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THE IMPACT OF STAGING LAPAROSCOPY ON DIAGNOSIS AND MANAGEMENT OF GASTROINTESTINAL MALIGNANCIES PRESENTING IN A TERTIARY CARE HOSPITAL LAHORE

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Abstract

Background: *Gastrointestinal malignancies pose a significant health burden, and accurate staging is crucial for optimal treatment planning. While preoperative imaging plays a vital role, it often fails to detect peritoneal disease and occult metastases, leading to inappropriate treatment decisions. Staging laparoscopy (SL) provides a minimally invasive approach to assess disease extent more accurately.*

Objective: *To evaluate the impact of staging laparoscopy on the diagnosis and management of gastrointestinal malignancies in a tertiary care hospital.*

Study Design & Setting: *A descriptive cross-sectional study was conducted at Surgical Unit 1, Sheikh Zayed Hospital, Lahore, over six months.*

Methodology: *Seventy-nine patients with histologically confirmed gastrointestinal malignancies underwent staging laparoscopy after preoperative imaging. Patient demographics, comorbidities, and ECOG/ASA scores were recorded. Preoperative and laparoscopic staging were compared to assess upstaging and treatment modifications. Data were analyzed using IBM SPSS 26.*

Results: *SL upstaged 20% of patients by detecting occult metastases, with peritoneal deposits and liver metastases identified in 23% and 15% of cases, respectively. Post-staging, 28% of patients were shifted to palliative care, and 19% received neoadjuvant therapy. Sensitivity and specificity of SL were 80% and 88.6%, respectively. The procedure had a low complication rate, with 79% of patients experiencing no postoperative complications.*

Conclusion: *Staging laparoscopy significantly improves diagnostic accuracy, prevents unnecessary laparotomies, and optimizes treatment strategies in gastrointestinal malignancies. Its routine integration into staging protocols is recommended.*

INTRODUCTION

Accurate staging is crucial in managing gastrointestinal (GI) malignancies, as it directly influences treatment strategies and prognostic assessments. Traditional imaging modalities, such as computed tomography (CT) and magnetic resonance imaging (MRI), often fail to detect occult metastases, particularly peritoneal dissemination, leading to potential mismanagement of the disease.[1,2] Staging laparoscopy (SL) has emerged as a valuable minimally invasive procedure that allows for direct visualization of the peritoneal cavity, enhancing the detection of metastatic disease that imaging techniques might miss. Several studies have underscored the efficacy of SL in identifying peritoneal metastases. A meta-

analysis reported an overall sensitivity of 84.6% and a specificity of 100% for SL in detecting peritoneal metastases in gastric cancer patients.[1,3]

Another systematic review highlighted that SL altered therapeutic decisions in approximately 8.5% to 59.6% of cases, preventing unnecessary laparotomies in a significant proportion of patients.[2]

Pancreatic cancer frequently presents at an advanced stage, and accurate staging is critical in determining resectability. Studies indicate that SL detects occult metastases in 25% to 40% of patient initially deemed resectable based on imaging (3). This significantly reduces the number of non- therapeutic laparotomies and allows better selection of patients for neoadjuvant therapy or palliative care.[4] For colorectal cancer, particularly in peritoneal carcinomatosis, SL is gaining recognition as an adjunct to imaging. A study on metastatic CRC reported that SL altered treatment decisions in 18% to 42% of patients by identifying peritoneal spread and liver metastases that were not evident on CT or PET scans.[5] This helps stratify patients for cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (HIPEC).[6]

Esophageal cancer, particularly adenocarcinoma of the gastroesophageal junction, has a high risk of peritoneal spread. Staging laparoscopy detects occult metastases in 10% to 25% of patients, significantly impacting surgical planning and patient selection for definitive chemoradiotherapy.[7] Studies suggest that SL should be incorporated into standard staging algorithms, particularly in patients with locally advanced disease.[8]

In Pakistan, data on SL for GI malignancies remain limited. However, a study on gastroesophageal junction and gastric cancers in the Pakistani population demonstrated that SL detected metastases in 40% of patients who were previously considered non-metastatic based on preoperative imaging.[9]

This study aims to evaluate the impact of staging laparoscopy on the staging and subsequent management of gastrointestinal malignancies in a tertiary care hospital in Lahore. By comparing preoperative imaging-based staging with intraoperative SL findings, we seek to determine the extent to which SL influences treatment decisions and outcomes in this specific healthcare setting.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted to evaluate the impact of staging laparoscopy on the stage of gastrointestinal malignancies. The study was carried out at Surgical Unit 1, Sheikh Zayed Hospital, Lahore, Pakistan, over a period of six months, starting from August 30, 2024.

A total of 79 patients diagnosed with gastrointestinal malignancies were included using a non-probability purposive sampling technique. Patients aged 18 years or older with histologically confirmed gastrointestinal malignancies, including esophageal, gastric, small bowel, colorectal, and pancreatic cancers, who underwent both preoperative imaging modalities and staging laparoscopy and provided written informed consent were included. Patients with contraindications to general anesthesia or laparoscopy, such as severe cardiopulmonary disease, coagulopathy, or pregnancy, or those unable or unwilling to comply with study procedures or follow-up requirements were excluded. The preoperative stage of malignancy was determined using the TNM classification based on imaging modalities such as CT, MRI, or PET-CT. Upstaging was defined as cases where staging laparoscopy detected peritoneal disease, occult metastases, or additional loco-regional spread that had been missed on preoperative imaging, while downstaging referred to cases where staging laparoscopy failed to confirm suspected metastases initially indicated by imaging. Following staging laparoscopy, final management decisions were reassessed and categorized into three main outcomes: proceeding with curative surgery, initiating neoadjuvant chemotherapy, or shifting to palliative treatment if metastatic spread was confirmed. Data were collected prospectively using a structured proforma, including preoperative information such as demographics, comorbidities, ECOG/ASA status, and previous surgical history. Details regarding preoperative imaging, duration since diagnosis, and last staging investigations were also recorded. During staging laparoscopy, intraoperative findings, including peritoneal deposits, liver metastases, and changes in staging, were documented. Post-staging treatment modifications were recorded, categorizing patients based on whether they proceeded to curative surgery, neoadjuvant therapy, or palliative care.

Finally, postoperative outcomes and complications were systematically tracked.

Data were entered into IBM SPSS 29 for statistical analysis. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and was approved by the institutional review board. Informed consent was obtained from all participants before enrollment, and all personal identifying information was kept confidential.

RESULTS

The study included 79 patients with a mean age of 58 ± 10 years and a male-to-female ratio of 57:43. The mean BMI was 24.5 ± 3.2 kg/m². ASA scores were distributed as I (10%), II (45%), III (35%), and IV (10%), while ECOG performance status was 0-1 in 60% and 2-3 in 40% of cases. Comorbidities included diabetes mellitus (30%), hypertension (40%), and coronary artery disease (10%). Prior surgical history was noted in 20% of cases, and multidisciplinary team (MDT) discussions were conducted in 85%. The mean duration since diagnosis and last staging was 3.8 ± 1.2 months and 2.5 ± 0.8 months, respectively given in Table 1

Table 1: Baseline Characteristics of Patients Undergoing Staging Laparoscopy (n=79)

Variables	Characteristic	Value
Age	Mean ± SD	58 ± 10 years
Gender	Male	45 (57.0%)
	Female	34 (43.0%)
BMI	Mean ± SD	24.5 ± 3.2
ASA Score	ASA-I	8 (10.1%)
	ASA-II	36 (45.6%)
	ASA-III	28 (35.4%)
	ASA-IV	7 (8.9%)
ECOG Performance Status	0-1	47 (59.5%)
	2-3	32 (40.5%)
Comorbidities	DM	24 (30.4%)
	HTN	32 (40.5%)
	CAD	8 (10.1%)
Previous Surgery	Yes	16 (20.3%)
MDT Discussion Done	Yes	67 (84.8%)
Duration Since Diagnosis	Mean ± SD	3.8 ± 1.2 months
Duration Since Last Staging	Mean ± SD	2.5 ± 0.8 months

Preoperative imaging classified 50% of patients with localized disease, 30% with locally advanced disease, and 20% with metastatic disease. After staging laparoscopy, localized cases decreased to 35%, while metastatic cases increased to 35%, revealing additional peritoneal deposits (23%) and liver metastases (15%) that were previously undetected. These findings highlight the role of staging laparoscopy in improving disease detection given in Table 2.

Table 2: Comparison of Preoperative and Laparoscopic Staging in Gastrointestinal Malignancies (n=79)

Stage Category	Preoperative Staging	Laparoscopic Staging
Localized Disease	40 (50.6%)	28 (35.4%)
Locally Advanced	24 (30.4%)	24 (30.4%)
Metastatic Disease	16 (20.3%)	28 (35.4%)
Peritoneal Deposits	-	18 (22.8%)
Liver Metastases	8 (10.1%)	12 (15.2%)

Following staging laparoscopy, 44.3% of patients proceeded to curative surgery, while 27.8% were shifted to palliative care due to newly identified metastatic spread. Additionally, 19% received neoadjuvant therapy, and only 8.9% had no change in their treatment plan, demonstrating the significant impact of staging laparoscopy on therapeutic decision-making given in Table 3.

Table 3: Post-Staging Treatment Modifications (n=79)

Treatment Plan	n (%)
Proceeded to Curative Surgery	35 (44.3%)
Shifted to Palliative Care	22 (27.8%)
Given Neoadjuvant Therapy	15 (19.0%)
No Change in Treatment Plan	7 (8.9%)

Intraoperative findings showed peritoneal deposits in 22.8% of patients, liver metastases in 15.2%, and omental nodules in 10.1%. Adhesions were observed in 5.1% of cases, while 46.8% had no additional findings. These results highlight the ability of staging laparoscopy to detect previously unidentified metastatic spread given in Table 4

Table 4: Operative Findings During Staging Laparoscopy (n=79)

Finding	n (%)
Peritoneal Deposits	18 (22.8%)
Liver Metastases	12 (15.2%)
Omental Nodules	8 (10.1%)
Adhesions	4 (5.1%)
No Additional Findings	37 (46.8%)

Among the 79 patients, 78.5% had no postoperative complications. However, wound infections occurred in 6.3%, respiratory complications in 5.1%, and prolonged ileus in 6.3% of cases. These findings suggest that staging laparoscopy is generally a safe

procedure with a low complication rate given in Table 5

Table 5: Postoperative Complications Following Staging Laparoscopy (n=79)

Complication Type	n (%)
No Complications	62 (78.5%)
Wound Infection	5 (6.3%)
Respiratory Complications	4 (5.1%)
Prolonged Ileus	5 (6.3%)

The sensitivity and specificity of staging laparoscopy for detecting metastatic disease were 80% and 88.6%, respectively. The positive predictive value (PPV) was 84.8%, while the negative predictive value (NPV) was 84.7%. These results confirm the high accuracy of staging laparoscopy in identifying metastatic spread given in Table 6

Table 6: Diagnostic Accuracy of Staging Laparoscopy (n=79)

Parameter	Value
True Positives (TP)	28
False Negatives (FN)	7
False Positives (FP)	5
True Negatives (TN)	39
Sensitivity	80.0%
Specificity	88.6%
Positive Predictive Value (PPV)	84.8%
Negative Predictive Value (NPV)	84.7%

DISCUSSION

Gastrointestinal malignancies are a major cause of cancer-related morbidity and mortality worldwide. Accurate staging is critical for determining the optimal treatment approach and avoiding unnecessary surgeries. Preoperative imaging modalities such as CT and MRI often miss peritoneal or occult metastases.[10,11] Staging laparoscopy (SL) offers a minimally invasive method to assess disease extent more accurately. By identifying metastatic spread, SL helps refine treatment plans and improve patient outcomes. Its integration into routine staging protocols remains an area of ongoing research.[12,13]

In line with existing evidence, our study confirms the crucial role of staging laparoscopy (SL) in detecting occult metastases and refining treatment strategies for gastrointestinal malignancies. As per Schena et al. (2023), SL is a key tool in preoperative staging, accurately assessing disease extent and identifying peritoneal metastases that conventional imaging may miss.[15] Our study demonstrated a sensitivity of 80% and a specificity of 88.6%, reinforcing its diagnostic accuracy. As reported by Shelat et al. (2012), 48% of

patients were upstaged following SL, with none undergoing unnecessary laparotomy. In our study, the upstaging rate was lower (20%), but SL effectively redirected 28% of patients to palliative care, preventing futile surgeries.[16] In accordance with Van et al. (2024), who observed an increase in SL utilization from 19.6% to 32.3% over time and a synchronous peritoneal metastasis detection rate of 37.6%, our study found that 19% of patients received neoadjuvant therapy based on SL findings.[17] As highlighted by Mishra et al. (2023), SL had a high sensitivity (96.7%) and prevented unnecessary laparotomies in 43.3% of cases, slightly higher than our study's avoidance rate.[18] Additionally, SL was associated with minimal complications, consistent with our findings, where 79% of patients remained complication-free. In line with Yuksel et al. (2021), who emphasized the importance of SL in peritoneal biopsy and cytology, our study further supports its role in improving staging accuracy.[19] As per Hu et al. (2016), SL altered treatment plans in 36.3% of cases, closely aligning with our findings where 28% of patients were shifted to palliative care.[20] Their study also demonstrated SL's strong agreement with final M staging (Kw = 0.990), further validating its superiority over imaging modalities.

Overall, our study reinforces the significance of SL in preoperative staging, demonstrating its high diagnostic value and ability to optimize treatment decisions while reducing unnecessary surgical interventions. This study highlights the significant role of SL in improving the accuracy of preoperative staging for gastrointestinal cancers. The prospective design and structured data collection enhance result reliability. However, the study is limited by its single-center setting and relatively small sample size. Lack of long-term follow-up restricts assessment of overall survival benefits. Future multi-center studies with larger cohorts are needed for further validation.

CONCLUSION

Staging laparoscopy (SL) is a crucial tool in the preoperative assessment of gastrointestinal malignancies, significantly altering treatment plans by detecting occult metastases missed on imaging. In this study, SL led to upstaging in several cases, shifting many patients from curative to palliative management, thereby preventing unnecessary surgeries. The procedure was safe, with minimal complications. Given its high diagnostic accuracy, SL should be routinely incorporated into staging protocols, especially for high-risk patients. Larger studies with long-term follow-up are needed to further establish its impact on oncological outcomes.

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