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The Efficacy of Laparoscopic Staging in Patients with Upper Gastrointestinal Tumors

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BACKGROUND. The major advantage of diagnostic laparoscopy for patients with a gastrointestinal tumor is the prevention of unnecessary explorative laparotomies. However, it is doubtful whether this procedure also prevents late laparotomies that are necessary for palliative treatment during follow-up.

METHODS. From January 1992 to July 1995, 233 consecutive patients with gastrointestinal malignancies underwent laparoscopy and laparoscopic ultrasonography after routine diagnostic procedures had shown potential curative disease.

RESULTS. After diagnostic laparoscopy, laparotomy was not performed in 21% of all patients (47 of 226) because of histologically proven, unresectable, mainly metastatic disease; 6% had esophageal tumors (4 of 64 patients), 43% had liver tumors (10 of 23), 43% had proximal bile duct tumors (9 of 21), 15% had periampullary tumors (17 of 111), and 43% had pancreatic body and tail tumors (3 of 7). Nonoperative palliation was successful in all patients. However, late laparotomies were necessary in 7 of these 47 patients (15%): 5 patients with periampullary tumors and 2 patients with proximal bile duct tumors. All 7 patients underwent a surgical bypass, most due to duodenal obstruction, 1 to 13 months after diagnostic laparoscopy.

CONCLUSIONS. In this study, diagnostic laparoscopy may have prevented unnecessary laparotomies for exploration or palliation in 18% of all patients (40 of 226). The procedure is of doubtful benefit for patients with esophageal tumors because the current findings show that only 6% of explorative laparotomies could be prevented. In patients with periampullary tumors, the initial benefit was 15%, but the risk of a late laparotomy is relatively high (30%). *Cancer* 1997;79:1315–9.

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Curative resection can be performed in a minority of patients with malignancies of the esophagus, liver, bile ducts, and pancreas because many patients have advanced and inoperable disease when diagnosed and palliation is all that can be offered.^{1–4} Extensive noninvasive staging is generally accepted for the prevention of unnecessary laparotomies, especially because nonsurgical palliation methods are now available in most hospitals. Patients with biliary obstruction can be palliated with biliary endoprosthesis and obstruction of the upper digestive tract can be treated with esophageal endoprosthesis.^{5,6}

Despite the technical advances in ultrasonography, spiral computed tomography (CT), magnetic resonance imaging, and other techniques, the diagnosis of small peritoneal deposits, small liver metastases, and local tumor ingrowth is frequently (10–40%) made during explorative laparotomy.^{7–10} Diagnostic laparoscopy has been recom-

mended as an important new staging modality. It is nearly as sensitive as an explorative laparotomy in detecting small peritoneal deposits and when diagnostic laparoscopy is combined with ultrasonography, small liver metastases and local ingrowth can be diagnosed.¹¹⁻²⁰ During diagnostic laparoscopy biopsies can be taken under direct laparoscopic or ultrasound guidance. The procedure-related morbidity and mortality are relatively low.¹⁴

It has been shown that laparoscopic staging prevents explorative laparotomies in 5-64% of patients depending on the type of tumor.¹²⁻¹⁹ However, only the early advantages of laparoscopic staging have been evaluated in most studies. The necessity to undergo later surgical palliative procedures has not yet been studied. In the current study, the long term efficacy of diagnostic laparoscopy and laparoscopic ultrasonography, defined as early minus later laparotomies, was evaluated.

PATIENTS AND METHODS

The records of 233 consecutive patients who underwent diagnostic laparoscopy and laparoscopic ultrasonography between January 1992 and July 1995 for the staging of upper gastrointestinal malignancies were reviewed. Only patients in good general condition who could tolerate a major surgical procedure were included in this staging protocol. Informed consent was obtained before diagnostic laparoscopy was performed.

Preoperative diagnostic and staging procedures were for esophageal tumors ultrasonography combined with Doppler ultrasonography of the neck and abdomen, endoscopic ultrasonography, indirect laryngoscopy and, when indicated, bronchoscopy as well. For hepatopancreatobiliary tumors a transabdominal ultrasound combined with Doppler ultrasound was performed in all cases; patients with obstructive jaundice underwent an endoscopic retrograde cholangiopancreatography with insertion of an endoprosthesis, and CT scans were frequently made in referring hospitals. All patients with liver tumors were staged with CT scans. Fine-needle biopsies of possible metastases were taken under ultrasound or CT guidance. Visceral angiography was performed in a minority of patients to verify vascular involvement if this was suspected after Doppler ultrasound investigation. Pathology proven metastases or total vascular occlusion caused by the tumor were accepted as an exclusion criterion for laparoscopy.

Diagnostic Laparoscopy and Laparoscopic Ultrasonography

Diagnostic laparoscopy was always performed as a separate procedure under general anesthesia. The pro-

cedure has been described previously.¹²⁻¹⁴ Tumors were restaged after laparoscopy and biopsy proven metastases or tumor ingrowth lead to exclusion from further surgical exploration. When ingrowth or vascular involvement was suspected without pathology, tumors were scored as doubtful resectable. All other tumors were scored as resectable. All patients with doubtful resectable or resectable tumors underwent laparotomy, normally between 1-4 weeks after diagnostic laparoscopy.

Palliative Treatment

Patients with an irresectable tumor after laparoscopy were offered treatment when indicated. For patients with esophageal tumors and tumors of the gastric cardia, a tygon tube or Wallstent[®] expandable stent (Schneider [Europe] AG; Bülack, Switzerland) or Song esophageal endoprosthesis (SooHo Medi-Tech Co., Ltd., Seoul, Korea) was placed and obstructive jaundice was treated with a biliary polyethylene (PE) endoprosthesis or Wallstent. All patients were discussed in an multidiscipline oncology meeting and palliative chemotherapy and/or radiotherapy was proposed within ongoing study protocols. This aspect of palliative treatment is beyond the scope of this study and will not be discussed.

Follow-Up

Patients excluded from explorative laparotomy after diagnostic laparoscopy were evaluated in January 1996. Most patients visited the outpatient clinic. When information was not available the patient's general practitioner or referring specialist was contacted. Survival time was measured as months alive after laparoscopy.

The number and indication for late laparotomies, necessary for palliative treatment during follow-up of the patients, was assessed.

The overall efficacy of laparoscopic staging was defined as the number of initially prevented laparotomies minus the number of late laparotomies.

RESULTS

Between January 1992 and July 1995, 233 patients with an upper gastrointestinal tumor underwent laparoscopic staging after conventional staging had not shown any signs of irresectability. Seven patients (3%) were excluded for various reasons (Table 1). No procedure-related mortality occurred. Complications were observed in 5 patients (2%): 2 cases of wound infections, 1 case of pneumonia, 1 case of bile leakage, and 1 case of urinary retention.

After diagnostic laparoscopy 47 of 226 patients (21%) were excluded from further laparotomy because

TABLE 1
Patient Characteristics and Exclusions

GI malignancy	Patients (n = 233)	F:M	Mean age, (yrs) (range)	Excluded	Evaluable (n = 226)
Esophagus/cardia	66	17:49	62 (49–83)	2 ^a	64
Liver	24	12:12	53 (20–77)	1 ^b	23
Proximal bile duct	22	12:10	57 (35–74)	1 ^b	21
Periampullary	114	55:59	62 (37–79)	3 ^c	111
Pancreas body/tail	7	2:5	58 (43–73)	—	7

F: female; M: male.

^a One patient refused further treatment and one patient had contraindications for resection.

^b One patient had an insufficient examination because of adhesions after previous abdominal surgery.

^c Two patients had insufficient examinations because of adhesions after previous abdominal surgery; one patient with a resectable tumor after laparoscopy died of cholangitis before tumor resection.

TABLE 2
Initial and Overall Results of Laparoscopic Staging

Diagnosis	Laparoscopy	Laparotomy avoided	Secondary laparotomy	Overall benefit laparoscopy
Esophagus/cardia	64	4 (6%)	—	4 (6%)
Liver	23	10 (43%)	—	10 (43%)
Proximal bile duct	21	9 (43%)	2 (22%)	7 (33%)
Periampullary	111	17 (15%)	5 (29%)	12 (11%)
Pancreas body/tail	7	3 (43%)	—	3 (43%)
Total	226	43 (19%)	7 (16%)	40 (18%)

of pathology proven metastases. Late laparotomies were performed between 1 and 13 months after diagnostic laparoscopy in 7 of 47 patients (15%). Six of the seven patients had duodenal obstruction and one patient had small bowel obstruction secondary to peritoneal carcinomatosis. The overall efficacy of laparoscopic staging in the long term prevention of unnecessary laparotomies was 40 of 226 patients (18%).

Carcinoma of the Esophagus and Gastric Cardia

In 4 of 64 patients (6%) explorative laparotomy was prevented after laparoscopic staging because of metastases detected during laparoscopy (Table 2). One patient underwent palliative radiotherapy and another patient underwent placement of a Tygon tube after laparoscopy. Two patients did not undergo palliative treatment. The survival times of these 4 patients were 3, 4, 6, and 8 months, respectively, and none was alive at the time of the evaluation. No late laparotomies were performed. Overall efficacy of laparoscopy was 6% (4 of 64 patients).

Carcinoma of the Liver

Explorative laparotomy was not performed after laparoscopic staging in 10 of 23 patients (43%) because

of cirrhosis (2 patients) or proven metastatic disease indicating dissemination in both sides of the liver (5 patients) and/or extrahepatic tumor spread (4 patients) (Table 2). Palliative chemotherapy or radiotherapy was given to six patients. Eight of the 10 patients died 4 to 24 months after laparoscopy; 2 patients were still alive 29 and 39 months, respectively, after laparoscopy. None of the patients required a late laparotomy and the overall efficacy of diagnostic laparoscopy was 43% (10 of 23 patients).

Carcinoma of the Proximal Bile Duct

Explorative laparotomy was not performed in 9 of 21 patients (43%) after laparoscopic staging (Table 2). Four patients had an unresectable gallbladder tumor and five patients had an unresectable proximal bile duct tumor. Palliative radiotherapy was given to two of the nine patients (22%) with unresectable tumors. Two of the 9 patients (22%) required a late laparotomy, 1 patient 4 months after laparoscopy for bowel obstruction caused by peritoneal carcinomatosis and 1 patient 7 months after laparoscopy for duodenal obstruction. The mean survival of the 9 patients with unresectable tumors was 6 months (range, 1–25

months). The overall efficacy of diagnostic laparoscopy was 33%. (7/21 patients)

Periampullary Carcinoma

After laparoscopic staging, explorative laparotomy was avoided in 17 of 111 patients (15%); 16 patients had metastases and 1 patient had tumor ingrowth (Table 2). Palliation was performed with biliary PE endoprotheses. Five patients later underwent placement of a Wallstent after a mean of 4.5 PE stent exchanges because of stent dysfunction or occlusion. Palliative chemotherapy and/or radiotherapy was given to three patients. Follow-up showed a mean survival of 8 months (range, 1–15 months); 2 of the 17 patients were still alive at the time of the evaluation, 6 and 9 months, respectively, after laparoscopy. Five of the 17 patients (29%) underwent a late laparotomy 1 to 13 months after laparoscopy, because of duodenal obstruction. No procedure-related deaths occurred. A gastroenterostomy combined with a hepaticojejunostomy was performed in these patients. Another two patients had signs of duodenal obstruction but a laparotomy was not performed because they were both in an end stage of their disease. The overall efficacy of diagnostic laparoscopy was 11% (12 of 111 patients).

Carcinoma of the Pancreatic Body or Tail

In three of seven patients (43%) explorative laparotomy was prevented by laparoscopic staging because of unresectable metastatic disease (Table 2). These 3 patients survival times of 12, 12, and 13 months, respectively, after laparoscopy. None of the patients received adjuvant palliative therapy. The overall efficacy of diagnostic laparoscopy was 43% (3 of 7 patients).

DISCUSSION

Noninvasive staging plays an important role in the therapeutic approach of gastrointestinal malignancies. Recently, laparoscopy in combination with laparoscopic ultrasonography has been introduced as an additional procedure. The advantage of laparoscopic staging is generally expressed in terms of prevention of unnecessary laparotomies.^{11–19} A variety of results are reported in the literature showing a rate of avoided laparotomies between 5% and 64%, depending on the type of tumor. In this study, the number of initially prevented laparotomies was 21% (range, 6–43%), which is in accordance with the literature.

However, these studies all described, as mentioned, the number of initially prevented laparotomies. None of the studies analyzed the number of laparotomies that had to be performed during follow-up of the patients because of inadequate nonsurgical palliative treatment. In the current study, the need

for later laparotomies in patients in whom an initial laparotomy could be prevented was assessed because it has been suggested that results of prevented laparotomies after laparoscopic staging are too optimistic. Late laparotomies were necessary in 7 of 47 patients (15%). These patients almost all developed duodenal obstruction and underwent a gastroenterostomy. The overall efficacy of laparoscopic staging decreased to 18% (range, 6–43%). Despite the outcome of this study, with a reduction in the number of prevented laparotomies of 3% (7 of 226 patients) during long term follow-up, diagnostic laparoscopy remains an important staging instrument for patients with gastrointestinal malignancies.

However, this study also shows a different beneficial effect of laparoscopic staging for various gastrointestinal tumors. For patients with malignant tumors in the esophagus and gastric cardia, the overall efficacy was only 6%. Diagnostic laparoscopy was only beneficial in tumors of the distal esophagus and the gastric cardia. Therefore, in the study institution, laparoscopy is now only performed in these patients, increasing the efficacy of laparoscopic staging.¹⁰

In patients with liver tumors, the overall efficacy of laparoscopic staging was 43%. This is due to the fact that surgical palliation methods are not frequently indicated. The additional value of laparoscopic staging of liver tumors shown in this study is in accordance with literature, John et al. were even able to prevent unnecessary laparotomies in 64% of their patients with liver tumors.¹⁵ Diagnostic laparoscopy is useful in detecting cirrhosis, metastases in the opposite liver side, and extrahepatic deposits, all contraindications for resection. Although 22% of patients in the current study with proximal bile duct tumors required a laparotomy during follow-up, overall efficacy of laparoscopic staging was high (33%). This can be explained by the fact that laparoscopy and laparoscopic ultrasound can evaluate the liver very accurately and tumor ingrowth in both liver sides can be identified, making resection impossible. Furthermore, the difficult diagnosis of proximal bile duct obstruction can be simplified by laparoscopy with direct view of the hepatoduodenal ligament and differentiation between gallbladder carcinoma and benign strictures due to impacted stones, or primary sclerosing cholangitis. Nevertheless, even after resection of tumors that were thought to be malignant preoperatively and during surgery, the resection specimens revealed benign fibrosing or localized sclerosing lesions in 13.4%.²¹

In a limited number of patients with tumors of the pancreatic body and tail, the overall efficacy was 43%. Secondary symptoms, such as duodenal obstruc-

tion, are not expected in these patients and laparoscopy is useful as a staging procedure.

Patients with periampullary tumors had an average initial benefit of laparoscopic staging (15%), but because of the considerable number of late laparotomies (30%), the overall efficacy diminished to 11%. Late laparotomies were not performed for obstructive jaundice, because this could be relieved by means of PE endoprotheses or Wallstents with a success rate of 97%, but only for ingrowth into the duodenum leading to upper gastrointestinal obstruction.²² According to Lillemoe, as many as 13% of patients with an unresectable pancreatic head tumor will eventually develop duodenal obstruction and subsequently require a gastroenterostomy because nonsurgical methods to relieve duodenal obstruction currently are not available.¹⁰ Recently, the authors evaluated 92 patients who underwent a biliary bypass combined with a prophylactic gastric bypass because of an unresectable pancreatic head carcinoma; 8 patients (9%) developed duodenal obstruction but at the end stage of their disease only 1 of these patients (1%) underwent a second laparotomy because of it.²³ Duodenal obstruction can be especially expected in the relatively long term survivors. Unfortunately, no method is available to identify these patients at the time of diagnostic laparoscopy, except for the fact that patients with metastatic disease have a significant shorter survival time compared with patients with locally advanced disease.²³

Five other patients who did not undergo a later laparotomy had at least four exchanges of their PE stents and eventually underwent placement of a Wallstent. Therefore, the overall efficacy of laparoscopic staging remains doubtful in patients with periampullary tumors and further investigation for the preferable palliative treatment of the individuals is indicated. In addition to the technical and medical aspects of laparoscopic staging, a quality-of-life study in these patients and a cost-effectiveness analysis appear to be valuable in assessing the beneficial effect of laparoscopic staging. These four aspects together should be the subject of further investigation, especially for patients with periampullary tumors.

REFERENCES

- Lehnert T, Otto G, Herfarth C. Therapeutic modalities and prognostic factors for primary and secondary liver tumors. *World J Surg* 1995;19:252-63.
- Allema JH, Reinders ME, Van Gulik TM, Koelmay MJW, van Leeuwen DJ, De Wit Lth, et al. Prognostic factors for survival after pancreaticoduodenectomy for patients with carcinoma of the pancreatic head region. *Cancer* 1995;75:2069-76.
- Mannell A, Becker PJ. Evaluation of the results of esophagectomy for esophageal cancer. *Br J Surg* 1991;78:36-40.
- Helling TS. Carcinoma of the proximal bile duct. *J Am Coll Surg* 1994;178:97-106.
- Daivids PHP, Groen AK, Rauws EAJ, Tytgat GNJ, Huijbregtse K. Randomised trial of self-expanding metal stents versus polyethylene stents for distal malignant biliary obstruction. *Lancet* 1992;340:1488-92.
- Tytgat GNJ, Bartelsman JFWM, Vermeyden JR. Dilatation and endoprosthesis for obstructing esophagogastric carcinoma. *Gastroenterol Endosc Clin North Am* 1992;2:415-32.
- Siewert JR, Sendler A, Dittler HJ, Höfler H. Staging gastrointestinal cancer as precondition for multimodal treatment. *World J Surg* 1995;19:168-77.
- Nghiem HV, Freeny PC. Radiologic staging of pancreatic adenocarcinoma. *Radiol Clin North Am* 1994;32:71-9.
- Reeders JWAJ, Bartelsman JFWM. Radiological diagnosis and preoperative staging of esophageal malignancies. *Endoscopy* 1993;25:10-27.
- Lillemoe KD. Current management of pancreatic carcinoma. *Ann Surg* 1995;221:133-48.
- Warshaw AL, Gu Z, Wittenberg J, Waltman AC. Preoperative staging and assessment of resectability of pancreatic cancer. *Arch Surg* 1990;125:230-3.
- Bemelman WA, Van Delden OM, Van Lanschot JJB, De Wit LTh, Smits NJ, Fockens P, et al. Diagnostic laparoscopy combined with laparoscopic ultrasonography influences reoperative staging of malignancies involving the esophagus. *J Am Coll Surg* 1995;181:421-5.
- Bemelman WA, De Wit LTh, Van Delden OM, Smits NJ, Obertop H, Rauws EAJ, et al. Diagnostic laparoscopy combined with laparoscopic ultrasonography in staging of cancer of the pancreatic head region. *Br J Surg* 1995;82:820-4.
- Gouma DJ, De Wit LTh, Nieveen van Dijkum EJM, Van Delden OM, Bemelman WA, Rauws EAJ, et al. Laparoscopic ultrasonography for staging of GI-malignancy. *Scand J Gastroenterol* 1996;31(Suppl 218):43-9.
- John TG, Greig JD, Crosbie JL, Miles WFA, Garden OJ. Superior staging of liver tumors with laparoscopy and laparoscopic ultrasound. *Ann Surg* 1994;220:711-9.
- John TG, Greig JD, Carter DC, Garden OJ. Carcinoma of the pancreatic head and periampullary region. *Ann Surg* 1995;221:156-64.
- Cuesta MA, Meijer S, Borgstein PJ, Sibinga Mulder L, Sikkenk AC. Laparoscopic ultrasonography for hepatobiliary and pancreatic malignancy. *Br J Surg* 1993;80:1571-4.
- Babineau TJ, Lewis WD, Jenkins RL, Bleday R, Steele GD, Forse RA. Role of staging laparoscopy in the treatment of hepatic malignancy. *Am J Surg* 1994;167:151-5.
- Hünerbein M, Rau B, Schlag PM. Laparoscopy and laparoscopic ultrasound for staging of upper gastrointestinal tumors. *Eur J Surg Oncol* 1995;21:50-5.
- Greene FL. The impact of laparoscopy on clinical cancer staging: a worldwide perspective. *Int Surg* 1994;79:217-20.
- Verbeek PCM, Van Leeuwen DJ, De Wit Lth, Reeders JWAJ, Smits NJ, Bosma A, et al. Benign fibrosing disease at the hepatic confluence mimicking Klatskin tumors. *Surgery* 1992;112:866-71.
- Huibregtse K, Carr-Locke DL, Cremer M, Domschke W, Fockens P, Foerster E, et al. Biliary stent occlusion—a problem solved with self-expandable metal stents? *Endoscopy* 1992;24:391-4.
- Van Wagenveld BA, Coene PPLO, Van Gulik TM, Rauws EAJ, Obertop H, Gouma DJ. Biliary and gastric bypass surgery in the palliation of pancreatic head carcinoma outcome of 126 patients. *Br J Surg* In press.