Original Article ISSN (O):2395-2822; ISSN (P):2395-2814

A Prospective Study to Assess the Role of Diagnostic Laparoscopy and Special Emphasis on Staging in Patients with Intraabdominal Malignancy.

Avishek Mandal[1], Makhan Lal Saha[2], Diptendra K Sarkar[2], Sujitesh Saha[3]

[1]Senior Resident, Bidhannagar Subdivisional Hospital, Kolkata.
[2]Professor, Department of General Surgery, IPGME&R & SSKM Hospital, Kolkata.
[3]Associate Professor, Department of Pediatric Surgery, IPGME&R & SSKM Hospital, Kolkata.

Received: May 2019
Accepted: June 2019

ABSTRACT

Background: Aim of this study is to use staging laparoscopy to accurately define the extent of disease, direct appropriate therapy and avoid unnecessary intervention. Routine laparoscopy before laparotomy, especially in cancers which have equivocal operability helps to avoid unnecessary laparotomies. **Methods:** Patients with intra abdominal malignancies (carcinoma of gall bladder, stomach, and colon) who have operable disease on preoperative imaging will be taken for diagnostic laparoscopy and the findings will be corroborated with the findings in laparoscopy. Laparoscopy will include assessment of distant metastasis (liver/peritoneum/omentum), resectability of the disease, and biopsy from lesions of uncertain diagnosis. **Results:** Out of 35 patients taken in this study, 29 patients were operable on radiology and 6 patients had uncertain operability. Out of these 29 patients, only 15 patients were found to be resectable on diagnostic laparoscopy and underwent definitive resection. Out of the rest 14 patients, 7 had isolated peritoneal metastasis, 3 had only liver metastasis (single or multiple) and 4 had both liver and peritoneal metastasis which was confirmed on frozen section and histopathological examination. **Conclusion:** Diagnostic laparoscopy can reduce the number of unnecessary laparotomies that seem resectable on radiology but are found to be irresectable on laparoscopy. It can aid in diagnosis of uncertain malignancies in which image guided biopsy is not recommended in operable disease on radiology (e.g. gall bladder malignancy). It also helps to prove metastatic disease by taking biopsy from peritoneal nodules, or liver nodules along with avoiding a morbid unnecessary laparotomy.

Keywords: Diagnostic laparoscopy, Staging, Intra-abdominal malignancy.

INTRODUCTION

Diagnostic laparoscopy (DL) has become an important tool in the evaluation of patients with certain gastrointestinal malignancies which are being considered for curative resection. Many patients with digestive cancers present with locally advanced or metastatic disease and therefore accurate staging assists in the appropriate treatment selection for cure or palliation. Moreover, research regarding neoadjuvant protocols for locally advanced cancers is ongoing, which makes accurate staging imperative. Even after modern preoperative imaging screening (trans-abdominal and endoscopic ultrasound, CT scan, MRI and PET scan), many patients are found to have unsuspected, unresectable disease at exploration. Laparoscopy allows a surgeon to diagnose and obtain information about dissemination of disease and to diagnose patients with equivocal radiological findings. This procedure enables the direct inspection of intra-abdominal organs and facilitates obtaining biopsy specimens and aspiration cytology which is sometimes not possible by image guidance. The magnified view of the laparoscope helps in diagnosing and staging GI cancers and enables the surgeon to detect small liver or peritoneal metastases that are not visible with current non-invasive imaging modalities. On the other hand, typically, surgery for these types of cancers are associated with a significant degree of morbidity and poor recovery that would be best avoided if it were known that disease progression was worse than originally radiologically staged.

We undertook a prospective study to assess the value of DL in patients with intra-abdominal malignancy particularly in terms of staging of intra-abdominal malignancy, to collect information complementary to radio-imaging modalities and to compare them, to assess operability and inoperability by confirmation of imaging studies, documentation of hepatic or peritoneal metastases, cytological evaluation of ascitic fluid, plan and documentation of appropriate

Name & Address of Corresponding Author
Dr. Sujitesh Saha,
Associate Professor,
Department of Pediatric Surgery,
IPGME&R & SSKM Hospital,
Kolkata.

treatment i.e.neo-adjuvant, curative or palliative following diagnostic laparoscopy and to analyse the incidence of perioperative morbidity and mortality related to procedure

MATERIALS AND METHODS

We conducted a prospective observational study between January2016 to September 2017 with a minimum 30 patients in the Department of General Surgery, IPGMER and SSKM Hospital. All patients>18 years of age diagnosed or suspected to have intra-abdominal malignancy and planned for any major abdominal procedure, or any patient with suspected or known non-metastatic GI cancers with doubtful resectability by clinical assessment and pre-operative imaging, tumours with doubtful fixity to adjacent structures, especially organs that cannot be salvaged were included in the study. Any Stage-IV or non-resectable disease on imaging, hepatic and pancreatic malignancy, patients with non-GIT cancers (lymphoma, gynaecologic cancers, genitourinary cancers, retroperitoneal sarcoma, sarcoma and abdominal metastasis of non-GI cancers) and metastatic cancers which were beyond the scope of curative surgery, patients those not fit for general anaesthesiawere excluded from the study. Patients were assessed by history, clinical examination. Informed consent wastaken, and patients were counselled about the possible outcome. Fitness for anaesthesia and major surgery was assessed by routine investigations. Pathological diagnosis was confirmed by cytological or histopathological examination of material retrieved by percutaneous, endoscopic or colonoscopic means. Operability was assessed by relevant radiological investigations.

Operative procedure

DL and ascitic fluid cytology were performed under general anaesthesia with endotracheal intubation, immediately before planned laparotomy. A thorough evaluation of peritoneal surfaces was performed. The suprahepatic and infrahepatic spaces, surface of the bowel, lesser sac, the root of the transverse mesocolon and small bowel, the ligament of Treitz, the paracolic gutters and the pelvis were inspected with bed position changes as necessary. The lesser sac was opened when required. For the lower oesophageal cancers, the exploration of diaphragmatic hiatus was achieved through the incision of the esophagocardial peritoneal fold and blunt dissection with retraction of the stomach to the patient's right or left. Biopsies and frozen sections were examined for any suspicion abdominal lesions. When no metastatic disease was identified on inspection, open laparotomy was immediately performed in the patients without distant metastasis or with certain primary tumour resectability by DL. Postoperatively, pathological diagnosis (pTNM), recovery period and perioperative complications were assessed.

RESULTS

A total 35 patients who were diagnosed previously to have no metastatic disease on pre-operative clinical evaluation and imagingwere included in our study, following all inclusion and exclusion criteria.

DL picked up 18 patients (51.4%, n=35) to have occult, previously unidentified unresectable primary or secondary lesion over radiology. Unnecessary Laparotomy could be avoided in them.

Rest of 17 patients underwent laparotomy in the intent of definitive resection. Four more patients (11.4%, 4 of 35) were found to have unresectable lesions which could be confirmed only on laparotomy. These four patientswere sent to Neo-adjuvant therapy; based on DL.

After both DL and Laparotomy, only 37% (13 out of 35) patients, were found to have resectable disease.Comparison of resectability of primary tumour by different methods is given in [Table 1].

Table 1: Comparison of Resectability of primary tumour

Resectability	Radiological (N=35)	Laparoscopy (N=35)	Laparotomy (n=17)
Resectable	82.9%	42.9% (n=15)	76.5% (n=13)
Unresectable	0%	51.4% (n=18)	23.5% (n=4)
Uncertain	8.6%	5.7% (n=2)	0.0%

Test of proportion showed that laparoscopy detected significantly higher proportion of unresectable primary tumours compared to radiological ($Z=3.7$; $p<0.05$).

DL has diagnosed all the patients with metastasis i.e.14 cases out of 35, and radiology has identified the only suspicion of 6 cases preoperatively.

DISCUSSION

Our study was conducted for evaluation of role diagnostic laparoscopy as a diagnostic and staging tool for intra-abdominal cancers. Four primary locations were studied: stomach, colon, gall bladder, and bile duct. All these patients were candidates for curative treatment based on their radiological investigations. DL was used as a tool for diagnosing, staging, and assessment of intra-abdominal malignancies in terms of primary tumour resectability, lymph node status and distant metastasis. Complications and morbidity related to procedure were assessed.

Many previous studies showed slight male preponderance for gastrointestinal malignancies.[1,2] Colon cancer was found to be most common cancer, followed by stomach, liver and biliary system. Adenocarcinoma accounted for the majority of the gastrointestinal malignancies.[3-5]

Muntean et al.[1] performed staging laparoscopy in 165 patients with digestive cancers and found that unnecessary laparotomy was avoided in 36(36.4%) of the patients without distant metastasis on imaging pre-therapeutic staging. In our study, DL identified 18(51.4%) patients of radiologically unidentified unresectable primary tumour. Patients with unresectable primary tumour but having no metastatic disease (4 Patients) underwent neoadjuvant therapy.

A retrospective analysis of 193 cases by Popova et al,[6] showed that surgery for GC could have been avoided in 42.5% of instances if laparoscopy had been instituted during the initial evaluation. Another prospective comparative study by Stell et al 61 in 103 patients showed that laparoscopy was more accurate in detecting metastases than ultrasound and CT. In a study of 92 patients by Conlon et al,[8] conducted at Memorial Sloan-Kettering Cancer Centre, Conlon and Karpeh reported that in one-third of the group, laparoscopy identified metastatic disease that had gone undetected by preoperative imaging. D'Ugo et al,[9] found undetected metastasis disease in 13% to 57% of patients with gastric cancers initially staged resectable by conventional modalities. Thus, exploratory laparotomy was avoided in over 20% patients.

In our study unnecessary laparotomy were avoided in 13 of the 35 patients who were diagnosed as having no metastatic disease on clinical evaluation (M0-cTNM) by preoperative imaging, contributing to 37.1 %.

Study by D'Angelica,[10] on hilar cholangiocarcinoma and Ca GB done in Memorial Sloan Kettering Cancer Centre, laparoscopy identified 84 inoperable cases out of 153, increasing resectability from 62% to 78%.In present study although DL could pick up 18 patients (51.4%) of unidentified unresectable primary lesion over radiology, it still missed unresectable primary lesions in 4 patients (11.4%) which could be confirmed only on laparotomy.

In Muntean et al.[56] DL done in 99 patients and 61 patients found unsuspected peritoneal and liver lesions. Among these, 36 patients had frozen section positive metastatic disease (hepatic 4, peritoneal 24 and hepatic and peritoneal 8).

In our study, DL done in 35 patients with either no evidence of metastasis (M0-cTNM) or lesions suspicious of metastasis in radiological evaluation, 14 patients (40%) found to have unsuspected peritoneal and liver lesions. Among these 14 patients,3 having only hepatic lesions (8.6%), 7(20%) with only peritoneal lesions and 4(11.4%) having both hepatic and peritoneal lesions. Frozen section and biopsy were found to positive in all 11 cases having peritoneal metastasis on DL.

In one prospective multi-institutional study by national cancer institute11, US, CT scan, magnetic resonance imaging and endoscopic ultrasound failed to identify 25% of metastatic disease identified by DL. In our study DL diagnosed distant metastasis disease in 14(40%) which were missed by preoperative radiology.

Reported complications have been rare and include bleeding, infection, visceral injury, bile leak (particularly if liver biopsy was performed) and anaesthesia related complications. Procedure related morbidity has been reported between 0 and 4%.[12,13] In another study 119 patients with DL, we observed 3 (2.5%) complications and no death56.Nair C K et al14reported complication rate of 25 % in diagnostic laparoscopy in gastrointestinal malignancy.

Our study revealed per-operative complications including 2 cases of bleeding, and 2 cases of postoperative morbidity in the form of wound infection. Overall morbidity in this study is 11.4% without any mortality.

Average length of hospital stay after SL was 1-3 days, which compares favourably with open exploration.[56,65] Staging laparoscopy is more cost-effective than open exploration when it is the only procedure required, with a 55-60% reduction in total hospital charges.[16]

It is notable that patients remained in hospital for an average of 3.97 days only. Most of patients began oral intake next day itself.[56] The average duration of keeping patients nil per mouth in post diagnostic laparoscopy was 10 ± 2 hours (range 8-10 hours) and the median was 9 hours.

Studies showed total hospital stay was 2.02±0.66 days (range 1-3 days) and the median was 2 days for patients who underwent only DL. The mean operative time of SL was 48 minutes and the immediate morbidity 2.5%56. The mean operative time in our study was 49.31± 9.95 minutes with a medianof 50 minutes thus being comparable to previous studies.

Our study was limited with small sample size. This study has not considered other gastrointestinal malignancies (pancreatic, hepatic).

CONCLUSION

To conclude, DL can significantly reduce the number of unnecessary laparotomies in cases which are deemed resectable on radiology. It can aid in diagnosis of uncertain malignancies in which image guided biopsy is not recommended in operable disease on radiology (e.g. gall bladder malignancy). It also helps to prove metastatic disease by taking biopsy from peritoneal nodules, or liver nodules, Lymph nodes or samples for Ascitic fluid study. However, further studies are required including all gastrointestinal cancers with a larger sample size in a multi institutional setting.

REFERENCES

1. West MA, Hackam DJ, Baker J, Rodriguez JL, Bellingham J, Rotstein OD. Mechanism of decreased in vitro murine macrophage cytokine release after exposure to carbon dioxide: relevance to laparoscopic surgery. Ann Surg. 1997 Aug;226(2):179-90.
2. Kopernik G, Avinoach E, Grossman Y, Levy R, Yulzari R, Rogachev B, Douvdevani A. The effect of a high partial pressure of carbon dioxide environment on metabolism and immune functions of human peritoneal cells-relevance to carbon dioxide pneumoperitoneum. Am J Obstet Gynecol. 1998 Dec;179(6 Pt 1):1503-10.
3. Wu FP, Sietses C, von Blomberg BM, van Leeuwen PA, Meijer S, Cuesta MA. Systemic and peritoneal inflammatory response after laparoscopic or conventional colon resection in cancer patients: a prospective, randomized trial. Dis Colon Rectum. 2003 Feb;46(2):147-55
4. Vallina VL, Velasco JM. The influence of laparoscopy on lymphocyte subpopulations in the surgical patient. SurgEndosc. 1996 May;10(5):481-4.
5. Allendorf JD, Bessler M, Whelan RL, Trokel M, Laird DA, Terry MB, Treat MR.Better preservation of immune function after laparoscopic-assisted vs. open bowelresection in a murine model. Dis Colon Rectum. 1996 Oct;39(10 Suppl):S67-72
6. Mandy Perrin, Anaesthesia Critical Care & Pain, Volume 4, Issue 4, 1 August 2004, Pages 107–110
7. Chui PT, Gin T, Oh TE. Anaesthesia for laparoscopic general surgery. Anaesth Intensive Care 1993; 21: 163 –71
8. Gutt CN, Kim ZG, Hollander D, Bruttel T, Lorenz M. CO2 environment influences the growth of cultured human cancer cells dependent on insufflation pressure.SurgEndosc. 2001 Mar;15(3):314-8. Epub 2000 Oct 20.
9. Basson MD, Yu CF, Herden-Kirchoff O, Ellermeier M, Sanders MA, Merrell RC,Sumpio BE. Effects of increased ambient pressure on colon cancer cell adhesion. J Cell Biochem. 2000 Apr;78(1):47-61.
10. Volz J, Köster S, Spacek Z, Paweletz N. The influence of pneumoperitoneum used in laparoscopic surgery on an intraabdominal tumor growth. Cancer. 1999 Sep 1;86(5):770-4.
11. Kooby DA. Laparoscopic surgery for cancer: historical, theoretical, and technical considerations. Oncology (Williston Park). 2006 Jul;20(8):917-27; discussion 927-8, 931-2.
12. Yeole BB. Trends in cancer incidence in esophagus, stomach, colon, rectum and liver in males in India. Asian Pac J Cancer Prev. 2008 Jan-Mar;9(1):97-100.
13. Kindermann, Guenther MD; Maassen, Volker MD; Kuhn, Walter MDLaparoscopic Management of Ovarian Tumors Subsequently Diagnosed as Malignant, Journal of Pelvic Surgery: September 1996
14. Franklin ME Jr, Rosenthal D, Abrego-Medina D, Dorman JP, Glass JL, NoremR,Diaz A. Prospective comparison of open vs. laparoscopic colon surgery for carcinoma. Five-year results. Dis Colon Rectum. 1996 Oct;39(10 Suppl):S35-46
15. Kwok, SPY, Lau, WY, Carey, PD, Kelly, SB, Leung, KL, Li, AKC 1996Prospective evaluation of laparoscopic-assisted large-bowel excision for cancer.Ann Surg223170176
16. Stellato TA. History of laparoscopic surgery. Surg Clin North Am. 1992 Oct;72(5):997-1002.
17. Leung, KL, Yiu, RYC, Lai, PBS, Lee, JFY, Thung, KH, Ch, B, Lau, WY 1999Laparoscopic-assisted resection of colorectal carcinoma: five-year audit.Dis Colon Rectum42327332
18. Hoffman GC, Baker JW, Doxey JB, Hubbard GW, Ruffin WK, Wishner JA. Minimallyinvasive surgery for colorectal cancer. Initial follow-up. Ann Surg. 1996Jun;223(6):790-6; discussion 796-8. PubMed PMID: 8645052;
19. Fleshman JW, Fry RD, Birnbaum EH, Kodner IJ. Laparoscopic-assisted and mini laparotomy approaches to colorectal diseases are similar in early outcome.Dis Colon Rectum. 1996 Jan;39(1):15-22.
20. Patankar SK, Larach SW, Ferrara A, Williamson PR, Gallagher JT, DeJesus S, Narayanan S. Prospective comparison of laparoscopic vs. open resections for colorectal adenocarcinoma over a ten-year period. Dis Colon Rectum. 2003 May;46(5):601-11.
21. Schlachta, CM, Mamazza, J, Seshadri, PA, Cadeddu, M, Poulin, EC 2000Determinants of outcomes in laparoscopic colorectal surgery.Surg Endosc14258263
22. Stocchi, L, Nelson, H, Yonug-Fadok, TM, Larson, DR, Ilstrup, DM 2000Safety and advantages of laparoscopic vs. open colectomy in the elderly.Dis Colon Rectum43326332
23. Gleeson NC, Nicosia SV, Mark JE, Hoffman MS, Cavanagh D. Abdominal wall metastases from ovarian cancer after laparoscopy. Am J Obstet Gynecol. 1993 Sep;169(3):522-3
24. Koji Yamaguchi, Kazuo Chijiiwa, Hitoshi Ichimiya, Masayuki Sada, Katsuhiko Kawakami, FujihikoNishikata, Kohki Konomi, Masao Tanaka. Gallbladder Carcinoma in the Era of Laparoscopic Cholecystectomy. Arch Surg.1996;131(9):981–984
25. Castillo OA, Vitagliano G. Port site metastasis and tumor seeding in oncologic laparoscopic urology. Urology. 2008 Mar;71(3):372-8
26. Cook TA, Dehn TC. Port-site metastases in patients undergoing laparoscopy for gastrointestinal malignancy. Br J Surg. 1996 Oct;83(10):1419-20
27. Eng MK, Katz MH, Bernstein AJ, Shikanov S, Shalhav AL, Zorn KC.J Endourol. Laparoscopic port-site metastasis in urologic surgery 2008 Aug; 22(8):1581-5.
28. Ramirez PT, Wolf JK, Levenback C. Laparoscopic port-site metastases: etiology and prevention. Gynecol Oncol. 2003 Oct;91(1):179-89.
29. Wang PH, Yuan CC, Lin G, Ng HT, Chao HT. Risk factors contributing to early occurrence of port site metastases of laparoscopic surgery for malignancy. Gynecol Oncol. 1999 Jan;72(1):38-44.
30. Neuhaus SJ, Texler M, Hewett PJ, Watson DI. Port-site metastases following laparoscopic surgery. Br J Surg. 1998 Jun;85(6):735-41.
31. Mathew G, Watson DI, Ellis T, De Young N, Rofe AM, Jamieson GG. The effect of laparoscopy on the movement of tumor cells and metastasis to surgical wounds.SurgEndosc. 1997 Dec;11(12):1163-6
32. Agostini A, Camatte S, Farthouat P, Blanc B, Lecuru F. [Port-site metastases following laparoscopic surgery]. Bull Cancer. 2000 Dec;87(12):902-6.
33. Canis M, Botchorishvili R, Wattiez A, Pouly JL, Mage G, Manhes H, BruhatMA.Cancer and laparoscopy, experimental studies: a review. Eur J ObstetGynecolReprod Biol. 2000 Jul;91(1):1-9.
34. Tsioulias GJ, Wood TF, Chung MH, Morton DL, Bilchik A; Diagnostic laparoscopy and Laparoscopic ultrasonography optimize the staging and resectability of intraabdominal neoplasms. SurgEndosc., 2001; 15(9): 1016-1019.
35. Ozmen MM, Zulfikaroglu B, Ozalp N, Ziraman I, Hengirmen S, Sahin B; Staging laparoscopy for gastric cancer. SurgLaparoscEndoscPercutan Tech., 2003;13(4): 241-244.
36. Cuschieri A; Role of video-laparoscopy in the staging of intra-abdominal lymphomas and gastrointestinal cancer. SeminSurg Oncol.,2001; 20(2): 167-172.
37. Krasna MJ, Flowers JL, Attar S, McLaughlin J. Combined thoracoscopic/laparoscopic staging of esophageal cancer. J Thorac Cardiovasc Surg. 1996 Apr;111(4):800-6; discussion 806-7
38. Krasna MJ, Reed CE, Jaklitsch MT, Cushing D, Sugarbaker DJ. Thoracoscopic staging of esophageal cancer: a prospective, multiinstitutional trial. Cancer and Leukemia Group B Thoracic Surgeons. Ann Thorac Surg. 1995 Nov;60(5):1337--40

39. Nakagawa S, Nashimoto A, Yabusaki H. Role of staging laparoscopy with peritoneal lavage cytology in the treatment of locally advanced gastric cancer. Gastric Cancer 2007; 10: 29-34
40. Warshaw AL, Tepper JE, Shipley WU. Laparoscopy in the staging and planning of therapy for pancreatic cancer. Am J Surg 1986; 151:76-80.
41. Andrén-Sandberg A1, Lindberg CG, Lundstedt C, Ihse I; Computed Tomography and Laparoscopy in the Assessment of the patientwith Pancreatic Cancer. J Am Coll Surg., 1998; 186(1): 35-40.
42. Van Dijkum EJ, de Wit LT, van Delden OM, Kruyt PM, van Lanschot JJ, Rauws EA et al.; Staging laparoscopy and laparoscopic ultrasonography in more than 400 patients withupper gastrointestinal cancer. J Am Coll Surg.,1999: 189:459-465.
43. Conlon KC, Dougherty E, Klimstra DS, Coit DG, Turnbull AD, Brennan MF. The value of minimal access surgery in the staging of patients with potentially resectableperipancreatic malignancy. Ann Surg1996;223:134–140.
44. Stefanidis D, Grove KD, Schwesinger WH, Thomas CR Jr. The current role of staging laparoscopy for adenocarcinoma of the pancreas: a review. Ann Oncol. 2006 Feb;17(2):189-99.
45. Warshaw AL, Tepper JE, Shipley WU. Laparoscopy in the staging and planning of therapy for pancreatic cancer. Am J Surg 1986; 151:76-80
46. Catena F, Di Battista M, Fusaroli P, Ansaloni L, Di Scioscio V, Santini D,Pantaleo M, Biasco G, Caletti G, Pinna A. Laparoscopic treatment of gastric GIST:report of 21 cases and literature's review. J Gastrointest Surg. 2008 Mar;12(3):561-8. Epub 2007 Nov 27.
47. Babineau TJ, Lewis WD, Jenkins RL, Bleday R, Steele GD Jr, Forse RA. Role of staging laparoscopy in the treatment of hepatic malignancy. Am J Surg. 1994 Jan;167(1):151-4; discussion 154-5.
48. Fuks D, Regimbeau JM. [Role of exploratory laparoscopy in hepato-biliary malignancies]. J Chir (Paris). 2008 Jan-Feb;145(1):16-9. Review. French.
49. Alan T. Lefor, MD, MPH Laparoscopic Interventions in Lymphoma Management Surgical Innovation ,Vol 7, Issue 2, pp. 129 - 13
50. Wyler SF, Sulser T, Seifert HH, Ruszat R, Forster TH, Gasser TC, Bachmann A.Laparoscopic extended pelvic lymph node dissection for high-risk prostate cancer.Urology. 2006 Oct;68(4):883-7.
51. Corvin S, Schilling D, Eichhorn K, Hundt I, Hennenlotter J, Anastasiadis AG,Kuczyk M, Bares R, Stenzl A. Laparoscopic sentinel lymph node dissection--a novel technique for the staging of prostate cancer. Eur Urol. 2006 Feb;49(2):280-5.
52. Bhayani SB, Allaf ME, Kavoussi LR. Laparoscopic RPLND for clinical stage I nonseminomatous germ cell testicular cancer: current status. Urol Oncol. 2004 Mar-Apr;22(2):145-8.
53. Steiner RA, Fehr PM. [Minimal invasive surgery in gynaecology]. Ther Umsch.2005 Feb;62(2):127-38.
54. Delpech Y, Tulpin L, Bricou A, Barranger E. [Lymph node surgical staging for locally advanced cervical cancer]. GynecolObstetFertil. 2010 Jan;38(1):30-5.
55. Muntean V, Oniu T, Lungoci C, et al. Staging laparoscopy in digestive cancers. J Gastrointestin Liv Dis. 2009;18(4):461–7
56. Nassour I, Fullington H, Hynan LS, Yopp AC, Augustine MM, Polanco PM, Choti MA, Mansour JC, Wang SC, Porembka MR. The Yield of Staging Laparoscopy in Gastric Cancer is Affected by Racial and Ethnic Differences in Disease Presentation. Ann Surg Oncol. 2017 Jul;24(7):1787-1794.
57. Abudu EK, Akinbami OS. Histopathologic Prolife of Primary Gastrointestinal Malignancies in Uyo City (Niger-Delta Region of Nigeria). Rare Tumors. 2016;8(1):6183. doi:10.4081/rt.2016.6183.
58. Najafi F, Mozaffari HR, Karami M, Izadi B, Tavvafzadeh R, Pasdar Y. Trends in Incidence of Gastrointestinal Tract Cancers in Western Iran, 1993-2007. Iranian Red Crescent Medical Journal. 2011;13(11):805-810.
59. Sharma A. Gastrointestinal cancers in India: Treatment perspective. South Asian Journal of Cancer. 2016;5(3):125-126. doi:10.4103/2278-330X.187580.
60. Machairas N, Charalampoudis P, Molmenti EP, et al. The value of staging laparoscopy in gastric cancer. Annals of Gastroenterology. 2017;30(3):287-294. doi:10.20524/aog.2017.0133.
61. Stell DA, Carter CR, Stewart I, et al: Prospective comparison of laparoscopy, ultrasonography, and computed tomography in the staging of gastric cancer. Br J Surg 83:1260-1262, 1996.
62. Conlon KCP, Karpeh MS: Laparoscopy and laparoscopic ultrasound in the staging of gastric cancer. Semin Oncol 23:347-351, 1996.
63. D'Ugo DM, Coppola R, Persiani R, Ronconi P, Caracciolo F, PicciocchiA.Immediately preoperative laparoscopic staging for gastric cancer. Surg Endosc.1996 Oct;10(10):996-9.
64. D'Angelica M, Fong Y, Weber S, Gonen M, DeMatteo RP, Conlon K, Blumgart LH, Jarnagin WR. The role of staging laparoscopy in hepatobiliary malignancy: prospective analysis of 401 cases. Ann Surg Oncol. 2003 Mar;10(2):183-9.
65. Krasna MJ, Flowers JL, Attar S, McLaughlin J. Combinedthoracoscopic/laparoscopic staging of esophageal cancer. J Thorac Cardiovasc Surg. 1996 Apr;111(4):800-6; discussion 806-7.
66. Chang L, Stefanidis D, Richardson WS, Earle DB, Fanelli RD. The role of staging laparoscopy for intraabdominal cancers: an evidence-based review. SurgEndosc. 2009 Feb;23(2):231-41. doi: 10.1007/s00464-008-0099-2. Epub 2008 Sep 24.Review.
67. Bemelman WA1, Nieveen van Dijkum EJ, de Wit LT, GoumaDJ.Staging laparoscopy for gastrointestinal malignancies: current indications.Z Gastroenterol. 2001 Jan;39(1 Suppl):25-8.
68. Nair CK, Kothari KC. Role of diagnostic laparoscopy in assessing operability in borderline resectable gastrointestinal cancers. J Minim Access Surg. 2012 Apr;8(2):45-9. doi: 10.4103/0972-9941.95533. PubMed PMID: 22623825;
69. Jarnagin WR, Conlon K, Bodniewicz J, Dougherty E, DeMatteo RP, BlumgartLH,Fong Y. A clinical scoring system predicts the yield of diagnostic laparoscopy in patients with potentially resectable hepatic colorectal metastases. Cancer. 2001 Mar 15;91(6):1121-8.
70. Morris S, Gurusamy KS, Sheringham J, Davidson BR. Cost-effectiveness of diagnostic laparoscopy for assessing resectability in pancreatic and periampullary cancer. BMC Gastroenterology. 2015;15:44. doi:10.1186/s12876-015-0270-x.

How to cite this article: Mandal A, Saha ML, Sarkar DK, Saha S. A Prospective Study to Assess the Role of Diagnostic Laparoscopy and Special Emphasis on Staging in Patients with Intraabdominal Malignancy. Ann. Int. Med. Den. Res. 2019; 5(4):SG57-SG61.

Source of Support: Nil, **Conflict of Interest:** None declared