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USE OF DIAGNOSTIC LAPAROSCOPY FOR STAGING IN GASTROINTESTINAL TUMOUR

KEYWORDS

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ABSTRACT *Background: 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 etastatic 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.*

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.[7]

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 intraabdominal 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, this study is also intended to study convalescence & cost effectiveness to patient by preventing unnecessary exploration.

AIMS AND OBJECTIVES

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

OBJECTIVES:

1. Role of diagnostic laparoscopy for staging of abdominal malignancy.
2. To study convalescence period & cost effectiveness to the patient.
3. To assess the ability to avoid unnecessary laparotomies

METHODOLOGY

The cases for the study were taken from patient admitted to ASRAM Hospital, Eluru attached to ASRAM Medical College, Eluru, Department of Surgery during the study period from November 2013 to November 2015. These cases were studied according to the proforma. The patients having abdominal malignancy were admitted in surgery department and following procedures undertaken viz., history taking, clinical examination, routine examination and special investigations. After initial assessment they were subjected to laparoscopy.

INCLUSION CRITERIA:-

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

EXCLUSION CRITERIA:-

1. Non resectabilty on CT Scan
2. Patient having uterine, ovarian or cervix malignancy.
3. Patient not fit for general anaesthesia

This study contains 30 patients, 13 males and 17 females.
A detailed history of patient was taken. The hospital records were reviewed to obtain information regarding age, sex, occupation, date of admission and discharge, operative date and clinical investigation.

Diagnostic Laparoscopy was performed and details were noted. According to the observations in SL patients were subjected to further course of management. Patients were also followed to known complications, convalescence & hospital cost.

Examination:

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

In all patients with abdominal malignancies complete general physical examination, local examination and systemic examination was done. All these were examined by inspection, palpation, percussion and auscultation.

Investigations:

In patients with abdominal malignancies we undertook following investigations as required :

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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, Upper GI endoscopy, lower GI endoscopy and CT scan 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 / subumbilical 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.

OBSERVATIONS AND RESULTS :

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

CC= 0.378; P= 0.288 (NS)

The age group with maximum number of cases was 61-70 age group followed by 41-50 age group and then by 51-60 age group. Mean age for groupbeing 53years.There were 13 Male & 17 Female patients in the study which is comparable

TABLE 2. DISTRIBUTION OF CASES ACCORDING TO TUMOUR SITE

Tumour site	No. of Patients	Percent
Colorectal	13	43.3%
Stomach	15	50.0%
Gall Bladder	2	6.7%

TABLE 3. RESECTABILITY ACCORDING TO THE TUMOUR SITE

	SITE			TOTAL
	COLORECTAL	STOMACH	GALL BLADDER	
RESECTABLE	12 (92.3%)	5 (33.3%)	0 (0%)	17(56.7%)
UNRESECTABLE	1 (7,7%)	10 (66.7%)	2(100%)	13 (43.3%)
TOTAL	13	15	2	30

CC= 0.545; P= 0.002 (S)

TABLE 4. LYMPH NODE STATUS ON STAGING LAPAROSCOPY

		SITE			Total
		Colorectal	Stomach	Gall bladder	
LYMPH NO	Count	1	0	0	1
	% SITE	7.7%	.0%	.0%	3.3%
N1	Count	7	6	2	15
	% SITE	53.8%	40.0%	100.0%	50.0%
N2	Count	5	9	0	14
	% SITE	38.5%	60.0%	.0%	46.7%
Total	Count	13	15	2	30
	% SITE	100.0%	100.0%	100.0%	100.0%

CC=0.355; P=0.362(NS)

TABLE 5. LIVER METASTASES ON STAGING LAPAROSCOPY

			SITE			Total
			Colorectal	Stomach	Gall bladder	
LIVER	NEGATIVE	Count	12	11	1	24
		% within SITE	92.3%	73.3%	50.0%	80.0%
	POSITIVE	Count	1	4	1	6
		% within SITE	7.7%	26.7%	50.0%	20.0%
Total		Count	13	15	2	30
		% within SITE	100.0%	100.0%	100.0%	100.0%

CC= 0.291; P= 0.250 (NS)

TABLE 6. PERITONEAL NODULES ON STAGING LAPAROSCOPY

		SITE			Total
		Colorectal	Stomach	Gall bladder	
PERITO NEGATIVE	Count	12	9	1	22
	% within	92.3%	60.0%	50.0%	73.3%
POSITIVE	Count	1	6	1	8
	% within	7.7%	40.0%	50.0%	26.7%
Total	Count	13	15	2	30
	% within	100.0%	100.0%	100.0%	100.0%

TABLE 7. OMENTAL NODULES ON STAGING LAPAROSCOPY

		SITE			Total
		Colorectal	Stomach	Gall bladder	
OMENTUM NEGATIVE	Count	13	6	0	19
	% within SITE	100.0%	40.0%	0%	63.3%
POSITIVE	Count	0	9	2	11
	% within SITE	0%	60.0%	100.0%	36.7%
Total	Count	13	15	2	30
	% within SITE	100.0%	100.0%	100.0%	100.0%

TABLE 8. ASCITES ON STAGING LAPAROSCOPY

		SITE			
		Colorectal	Stomach	Gall bladder	Total
ASCITIS NEGATIVE	Count	10	8	1	19
	% within	76.9%	53.3%	50.0%	63.3%
POSITIVE	Count .	3	7	1	11
	% within	23.1%	46.7%	50.0%	36.7%
Total	Count	13	15	2	30
	% within	100.0%	100.0%	100.0%	100.0%

CC = 0.240; P= 0.400 (NS)

TABLE 9. MESENTERIC NODULES ON STATGING LAPAROSCOPY

		SITE			Total
		Colorectal	Stomach	Gall bladder	
MESENTRIC NEGATIVE	Count	13	13	2	28
	% within SITE	100.0%	86.7%	100.0%	93.3%
POSITIVE	Count	0	2	0	2
	% within SITE	0%	13.3%	0%	6.7%
Total	Count	13	15	2	30
	% within SITE	100.0%	100.0%	100.0%	100.0%

CC = 0.258; P= 0.343(NS)

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TABLE 10. PELVIC METASTASES ON STAGING LAPAROSCOPY

		SITE			
		Colorectal	Stomach	Gall bladder	Total
PELVIC NEGATIVE	Count	11	14	2	27
	% within SITE	84.6%	93.3%	100.0%	90.0%
POSITIVE	Count	2	1	0	3
	% within SITE	15.4%	6.7%	0%	10.0%
Total	Count	13	15	2	30
	% within SITE	100.0%	100.0%	100.0%	100.0%

CC = 0.164; P= 0.662 (NS)

TABLE 11. RESECTABILITY ACC TO ENDOSCOPIC SITE OF TUMOUR

		ENDOSCOPIC SITES								Total
		Fundus	Body	Pylorus	Caecum	Splenic flexure	Upper rectum	Middle rectum	Lower rectum	
LAPAROSCOPIC STAGING	R	1 50.0%	3 30.0%	1 33.3%	2 100.0%	1 100.0%	3 100.0%	2 100.0%	4 80.0%	17 60.7%
	U	1 50.0%	7 70.0%	2 66.7%	0 .0%	0 0% .	0 .0%	0 .0%	1 20.0%	11 39.3%
Total		2	10	3	2	1	3	2	5	28
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

CC = 0.530; P- 0.141 (NS)

TABLE. 12. LAPAROTOMY STAGING ACC. TO ENDOSCOPIC SITE OF TUMOUR

		ENDOSCOPIC SITES								Total
		Fundus	Body	Pylorus	Caecum	Splenic flexure	Upper	Middle	Lower	
Laparotomy Staging	R	1	2	1	2	1	3	2	2	14
		50.0%	20.0%	33.3	100.0%	100.0%	100.0%	100.0	60.0%	50.0%
	U	1	5	2	0	0	0	0	0	8
		50%	50.0%	66.7	0%	0%	0%	0%	0%	8%
	NA	0	3	0	0	0	0	0	3	6
		0%	30.0%	0%	0%	0%	0%	0%	40%	22.4%
Total		2	10	3	2	1	3	2	5	28
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

CC = 0.620; P.'= 0.229 (NS)

TABLE 13. TYPE OF SURGERY PERFORMED

	LAPAROSCOPIC STAGE			
PROCEDURE	RESECTABLE	UNRESECTABLE	TOTAL	PERCENT
DEFINITIVE	16(94.1%)	0(0%)	16	53.3%
PALLIATIVE	1 (5.9%)	6 (46.2%)	7	23.4%
COLOSTOMY	0 (0 %)	1 (7.6%)	1	3.3%
BIOPSY	0 (0 %)	6 (46.2%)	6	20.0%
TOTAL	17 (100.0%)	13 (100.0%)	30	100.0%

CC = 0.685; P= 0.000 (S)

TABLE 14. DURATION OF STAGING LAPAROSCOPY

	LAPSTAGE	N	Mean	Std. Deviation
DURNLAP	R	17	17.3529	3.99908
	U	13	20.7692	5.71772

		t-test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
DURNLAP	Equal variances assumed	-1.927	28	.064	-3.4163

TABLE 15. COMPLICATIONS OF STAGING LAPAROSCOPY

	No. of Patients	Percent
Complications	5	16.7%
No complication	25	83.3%
Total	30	100.0%

Chi square value = 13.333; p=0.000(S)

TABLE 16. CONVALESCENE PERIOD OF PATIENTS

	LAPSTAGE	N	Mean	Std. Deviation	Std. Error Mean
CONVAL	R	17	10.5882	2.80755	.68093
	U	13	5.0000	1.73205	.48038
		t-test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
CONVAL	Equal variances assumed	6.303	28	.000	5.5882

TABLE 17. COST EFFECTIVENESS

	LAPSTA	N	Mean	Std.	Std. Error
COST	R	17	10388.23	2071.3054	502.36535
	U	13	7785.384	.	846.76051

		t-test for Equality of Means			
		t	df	Sig. (2-	Mean
COST	Equal variances	2.782	28	.010	2602.8507

TABLE 18. EFFCT OF COMPLICATIONS ON CONVALESCENCE &COST EFFECTIVENESS

	COMPLI	N	Mean	Std. Deviation	Std. Error
CONVAL	Y	5	10.8000	3.83406	1.71464
	N	25	7.6400	3.48664	.69733
COST	Y	. 5	12630.000	2896.12672	1295.187
	N	25	8586.4000	2315.95216	463.1904

	t-test for Equality of Means			
	T	df	Sig. (2-tailed)	Mean Difference
CONVAL	1.823	28	.079	3.1600
COST	3.429	28	.002	4043.6000

TABLE 19. CONVALESCENCE OF STUDY GROUP VS LAPAROTOMY & CLOSURE IN ASRAM HOSPITAL

	N	Mean	Std. Deviation	Std. Error Mean
CONVAL	13	5.0000	1.73205	.48038
	Test Value = 8			
	T	df	Sig. (2-tailed)	Mean Difference
CONVAL	-6.245	12	.000	-3.0000

TABLE 20. COST EFFECTIVENESS OF STUDY GROUP VS LAPAROTOMY & CLOSURE IN ASRAM HOSPITAL

	N	Mean	Std. Deviation	Std. Error Mean
COST	13	7785.3846	3053.03842	846.76051
	Test Value = 10000			
	T	df	Sig. (2-tailed)	Mean Difference
COST	-2.615	12	.023	-2214.6154

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DISCUSSION

Our aim of the study is to study the role of diagnostic laparoscopy for staging in abdominal malignancies. Diagnostic laparoscopy was performed in each patient immediately before the planned elective surgery. 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. It is similar to that seen in other studies. Ozmen MM et al [1] study comprised 48patients ranging from 26 - 72 years (mean 54.5) v/ith 26 males and 22 females. Hemming AW et al ~ study comprised 162 patients with patients ranging from 28 to 89 years (mean 67 years) and male to female ratio of 3:2. Lehnert T et al[82]study comprised 120 patients ranging from 30 - 84 years (mean 65 years) with 78 males & 42 females.

Tumour site : Study group had 30 cases comprising 15 (50.0%) cases of stomach tumour, 13 (43.3%) cases of colorectal & 2 (6.7%) cases of biliary tract tumours. Muntean V et al[2]study comprised 119 cases with 6 primary locations studied. Stomach tumours were 45 (37.8%), 20 (16.8%)cases of colon tumour and only 4 cases of biliary tract tumours.

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[3] had 3(20%) patients with liver metastases out of 15 patients undergoing staging laparoscopy precluding surgery. Muntean V et al[2] study revealed liver metastases in 12(12.12%) patients out of 99 patients. But 18 out of 20 cases of colon tumour had liver metastases with 2 of them being unresectable. Ozmen MM et al[80] study showed liver metastases in 18 (33.3%) cases out of total 48 patients. Thus in various studies, Liver metastases on diagnostic laparoscopy are found in about 12 - 33% of cases. It was seen in 20% of cases in our study, which was found to be similar to other similar studies.

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 study revealed peritoneal seedling in 32 (32.3%) cases & in 1 case of colon malignancy out of 20cases. Ozmcn MM et al[1] study on gastric cancer revealed peritoneal seeding in 8 cases (16,6%) out of 48. Thus previous studies have revealed Peritoneal seedling 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 case had free fluid evident on pre operative imaging modality had negative cytology on Ascitic fluid analysis pre operatively. Ozmen MM et al[3] had positive peritoneal cytology in 11 cases out of 48 (22.9%). Our study results are not comparable to other studies as peritoneal cytology was not routinely performed procedure. It was not done if no ascitic fluid was found on staging laparoscopy.

Omental, Mesentric & 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 resulted in omental nodules. Mesentric & Pelvic Nodules are not found commonly and 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 tumour had Secondaries on bilateral ovaries found on staging laparoscopy. Mesentric nodules were seen in 2 cases of stomach tumours.1 case of stomach tumour was found to have splenic nodule.

Lymph Node status: Lymph nodes were found to be involved by lymphatic spread from tumour which is seen quite early in tumour 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 Tumour 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 al2 in his study had 36 (36.4%) patients avoided from undergoing unnecessary laparotomies. Hemming AW et al4 in their study feel that laparoscopic staging in intraabdominal malignancies is of value & will prevent upto 36% of futile laparotomies. 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 had severe obstructive symptoms and thus present later in the disease stage. Further subdivision according to tumour site revealed 10 cases of stomach malignancies to be unresectable out of total 15 cases(66.66%).

Further they were analysed according to endoscopic site of tumour which revealed 7 out of 10 cases from body of stomach. Tumour in body of stomach present in later stages of disease as patient does not develop prominent obstructive symptoms seen in fundic or pyloric tumours. 2 cases of pyloric tumour & 1 fundic tumour were found to be unresectable. Muntean V et al 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[4] 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 66.66% of stomach tumour were found to be unresectable which was higher compared to other studies probably because body of the stomach constituted major part of all the stomach tumours. 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 tumour was found to be unresectable on Staging Laparoscopy. Muntean V et a I2 found in his study that 4 cases(20%) to be unresectable. Grobmyer SR et al[5] in their study on Diagnostic laparoscopy prior to planned hepatic resection for colorectal metastases found in their study that staging laparoscopy prevented nontherapeutic celiotomy in 10% of patients. In our study only Laparoscopy was used for imaging liver metastases from colorectal malignancies and no use of LUS was made resulting in lower detection of hepatic metastases.

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

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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. Total 17 cases were found to be resectable on Staging Laparoscopy out of which 16 (94%) cases underwent definitive procedure. 1 case (6%) was found to be unresectable on laparotomy which was not found on Staging Laparoscopy due to infiltration into the pancreas.

1 case of unresectable colorectal tumour underwent colostomy & other

7 unresectable cases underwent palliative procedure.

6 cases underwent only laparoscopic biopsy as only procedure after staging laparoscopy.

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 was no mortality in the study group. 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. (P - 0.000)

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; P = 0.000) when it is the only procedure required. Similar evidence is found in various studies. In his study Muntean V et al[2] average length of stay after SL compares favourably with open exploration. In study performed by Jarnagin WR et al[6] on diagnostic laparoscopy in resectable hepatic colorectal metastases compared with open laparotomy, hospital length of stay was significantly lower.

Cost effectiveness :
Mean cost for study group was Rs 8,897 (4,665 - 16,150). Cost for Unresectable group was significantly lower compared to resectable group (P = 0.01). Cost in patients having complications following surgery was also found to be significantly higher compared to other group without complications (P = 0.002).

Cost effectiveness of staging laparoscopy, compared to open procedure was also found to be significantly lower (P=0.023) when performed as the only procedure for the patient. In similar study done by Muntean V et al2 when done as only procedure SL resulted in 55 -60% reduction in total 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. (P - 0.000) 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; P = 0.000) when it is the only procedure required. Similar evidence is found in various studies. In his study Muntean V et al[2] average length of stay after SL compares favourably with open exploration. In study performed by Jarnagin WR et al[6] on diagnostic laparoscopy in resectable hepatic colorectal metastases compared with open laparotomy, hospital length of stay was significantly lower.

Cost effectiveness : Mean cost for study group was Rs 8,897 (4,665 - 16,150). Cost for Unresectable group was significantly lower compared to resectable group (P = 0.01). Cost in patients having complications following surgery was also found to be significantly higher compared to other group without complications (P = 0.002). Cost effectiveness of staging laparoscopy, compared to open procedure was also found to be significantly lower (P=0.023) when performed as the only procedure for the patient. In similar study done by Muntean V et al2 when done as only procedure SL resulted in 55 -60% reduction in total hospital charges.

According to Practical/Clinical Guidelines published by SAGES in 11/2007, high quality evidence is lacking on cost effectiveness of staging laparoscopy. The literature suggests that staging laparoscopy is more cost effective than open exploration when it is the only procedure.

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 al2 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.

CONCLUSION
Staging laparoscopy 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 tumour when compared to colorectal cancers. Staging Laparoscopy gives additional information regarding extent of the disease intrabdominally 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. Staging Laparoscopy has been found to significantly decrease the hospital stay & cost expenditure when compared to open exploration.

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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