

Research Article**Evaluation of Role of Diagnostic Laparoscopy for Staging in Abdominal Malignancies****Dr. Sreeharsha. M. V^{*1}, Dr. Sanketh Shah², Dr. Siddesh. G³, Dr. Mohammad Raza⁴**¹Assistant Professor, Department of Surgery, JSS Medical College Hospital, Ramanuja Road, Mysore -570004, Karnataka, India²Postgraduate student, Department of Surgery, JSS Medical College Hospital, Ramanuja Road, Mysore -570004, Karnataka, India³Professor, Department of Surgery, JSS Medical College Hospital, Ramanuja Road, Mysore -570004, Karnataka, India⁴Associate Professor, Department of Surgery, JSS Medical College Hospital, Ramanuja Road, Mysore -570004, Karnataka, India***Corresponding author**

Dr. Sreeharsha. M. V

Email: srharsha_mv@rediffmail.com

Abstract: Abdominal malignancies are one of the most common malignancy affecting humans. Many patients with abdominal malignancies are found at exploration to be unable to undergo resection. Laparoscopy has been suggested as a sensitive method for detecting metastatic disease in this group of patients. Diagnostic laparoscopy effectively establishes a diagnosis, can be therapeutic, and causes less morbidity and mortality than a formal laparotomy. Also there is not much literature about cost effectiveness of the procedure & reduction in convalescence period. The objectives of the study was to find the role of diagnostic laparoscopy for staging of abdominal malignancy and to assess the ability to avoid unnecessary laparotomies. The present study evaluated 30 patients of abdominal malignancies admitted to the hospital, during the period of November 2008 to November 2010 fulfilling the inclusion and exclusion criteria. Diagnostic Laparoscopy was performed in all 30 patients after taking written consent. Diagnostic Laparoscopy was immediately followed by definitive or palliative surgeries when required. Categorical variables in the study were compared using Chi square test, contingency coefficient analysis, Independent sample t test, one sample t test using SPSS software. P value of < 0.05 was considered to be significant. Study included total of 30 patients comprising of stomach, biliary & colorectal malignancies with mean age of 53 years (21-70). 13 cases (43.3%) were found to be unresectable on staging laparoscopy and prevented from undergoing unnecessary laparotomy. 6 cases (20%) had liver metastases & 8 cases (26.7%) had peritoneal seedings on staging laparoscopy which were not revealed on preoperative imaging workup. Mean duration of Staging Laparoscopy was 18.83 min (10-30mins). Staging Laparoscopy had minimal major complication rates. Mean convalescence period was 8.2 days for study group. It was significantly lower compared to open exploration. A short Staging Laparoscopy performed just before the planned surgical procedure to certify the operability is found to be safe & very effective. It is very accurate in assessing peritoneal seedings, hepatic metastases which are not found on imaging modalities. Staging laparoscopy has a significant impact on decisions regarding the treatment plan, helps in more careful planning of palliative & resection procedure in advanced conditions, performing biopsy from sites of dissemination & having histological confirmation. It spares patients from unnecessary laparotomies and has been found to significantly decrease the hospital stay. Staging Laparoscopy should be a routine tool in the armamentarium of all surgeons.

Keywords: Diagnostic Laparoscopy, Staging of abdominal malignancies, Staging Laparoscopy, Operability, Resectability..

INTRODUCTION

Abdominal malignancies are one of the most common malignancy affecting humans. The purpose of this study is to determine if a laparoscopic approach that mimics open exploration would improve the accuracy of management of patient. Many patients with abdominal malignancies are found at exploration to be unable to undergo resection. Laparoscopy has been suggested as a sensitive method for detecting metastatic

disease in this group of patients. In oncologic practice, minimal access surgery has been proposed for the diagnosis, staging, palliation, and treatment of various malignancies without any substantive data confirming its effectiveness.

Diagnostic laparoscopy effectively establishes a diagnosis, can be therapeutic, and causes less morbidity and mortality than a formal laparotomy. The

findings of a diagnostic laparoscopy might change the further course of management to a more limited approach or conservative line of management and help in avoiding unnecessary non-therapeutic laparotomies. Laparoscopy is as much a surgical procedure as an exploratory laparotomy, often just as informative, and to the trained surgeon affords a better view of the entire peritoneal cavity than the usual exploratory incision. To achieve a high rate of positive diagnosis from laparoscopy requires much more than correct technique; it requires a thorough background of surgery, sound clinical acumen as also knowledge and awareness of abdominal pathology [1].

One of the most meaningful and important advances realized by the rebirth of interest in laparoscopy is in the area of cancer diagnosis and staging. Diagnostic laparoscopy is being increasingly employed for intra abdominal malignancies. Laparoscopy can prevent unnecessary exploration in many abdominal malignancy patients. This novel technique may reveal general metastases or secondary nodules in the liver, peritoneum or adenopathy, thus rendering further procedures unnecessary and saving the patient a rather prolonged convalescence. In this study the role of diagnostic laparoscopy in management of abdominal malignancy is being evaluated.

Aim of the study

To study the role of diagnostic laparoscopy for staging in abdominal malignancies.

Objectives

- To evaluate the role of diagnostic laparoscopy for staging in abdominal malignancy.
- To assess the ability to avoid unnecessary laparotomies.

MATERIALS AND METHODS

The patients having abdominal malignancy were admitted in surgery department and following procedures undertaken viz., history taking, clinical examination, routine examination and special investigations.

Inclusion Criteria

- Patient age >18 year (Both males and females)
- Histologically proven, clinically & radiologically suspected malignancies requiring surgery (laparotomy)

Exclusion Criteria

- Non resectability on CT scan.
- Patient having uterine, ovarian or cervix malignancy.
- Patient not fit for general anesthesia.

Examination

All patients with abdominal malignancies were examined thoroughly and the findings were recorded.

Investigations

- In patients with abdominal malignancies we undertook following investigations as required:
- Hematological – Hb%, TC, DC, ESR.
- Biochemical - RBS, Blood urea, Serum creatinine, Serum electrolytes, LFT
- Radiological – Chest X- ray, X-ray erect abdomen, ultrasound abdomen and pelvis, CT scan, Upper GI endoscopy and lower GI endoscopy wherever applicable.

Laparoscopy

After complete workup and investigations, clinical diagnosis ascertained, radiological help obtained wherever possible and patients were considered for diagnostic laparoscopy. All patients were informed of the risks and benefits of the procedure and also explained about the probability of laparotomy if need arose and for the definitive procedure when required.

After creating the pneumoperitoneum using veress needle or blind trocar insertion method 10 mm telescope was placed through the supra / sub umbilical port, another 5 mm port was placed in the upper or lower abdomen to allow manipulation or biopsy of intraabdominal pathology.

A thorough evaluation of peritoneal cavity was made and wherever required biopsy was taken. Subsequently thorough staging was done wherever feasible a therapeutic procedure was also performed by laparoscopy.

If the condition did not require any intervention nothing else was done.

The operative time represented the total time is in minutes from insertion of the first trocar insertion to completion of staging procedure. Convalescence period was determined from day of surgery to discharge or expiry. Complications were determined intraoperatively and post operatively, morbidity in respect to wound sepsis (surgical site infection), respiratory distress etc.

Mortality if any, were recorded.

RESULTS AND DISCUSSION

During the last decade, laparoscopy has replaced open laparotomy as the preferred approach in patients who require surgical diagnosis and staging of cancer. The role of laparoscopy as a biopsy tool is reserved primarily for patients in whom a tissue diagnosis is needed to direct therapy but cannot be obtained by image-guided needle biopsy or by endoscopic means. Laparoscopy allows a surgeon to

diagnose and obtain information about dissemination of disease and to diagnose patients with equivocal abdominal findings [2, 3].

The liver and peritoneal surfaces are the most readily accessible sites for laparoscopic tumor biopsy. Other sites, which may be accessible to the laparoscope but may require more dissection for exposure and access, include the intestinal mesentery and the retroperitoneum. Lymph nodes or other lesions in the para-aortic and caval regions of the retroperitoneum are especially difficult to access, whereas celiac and iliac nodes are more readily biopsied. Aspiration of ascites or peritoneal lavage can be performed and fluid sent for cytological analysis for possible intra-peritoneal shedding of tumor.

Staging Laparoscopy

Staging laparoscopy has become an important tool in the evaluation of patients with certain gastrointestinal malignancies who are being considered for curative resection. The magnified view of the laparoscope enables the surgeon to detect small liver or peritoneal metastases that are not visible with current non-invasive imaging modalities. In addition, the use of laparoscopic ultrasound may allow imaging of occult liver metastases or local tumor invasiveness that would preclude curative resection. In large series of patients with mixed upper gastrointestinal malignancies undergoing staging laparoscopy, the incidence of occult metastases not seen on preoperative imaging has been approximately 20% [4, 5].

The accuracy of pre-operative staging was improved by laparoscopy in 41% of patients in one series of 389 patients, including several patients who had suspicious lesions on preoperative imaging that proved benign [4].

Laparoscopic staging can be helpful in lymphoma, esophageal cancer [6], gastric cancer, pancreatic adenocarcinoma [7], hepatocellular carcinoma, carcinoma of the gallbladder, extrahepatic bile duct cancer, and selected periampullary cancers as well as in second look operations after chemotherapeutic regimens.

Most occult metastases are identified by laparoscopy with biopsy alone; however, the addition of laparoscopic ultrasound to the staging protocol may allow detection of disease elsewhere, particularly vascular invasion that would also contraindicate resection. Some authors have advocated that diagnostic laparoscopy and laparoscopic ultrasonography should be used as an adjunct to pre-operative imaging studies in all patients with primary or metastatic intra-abdominal neoplasms [8] because as compared with pre-operative imaging, the combination of diagnostic laparoscopy and laparoscopic ultrasonography provides

more accurate information regarding staging and resectability, thereby helping to determine the extent of operation and reduce the number of unnecessary laparotomies.

Staging laparoscopy (SL) plays two important roles for patients:

- It spares patients from the experience of undergoing an exploratory laparotomy and
- Identifies patients with locally advanced disease for neoadjuvant therapy.

There is good category II/III evidence that video-laparoscopic staging is valuable in certain gastrointestinal (gastric, esophageal, pancreatic and hepatobiliary) and intra-abdominal lymphomas, but no category I evidence (based on prospective randomized trials). The evidence available is all retrospective, but of sufficient consistency to indicate that laparoscopic staging adds to the primary (imaging) staging and often alters the clinical stage of the disease and hence the management of the individual patient [9].

Siewert affirms that beyond any doubt surgical laparoscopy constitutes a step forward in surgical methodologies and contributes to improve preoperative staging, especially for peritoneal carcinomatosis. It should be used if therapeutic benefits can be gained, as is true for neoadjuvant chemotherapy. Otherwise, benefits and risks must be evaluated carefully. Irresponsible usage of surgical laparoscopy is not beneficial for the doctor or for the patient [10].

Rosin *et al.* define important technical aspects regarding diagnostic laparoscopy. The first controversial issue is its timing: it can be a separate procedure, or performed immediately before the planned curative surgery. Another unresolved debate is the extent of the procedure: it ranges from inspection only, with biopsy of suspicious lesions, to extensive dissection, use of LUS, and peritoneal cytology sampling [11].

Luis F. Onate-Ocana *et al.* [12] define a four group staging system:

- Stage I - no serosal involvement;
- Stage II - serosal involvement;
- Stage III - adjacent organ invasion;
- Stage IV - distant disease

The proposed staging system is a simplification of the TNM staging and is not intended to be a substitute. It should be regarded as a tool for the selection of the best therapeutic option for the specific patient and also for pretherapeutic stratification of risk factors in the setting of new randomised clinical trials [12, 13].

Our aim of the present study was to study the role of diagnostic laparoscopy for staging in abdominal malignancies.

In our study 30 cases of abdominal malignancies admitted to the Hospital during the study period i.e. November 2008 to November 2010 were included.

Diagnostic laparoscopy was performed in each patient immediately before the planned elective surgery after thorough clinical evaluation and appropriate radiological & histological investigations. It resulted in

change in further course of management of significant number of patients and was associated with less morbidity.

Age and sex incidence

Out of 30 cases studied 13 were male patients and 17 were female patients constituting 43.3% and 56.7% respectively. Patients ranged from 21 years to 70 years with mean age being 53 years. Maximum number of patients in our study was in age group 61-70 followed by 41-50 and 51 – 60 years. Abdominal malignancies show increasing trend with age.

Table 1: Age & Sex Distribution

Age group in years	Male	Female	Total	Percentage (%)
21-30	1	2	3	10
31-40	1	2	3	10
41-50	2	5	7	23.3
51-60	5	1	6	20
61-70	4	7	11	36.7
Total	13	17	30	100

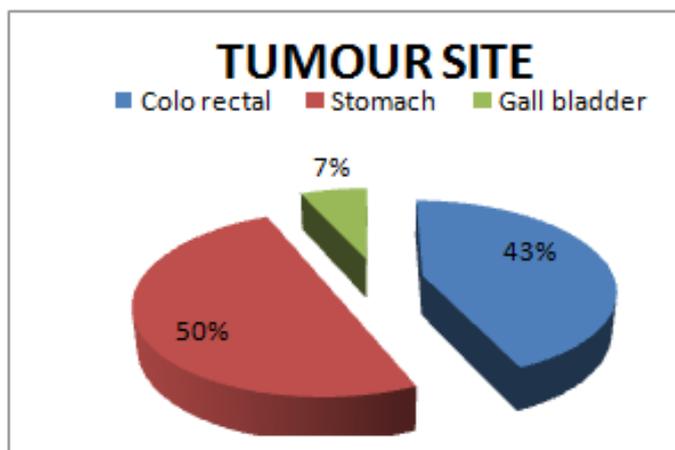


Fig. 1: Distribution of Cases According to Tumour Site

Tumor Site

Stomach malignancies constituted 15 (50%) cases of the study cases followed by Colorectal which

constituted 13(43%) and rest by Gall bladder malignancies 2(7%) cases of the study.

Table 2: Table Showing Different Metastasis in the Study

	Liver metastasis	Peritoneal nodules	Omental nodules	Mesenteric nodules	Ascites	Pelvic metastasis
Stomach malignancy	4	6	9	2	7	1
Colorectal malignancy	1	1	0	0	3	2
Gallbladder malignancy	1	1	2	0	1	0

Liver Metastases

Liver metastases was found in 6 (20%) of cases while 24 cases had no liver involvement on Staging Laparoscopy. Lehnert T *et al.* [14] had 3(20%) patients with liver metastases out of 15 patients

undergoing staging laparoscopy precluding surgery. Muntean V *et al.* [15] study revealed liver metastases in 12(12.12%) patients out of 99 patients. Ozmen MM *et al.* [16] study showed liver metastases in 18 (33.3%) cases out of total 48 patients.

Peritoneal nodules

Peritoneal nodules were found in 8 (26.7%) cases in our study. Mostly they were seen in patients with stomach malignancies. Only 1 case of colorectal malignancy & 1 case of gall bladder malignancy had peritoneal nodules. Muntean V *et al.* [15] study revealed peritoneal seeding in 32 (32.3%) cases & in 1 case of colon malignancy out of 20 cases. Ozmen MM *et al.* [16] study on gastric cancer revealed peritoneal seeding in 8 cases (16, 6%) out of 48.

Thus previous studies have revealed Peritoneal seeding in 16 – 32% cases. In our study it was found to be in 26.7% cases which were in accordance to the other studies. These peritoneal nodules were missed on CT scan & other imaging modalities. Staging laparoscopy was found to be most sensitive modality for peritoneal seedlings.

Ascites

In our study ascitic fluid was found in 11(36.7%) cases. Ascitic fluid was aspirated in each case and sent for cytological analysis. No irrigation cytology was done in this study. Most of the cases which had free fluid evident on pre operative imaging modality had negative cytology on ascitic fluid analysis pre operatively. Ozmen MM *et al.* [16] had positive peritoneal cytology in 11 cases out of 48 (22.9%).

Omental, Mesenteric & Pelvic nodules

Omental nodules were found in 11 cases in our study. All cases were of Upper Gastrointestinal malignancies – 9 stomach & 2 gall bladder. No colorectal malignancies had omental nodules.

Mesenteric & Pelvic Nodules were reported in only 2 & 3 cases respectively in our study. Pelvic nodules were seen in 2 cases of colorectal malignancy. 1 case of stomach tumor had secondaries on bilateral ovaries found on staging laparoscopy. Mesenteric nodules were seen in 2 cases of stomach tumors.

1 case of stomach tumor was found to have splenic nodule.

Lymph Node status

Lymph nodes are involved by lymphatic spread from tumor which is seen quite early in tumor spread. In our study lymph nodal metastases was found in 29 out of 30 patients. It does not prevent curative resection unless extensive involvement (N3 status). Even in such cases palliative resection is possible, so lymph node staging as independent predictor does not have much impact in changing management & preventing exploratory laparotomies.

Resectability According to Tumor site

On staging laparoscopy, in our study 17 cases were deemed Resectable & 13 cases as Unresectable. In our study 43.3% cases were found to be Unresectable on Staging Laparoscopy. These patients were prevented from undergoing unnecessary exploratory laparotomy. Muntean V *et al.* [15] in his study had 36 (36.4%) patients avoided from undergoing unnecessary laparotomies. Hemming AW *et al.* [17] in their study feel that laparoscopic staging in intraabdominal malignancies is of value & will prevent up to 36% of futile laparotomies.

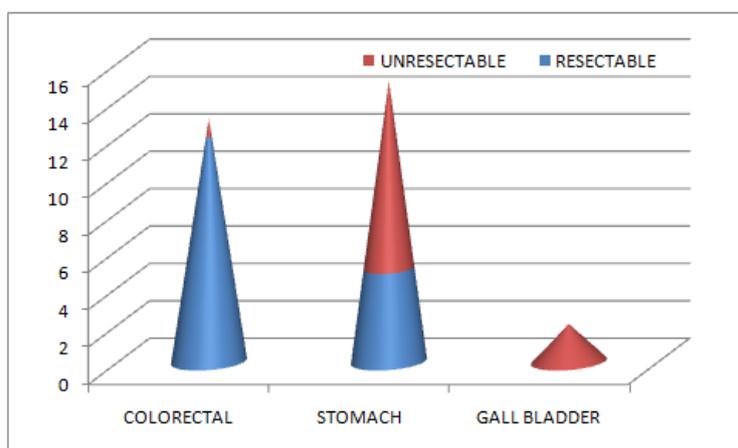


Fig. 2: Resectability According To Tumour Site

There were 2 cases of Gall bladder malignancies and both of them were unresectable. There were 15 cases of Stomach malignancies out of which 10 (66.7%) were unresectable. Out of 13 cases of colorectal malignancies only 1(7.7%) was found to be unresectable.

43.3% patients in our study were prevented from unnecessary laparotomy which was higher than seen in other studies probably as the patients in our study group are not very well educated and present in the later stage of disease compared to Western population. Most of the patient found to be unresectable

did not have severe obstructive symptoms and thus present later in the disease stage.

Further subdivision according to tumor site revealed 10 cases of stomach malignancies to be unresectable out of total 15 cases (66.66%). Further they were analyzed according to endoscopic site of tumor which revealed 7 out of 10 cases from body of stomach. Tumor in body of stomach present in later stages of disease as patient does not develop prominent obstructive symptoms seen in fundic or pyloric tumors. 2 cases of pyloric tumor & 1 fundic tumor were found to be unresectable.

Muntean V *et al.* [15] found in his study 26 cases of stomach cancers to be unresectable on Staging laparoscopy out of total 45 cases (57.77%). Asencio F *et al.* [18] did study on gastric adenocarcinoma & found that despite apparently extensive preoperative assessment, laparotomy was abandoned in 41% of patients after laparoscopic staging.

In our study there were 13 cases of colorectal malignancies which on further subdivision into Caecum 2, Splenic flexure 1, Upper rectum 3, Middle rectum 2 & lower rectum 5 cases. Only 1(7.7%) case of lower rectal tumor was found to be unresectable on Staging Laparoscopy. Muntean V *et al.* [15] found in his study that 4 cases (20%) to be unresectable.

Only 2 cases of extrabiliary tumor were present in our study which were both found to be unresectable on Staging Laparoscopy and thus avoided unnecessary laparotomy. Muntean V *et al.* [15] found 2 cases out of 4(50%) to be unresectable in the study which was found to have extensive spread on Staging Laparoscopy.

There are few series evaluating the use of laparoscopy in patients with gallbladder cancer. Although the yield of laparoscopy was up to 80% in some studies, the patients evaluated had minimal preoperative imaging, often with ultrasound alone, and laparoscopy was used primarily as a diagnostic tool. Results found in our study had only 2 patients which are too low to draw conclusions. As found in other studies the yield of SL for gallbladder cancer is slightly higher than for cancers of the biliary tree because of the higher incidence of peritoneal and liver metastases associated with gallbladder cancer

1 case of unresectable colorectal tumor underwent colostomy & other 7 unresectable cases underwent palliative procedure. 6 cases underwent only laparoscopic biopsy as only procedure after staging laparoscopy.

17 cases were found to resectable on Laparoscopic staging but only 16 underwent definitive

procedure as 1 case of stomach body tumor was found to be unresectable on laparotomy and underwent only palliative procedure.

Thus 13(43.3%) cases out of 30 were prevented from undergoing unnecessary exploratory laparotomy

Duration of Staging Laparoscopy

Mean duration of Staging Laparoscopy was 18.83 min (10-30mins). It was little higher in unresectable group compared to resectable (20 vs. 17mins respectively) which was not found to be significantly different. Muntean V *et al.* [15] in their study had 48 mins mean operative time for SL (25-90mins.) In this study extended staging laparoscopy, peritoneal lavage, LUS including colour doppler was done resulting in more mean time for SL.

Short duration procedure that is based only on inspection of abdominal organ surfaces can be performed quickly (usually within 10–20 min), can be done through one or two ports and has good diagnostic accuracy. Extensive procedure includes opening up lesser sac, assessment of vessels & LUS which is more time consuming but increases diagnostic accuracy.

Complications

Procedure related complications were seen in 5 cases in our study out of which 4 cases were resectable – 2 major & 2 minor complications. Only 1 case of unresectable group had minor wound sepsis. There were no complications in 25(83.7%) cases and only 5(16.7%) cases had complications. 3(10.0%) cases had minor complication of operative wound sepsis. Only 2 (6.7%) cases had major respiratory complication.

There was no Mortality in the 30 study cases

Convalescence Period

Mean convalescence period was 8.2 days (2-16days) in the study. It was found to be significantly less in unresectable group compared to patients undergoing definitive surgery [19].

Convalescence period in patients with complications was 10.8 days compared to 7.6 days in patients without complications, which was not found to be significantly higher.

Convalescence period was very significantly low in patients undergoing SL compared to exploratory laparotomy & closure (5 vs. 8 days respectively) when it is the only procedure required. Similar evidence is found in various studies. In his study Muntean V *et al.* [15] average length of stay after SL compares favorably with open exploration. In study performed by on diagnostic laparoscopy in resectable hepatic colorectal

metastases compared with open laparotomy, hospital length of stay was significantly lower.



Fig. 3: Main trocar position for staging laparoscopy

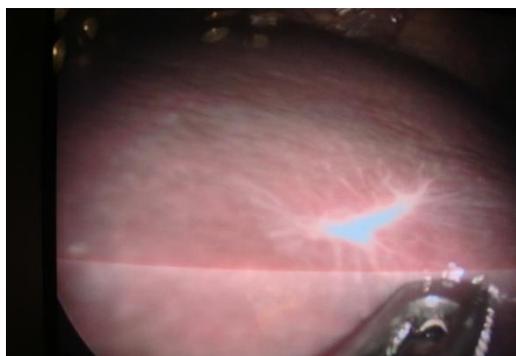


Fig. 4: Liver metastasis seen on staging laparoscopy



Fig. 5: Peritoneal nodules from stomach tumor seen on staging laparoscopy



Fig.6: Omental nodules as seen on staging laparoscopy

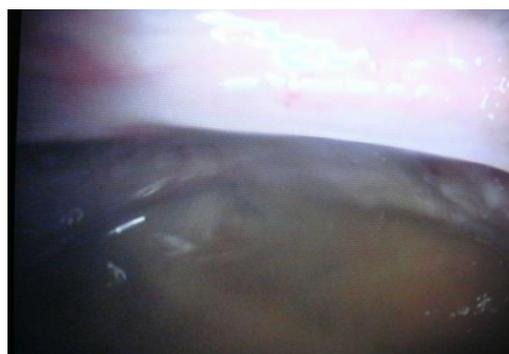


Fig. 7: Ascites found during staging laparoscopy



Fig. 8: Bilateral ovarian secondaries from carcinoma stomach

CONCLUSION

Staging Laparoscopy (SL) has a very significant role in abdominal malignancies. It is very accurate in assessing peritoneal seeding, hepatic metastases which are not found on imaging modalities.

A short SL performed just before the planned surgical procedure to certify the operability is found to be safe & very effective and need not be performed as a separate procedure. But short SL is less sensitive in staging compared to extended SL and use of LUS

Staging Laparoscopy is found to be more useful in staging gastric & extra hepatic biliary tumor when compared to colorectal cancers.

Staging Laparoscopy gives additional information regarding extent of the disease intra-abdominally which changes the course of management in significant number of patients. Staging laparoscopy had a significant impact on decisions regarding the treatment plan in patients. It helps in more careful planning of palliative & resectional procedure in advanced conditions.

Staging Laparoscopy has added benefit of performing biopsy from sites of dissemination & having histological confirmation.

Staging Laparoscopy spares malignancy patients from unnecessary laparotomies and has an associated decreased morbidity & pain, faster recovery and earlier time to adjuvant treatment.

Limitation of the study was it has small sample size comprising only stomach, gall bladder & colorectal malignancies. Evaluation of lesser sac & pancreatic infiltration was not possible & peritoneal cytology was not done in all cases.

Staging laparoscopy should be a routine tool in the armamentarium of all surgeons performing surgeries routinely on abdominal malignancies. It should be used as a diagnostic tool comprehending other imaging modalities.

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