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Diagnostic Role of Staging Laparoscopy in the Management of Gastro-Esophageal Junction and Gastric Adenocarcinoma

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ABSTRACT

Objectives: To evaluate the role of staging laparoscopy in the detection of radiological occult peritoneal metastasis in patients with gastro-esophageal junction and gastric adenocarcinoma.

Study Design: Prospective observational study

Place and Duration of Study: Department of Medical Oncology, Jinnah Postgraduate Medical Centre, Karachi, Pakistan from Oct 2019 to Jun 2020.

Methodology: Patients with cancers of gastro-esophageal junction and gastric adenocarcinoma on histopathology specimen obtained by endoscopy were included in the study. Patients with T1 lesions and those who refused or had medical contraindications for laparoscopy were excluded from the study. Staging Laparoscopy was done in patients with no metastatic disease on CT scan. Peritoneal washings for cytology were taken for all patients undergoing staging laparoscopy.

Results: The mean age of study participants was 52.6±13.48 years. There were 67(67.0%) male patients and 33(33.0%) female patients. 23 patients had gastroesophageal junction carcinoma while 77 had gastric adenocarcinoma. 41(41.0%) were positive for metastasis on CT chest/abdomen while no metastasis was detected on imaging in 59(59.0%) patients. So, 59 patients underwent diagnostic laparoscopy, out of which 22(37%) had metastatic disease. Patients had positive peritoneal cytology for malignant cells, 17 had metastasis in peritoneal lesions, 4 patients had lymph node metastasis, and 2 had liver metastasis.

Conclusion: The current study indicated staging laparoscopy (SL) as a safe and accurate modality to detect occult peritoneal metastasis in gastric and gastro-esophageal junction cancer patients.

Keywords: Gastro-esophageal junction and gastric adenocarcinoma, Staging laparoscopy, Peritoneal cytology.

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INTRODUCTION

Gastric carcinoma is the second most common cause of cancer related deaths in the world. It is also the fourth most common cancer, worldwide.[1] It is one of the most common gastrointestinal cancers in Asian countries, especially in Japan. According to GLOBOCAN data from 2018, the incidence rate of gastric carcinoma in Pakistan was 2.4% and the mortality rate was 3.3% among all the cancers.[2]

Approximately 95% carcinomas of the stomach and gastric-esophageal junction (GEJ) are adenocarcinomas. Gastric cancers are classified on the basis of their anatomical location and histology type (diffuse or intestinal). Intestinal type of cancers is often associated with environmental causes including infection with Helicobacter pylori, smoking, high intake of salt and other dietary issues. However, the diffuse type is attributed to genetic abnormalities and mutations.[3]

GEJ cancers can be divided into three types according to the Siewert-Stein classification. The classification is based on the anatomical location of the epicenter of the tumor or the majority of the tumor mass. GEJ adenocarcinomas are usually associated with Gastroesophageal Reflux Disease (GERD).[3,4]

The diagnosis of gastric and GEJ carcinoma is challenging due to its insidious nature. By the time a confirmed diagnosis is made, the cancer is often inoperable.[5,6] Accurate staging of carcinomas is of utmost importance, as it aids in determining the most effective treatment strategy.

However, multiple pre-operative imaging modalities (endoscopic ultrasound, CT scan and PET scan) can effectively identify wall infiltrations and the involvement of lymph nodes, interventions for the detection of peritoneal dissemination still needs to be developed. The presence of intra- peritoneal lesions results in a poor prognosis. Staging laparoscopy is a minimally invasive surgical technique that helps in

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detecting occult peritoneal disease and aids in the collection of peritoneal lavage fluid for cytological analysis and biopsy of peritoneal lesion.[6,7]

Staging Laparoscopy is a procedure that has been extensively used as a diagnostic intervention for patients suffering from an advanced stage of gastric and gastro-esophageal junction carcinoma. It allows for accurate pre-operative staging of gastric cancer.[8] The main objective of staging laparoscopy is to investigate an occult peritoneal disease that cannot be detected through imaging. Through staging laparoscopy, the optimal treatment interventions can be designed for the patient.[9]

A procedure that prevents extensive tissue damage, staging laparoscopy helps to avoid invasive exploratory laparotomy. Staging laparoscopy is indicated before planning a surgery, to evaluate the possibility of peritoneal disease.[10] It enables early detection of peritoneal metastasis by means of direct visualization, which is not possible by means of Computed Tomography (CT) scans or Endoscopic ultrasounds.[10]

However, as of yet the local data from Pakistan on the effectiveness of laparoscopy as a diagnostic tool is limited. In this study, the authors aimed to evaluate the diagnostic role of staging laparoscopy in detecting the occult peritoneal disease in patients with GEJ and gastric cancer.

METHODOLOGY

The prospective observational study was conducted at the Department of Oncology, Jinnah Postgraduate Medical Centre, Karachi, Pakistan between October-2019 to June-2020 for a duration of 9 months. Ethical approval was obtained from the ethical committee with the reference number F.2-81/2019-GENL/45789/JPMC prior to the start of the study.

Inclusion Criteria: Patients with cancers of gastro-esophageal junction and gastric adenocarcinoma on histopathology specimen obtained by endoscopy were included in the study.

Exclusion Criteria: Those who refused for the laparoscopy were excluded from the study.

Informed verbal and written consent were obtained from all patients prior to the data collection. Detailed information on diagnostic laparoscopy was given to participants.

A non-probability convenience sampling technique was applied to enroll participants in the study. Using Select Statistics Sample Size calculator, keeping a confidence interval of 95%, a margin of error to be 4.27%, and the prevalence of gastric carcinoma in Pakistan to be 5%11, a total sample size of 100 was obtained. All participants with confirmed diagnosis of gastro esophageal junction and gastric adenocarcinoma on histopathology specimen obtained by endoscopy were included in the study. CT scan (computed tomography) of chest and abdomen with contrast was done in all patients. PET

Scan was advised but done only in few patients because of non-affordability and longer waiting time. Patients with T1 lesions were excluded from the study.

Patients with negative findings on the chest and abdominal CT were offered diagnostic laparoscopy to look for occult peritoneal metastasis. Peritoneal washings for cytology were taken for all patients undergoing staging laparoscopy. Biopsies were taken from any suspicious peritoneal nodules/lesion, enlarged lymph nodes or any other suspicious lesion found on staging laparoscopy.

Patients with metastatic disease on CT scan, PET scan or staging laparoscopy were offered palliative chemotherapy or supportive care depending on patient's performance status and medical co-morbidities. Patients with stage II or III disease were offered perioperative chemotherapy with FLOT (5-flurouracil, Leucovorin, oxaliplatin, taxotere) and surgery.

A predefined questionnaire was used to collect patient data regarding sociodemographic features including age, gender, ethnicity, eating habits, substance abuse, family history of cancer. Tumor grade, site of tumor, and organ of metastasis were recorded under clinical profile of study participants.

Data was analyzed using Statistical Software for Social Sciences (SPSS version 26). The continuous variables were presented as mean plus SD. Categorical data was represented with frequency and percentage. The results were compiled using tables and graphs.

RESULTS

A total of 100 participants were enrolled in the study during the study period. The mean age of patient was 52.68±13.48 years with an age range of 18-75 years. There were 67(67.0%) male patients and 33(33.0%) female patients. The population was ethnically diverse. The majority of the patients were Urban dwellers. Sociodemographic detail is given in Table-I. Out of the ten patients who presented with

complications, 5 had pyloric obstruction, 2 had massive hematemesis and 3 had perforation. Patients with complications were referred to general surgery for further management. 23 patients had GEJ carcinoma while 77 had gastric adenocarcinoma. Out of the 100 cases, 41(41.0%) were positive for metastasis on CT chest/abdomen. The most frequently detected was hepatic metastasis in twenty out of 41 patients followed by pulmonary metastasis in ten patients (Table-II).

Table-I: Sociodemographic Characteristics of Patients

Variables	n(%)
Gender Male Female	67(67.0%) 33(33.0%)
Residence Urban Rural	88(88.0%) 12(12.0%)
Ethnicity	
Sindhi	26(26.0%)
Urdu	30(30.0%)
Punjabi	14(14.0%)
Pushto	19(19.0%)
Balochi	9(9.0%)
Other	2(2.0%)
Comorbidities	
No known comorbidity	46(46.0%)
Hypertension (HTN)	26(26.0%)
Diabetes Mellitus (DMT2)	12(12.0%)
Ischemic Heart Disease (IHD)	8(8.0%)
Other	8(8.0%)
Occupation	
Employed	55(55.0%)
Unemployed	45(45.0%)
Addiction	
None	55(55.0%)
Smoking	22(22.0%)
Pan	13(13.0%)
Naswar	10(10.0%)
Family History	
Yes	14(14.0%)
No	86(86.0%)
Naswar	10(10.0%)

Metastasis on imaging was not detected on imaging in 59(59.0%) patients. In these patients, staging laparoscopy was performed to look for distant metastasis. Out of the 59 patients who underwent diagnostic laparoscopy, 22 had metastasis. 9(15.2%) patients had metastasis in the peritoneal washings, 17(28.8%) had positive metastasis in peritoneum, 4(6.8%) patients had lymph node metastasis, and 2 patients had in other sites. See figure-1.

DISCUSSION

The treatment plan for the gastric cancers is based on the prompt and accurate evaluation of the tumor extent and stage. In spite of substantial improvement in the preoperative tumor staging owing to the advanced imaging techniques, in many cases, peritoneal disease is only discovered intraoperatively.[11-14]

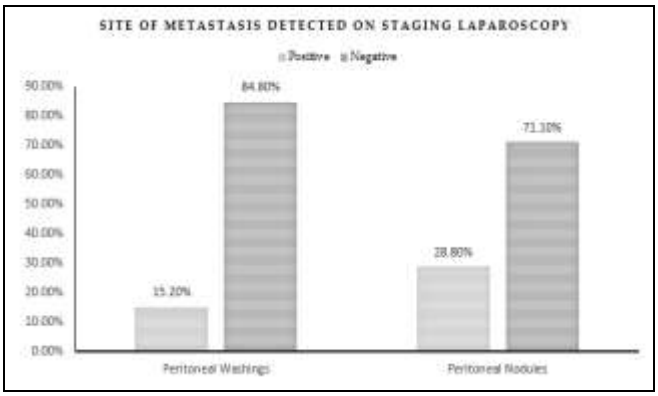

Figure-1: Site of Metastasis detected on Laparoscopy

Table-II: Tumor Characteristics in Study Participants

Clinical Variables	n(%)
Site of Tumor	
Gastroesophageal Carcinoma	23(23.0%)
Gastric	77(77.0%)
Grade	
Grade 1	11(11.0%)
Grade 2	40(40.0%)
Grade 3	49(49.0%)
Stage of Tumor	
II	10(10.0%)
III	29(29.0%)
IV	61(61.0%)
CT Chest and Abdomen	
Positive for Metastasis	41(41.0%)
Negative for Metastasis	59(59.0%)
Site of Metastasis	
Adrenal metastasis	4
Peritoneal carcinomatosis	11
Pulmonary metastasis	10
Staging Laparoscopy	
Positive for Metastasis	22(37.3%)
Negative for Metastasis	37(62.7%)

The current study evaluated the role of staging laparoscopy in patients with gastric and GEJ cancers in our local setting. We performed staging laparoscopy in 59 patients; of these 37.3% patients were positive for peritoneal disease. The current study findings are in accordance with

previous studies.[15-18] Muntean and colleagues reported that out of their 98 patients with gastric carcinoma, 45 patients underwent staging laparoscopy. Out of these, 17(37.8%) had distant

metastases. 15 Conlon *et al.,* reported that 33.7% of patients who underwent SL had previously undiscovered metastasis on imaging.[16] There were 17(28.8%) undetected peritoneal metastasis and in 9(15.2%) patients, cancer spread was detected in peritoneal washings. These findings agreed to other studies including a study by Nakagawa et al., who reported peritoneal masses in 22.6% cases which were discovered on staging laparoscopy.[17]

Staging Laparoscopy (SL) is usually advised for patients exclusively with advanced T4 gastric carcinomas however, other authors recommend SL in patients with≥T2 tumors.[18-19] We performed staging laparoscopy in patients with T2 to T4 gastric carcinomas. Over one-thirds of the patients had unsuspected peritoneal metastasis, which could only have been discovered during the surgery if staging laparoscopy were not performed.

Laparoscopy is a minimally invasive procedure rendering it a safe staging modality.[20] A rare complication of SL is port site metastasis which is more common in patients with advanced stage cancer or in patients with disseminated disease.[21] Patients who undergo SL may develop wound infection and other associated complications. In a study, 389 cancer patients underwent SL, and out of these only about five percent converted to a laparotomy. Laparoscopy related complications were seen in four percent patients.[22] In a retrospective study of 747 patients undergoing a diagnostic laparoscopy, severe complications were found in 11 cases (1.5%), of which 5 were converted to open surgery while one patient with metastatic gastric cancer died of a multiple

organ failure following a laparoscopic tumor biopsy (0.13%).[23] However, in our study no significant morbidity or severe complications were observed. Only mild wound infections were seen in 2 cases which were significantly overshadowed by the ability of SL to detect peritoneal metastasis in study population. Nevertheless, further studies can elaborately explore the safety profile of staging laparoscopy especially in patients with multiple comorbidities.

In short, staging laparoscopy is a safe and highly sensitive procedure which can accurately detect occult peritoneal metastasis in patients with GEJ and gastric carcinoma. This not only avoids unnecessary surgical intervention but also identify patients who would rather benefit more from other therapeutic approaches.

CONCLUSION

Laparoscopy is a safe and effective staging modality in GEJ and gastric adenocarcinoma. In current study, SL resulted in upstaging of disease in a significant number of patients. Therefore, it plays an important role in detecting occult peritoneal metastasis that could be missed by CT scan or PET scan. Hence, it should be done before considering any definitive treatment of gastro-esophageal junction and gastric adenocarcinoma.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AT & GH: Data acquisition, data analysis, critical review, approval of the final version to be published.

BM & TA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

HA & MA: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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