Original Research Article

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Efficacy of contrast enhanced computed tomography and diagnostic laparoscopy in detecting unsuspected peritoneal metastasis in gastric carcinoma

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ABSTRACT

Background: Gastric cancer remains the second most common cause of death from cancer worldwide. Peritoneal metastasis is the most frequent pattern of disease failure after curative resection of gastric cancer. Detection of these deposits and free cancer cells are necessary for predicting the risk of recurrence and prognostication.

Methods: The study was conducted in Department of Surgery from October 2011 to July 2013. The study was designed as a prospective comparative study. All the patients diagnosed with gastric cancer by upper gastrointestinal endoscopy guided biopsy and not having clinical and / or radiological evidence of distant metastasis were included in the study. All patients underwent contrast enhanced computed tomography pre-operatively to detect metastatic disease or advanced gastric cancer. Subsequently the patients were planned for diagnostic laparoscopy followed by appropriate surgery. Sensitivities of the procedure in detecting peritoneal metastases was calculated and compared.

Results: A total of 35 gastric cancer patients who met the inclusion and exclusion criteria were recruited in the study. The mean age of these patients was 53.5 years. Diagnostic laparoscopy detected 11 cases of metastatic diseases which were not picked up by CECT, which was statistically significant (p <0.05). Diagnostic laparoscopy showed adjacent organ infiltration in 18 patients, 9 of which were also identified on CT scan. Difference in detection of adjacent organ infiltration was not statistically significant. Infiltration of the serosal surface was seen in 31 patients and 9 of them were identified on CECT scan.

Conclusions: Diagnostic laparoscopy is more sensitive and specific than current generation MDCT in detecting peritoneal metastasis and liver surface nodules in cases of gastric cancer. Diagnostic laparoscopy is also more specific in diagnosing the local infiltration into adjacent organs.

Keywords: Carcinoma, Gastric cancer, Peritoneal metastasis, Peritoneal nodules

INTRODUCTION

Gastric cancer remains the second most common cause of death from cancer worldwide. 1.2 Peritoneal metastasis is the most frequent pattern of disease failure after curative resection of gastric cancer. 3.4 Detection of these deposits and free cancer cells are necessary for predicting the risk of recurrence and prognostication. 3.4 While CECT scan remains the most widely used imaging technique for pre-

operative assessment, its sensitivity for detecting the peritoneal metastasis has been found to be low. 5,6

Diagnostic laparoscopy has been found to be effective in detecting this unsuspected peritoneal metastasis and avoid unnecessary laparotomies in recent studies. Hence the study was conducted to compare the efficacy of CECT and diagnostic laparoscopy in detecting unsuspected peritoneal metastasis in gastric carcinoma.

METHODS

The study was conducted in Department of Surgery from October 2011 to July 2013. The study was designed as a prospective comparative study. All the patients diagnosed with gastric cancer by upper gastrointestinal endoscopy guided biopsy and not having clinical and/or radiological evidence of distant metastasis were included in the study. Patients who had gastric lymphoma, sarcoma, clinical and ultrasound evidence of metastatic disease, bleeding gastric carcinoma, malignant perforation and contraindications for laparoscopy were excluded. The study was approved by Ethics Committee of the institute.

All patients underwent Contrast Enhanced Computed Tomography (CECT) pre-operatively to detect metastatic disease or advanced gastric cancer. Image interpretation was done by a radiologist who had no prior knowledge of the endoscopic, surgical or histological diagnosis. Wall thickening of well distended stomach more than 5 mm was considered significant for advanced gastric cancer. Thickening of the bowel loops, increased density of the peritoneal fat, presence of peritoneal nodules were taken as features of peritoneal metastases.

Thickening, increased density, haziness and enhancement of the omentum on CECT were considered suggestive of omental deposits. The groups and the number of lymph nodes enlarged were noted. Nodes more than 1cm along the short arm, rounded with central necrosis with heterogeneous enhancement were considered metastatic.

Subsequently the patients were planned for diagnostic laparoscopy followed by appropriate surgery. Ascitic fluid if present was aspirated and sent for cytology. In the absence of ascites, 200 cc of normal saline was instilled into the peritoneal cavity and aspirated from the pelvis

and bilateral sub diaphragmatic spaces for cytological examination.

Full inspection of the peritoneal cavity was done to evaluate for peritoneal or liver metastases. If no metastatic disease was discovered, then the left lateral lobe of the liver was elevated to expose the entire stomach. The perigastric nodes along the greater and lesser curvature were inspected and biopsied. The tumour was inspected for extra-serosal invasion and infiltration into surrounding structures. If the tumour was located posteriorly as per endoscopy, then the lesser sac was accessed to gain appropriate visualization for tumour extent.

Sample size was estimated for comparing the sensitivities of the procedure in detecting peritoneal metastases. The sample size was estimated as 30 for 5% precision at 95% confidence interval with an expected difference in sensitivity of 48%. All categorical data was presented as frequencies & percentages and analysed with Chi square or Fischer exact test. Sensitivity, specificity along with predictive value and likelihood ratio was calculated to assess the diagnostic power of different procedures. All statistical analysis was carried out at 5% level of significance and p value < 0.05 was considered as significant.

RESULTS

A total of 35 gastric cancer patients who met the inclusion and exclusion criteria were recruited in the study. The mean age of these patients was 53.5 years. Diagnostic laparoscopy detected 11 cases of peritoneal metastatic diseases which were not picked up by CECT, which was statistically significant (p<0.05).

Table 1: Comparison of diagnostic laparoscopy and MDCT in detecting the locally advanced gastric cancer.

	Diagnostic laparoscopy no. (%)	MDCT no. (%)	p-value
Infiltration of serosa	31 (88.57)	9 (25.71)	0.0001
Infiltration into adjacent structures	18 (51.43)	9 (22.86)	0.0134
Mixed	9		

Diagnostic laparoscopy detected liver surface as well as peritoneal nodules in 7 patients, isolated peritoneal nodules in 3 cases and isolated liver nodule in 1 case. The size of these nodules ranged from 2mm to 5mm. The difference in detection of metastatic disease was statistically significant diagnostic laparoscopy showed adjacent organ infiltration in 18 patients, 8 of which were also identified on C T Scan (Table 1). Liver infiltration was seen in 5 patients on diagnostic laparoscopy of which 2 were identified by CT scan.

Mesocolon invasion was seen in 3 patients, none of them were picked up by CECT. Pancreatic infiltration was seen in 10 patients, 6 of them were identified by CECT also. Difference in detection of adjacent organ infiltration was not statistically significant. Infiltration of the serosal surface was seen in 31 patients and 9 of them were identified on CECT scan (Table 1). Malignant cytology was positive for free cancer cells in 80 % of the patients who had peritoneal deposits; two patients had free cancer cells who did not display any macroscopic dissemination.

DISCUSSION

Staging gastric cancer is essential to categorize the patient between palliative or curative group and to assess the outcomes.⁴ Exploratory laparotomy for detecting the metastasis is bound to have complications up to 23 % in unresectable disease in the form of vessel injury, wound infections and so on.⁵ Hence if a curative resection cannot be performed it would be prudent to prevent these complications so that these patients could return for chemotherapy at the earliest.

In the present study laparoscopy proved to be very sensitive in detecting peritoneal metastasis reaching level of 92 % compared to MDCT especially when the size of these metastasis were less than 5mm. Most of the metastasis was diffuse involvement of the peritoneum except in two cases when they were in the form of small nodules in the peritoneum over the left iliac fossa and pelvis. The sensitivity of CT was only 63 % for the same. Possik et al also reported 83% detection rate of staging laparoscopy of peritoneal metastasis and 87 % for liver metastasis as against less sensitive methods like ultrasound, liver scintigraphy and alkaline phosphatase for liver metastasis.⁷ Similarly Gretschel et al showed a sensitivity of staging laparoscopy of 85% for detecting peritoneal metastasis as against 28 % for C T Scan showing that laparoscopy continues to dominate the arena of the peritoneum.⁸ Stell et al. also showed the sensitivity of staging laparoscopy to detect peritoneal metastasis was 96% compared to either C T or ultrasound.9 Sotiropoulos et al showed that 60% of their investigated patients had peritoneal metastasis which did not have any CT correlation. 10

In the Present study out of 35 patients unsuspected peritoneal metastases were detected in 10 patients (28%) and hence curative resection was deferred and palliative procedure was performed. The accuracy of laparoscopic staging has been well documented, but its safety and impact on clinical decision making are less clear. Laparoscopic staging is recommended in gastric cancer, since it causes important changes to the management plan in one-third of cases, and the risks of port site metastasis appear low. In our patients most of them presented with features of gastric outlet obstruction and palliation in the form of gastrojejunostomy was required. In our centre laparoscopic gastrojejunostomy is not a standard practice for these patients hence all the patients even though metastatic underwent laparotomy for palliation.

Peritoneal washing cytology is a simple way of diagnosing free cancer cells in the peritoneum and this is an integral part of the Japanese classification system. In the Present study the peritoneal washings cytology was positive in 80% of the patients with macroscopic peritoneal deposits. Free cancer cells were detected in 2 other patients who did not show any metastasis on diagnostic laparoscopy. It has been shown that the peritoneal washings positive for the cancer cells found to

correlate with the extent of the disease. ¹¹ In the present study no specific cancer stage is included and the staging was done based on CT scan and final staging done by diagnostic laparoscopy. In the Present study no patient had diagnostic laparoscopy associated morbidity or mortality.

The wall thickness of the gastric wall depends on the distension of the stomach. In the present study water was used as the contrast medium and an agent to distend stomach. In our study all the patients had thickness more than 5 mm, with the average 14.9 mm. it showed the sensitivity of almost 100% in detecting gastric cancer. Ishigami et al showed in their study that gastric wall thickness of 1 cm or greater at CT had a sensitivity of 100% but a specificity of less than 50% for detection of malignant or potentially malignant stomach lesions that necessitated further diagnostic evaluation. 12 Adjacent organ infiltration is an important parameter in a set up like ours where the resectability depends on the organ involved. In our institution we perform curative resection for all the tumours T1/T2/T3/T4. The morbidity increases when the involved organs like liver or pancreas are resected, so we refrain from such radical organ resections in the Indian population.

CONCLUSION

Diagnostic laparoscopy is more sensitive and specific than current generation MDCT in detecting peritoneal metastasis and liver surface nodules in cases of gastric cancer. Diagnostic laparoscopy is more specific in diagnosing the local infiltration in the organs and influence on resectability and avoid unnecessary morbidity of laparotomy and return the patients for chemotherapy at the earliest.

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Ethical approval: The study was approved by the

institutional ethics committee

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