation of their gastric adenocarcinoma. One patient failed laparoscopy secondary to adhesions from prior operation (Cesarean section and umbilical hernia repair). An exploratory laparotomy was performed that showed T4M1 disease, and a gastrojejunostomy was performed for presumed impending gastric outlet obstruction. Laparoscopy was successful technically in the remaining 110 patients. Seven patients with advanced cancers (T3 by endoscopic ultrasound) underwent laparoscopy for staging before induction chemotherapy. No metastases were found on laparoscopy, but because they did not undergo laparotomy for open confirmation of M0 disease, they are

not included in the sensitivity–specificity analysis (Fig. 3).

Laparoscopy accurately staged 94% of the patients for the presence or absence of metastatic disease (Table 1). Thirty-two patients had biopsy-proven metastatic disease diagnosed laparoscopically (Fig. 3). Seventy-one patients had no evidence of metastatic disease laparoscopically. On exploration, this was confirmed in 65. The other six (6%) were false-negatives. Three patients were M1 by virtue of distant nodal disease, documented pathologically postresection. The fourth patient had peritoneal metastases on the undersurface of the transverse mesocolon missed at laparoscopy and was closed. The last two patients had omental or transverse mesocolic metastases with large bulky tumors and were not resected. Overall, laparoscopy had a sensitivity of 84% with a specificity of 100%.

The majority of metastases seen laparoscopically were secondary to peritoneal implants, and a biopsy of these tissues was done easily (Fig. 4). Only three patients had hepatic metastases as their only manifestation of M1 disease. No liver metastases were missed laparoscopically. Laparoscopic ultrasound was not used in the three patients with liver-only metastases. Only four patients had M1 disease secondary to distant nodal disease alone. One of these was diagnosed laparoscopically.

Table 1. ACCURACY OF LAPAROSCOPY IN DETECTING M1 DISEASE IN GASTRIC ADENOCARCINOMA

Outcome	N
True positive	32
True negative	65
False positive	0
False negative	6
Total	103

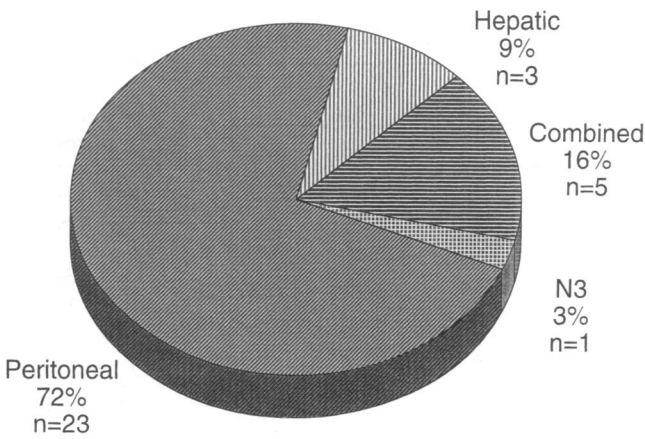


Figure 4. Distribution of intra-abdominal M1 disease by site (M1 disease missed on laparoscopy not included).

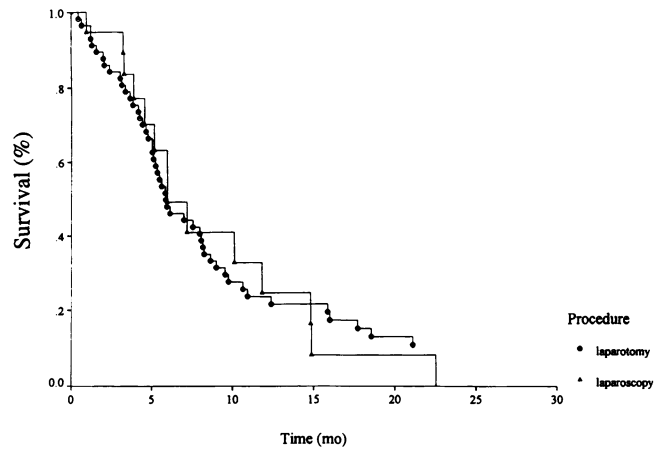


Figure 5. Survival curves for patients undergoing laparoscopy only vs. laparotomy only.

Nine patients had T4M0 disease. All had exploratory laparotomies after laparoscopy. Seven (78%) were deemed resectable on laparoscopic evaluation and subsequently were resected. Two patients were not resected because of concern they would not tolerate the extensive operation necessary to render them free of disease. One of these patients underwent open exploration to confirm the laparoscopic ultrasound findings of extension of the tumor into the pancreatic head. In another, the second patient, the size and extent of the tumor were not appreciated laparoscopically and only were fully evaluable after exploratory laparotomy through a thoracoabdominal incision.

Twenty-four patients underwent laparoscopy only for metastatic disease. Hospital stay was significantly shortened in the laparoscopy group *versus* those patients who had laparoscopy and exploratory laparotomy (for missed M1 or unresectable disease) or exploratory laparotomy only (Table 2). There were fewer complications in the laparoscopy group and operating room time was less, although these numbers did not reach significance.

Eight patients with metastatic disease underwent resection (Fig. 3). Four had immediate resection, two for palliation and two with unsuspected distant nodal (M1) disease.

Four were found to have metastatic disease on initial laparoscopy and received chemotherapy with good response of the primary tumor. They subsequently were relaparoscoped and resected to minimal metastatic disease with intraperitoneal port placement (protocol patients).

After surgery, the majority of patients with unresected M1 disease were dead within 1 year (Fig. 5). Three patients were re-explored at a later date in the control exploratory laparotomy group. One required a gastrectomy for uncontrolled bleeding. A second patient had a feeding tube placement for anorexia. A third patient underwent exploration for a small bowel obstruction. The obstruction could not be released, and the patient expired several days after surgery. None of the 24 patients who underwent laparoscopy only to diagnose M1 disease have required a subsequent laparotomy, and the median survival of this group was 6 months.

DISCUSSION

Laparoscopy has the potential to fulfill two roles in patients with advanced gastric cancer: 1) sparing asymptomatic patients with metastatic disease a laparotomy and

Table 2. LAPAROSCOPY VERSUS EXPLORATORY LAPAROTOMY IN UNRESECTED PATIENTS

Operation	N	Age (yr)	Hospital Stay (days)	Complications (%)	Operative Time (min)
Laparoscopy	24	58 ± 12	1.4 ± 1.4*	1	74 ± 27
Laparoscopy/laparotomy	4	75 ± 7*	6.5 ± 3.8	0	138 ± 66*
Laparotomy	60	60 ± 14	6.8 ± 2.1	8	83 ± 41

* p < 0.05.

Table 3. SUMMARY OF LAPAROSCOPIC STUDIES AND GASTRIC CANCER*

Author	Year	No. of Patients	Preoperative Imaging	Prevalence of M1 Disease (%)	Accuracy (%)	Median Survival (mo)	Subsequent Surgery
Gross	1984	46	NR	NR	NR	NR	NR
Possick	1986	360	US/SCINT	34	89† 96	NR	NR
Kriplani	1991	40	US/CT	13	92	NR	NR
Lowy	1996	71	CT	28	94 33	5	1
Burke	1996	111	CT	37	94	5.5	0

* Studies that only looked at gastric cancer.

† Top, peritoneal metastases; bottom, liver metastases.

NR = not reported.

2) staging patients for preresection multimethod protocols.

The majority of patients in the United States present with advanced gastric adenocarcinoma, and many are first found incurable or unresectable at laparotomy. Preoperative screening methods including modern generation computed tomographic scanning are not sensitive enough to detect the small metastatic intra-abdominal deposits typical of gastric adenocarcinoma. In this study, one third of patients undergoing laparoscopy had metastatic disease, the majority secondary to peritoneal seeding. By performing laparoscopy, a significant number (24%) in this study were spared the morbidity and lengthened hospital stay of that of a full laparotomy. These patients then were referred for chemotherapy, with resection for responders. There were minimal complications, suggesting laparoscopy safely could become a same-day procedure.

Shandall and Johnson,² in a study of 14 patients with gastric cancer, suggested that laparoscopy is of little benefit because most (70%) need resection because of obstruction or dysphagia. Our results do not support this conclusion. A minority (2%) of patients in this study had palliative resections, and a significant number were spared a laparotomy without a subsequent palliative surgical procedure. Similar results were found by Lowy et al.,³ who reported a 1% palliation rate (Table 3). It makes sense both from a patient care and economic viewpoint to have this patient population undergo laparoscopy.

For accurate evaluation of neoadjuvant therapy protocols, it will be imperative to stage patients precisely. Endoscopic ultrasound is current state-of-the-art in clinically evaluating tumor invasion (T-stage) and has proven clinical significance.⁴ Laparoscopic ultrasound is evolving at this time, however, and may prove to be as accurate as endoscopic ultrasound in identifying advanced gastric cancers.^{5,6} In this limited experience, the potential of lapa-

roscopic ultrasound for identifying T4 disease at the pancreatic head was shown.

Identifying occult nodal disease remains difficult with any method. Laparoscopy in this study was weakest in identifying distant nodal disease as the only manifestation of metastatic disease. Three of four were missed at laparoscopy, although only one of three was diagnosed definitively at laparotomy. This is in agreement with Possick et al.,⁷ who reported a 58% efficiency rate for predicting nodal disease by laparoscopy. This may not be unique to laparoscopy. The inability to predict lymph node positivity by inspection and palpation remains a challenge during laparotomy. Lymph node sampling might be an option to increase diagnostic accuracy, especially if preoperative chemotherapy can be shown to make a difference in these patients. We routinely evaluate the para-aortic nodes in the region of the ligament of Trietz and the porta hepatis to rule out obvious distant nodal metastasis. Biopsy can be done to these nodes to confirm the presence of stage IV disease.

Laparoscopy accurately staged 94% of the patients with respect to metastatic disease. These results are supported by previous studies, although only Lowy et al.³ and this study used current generation computed tomographic imaging to screen patients prelaparoscopy (Table 3).⁷⁻⁹ All these studies found laparoscopy to be quite accurate for peritoneal disease, although there was some discrepancy in diagnosing liver metastases. We were able to identify all isolated liver metastases in this study, but this represented only 9% of all patients with M1 disease. These small numbers probably account for the variations in reported results.

This study represents the largest and most complete analysis of laparoscopic staging for gastric cancer in the era of modern generation computed tomographic scanning. Our results support the use of laparoscopy as the standard of care in evaluating patients with advanced gastric cancer. In those found to have M1 disease, this study clearly shows that resec-

tion is not necessary to prevent future complications in the majority of patients. Given the poor results for postoperative adjuvant chemotherapy, the minimally symptomatic patient with occult M1 disease should be offered the potential benefits of preoperative chemotherapy.

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