USEFULNESS OF DIAGNOSTIC LAPAROSCOPY OVER CECT ABDOMEN IN ASSESSING OPERABILITY IN GASTROINTESTINAL MALIGNANCY

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ABSTRACT

BACKGROUND

New advancement in CT scan has greatly helped the surgeons in accurately staging gastrointestinal malignancies and planning its treatment protocols. In this era of minimal invasive surgery, direct vision of the intraabdominal malignancies taking FNAC or biopsy of tumour and assessing its operability can avoid some of the shortcomings of CECT abdomen. It may further help in modifying the treatment protocol for a particular patient if the CECT finding does not match with that of biopsy report or direct laparoscopic assessment of tumour. Here the aim of the study was to find out the overall accuracy of diagnostic laparoscopy abdomen in assessing the operability in cases of gastrointestinal malignancies.

METHODS

This was a prospective study of total 40 patients with gastrointestinal malignancy, where all the patients were evaluated by CECT abdomen and found fit to undergo definite surgical procedure. All the patients were subjected to diagnostic and staging laparoscopy to assess the operability at Kalinga Institute of Medical Sciences between August 2012 and November 2014.

RESULTS

On preoperative diagnostic staging laparoscopy, it was found that out of 40 cases who were having CECT criteria of operability, 8 had metastatic disease, 8 had unresectable tumour due to local tumour ingrowth and one had benign disease on lap. Assisted tumour biopsy. Also palliative procedures like feeding jejunostomy in two patients with advanced cancer stomach.

CONCLUSION

Routine preoperative diagnostic and staging laparoscopy helped us in detecting advanced disease in significant no. of patient which otherwise was missed in CECT evaluation. Therefore, in our opinion it should be practiced routinely for staging GI malignancy either just before the planned surgery or as a separate diagnostic procedure. It should be added to the investigation modality to detect operability in GI malignancy.

KEYWORDS

Laparoscopy, Staging, Gastrointestinal Malignancy, Laparotomy, Imaging Modalities.

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INTRODUCTION

Surgical resection of patients with malignancies of the soft organs carries significant morbidity and mortality and many patients with advanced unresectable metastatic disease, palliation is all that can be offered.[1] Clinical staging is to accurately define the extent of disease, direct appropriate therapy and to avoid unnecessary interventions because nonsurgical palliation methods are now available mostly in all hospitals.[2]

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Despite an increasingly sophisticated radiological diagnostic armamentarium, many patients with GI malignancy are diagnosed with unresectable or metastatic disease made at exploratory laparotomy.[2] However, those patients who do not require a palliative procedure, exploration confer little benefit and may be associated with significant morbidity and mortality affecting both the quality and duration of their survival.[2]

The potential to prevent a non-therapeutic laparotomy by means of accurate and less invasive staging is the driving force behind laparoscopic staging of GI malignancy. Laparoscopy is exalted as king of all surgical procedures, which play a complementary role in the staging of abdominal malignancy. Laparoscopic examination can visualize the primary tumour, identify small hepatic and peritoneal metastases, diagnose regional nodal metastases, can assess the tumour in growth along with the added advantages of short hospitalization, increased comfort, their rapid return to normal activities.[3]

Despite the technical advances in CT scan/CECT, MRI and many other techniques, the diagnosis of small peritoneal deposits, small hepatic metastases, regional nodal metastases and local tumour in growth is frequently made during exploratory laparotomy.[4-7] With the rapid advancement in the instrumentation and technique in last two decades, laparoscopy has gained the wide acceptance as a new important modality in the evaluation of GI malignancy. Furthermore, diagnostic laparoscopy has been recommended as an important new staging modality and it is nearly as sensitive as an explorative laparotomy in detecting small peritoneal deposits and when combined with ultrasonography small liver metastases and local ingrowths can be diagnosed.[1] Biopsies can be taken under direct laparoscopic or ultrasound guidance and the procedure-related morbidity and mortality are relatively low.[8-10] In the current study, our study aims to find out how helpful is laparoscopy in staging GI malignancy in comparison to CECT abdomen in diagnosis and staging of GI malignancies.

PATIENTS AND METHODS

This was a prospective study of GI malignancy patients, evaluated by diagnostic and staging laparoscopy between August 2012 and November 2014. Total 106 patients were presented with GI cancers and out of which 66 patients were diagnosed with inoperable disease and were excluded from the study. In the study group, only 40 patients (27 male and 13 female) including stomach (n=19), lower oesophagus (n=1), cystic neoplasm of pancreas (n=1), periampullary (n=4), gallbladder (n=4), colon (n=4), rectum (n=6), and benign (n=1) were subjected to diagnostic laparoscopy in the immediate preop period. The mean age of presentation was 56.8 years (27-86 years) and maximum numbers of patients were in the age group of 61-70 years. Patients with non-GI tract cancers including gynaecological cancers, genitourinary cancers, retroperitoneal sarcoma, lymphoma, abdominal metastasis from non-GI cancers and metastatic cancers were excluded from the study group.

The priority of the study was to find out specificity and positive predictive value of diagnostic laparoscopy in diagnosis staging of GI malignancy in comparison to CECT evaluation alone. After a thorough preoperative evaluation such as clinical imaging and perioperative parameters, patients with suspected non-metastatic GI cancers were found resectable. Preoperative investigations included basic haemogram, chest X-ray, renal function test, liver function test, ultrasound scan of abdomen and CT scan of abdomen. For oesophageal tumours, ultrasonography combined with Doppler ultrasonography of the neck and abdomen, indirect laryngoscopy and bronchoscopy examinations were done when indicated. Patients with obstructive jaundice underwent an endoscopic retrograde cholangiopancreatography with insertion of an endoprosthesis and CT scans were frequently made in referring departments in our hospital. To verify vascular involvement, visceral angiography was performed in patients by Doppler ultrasound and CT angiography.

Preparation for surgery included preoperative pulmonary spirometer exercise, bowel preparation and antibiotics prophylaxis. Camera port was usually placed near the midline and two working ports were put on either lumbar regions and also at times additional ports were put anywhere as and when required. General inspection of peritoneal cavity and liver surface was done first and any suspicious lesions on liver or anywhere in the peritoneal surface including paraaortic nodes were biopsied. Lesser sac was entered in cases of upper GI malignancy. Biopsy proven metastases and tumour in growth were excluded from further surgical exploration. Patients with local tumour infiltration or vascular involvement were also excluded from surgery. In other patients found operable by laparoscopic evaluation were prepared for a single stage surgery. All patients received standard postoperative care that included antibiotics, preparation, analgesics, intravenous fluid, chest physiotherapy and prophylaxis for deep vein thrombosis. Study was approved by Institutional Review Board and Human Ethics Committee of the KIIT University, Bhubaneswar.

RESULTS

Between two consecutive years of our study period 106 patients were presented with GI cancers and out of which 66 patients were diagnosed with inoperable disease for various reasons (Table 1). Forty patients underwent diagnostic laparoscopy and subsequent open surgery in GI malignancies (Fig. 1). Out of forty patients, open surgery was avoided in 8 (20%) including 6 patients with Carcinoma stomach and 2 patients with carcinoma gall bladder. After diagnostic laparoscopy, laparotomy was avoided in 8 (20%) out of 40 patients including 6 patients with stomach cancer and 2 patients with gallbladder cancer because of disseminated disease with multiple peritoneal deposits (Fig. 2). No definitive procedure was done in these patients except laparoscopic feeding jejunostomy in 2 patients with locally advanced carcinoma stomach without ascites. Interestingly, one of these patients also had malrotation of gut. These patients were otherwise found fit for surgery after CECT abdomen. The benefits of laparoscopy over CECT in avoiding the unnecessary laparotomy has been depicted in (Table 2). Diagnostic laparoscopy also helped us in identifying additional information in certain cases. We used intraoperative FNAC in certain doubtful liver lesions without gross disseminated disease. In one patient with prepyloric growth stomach, there was a granulomatous lesion in segment VIII in liver (Fig. 3).

Intraoperative laparoscopy guided FNAC was negative for malignancy and open radical D2 gastrectomy was completed. In other two cases in stomach cancer and sigmoid colon, intraoperative FNAC was positive for malignancy in suspected liver lesions, so only palliative procedures like bypass loop gastrojejunostomy, jejunojejunostomy and sigmoid colectomy was done. We also had cirrhosis of liver (S1) and liver haemangioma (S2), detected in 2 patients each after diagnostic laparoscopic evaluation. These were unexpected findings affecting the postoperative outcomes, particularly in cirrhosis of liver. In our series, there was no mortality due to added surgical stress in diagnostic staging laparoscopy.

After diagnostic laparoscopy, all the patients found fit had undergone laparotomy in the same sitting. Diagnostic laparoscopy has got some limitation in assessing operability in cases without extensive mobilization and also without the use of laparoscopic ultrasound. So in some cases palliative procedures was followed (Table 3).

One 65-year male patient had a very peculiar clinical course. CT scan revealed thickened gallbladder wall with hepatoduodenal wall infiltration and upper GI endoscopy showed nodular elevation with multiple ulcers in stomach. Diagnostic laparoscopy and subsequent laparotomy showed a thickened gallbladder mass infiltrating antrum of stomach and adherent to omentum, thus antecolic GJ was done. Biopsy from the omental nodule suggested a granulomatous lesion with giant cell formation. Subsequent follow-up endoscopy after 4 wks. showed complete resolution of nodular lesions with ulcers of stomach.

After diagnostic laparoscopy in this small series of patients (n=40), 8 patients were diagnosed with disseminated disease, thus unnecessary laparotomy was avoided. Detail reasons for inoperability were shown in (Table 4). The surgical procedure was palliative in 8 patients, because of advanced disease with local infiltration or liver/peritoneal deposits (Fig. 4) and surgery was done in 23 patients with a curative intent.

(Fig. 5) shows the final outcome after diagnostic laparoscopy and subsequent laparotomy.

The average duration of the diagnostic laparoscopy was 25 mins (15-40 mins) and the average time for restoration of bowel movements was 3.1 days (1-6 days) in patients where open surgery was not done. The average duration of hospitalization was variable for those with disseminated disease 2 days (1-4 days) and those other open laparotomy cases where definitive procedures was done 9 days (5-14 days). One patient with stomach cancer had postoperative leak from the feeding jejunostomy site following ascites due to underlying cirrhosis of liver. The patient improved conservatively and feeding jejunostomy was removed on 25th day. One patient with locally advanced rectum cancer developed severe postoperative bladder dysfunction, incontinence and urinary tract infections. Another patient with rectum cancer developed intestinal obstruction in the postoperative period, which was corrected surgically.

GI Malignancy	Patient (N=106)	Mean Age (Range; Years)	Excluded (N=66)	Evaluable (N=40)
Oesophagus	7	60 (55-83)	6	1
Gallbladder	16	59 (56-74)	11	5 (1, Benign)
Stomach	51	53(40-86)	32	19
Colon	6	61 (36-70)	2	4
Rectum	11	58 (27-74)	5	6
Pancreas	5	62 (49-76)	4	1
Periampullary	10	57 (36-78)	6	4

Table 1: Demographic Patient Characteristic and Exclusion of GI Malignancy

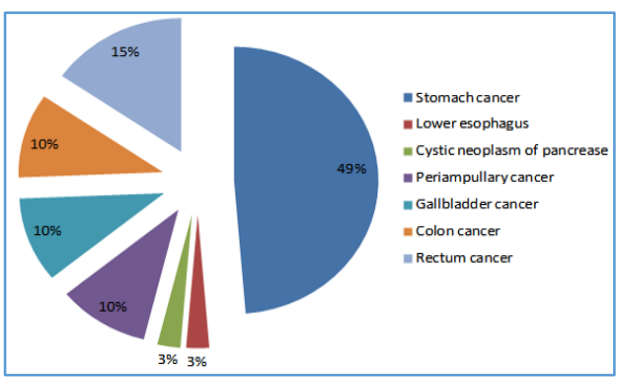

Fig. 1: Percentage of different GI Malignancy (n=40)

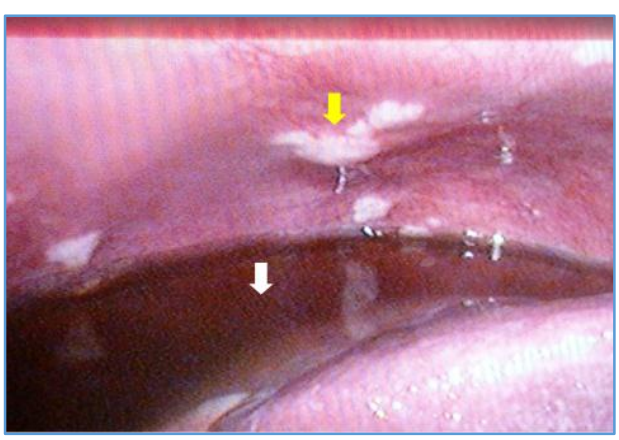

Fig. 2: Disseminated Disease with Multiple Peritoneal Deposits, Yellow Arrow Deposits, White Arrow Ascites

All Benefits	**8/40**	
Stomach Cancers	6	
Gallbladder Cancer	2	
Stomach	**6**	
GE Junction	Disseminated	No Procedure
Prepyloric	Disseminated	No Procedure
Linitis Plastica	Disseminated	No Procedure
Linitis Plastic	Deposits falciparum	
Body & Lesser Curvature Serosal, Infiltration		
	Lt. Lobe deposits	
Gallbladder Cancer	**2**	
Gallbladder Cancer	Disseminated	No Procedure
	Disseminated	No Procedure
(Disseminated-Multiple peritoneal, liver deposits with ascites)		

Table 2: Benefits of Laparoscopy Avoiding Unnecessary Laparotomy

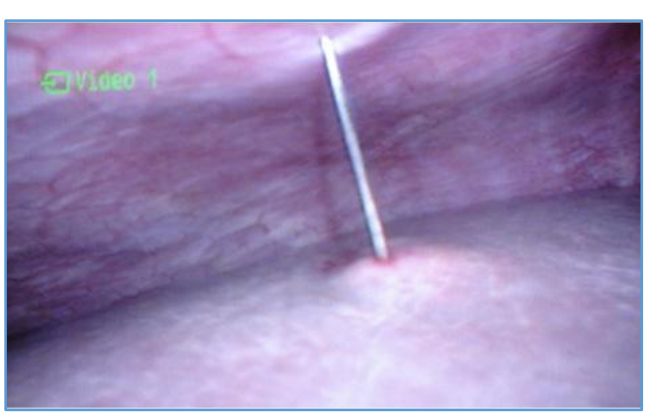

Fig. 3: Intraoperative FNAC of Doubtful Lesions

GI Malignancy	Reasons for Palliative Surgery	Number
Stomach	Local infiltrations to deep margins of crura	1
Stomach	Nodular deposit to liver and omentum	1
Rectum	Local infiltrations to bladder serosa	1
Rectum	Local infiltrations to posterior wall of vagina with extensive nodal disease	1
Rectum	Radial margin was positive	1
Cystic neoplasm of pancreas	Significant retropancreatic nodes	1
Gallbladder	Significant pericholedochal-nodes	1
Gastro-oesophageal junction	Positive oesophageal margins on biopsy	1

Table 3: Causes of Palliative Surgery

Status	Number
Peritoneal metastasis	7
Liver metastasis	3
Ascites	4
Extensive nodal diseases	4
Local infiltration	2

Table 4: Causes of Inoperability

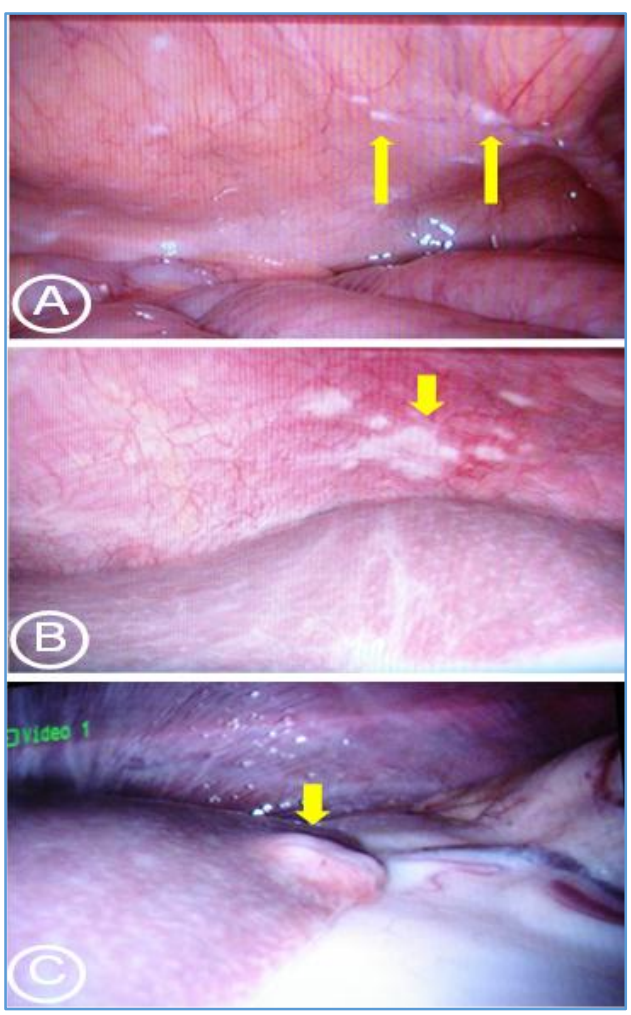

Fig. 4: Multiple Peritoneal Deposits A and B, Liver Nodule C

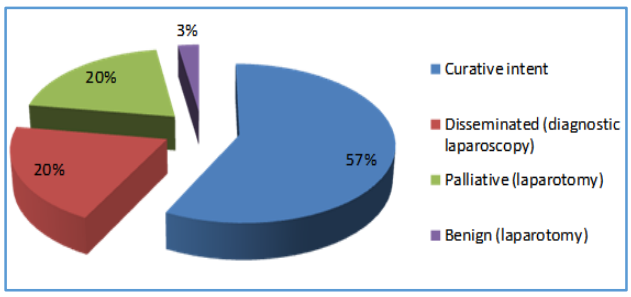

Fig. 5: Outcome after Diagnostic Laparoscopy and Subsequent Laparotomy

DISCUSSION

Several research reports have suggested that the laparoscopy is an important tool in the staging of abdominal malignancy.[11,12] Laparoscopic examination helps in many ways including direct visualizing the primary tumour, identify hepatic metastases, superior staging of liver tumours, preoperative staging and assessment of respectability of pancreatic cancer, diagnose regional nodal metastases, staging of carcinoma of the oesophagus and gastric cardia, and detect small-volume peritoneal disease unappreciated by other non-invasive staging modalities.[13-19] The present study evaluated the role of diagnostic laparoscopy in staging and assessing operability in GI malignancy. Out of total 40 patients, laparoscopy avoided 20% patients with unnecessary laparotomy. Diagnostic laparoscopy has the best utility in detecting peritoneal nodules and liver metastasis and all such were diagnosed in this present study.

Prospective multi-institutional studies revealed that non-invasive staging modalities like ultrasound, CT scan, MRI and endoscopic ultrasound plays an important role in the therapeutic approach of GI malignancies, but failed to identify 25% of metastatic disease, which was identified by laparoscopy.[20] Hemming et al[13] demonstrated that laparoscopic staging in intraabdominal malignancies is of great value and will prevent up to 36% of futile laparotomies.

Staging laparoscopy can range from simply inspecting the liver and peritoneum to extensive dissection, which may include lesser sac exploration and the use of laparoscopic ultrasound. Laparoscopic ultrasound defines the depth of tumour penetration, nodal involvement and occult liver metastasis. In our study maximum number of patients was of stomach carcinoma, in which unnecessary laparotomy was avoided in (6 out of 19) 31.57% patients. Additional feeding jejunostomy was done in 2 patients. Unfortunately, we had the limitation of the use of both laparoscopic ultrasound and endoscopic ultrasound. In one of the early studies undetected metastasis disease in gastric cancers patients were found in 13% to 57% initially staged by conventional modalities and exploratory laparotomy was avoided in over 20% patients.[21] These prospective studies showed staging accuracy of laparoscopy is 90% vs. 70-80% in conventional imaging. Burke et al[22] published their study of 110 gastric cancer patients who underwent laparoscopy, which enabled them to exclude 22% of these patients for further surgical intervention due to identification of occult metastasis. Earlier prospective study found that staging laparoscopy in oesophageal and gastric cancer patients reduced the rate of needless laparotomy from 25% to 12%.[23] The addition of laparoscopic ultrasound further reduced this rate to 9%.

Further, Tsioulias et al[8] demonstrated in his study that laparoscopy discovered peritoneal metastasis in 17% of patients that were not seen by other modalities.

In this study there were total 10 cases of colorectal malignancy, 4 patients of colon cancer and 6 of rectum cancer. None of the patients was found unresectable on diagnostic laparoscopy, although the procedure was palliative in 3 cases of rectal cancer due to lateral wall and posterior vaginal wall infiltration and liver nodules. Muntean et al[24] found in his study that unnecessary laparotomy was avoided in 36 of the 99 patients (36.4%) without distant metastases on imaging pre-therapeutic staging and staging laparoscopy avoids unnecessary laparotomies and changes the therapeutic plan in a significant number of patients.

Pancreatic cancer often presents with advanced disease with curative resection possible in only 5% to 15% of patients. Jiminez et al[25] found that laparoscopy diagnosed unsuspected metastases in 31.2% of patients with pancreas cancer, thus avoiding non-therapeutic laparotomy. Other studies have indicated that staging laparoscopy can detect unresectable disease in 20% to 48% of patients found resectable by CT scan.[26] Thus, laparoscopy must be performed in all pancreatic cancer patients prior to curative surgery. In our study, we found one patient with large cystic neoplasm of pancreas with significant retropancreatic nodes. So, only palliative distal pancreatectomy with splenectomy was completed. Although limited in our setup of laparoscopic ultrasound has got significant role in assessing resectability. Study by Schachter and Colleagues demonstrated a change in surgical intervention in 36% of patients with avoidance of unnecessary laparotomy in 31%.[27] Similarly, cytological examination of peritoneal washing obtained at the time of laparoscopy has been suggested to enhance the sensitivity of staging laparoscopy.[28]

Till date accurate staging for hepatobiliary malignancy is important, as there is no role for laparotomy or palliative surgery in the presence of metastatic disease. Montorsi.[29] demonstrated in one prospective study involving 60 patients that laparoscopic procedure detected additional tumour nodule in 11 out of 15 patients, and this changed the plan of management. Study by D'Angelica.[30] demonstrated in hilar cholangiocarcinoma and gallbladder cancer at MSKCC, New York, that laparoscopy procedures identified 84 inoperable cases out of 153, increasing resectability from 62% to 78%. In our study of 4 patients of gallbladder cancer, disseminated disease was found in 2 patients. In another patient with multiple significant pericholedochal nodes procedure was only limited to palliative radical cholecystectomy. Moreover, Lo et al[31] demonstrated in his study that laparoscopy and laparoscopic ultrasound were both able to evaluate disease resectability, thus aid in selection of patients who would benefit from either laparoscopic resection or local ablative therapy and/or formal hepatectomy.

In the literature review the outcome after various preoperative imaging and diagnostic laparoscopy was analysed. Although not done in our setup, EUS is more accurate than CT for staging pancreatic malignancies including predicting vascular invasion and local resectability.[32] Similarly, in the review article, Lightdale et al observed that EUS has been invariably more accurate than computed tomography for T (80-90%) and N (75%) staging, but EUS is limited for staging distant metastases.[33] In a study of different imaging modalities in upper GI malignancy, Mortensen et al observed that accuracy of EUS+LUS identified all non-resectable patients and the sensitivity of CT+US, laparoscopy and EUS were 14%, 36% and 79%, respectively.[34]

The success of diagnostic laparoscopy has its own limitations, particularly in identifying local infiltration and nodal disease. In 2 patients with gastro-oesophageal junction cancer and rectum cancer, the proximal oesophageal margins and also radial margins were positive. Recently, introduction of laparoscopic ultrasound in the armamentarium of minimally invasive surgery resulted in identification of occult metastasis in solid organs including liver, peritoneum, etc. Using laparoscopic tool, even lesions smaller than 1 cm can be identified, biopsied and ablated easily. Laparoscopy has been suggested to prevent 10–44% of patients from having an unnecessary laparotomy by identifying those with unresectable disease not identified by imaging.[35]

CONCLUSION

Different GI tract cancers have different peculiar biological behaviour, so applying diverse modality to study various GI cancers and therapeutic approach may be questionable to surgeons nowadays. Diagnostic laparoscopy in GI malignancy appears to be a safe, painless, faster recovery, cost-effective means of directing appropriate therapy and also avoids unnecessary laparotomies. This has been associated with decreased morbidity and earlier plan for neoadjuvant treatment.

The main area where laparoscopy scores over imagelogy is in identifying peritoneal and surface lesions of various organs inside the peritoneal cavity and provision for taking biopsy under vision. We know that our sample size is small, and each subtype is not evaluated extensively. However, our study revealed that diagnostic laparoscopy can be performed just before the planned surgery or as a separate diagnostic procedure.

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