

The efficacy of pre-operative laparoscopy in the staging for gastric cancer

Kandasami Palayan

Abstract: The only potential curative therapy for gastric cancer is the resection of both the tumor and the regional lymph nodes at the early stage of the disease. The majority of patients with gastric cancer in Malaysia have an advanced disease at initial diagnosis, and curative surgery is possible in less than 20% of operated cases. Accurate preoperative staging is crucial in determining the most suitable therapy and avoiding unnecessary attempts at curative surgery. While computed tomography remains as the most widely used imaging modality for gastric cancer staging, its ability to detect local invasion, peritoneal and liver metastases is limited. In the recent years laparoscopy has become an important component in the staging algorithm of gastric cancer. The aim of this review is to evaluate the efficacy of routine preoperative laparoscopic staging in the management of gastric cancer, and in particular describe the Malaysian experience.

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Introduction

Gastric cancer continues to remain a major public health burden; it ranks as the second leading cause of cancer-related death worldwide.¹ In Far Eastern countries such as Korea, Japan and China, gastric cancer is the leading cause for cancer deaths. In Peninsular Malaysia gastric cancer is ranked as the 8th commonest cause of cancer deaths in the country.²

Surgical resection offers the only method of achieving a potential cure in gastric cancer. However, for effective curative treatment there must be complete resection of all gross disease with no residual microscopic disease. Surgeries in patients with advanced disease are likely to cause serious morbidities and are considered futile. The majority of patients presenting with gastric cancer in Malaysia have advanced disease. Early symptoms of gastric cancer are often non-specific, are usually ignored or treated with antiulcer therapy. In a report on gastric

cancers in Malaysia, it was noted that more than 80% of patients with gastric cancer present at an advanced stage of the disease at time of diagnosis.³ Curative surgery was possible in less than 20% of operated cases. In a substantial number of patients who were subjected to surgery, not even a palliative procedure was offered and laparotomy was considered unnecessary. Vistre *et al.* in 1988, reported that 25% of patients with gastric cancer underwent unnecessary laparotomy, and 13% to 23% developed complications due to the laparotomy.⁴

In recent years, treatment of gastric cancer has become very refined, with therapies tailored to individual cases.⁵ Treatment options include endoscopic mucosal resections for selected mucosal cancers to aggressive combined chemotherapy and radiotherapy for locally advanced cancers. Accurate preoperative staging is crucial in determining the appropriate treatment option and avoiding inappropriate attempt at curative surgery.

Staging in the past was made on the bases of clinical presentation, laboratory tests and imaging techniques such as trans-abdominal ultrasound and computed tomography (CT) scans. Unfortunately, these imaging modalities are not accurate enough to grade advanced disease. Laparoscopic surgery is widely used in the curative treatment of various gastro-intestinal cancers. Its technical feasibility and oncological efficacy in the management of gastro-intestinal cancers are well accepted. Presently, laparoscopy has become an important component in the staging algorithm of gastric cancer.⁶ The efficacy of routine preoperative laparoscopic staging in the management of gastric cancer, and in particular the Malaysian experience is reviewed in this paper.

Staging of Gastric Cancer

The most commonly used clinical staging system for gastric cancer is the TNM system, by the International Union against Cancer (UICC) and the American Joint Committee on Cancer (AJCC). The TNM system describes the disease burden and provides guidance for devising the most appropriate treatment strategy.

For Correspondence:

Professor Dato' Dr Kandasami Palayan, Department of Surgery, International Medical University, Jalan Rasah, 70300 Seremban, MALAYSIA
No. 126, Jalan Jalil Perkasa 19, Bukit Jalil, 57000 Kuala Lumpur, MALAYSIA
Email: kanda@imu.edu.my

The TNM system relies on the depth of tumour invasion (T), adjacent nodal involvement (N) and distant metastases (M). The 7th edition of the AJCC Cancer Staging Manual is the most recent standard description of the anatomical presence and extent of the disease. According to it the characteristics of 'T' staging are as follows: T1 when tumour invades mucosa or submucosa, T2 when tumour invades muscularis propria, T3 when tumor penetrates subserosal connective tissue without invasion of visceral peritoneum or adjacent structures and T4 when tumor invades serosa (visceral peritoneum) or adjacent structures. The 'N' status is classified as follows: N0 when gastric cancer is contained and lymph is not invaded, N1 when the cancer invades 1-2 regional lymph nodes, N2 when cancer invades 3-6 regional lymph nodes and N3 when cancer invades 7 or more regional lymph nodes. The 'M' status is classified as follows: M0 when there is no distant metastasis, M1 when cancer has invaded organs away from the stomach region.

Methods for gastric cancer staging

Computed tomography (CT) of the chest and abdomen is the most frequently used imaging modality of the gastric cancer staging. Gastric cancers are seen as an intraluminal mass, and invasion of the gastric wall is seen as thickening. Loss of the fat plane between a gastric mass and the adjacent organs is suggestive of tumour invasion of surrounding structures. Lymph nodes are considered to be metastatic if they are greater than 10mm. CT appears useful for diagnosis of locally advanced and metastatic disease. However, CT for staging gastric cancer has major limitations. Its overall accuracy has been reported to range from 51% to 65%.⁷ The detection of small hepatic, non-enlarged lymph node and peritoneal metastases is poor. CT failed to pick up liver metastases in nearly 50% of patients.⁸ Advances in CT technique that include multi-detector row combined with water and air distension can improve the accuracy of preoperative staging of gastric cancer.

Positron emission tomography (PET) is able to identify tumour based on fluorodeoxyglucose (FDG) activity of

cancer cells. FDGPET is valuable for detection of distant metastases in liver, lung and bones. However because of its limited availability and cost, it is not used as first-line diagnostic procedure for gastric cancer staging.

Endo-ultrasound (EUS) combines fiberoptic endoscopic visualisation with internally placed high-frequency ultrasonography. EUS identifies all the layers of gastric wall and disruption of normal ultrasound appearance is interpreted as tumour invasion. EUS is the most useful tool for evaluating depth of tumour invasion with accuracy ranging from 60 to 90%. EUS is also sensitive for detecting enlarged perigastric lymph nodes. The enlarged lymph can be sampled by EUS-guided fine needle aspiration, thus improving accuracy of the evaluation. However, EUS is unable to detect the presence of peritoneal metastases.⁸ The combination of CT with EUS, will improve accuracy of staging of the gastric wall infiltration and lymph status. However, this approach will still be poor in the diagnosis of peritoneal metastases.

Major institutions dealing with gastric cancer rely on a combination of computed tomography (CT), endo-ultrasound (EUS), magnetic resonance imaging (MRI), positron emission tomography (PET), laparoscopy and peritoneal cytology. These investigative approaches provide significant detailed views of the extent of the gastric cancer and its potential spread to adjacent or distant sites. In Malaysia, many of these tools are not routinely used because of limited availability and cost. The most commonly used modality for staging gastric cancer is CT.

Laparoscopy

Laparoscopy allows direct visualization of the primary tumour as well as assessment of the liver and peritoneal cavity. Laparoscopy is especially sensitive for detecting small peritoneal hepatic seedlings not detected by CT scan. It has emerged staging modality that is more sensitive and specific than other available imaging modalities.⁹ Published evidence suggests that preoperative staging laparoscopy may substantially

reduce unnecessary laparotomies in patients with gastric cancer.¹⁰ Based on these considerations, we evaluated the value of preoperative laparoscopic staging for gastric cancer at Hospital Tuanku Ja'afar, a 900 bedded tertiary care facility in Seremban, Malaysia.¹¹ The evaluation was a prospective study comparing conventional CT with laparoscopy for TNM staging of gastric cancer. The final stage was based on the combination of intraoperative surgical assessment and postoperative histopathological reports. A total of 40 patients were studied. The CT used was a 16-slice scanner, and patients were given oral and intravenous contrast. Laparoscopic assessment of the primary tumour in the stomach, adjacent lymph nodes, peritoneum and liver was carried out.

The results demonstrated that with regards to the T staging, sensitivity of laparoscopy for T3 tumours was 90.3% as compared to 58% with CT scan. The sensitivity of laparoscopy detection of lymph nodes was 70%; and CT, 62.5%. The most significant finding in this study was with regards to M staging. No patient was identified to have peritoneal or liver metastases on CT scan. However, laparoscopy detected 7 cases of peritoneal metastases and these patients were spared surgery, and the morbidities associated. Laparoscopy is very sensitive in detecting peritoneal metastases. Possik *et al.* reported sensitivity of 83% in the detection of peritoneal metastasis and 87% in the detection of liver metastasis.¹² McCulloh *et al.* in their study showed that the impact of laparoscopy on clinical decision making was substantial, altering previous management plan in 34% of the cases.¹³ The most important goal of preoperative staging investigations is the detection of distant metastases, in particular peritoneal and liver metastases. In Japan and Korea where incidence of advanced gastric cancer is low, routine preoperative staging laparoscopy may not be very beneficial. By contrast, in Malaysia where the majority of patients present with advanced disease, preoperative laparoscopic assessment will be useful. In this study, we concluded that laparoscopy should be an integral part of preoperative staging of gastric cancer

Conclusion

With increase in therapeutic options for treatment of gastric cancer, pre-therapeutic staging is crucial. Laparoscopy is a reliable, efficient and cost-effective modality for staging gastric cancer. It is more sensitive in detecting hepatic and peritoneal metastases when compared to CT. The use of preoperative staging laparoscopy in the diagnostic algorithm for gastric cancer is safe and effective.

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