International Surgery Journal
Sonkar S et al. Int Surg J. 2019 Jan;6(1):119-125
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20185137

Original Research Article

Evaluation of role of staging laparoscopy as an adjunct to CECT abdomen staging in carcinoma stomach

Santosh Sonkar, Rajendra Ratre*, Sandeep Chandrakar, Utkarsh Nanda

Department of General Surgery, Pt. J.N.M. Medical College, Raipur, Chhattisgarh, India

Received: 09 December 2018
Accepted: 14 December 2018

***Correspondence:**
Dr. Rajendra Ratre,
E-mail: raj.SU07@gmail.com

ABSTRACT

Background: Gastric cancer (CG) is the fifty most common cancer among males and seventh most common cancer among females in India. Prognosis in gastric cancer is very much related to pathological staging. Over the last decade management of gastric cancer has evolved from surgeon to multidisciplinary approach. Laparoscopy has been proposed as an accurate staging modality in a variety of upper gastrointestinal malignancies.
Methods: The present cross-sectional prospective hospital-based study was conducted in the department of surgery, pt. J.N.M medical college Raipur, Chhattisgarh, India, during study period July 2016 to June 2018. All the patients of endoscopic biopsy proven gastric cancer (50 cases) who presented during study period and satisfied the inclusion criteria underwent investigations like hemogram, renal function tests, liver function tests, CEA, CA 19-9, chest X-ray, CECT Abdomen and pelvis, staging laparoscopy. Standard protocols were followed for CECT abdomen scan, staging laparoscopy. Appropriate management of the cases were done.
Results: In this study, most common symptom associated with carcinoma stomach was upper abdominal pain which was present in 42 cases (84%). Most common site for tumor was pylorus in 38 cases (76%). 2nd most common site for tumor was fundus in 8 cases (16%) followed by body in 3 cases (6%) and diffuse in 1 case (2%). CECT staged 2 cases (4%) as stage I (IA-0, IB-2), 11 cases (22%) as stage II (IIA-3, IIB-8) and 37 cases (74%) as stage III (IIIA- 18, IIIB-05, IIIC-14). Surgery with curative intent was done in 15 cases (30%). In 32 cases (64%) due to disseminated disease as found on staging laparoscopy, surgery was abandoned and patients were sent for Neoadjuvant chemotherapy.
Conclusions: Laparoscopy is a valuable technique in staging carcinoma stomach and has an important role in detection of occult extensive intra-abdominal or metastatic disease.

Keywords: CECT, Gastric cancer, Laparoscopy

INTRODUCTION

Gastric cancer (CG) is the fifty most common cancer among males and seventh most common cancer among females in india.[1] In India, across the various registries, there is a wide variation in the incidence of gastric carcinoma. The incidence rate of gastric cancer is four times higher in southern India compared with northern India. Prognosis in gastric cancer is very much related to pathological staging. The most widespread system for staging of gastric cancer is the tumor-node-metastasis (TNM) staging system based on depth of tumor invasion, extent of lymph node metastases and presence of distance metastases. This system was developed by the American Joint Committee on Cancer (AJCC) and the Union for International Cancer Control (UICC).[2] Over the last decade management of gastric cancer has evolved from surgeon to multidisciplinary approach. As there are

multiple modalities for treatment and treatment must be tailored according to individual's condition more accurate extent of disease work up has become essential for treatment planning in present times. There have been many advances in radiological technologies in recent times but even after that many patients with stomach carcinoma are diagnosed as unresectable or metastatic on exploratory laparotomy. This results in unnecessary laparotomies yielding very little benefit to patients but at same time morbidity and mortality in patients increases significantly.[3]

Overall CECT and other imaging modalities have low sensitivity for peritoneal metastasis detection.[4] It has been estimated that this low sensitivity results in 30% of failed laparotomies and thus increasing mortality and morbidity significantly. Laparotomy has high accuracy for T staging and high sensitivity for the detection of peritoneal metastasis but in patients with unresectable or disseminated disease laparotomy is unnecessary due to associated mortality and morbidity.[5]

This problem can be overcome by staging laparoscopy as a minimally invasive approach to exclude distant metastasis. For suspected metastatic (M1) cases, negative findings by staging laparoscopy may help patients regain the potential of radical surgery. Neoadjuvant chemotherapy, instead of first-hand surgery, can be planned to downstage tumor and diagnostic laparoscopy instead of laparotomy, prevent open-close surgery in the patients.[6]

Laparoscopy has been proposed as an accurate staging modality in a variety of upper gastrointestinal malignancies. In gastric cancer, preoperative laparoscopy not only prevents unnecessary surgical explorations in case of peritoneal dissemination of tumor or liver metastasis undetected by conventional staging but also offers surgeon an opportunity to perform palliation procedures laparoscopically.[7-9]

Staging laparoscopy has been proven to be superior to even very advanced radiological techniques in assessment of advanced gastric cancers. Peritoneal deposits are detected in up to 30% of gastric cancer cases missed by EUS as well as CT scan.[10-12]

This study was done to evaluate the role of staging laparoscopy as an adjunct to CECT staging of tumor and assessing its resectability so that patients with resectable tumor on CECT abdomen but found unresectable on staging laparoscopy may not undergo unnecessary laporotomies.[13,14]

METHODS

The present cross-sectional prospective hospital-based study was conducted in the department of surgery, pt. J.N.M medical college Raipur Chhattisgarh, India during study period July 2016 to June 2018. Written informed consent of all participants was obtained before gathering any information. The information collected is kept strictly confidential and individual identity would not be disclosed under any circumstances. The patients of endoscopic biopsy proven carcinoma stomach deemed resectable on CECT thorax, abdomen and pelvis and those who give consent to participate in the study are included. The patient who received neoadjuvant chemotherapy before staging laparoscopy, patients of proven metastasis on CECT thorax, abdomen and pelvis and the patients who did not give consent are excluded.

All the patients of endoscopic biopsy proven gastric cancer (50 cases) who presented during study period and satisfied the inclusion criteria underwent investigations like hemogram, renal function tests, liver function tests, CEA, CA 19-9, chest X-ray, CECT Abdomen and pelvis, staging laparoscopy. A written informed consent was taken from all participants for staging laparoscopy. Standard protocols were followed for CECT abdomen scan and staging laparoscopy. Appropriate management of the cases were done.

Data was collected and analysed with the help of excel and graph-pad in stat software for statistical analysis. Proportion as number and percentage was determined for categorical variables like gender. Chi-square test was applied for comparison for qualitative variables. The differences seen were evaluated for significance, p value less than 0.05 was taken as significant.

RESULTS

Maximum number of subjects belongs to 51-60year followed by 41-50year. Amongst males maximum number of 12 cases (24%) were in 51-60years age group. Amongst females maximum number of 4 cases (8%) were in 51-60years age group (Table 1).

Table 1: Age and Sex wise distribution of study subjects.

Age distribution	Male		Female		Total	
	N	%	N	%	N	%
<=40	5	10	4	8	9	18
41-50	10	20	4	8	14	28
51-60	12	24	4	8	16	32
61-70	5	10	3	6	8	16
71-80	3	6	0	0	3	6
Total	35	70	15	30	50	100

In our study most, common symptom associated with carcinoma stomach was upper abdominal pain which was present in 42cases (84%). 2nd most common symptom associated was vomiting in 29 cases (58%) followed by weight loss in 28 cases (56%), anorexia in 21 cases (42%). Abdominal lump was found in 11cases (22%) and pallor in 15 cases (30%) and both lump and pallor in 24 cases (48%) (Table 2).

Table 2: Distribution of patients according to Symptoms and Signs.

Symptoms/signs	No. of patients	%
Upper abdominal pain	42	84
Anorexia	21	42
Vomiting	29	58
Weight loss	28	56
Pallor	15	30
Lump	11	22
Lump + pallor	24	48

Most common site for tumor was pylorus in 38 cases (76%). 2nd most common site for tumor was fundus in 8 cases (16%) followed by body in 3 cases (6%) and diffuse in 1 case (2%). Endoscopic biopsies were done in all cases and adenocarcinoma was the most common histologic type.

Among adenocarcinoma poorly differentiated type was most common in 24 cases (48%) followed by well differentiated in 13 cases (26%), moderately differentiated in 9 cases (18%) and 4 (8%) cases of signet ring adenocarcinoma.

Table 3: Distribution of patient according to site of tumor in UGI endoscopy and histopathology.

Location of tumour/hispathology	No. of patients	%
Fundus	8	16
Body	3	6
Pylorus	38	76
Diffuse	1	2
Adenocarcinomawell differentiated	13	26
Adenocarcinoma moderately differentiated	9	18
Adenocarcinoma poorly differentiated	24	48
Signet ring adenocarcinoma	4	8
Cea raised	3	6
Ca19-9 raised	9	18
Both raised (Cea, Ca 19-9)	9	18
Both (Cea, Ca19-9) within normal range	29	58

Table 4: Age wise distribution according to histopathology.

Histopathology	<=40years	41-50years	51-60years	61-70years	71-80years
Well differentiated adenocarcinoma	3	3	5	1	1
Moderately differentiated adenocarcinoma	0	2	4	3	0
Poorly differentiated adenocarcinoma	6	7	6	4	1
Signet ring adenocarcinoma	0	2	1	0	1
Total	9	14	16	8	3

Out of 50 cases both tumor markers (CEA, CA19-9) were raised in 9 cases (18%). CA19-9 was raised in 9 cases (8%) while CEA was raised in 3 cases (6%). Tumour markers were within normal range in 29 cases (58%) (Table 3).

In this study maximum number of cases of well differentiated adenocarcinoma were found in 51-60 years age group i.e. 5 cases (10%). Majority poorly differentiated adenocarcinoma were present in 41-50 years age group i.e. 7 cases (14%). Moderately differentiated adenocarcinoma was found predominantly in 51-60years age group i.e. 4 cases (8%). 2 cases (4%) of signet ring adenocarcinoma were found in 41-50years age group (Table 4). CECT staged 2 cases (4%) as stage I (IA-0, IB-2), 11 cases (22%) as stage II (IIA-3, IIB-8) and 37 cases (74%) as stage III (IIIA-18, IIIB-05, IIIC-14). Staging laparoscopy was done in all 50 patients and after staging laparoscopy occult metastasis was seen in 35 cases (70%). Out of these liver metastases was seen in 17 patients, peritoneal metastasis in 8 patients, both liver and peritoneal metastasis in 4 patients, pancreas infiltration in 2 patients, bowel involvement in 2 patients, bulky disease in 1 patient and celiac axis infiltration in 1 patient (Table 5). On correlating CECT staging with occult metastasis on staging laparoscopy out of 35 cases, 3 cases of metastasis (8.57%) was present in stage II and maximum number in stage III 32 cases (91.42%) (Table 6).

Maximum number of patients with occult metastasis on staging laparoscopy was seen in poorly differentiated adenocarcinoma of stomach i.e. 18 cases (75%) followed

by 7 cases (77.77%) in moderately differentiated adenocarcinoma, 6 cases (46.15%) in well differentiated adenocarcinoma and 4 (100%) cases in signet ring adenocarcinoma (Table 7).

Table 5: Distribution of patients as per CECT abdomen staging.

CECT staging	No. of cases	%
IB	2	4
IIA	3	6
IIB	8	16
IIIA	18	36
IIIB	5	10
IIIC	14	28
Occult metastasis		
Liver metastasis	17	48.57
Peritoneal metastasis	8	22.85
Liver + peritoneal metastasis	4	11.42
Pancreas infilteration	2	5.71
Bowel metastasis	2	5.71
Bulky disease	1	2.85
Celiac axis infiltration	1	2.85

Table 6: Occult metastasis found by staging laparoscopy in various stages as per CECT abdomen.

CECT stage	Occult metastasis
II	3(8.57%)
III	32 (91.42%)
Total	35 (100%)

Maximum number of subjects belongs to stage III-A followed by III-C. In the present CECT staging there was up staging in 35 (70%) cases after staging laparoscopy. (Table 8). Staging laparoscopy was done in all of 50 patients. Out of them as per findings, surgery with curative intent was done in 15 cases (30%). Palliative surgery was done in 3 cases (6%). Patients who underwent palliative surgery were those in whom curative surgery could not be done but they required symptomatic relief. All 3 patients had gastric outlet obstruction.

In 32 cases (64%) due to disseminated disease as found on staging laparoscopy, surgery was abandoned and patients were sent for neoadjuvant chemotherapy (Table 9).

Table 7: Occult metastasis in relation to histopathology.

Type of histopathology	Total no. of cases	No. of cases with metastasis	Percentage of metastasis with various histology
Well differentiated adenocarcinoma	13	6	46.15
Moderately differentiated adenocarcinoma	9	7	77.77
Poorly differentiated adenocarcinoma	24	18	75
Signet ring adenocarcinoma	4	4	100
Total	50	35	
X^2-Value: 3.178, (Degree of freedom=3), P>0.05 (Not significant)			

Table 8: Various findings on staging laparoscopy in relation to stages of CECT.

Stage	Liver meta	Peritoneal meta	Peritoneal meta+ ascites	Liver meta+ ascites	Pancreases infiltration	Bowel infiltration	Liver + peritoneal metastasis	Bulky disease	Celiac axis infiltration
IIB	2	-	1	-	-	-	-	-	-
IIIA	7	3	2	2	1	-	1	-	1
IIIB	-	-	-	1	-	-	-	-	-
IIIC	4	2	-	1	1	2	3	1	-

Table 5: Distribution of patients as per CECT abdomen staging.

Management	No. of patients	%
Surgery with curative inten	15	30
Palliative surgery	3	6
Chemotherapy (neoadjuvar	32	64
Total	50	100

DISCUSSION

In the present study maximum number of patients i.e. 16 cases (32%) of carcinoma stomach were found in 51-60years age group. The maximum number of cases were in 6th decade of life. Saha AK et al, in his study showed that the most common age group for carcinoma stomach was over 40years.[15]

Chrungoo R et al, in his study found the maximum number of cases of carcinoma stomach were in 51-70years age group (72%).[16] The age of patients in this study was well within range as observed in other studies.

In the present study carcinoma of the stomach was found in 35 males (70%) and in 15 females (30%) and the male to female ratio was 2.33:1. Shelat VG et al, in his study found that (18,66.7%) of these patients were male and (9,33.3%) were female with male:female ratio was 2:1.[17] Chrungoo R et al, in his study found that there were 19 males (76%) as against 6 females (24%). male:female ratio was 3.17:1.[16] Saha AK et al, in his study found that male:female ratio was 2.7:1.[15] The male preponderance of carcinoma stomach in this study was consistent with the studies conducted by others.

In this study, most common symptom associated with carcinoma of stomach was upper abdominal pain which was present in 42 cases (84%) followed by vomiting in 29 cases (58%), weight loss in 28 cases (56%), anorexia in 21 cases (42%). Chrungoo R et al, in his study found that pain was predominant symptom in 14 cases (56%), followed by anorexia in (12%) and vomiting (8%).[16] Saha AK et al, in his study showed that abdominal pain (66.2%) was the commonest symptom followed by weight loss (43.3%), indigestion (45.9%), anorexia (39.9%), nausea/vomiting (34.2%), postprandial pain (29%), and melena (9.5%).[15] Symptom profile of the patients in this study was in accordance with other studies.

In this study most common sign was both pallor and epigastric lump in 24 cases (48%) followed by pallor in 15 cases (30%) and epigastric lump in 11 cases (22%) Chrungoo R et al, in his study recorded pallor as the commonest sign, according for 16 (64%) cases.[16] Hire P et al, in his study showed that most common sign was palapable lump in the epigastric region which was found in 20 cases (83.33%) followed by pallor, seen in 14 cases (58.33%).[18] However, symptoms observed in this study were not in accordance with the studies conducted by others.

In the present study the tumor was located in pylorus in 38 cases (76%). Body and fundus accounted for 3 cases (6%) and 8 cases (16%) respectively and diffuse involvement was seen in 1 case (2%). Shelat VG et al, in his study on 27 patients noted the commonest site of gastric adenocarcinoma was the cardio-esophageal junction (58%) followed by antrum (15%), greater curvature, lesser curvature and body all 8% respectively. Saha AK et al, in his study found that antrum part of stomach was mostly involved (51.9%) followed by body (18.6%) and fundus (16.4%).[15] Chrungoo R et al, in his study found that the site of carcinoma of stomach was distal one third in 15 (60%) patients, proximal one third in 3 (12%) patients, middle one third in 2 (8%) and diffuse involvement was seen in 5 (20%) patients similar to our study.[16] Cherian J et al, in his study showed no change in site specificity of carcinoma of stomach in south Indian population.[19] Tumour location profile of the patients in this study was in accordance to various studies.

Present study showed that both CEA and CA19-9 are positive in 9 cases (18%). CA19-9 is raised in 9 cases (18%) followed by CEA in 3 cases (6%). Tumour markers are within normal limit in 29 cases (58%) Duraker N et al, in his study found CA 19-9 and CEA 19-9, CA72-4, CEA, and AFP-positive cases were 41%, 32.6%, 24.2%, and 8.4%, respectively.[20] Wang W et al, in his study showed positivity of 20.0% for CA19-9 and 19.2% for CEA.[21] this study results in terms of tumour location were in accordance with these studies.

In the present study CECT staged 2 cases (4%) as stage I (IA-0, IB-2), 11 cases (22%) as stages II (IIA-3, IIB-8) and 37 cases (54%) as stages III (IIIA-18, IIIB-5, IIIC-14). In the present study CECT correctly staged 15 (30%) cases and 35 cases (70%) were not staged correctly. Nakagawa et al, in their study on 100 patients of gastric adenocarcinoma found after staging laparoscopy total 47% of cases were re-stages, 3% were downstage and 44% were staged with a more advanced stage.[22] Peritoneal deposits was found in 7 patients which was diagnosed by conventional examination. An unsuspected peritoneal deposit was found in 21 of 93 patients (29%). Gastrectomy after staging laparoscopy was performed in 39 patients.

Kapiev A et al, in their study on 55 patients (70.5%) found that the staging laparoscopy was negative and restaging was done in 23 patients (29.5%) to be more advanced stage.[23] Chrungoo R et al, in there study on 25 patients found that growth was resectable in 10 (40%) patients, while in 15 (60%) it was unresectable.[16]

Hire P et al, in his study on 24 patients found that laparoscopic findings in 13 patients (54.17%) were found in accordance with CECT findings and these cases further underwent explorative laparotomy for curative resection. 11 patients (45.83%) were found to be underestimated by CECT who went for palliative chemotherapy.[18] The CSCT abdominal staging related findings were in consistent with the study mentioned above.

In present study after staging laparoscopy in 50 patients occult metastasis was seen in 35 (70%). Out of these liver metastases was seen in 17 patients on staging laparoscopy. Peritoneal metastasis was seen in 8 patients. Liver and Peritoneal metastasis was seen in 4 patients. Pancreas infiltration was seen in 2 patients. Bowel involvement was seen in 2 patients. Bulky disease was seen in 1 patient. Celiac axis infiltration was seen in 1 patient. Kakroo SM et al, in his study on 50 patients revealed metastasis in 14 patients (28%) (9 hepatic 18%, 5 peritoneal 10%) which were confirmed by frozen section.[24] Singh HK et al, in his study on 35 patients found that CECT found serosal infiltration in 25.7%

cases whereas staging laparoscopy found serosal involvement in 88.57% cases. Other organ infiltration was found on CECT in 22.8% while on staging laparoscopy in 51.43% cases. Mesocolon invasion was seen in 3 patients, none of them were picked up by CECT. Pancreatic infiltration was seen in 10 patients, 6 of them were identified by CECT also.[25]

Hire P et al, in his study on 24 patients showed that occult metastasis was found in 7 cases (29.17%) of which liver metastasis was present in 5 cases (20.83%) and peritoneal metastasis in 2 patients. (8.33%).[18] Results regarding other organ involvement occult metastasis were comparable and similarity was noted.

CONCLUSION

Multimodal management of gastric cancer demands accurate preoperative staging. Small size liver, peritoneal metastasis or infiltration of adjacent organs by means of metastasis in gastric carcinoma are difficult to detect by conventional imaging technique. Theses image techniques are with limitations and often results in under-staging of disease and unnecessary laparotomy. Staging laparoscopy is a safe and fast, minimally invasive, procedure that can improve detection of even small sized liver and peritoneal metastasis by direct visualization. It can be performed in combination with laparoscopic ultrasound and allow further evaluation of the tumor for local invasion or small size liver metastasis.

Laparoscopy is a valuable technique in staging carcinoma stomach and has an important role in detection of occult extensive intra-abdominal or metastatic disease not detected by conventional radiological staging. The value of staging laparoscopy is in the prevention of unnecessary surgical exploration and the resultant morbidity and mortality in patients with locally advanced or metastatic disease.

ACKNOWLEDGEMENTS

Authors would like to thank all the faculty and technical staff members of the Department of Surgery, Pt. JNM Medical College, Raipur (CG), India for their cooperation and support during entire study period.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Rao DN, Ganesh B. Estimate of cancer incidence in India in 1991. Ind J cancer. 1998;35(1):10-8.
2. Edge SB, Compton CC. The American joint committee on cancer: the 7th edition of the AJCC cancer staging manual and the future of TNM. Annals Surg Oncol. 2010;17(6):1471-4.
3. Conlon KCP, Rega AT. Laparoscopic staging and bypass, in Maingots Abdominal Operations, MJ Zinner and SW Ashley, Eds., Mcgraw Hill Companies, New York, NY, USA, 11th edi; 2007:1245.
4. Hallinan JT, Venkatesh SK. Gastric carcinoma: imaging diagnosis, staging and assessment of treatment response. Cancer Imaging. 2013:212-27.
5. Muntean V, Mihailov A, Iancu C, Toganel R, Fabian O, Domsa I, et al. Staging laparoscopy in gastric cancer:accuracy and impact on therapy. J Gastrointes Liver Dis. 2009;18(2):189-95.
6. Japanese Gastric Cancer Association. Japanese gastric cancer treatment guidelines,2010. Gastric Cancer. 2011;14(2):113-23.
7. Lehnert T, Rudek B, Kienle P, Buhl K, Herfarth C. Impact of diagnostic laparoscopy on the management of gastric cancer: prospective study of 120 consecutive patients with primary gastric adenocarcinoma. Brit J Surg. 2002;89(4):471-5.
8. Giger U, Schäfer M, Krähenbühl L. Technique and value of staging laparoscopy. Dig Surg. 2002;19(6):473-8.
9. Cuschieri A. Role of video-laparoscopy in the staging of intra-abdominal lymphomas and gastrointestinal cancer. Seminars Surg Oncol. 2001;20(2):167-172.
10. Lowy AM, Mansfield PF, Leach SD, Ajani J. Laparoscopic staging for gastric cancer. Surg. 1996;119(6):611-4.
11. Sarela AI, Lefkowitz R, Brennan MF, Karpeh MS. Selection of patients with gastric adenocarcinoma for laparoscopic staging. Am J Surg. 2006;191(1):134-8.
12. Kinkel K, Lu Y, Both M, Warren RS, Thoeni RF. Detection of hepatic metastases from cancers of the gastrointestinal tract by using non-invasive imaging methods (US, CT, MR imaging, PET): a meta-analysis. Radiol. 2002;224(3):748-56.
13. Bentrem D, Wilton A, Mazumdar M, Brennan M, Coit D. The value of peritoneal cytology as a preoperative predictor in patients with gastric carcinoma undergoing a curative resection. Annals Surg Oncol. 2005;12(5):347-53.
14. Kodera Y, Yamamura Y, Shimizu Y, Torii A, Hirai T, Yasui K, et al. Peritoneal washing cytology: prognostic value of positive findings in patients with gastric carcinoma undergoing a potentially curative resection. J Surg Oncol. 1999;72(2):60-4.
15. Saha AK, Maitra S, Hazra SC. Epidemiology of gastric cancer in the gangetic areas of West Bengal. ISRN Gastroenterol. 2013;23.
16. Chrungoo R, Mala T, Gupta R, Kachroo S, Chrungoo I, Malla S. Role of laparoscopic surgery in cancer of stomach: our early experience. Inter J Cancer Therapy Oncol. 2015;3(3).
17. Shelat VG, Thong JF, Seah M, Lim KH. Role of staging laparoscopy in gastric malignancies-our institutional experience. World J Gastrointes Surg. 2012;4(9):214-19.

18. Hire P, Golhar KB. Role of Staging Laparoscopy in Gastric Carcinoma. Inter J Adv Res Ideas Innovations Technol. 2017;3(4):204-214.
19. Cherian J, Sivaraman R, Muthusamy A, Venkataraman J. Stomach carcinoma in the Indian subcontinent: a 16-year trend. Saudi J Gastroenterol. 2007;13(3):114-7.
20. Duraker N, Çelik AN. The prognostic significance of preoperative serum CA 19-9 in patients with resectable gastric carcinoma: comparison with CEA. J Surg Oncol. 2001;76(4):266-71.
21. Wang W, Chen XL, Zhao SY, Xu YH, Zhang WH, Liu K, et al. Prognostic significance of preoperative serum CA125, CA19-9 and CEA in gastric carcinoma. Oncotarget. 2016;7(23):35423.
22. 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.
23. Andronik Kapiev MD, Ron Lavy MD, Zahar Shapira MD, Kais H, Natan Poluksht MD, et al. The role of diagnostic laparoscopy in the management of patients with gastric cancer. IMAJ. 2010:726-8.
24. Kakroo SM, Rashid A, Wani AA, Akhtar Z, Chalkoo MA, Laharwal AR. Staging laparoscopy in carcinoma of stomach: a comparison with CECT staging. Inter J Surg Oncol. 2013;674965.
25. Singh HK, Elamurugan TP, Sreenath GS. Efficacy of contrast enhanced computed tomography and diagnostic laparoscopy in detecting unsuspected peritoneal metastasis in gastric carcinoma. Inter Surg J. 2016;4(1):181-4.

Cite this article as: Sonkar S, Ratre R, Chandrakar S, Nanda U. Evaluation of role of staging laparoscopy as an adjunct to CECT abdomen staging in carcinoma stomach. Int Surg J 2019;6:119-25.