Laparoscopic Staging in Gastric Cancer

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Abstract

Staging in any form of cancer has been an integral part in the management of this disease, especially so in gastric cancers. Gastric cancer has a high incidence in the Asian region and comes with a poor prognosis if not detected early. Gastric cancer remains the second leading cause of cancer related deaths in the world. Laparoscopy was introduced more than four decades ago and has been utilized in various surgical fields. Laparoscopy in gastric cancer has revolutionized its management and offers a more comprehensive way of dealing with this dreaded disease. A simple and quick method of staging, laparoscopy detects metastatic disease and can alter the course of treatment. Laparoscopic staging complements other staging modalities like a CT scan. A diagnostic laparoscopy can also avoid unnecessary laparotomy which will increase the morbidity of an ill patient.

Surgery has been the mainstay form of treatment for gastric cancer worldwide. Majority of patients present with an advanced disease in many parts of the world. Surgical resection is dependent on the staging of the disease. It was reported in Malaysia that 82% of patients presented with Stage IV disease [1]. In a substantial number of patients, not even a palliative procedure was offered. Accurate preoperative staging can help reduce the number of unnecessary surgeries and decide other options of treatment.

When surgery is indicated, laparotomy has always represented the traditional technique to ascertain and confirm the resectability of gastric cancer. Preoperative staging is of utmost importance because an exploratory laparotomy not followed by radical surgery due to unresectability or metastatic spread will be followed by considerable morbidity and mortality (13-23% and 10-36% respectively)[2]. Research regarding neoadjuvant protocols for locally advanced cancers is ongoing, which makes accurate staging imperative. Even after modern preoperative imaging screening like CT scan, PET scan, endoscopic ultrasound, many patients are found to have unsuspected, unresectable disease at surgery.

External imaging methods are poor at detecting incurable disease in gastric cancer, because resection is commonly precluded by either direct local invasion or peritoneal metastasis. In regard to the detection of liver metastasis, competing methods such as PET-CT, ultrasound and CT scan have become popular because unlike laparoscopy, they are non invasive techniques. Infiltration of gastric serosa, peritoneum, lymph nodes and liver are valid prognostic factors and they can remarkably modify the survival curves [3]. They represent the difference between a localized neoplasm, surgically resectable and an advanced disease.

The method of diagnostic laparoscopy at our center is standard as in many other centers. We place the patient in a supine position and a 12mm trocar is inserted at the subumblical region under general anaesthesia. A 30 degree, 5mm telescope is inserted into the peritoneal cavity for inspection. Another 5mm trocar is inserted into the left hypochondrial region to assist in lifting the stomach and other organs to assess mobility and if present tumour infiltration.

The liver is also inspected for overt secondaries not seen on CT scan. The peritoneum is inspected for metastasis and if present biopsies are taken. The diaphragm and diaphragmatic pillars specifically for cardiac neoplasms are inspected in order to detect the evidence of micrometastases or carcinomatosis of omentum and peritoneum not detected before. The possible local extent and infiltration of gastric serosa is evaluated by di-
rect vision and instrumental palpation. Usually gastric wall is soft and there is mobility between anterior and posterior wall. Conversely, areas infiltrated by the neoplasm are hard and rigid.

Sliding of the greater curve of the stomach to the left allows for visualization of the celiac lymph nodes and the possible infiltration of the superior margin of the pancreas. The lesser sac can be inspected by dissecting the gastrocolic omentum to detect any posterior infiltration of the tumour. Any ascitic fluid is sent for cytology. A peritoneal wash could also be done for overt malignant cells if gross ascites is not present. A laparoscopic ultrasound of the liver is routinely not done as in many centers as the availability is limited. Open or laparoscopic resection is followed by diagnostic laparoscopy if there are no suspicions of distant metastasis like peritoneal lesions or ascitic fluid which needs cytological confirmation. Laparoscopic staging for early lesions (T1) is routinely followed by laparoscopic resection without a second anaesthesia. In advanced cases of which palliation is decided, either a laparoscopic bypass or an open procedure is done.

Outcome of stage IV cases have been poor in Malaysia as majority of patients present at this stage. Palliative chemotherapy has only improved survival by at least six to nine months. We showed that for metastatic disease, laparoscopy was very sensitive. Possik et al. [4] reported sensitivity of 83% in the detection of peritoneal disease and 87% in the detection of liver metastasis in a series of 360 cases. Gretschel et al. [5] showed the sensitivity for detecting peritoneal metastasis with laparoscopy was 85% as compared to 28% with CT. Gross et al. [6] evaluated 46 consecutive patients with adenocarcinoma of the stomach and among them laparoscopy identified 27 cases of metastatic disease.

Controversy exists as to the value of computed tomography (CT) in preoperative staging of gastric cancer. This is because of its limited ability to identify correctly lymph node metastasis, invasion of adjacent organs or hepatic and peritoneal metastases. CT remains the most widely used imaging modality for preoperative staging but this needs to be reconsidered. More recent literature reports limited ability to identify correct lymph node metastases [7]. In the past few years, spiral or helical CT technology has been developed which has a number of potential advantages over conventional systems. In spiral CT, arterial phase imaging, portal venous phase imaging or combination is now possible. With these potential advantages it is hoped that spiral CT may improve the staging of gastric cancer. Reports from authors have mentioned sensitivities for spiral CT range from 48 to 91%. Most recently Endoscopic Ultrasound has been shown to be more accurate than either CT or operative assessment in detecting lymph node metastasis. One Japanese study reported spiral CT found that the incidence of positive lymph nodes varied with size. This study showed that spiral CT is superior to conventional CT in the detection of nodal metastases.

Preoperative knowledge of adjacent organ invasion is important in planning treatment. Conventional CT was found to be insensitive in evaluating invasion of the colon and mesocolon. Pancreatic invasion is also difficult to assess both at laparotomy and preoperative staging. Reports have described sensitivities for assessment of pancreatic invasion varying from 27 to 95%. CT has always limited value in detecting peritoneal metastases. It can identify obvious gross peritoneal disease, with presence of ascites.

Endoscopic ultrasound has been proven to be a good tool in preoperative staging in gastric cancers. It is being used with high diagnostic yield in loco-regional staging of gastric cancer. Some have considered that the additional information supplied by endoscopic ultrasonography with regards to other imaging techniques may have important implications in the therapeutic management of these patients [8]. The usefulness of endoscopic ultrasound in the loco-regional extension shows a diagnostic precision for stage T varies between 70-90%. There may cases of overstaging due to inflammation, peritumorous necrosis and fibrosis. Errors due to understaging may be due to deep microscopic invasion undetectable by the technique, ultrasound artefacts in relation to air content, mucous or food remains in the stomach. The proportion of malignant lesions detected is high in perigastric tumours located in the lesser curve but lower in other locations. Endoscopic ultrasound also detects small amounts of ascetic fluid invisible to abdominal CT.

Diagnostic laparoscopy is limited in the assessment of solid abdominal organs, retroperitoneal structures and lymphnode metastasis. Laparoscopic Ultrasound has been introduced as an adjunct to diagnostic laparoscopy for staging of tumours of the GI tract. It has been useful for detecting small liver metastases, lymphnode metastases and for the assessment of local extension of
tumours of the stomach. Laparoscopic-US was found to supply relevant clinical information and modify the surgical approach in a significant number of patients. FDG-PET/CT is increasingly used in the preoperative diagnosis of various cancers to determine staging, as well as in the detection of recurrence after curative surgery. PET has shown comparable results to CT. In one study, the detection rate of primary tumour and lymph node metastasis in FDG-PET was significantly higher as the T and N stage increased, while the tumour size was not significantly associated with the detection of lymph node metastasis in PET. The histological subtype had a strong influence on the detection of primary tumour and lymph node metastasis. The evaluation of FDG-PET compared to CT in the diagnostic accuracy of early gastric cancer has not achieved consistent levels of accuracy. Previous reports have shown low detection rates for early gastric cancer in CT with a range of 26-53%. FDG-PET has a low to moderate sensitivity of lymph node metastasis due to its limited resolution. FDG-PET has a 4mm to 5mm resolution but 14.5% of metastatic lymph node in gastric cancer has the largest diameter of less than 3 mm. Another reason for the low sensitivity of FDG-PET is the masking of perigastric lymph node by the FDG uptake of the adjacent primary tumour. FDG-PET has a better diagnostic performance than CT in detecting a primary tumour in early gastric cancer and comparable accuracy of detecting lymph node metastasis.

Nonoperative treatment of advanced gastric cancer is not a novel concept. Patients who have a laparoscopic stage M1 disease and no resection represent a population that is unique. Usually these patients has CT scan stage M0 disease, no significant obstruction or bleeding, and is fit for surgical resection.

Satisfactory palliation and quality of life are the principal objectives in the care of patients with incurable gastric cancer. Good functional performance status and low burden of peritoneum only metastasis were significant indicators of longer survival. Metastasis related complications, such as extrahepatic biliary obstruction are known to be associated with very poor outcome.

The striking feature of the major published reports regarding the value of laparoscopy in staging patients with gastric cancer is the extreme variability of the results. Most data have emerged from centers with a high incidence of advanced gastric cancers. In Japan, where more than 60% of the gastric cancers diagnosed are early tumours, staging laparoscopy remains very rare. By contrast, advanced disease precluding curative surgical resection undetected by preoperative CT has been described. The true added value of laparoscopy can only be unequivocally proven by a prospective randomized controlled trial in patients with tumours presumed to be of stage III and IV on CT criteria, which, if the findings of this study are representative, may be difficult to justify on ethical grounds. It is apparent that the judicious use of laparoscopy can improve the perceived preoperative stage of gastric cancer two-fold when compared with CT alone, and, until the sensitivity and specificity of radiological imaging modalities approach 100%, laparoscopy will continue to provide upper gastrointestinal surgeons with important additional staging information.

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References