CA STOMACH: COMPARING ROLE OF USG AND CT SCAN IN STAGING OF THE DISEASE.

Radiology

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ABSTRACT

INTRODUCTION: Accurate staging of carcinomas of stomach is helpful in improving the prognosis. USG is initial modality of choice when investigating non-specific complaints where in doubtful cases or if USG suggests a resectable stomach malignancy, computed tomography (CT) often provides additional information.

OBJECTIVES: To evaluate the diagnostic accuracy of USG and computed tomography (CT) for staging of carcinoma stomach.

METHODOLOGY: 50 patients were selected for the study for which they underwent USG and computed tomography (CT) examination after explaining the entire procedure and the risks involved.

RESULTS: In Our study, stomach cancer was most common in 6th decade followed by 5th decade, with stomach cancers were more common in males compared to females with ratio of 1.17:1.0. Patients presented with weight loss (80%) as most common symptom followed by early satiety (70%) and poor appetite (68%). Most of gastric cancer arises from distal stomach (72) followed by proximal stomach (20%) and diffuse involvement of stomach in 8%. The most common histo-pathological type is adenocarcinoma (90%). CT is more sensitive in detecting stomach cancer (96%) while Trans-abdominal USG has lower sensitivity of 46%. Accuracy rates for each T stage with MDCT is 50% for T1, 71.3% for T2, 72.7% for T3 and 100% for T4 while with trans-abdominal US is 50% for T1, 66.67% for T2, 81.81% for T3 and 71.42% for T4. Sensitivity, specificity and accuracy of CT in detecting nodal metastasis (N-stage) was 86.11 %, 78.57 % and 84 % respectively and sensitivity, specificity and accuracy of trans-abdominal US in detecting nodal metastasis (N-stage) was 75 %, 64.28 % and 72 % respectively. Most common metastatic feature was peritoneal nodules (44%) followed by liver (18%), lung (12%) and ovarian metastasis (12%).

CONCLUSION: USG being less expensive and radiation free, is the first line investigation in patients of stomach cancers but CT remains the investigation of choice as it is superior diagnostic imaging modality than USG prior to treatment which improved detection and characterization of tumor contribute to better diagnostic accuracy and consequently reduction of invasive procedure which lead to significant reduction of mortality and morbidity from tumor.

KEYWORDS

Carcinoma stomach, USG, computed tomography (CT)

INTRODUCTION

Stomach is the most dilated part of the digestive tube, having a capacity of 1000–1500 ml in the adult, situated between the end of the oesophagus and the duodenum. It lies in the epigastric, umbilical and left hypochondrial regions of the abdomen. Principal function of the stomach is to mix the food with acid, mucus and pepsin and then release the resulting chyme, at a controlled rate into the duodenum for the process of absorption.

Gastric cancer is the fifth most common type of cancer and is the fourth leading cause of cancer-related death worldwide and second in India. Incidence of gastric cancer varies in different parts of world, and it is most common in japan.[1] Adenocarcinoma comprises vast majority of gastric cancers. Incidence is low in india due to regional diversity.

A number of predisposing factors have been identified for gastric cancer with majority of it includes: Hot or salty food, atrophic gastritis, gastric ulcers & gastric polyps, intestinal metaplasia and reflux esophagitis.

The signs and symptoms of stomach cancer can include poor appetite, weight loss (95%), abdominal (belly) pain, fullness in upper abdomen after eating and heartburn or indigestion.

The treatment of gastric cancer has become increasingly sophisticated, with therapies tailored to individual cases.[2] Although cornerstone of therapy is complete resection of a gastric tumour and adjacent lymph nodes with or without adjuvant chemotherapy or chemo-radiation in appropriate cases [3,4] treatment varies from endoscopic mucosal resection for selected mucosal cancers to more radical treatments for advanced cancers. For this reason, accurate preoperative staging, particularly the depth of mural invasion, adjacent organ invasion, nodal spread, and distant metastases, is very crucial in determining the most suitable therapy and avoiding inappropriate attempts at curative surgery.

The primary role of trans-abdominal ultrasonography (US) is to detect liver metastases in cases of gastric malignancy.

Computed tomography (CT) has been the modality of choice for preoperative evaluation and staging in patients with gastric carcinoma.

Also, CT has play pivotal role in determining recurrence and their response to chemotherapy; CT shows some limitation in diagnosis of small lymph node metastasis weather it is reactive or metastatic, peritoneal metastasis less than 5 mm in size and small haematogenous metastasis.[5,6]

MATERIALS AND METHODS

This study was conducted on 50 patients with suspected stomach malignancy. All patients were scanned in the SIEMENS EMOTION 16, a sixteen slice CT scanner and Medium and High frequency transducer on GE Model LOGIQ P5 & Siemens ACUSON S3000 USG machine. The study was conducted in Department of Radiology of Gujarat Cancer Research Hospital and BJ medical college, Asarwa, Ahmedabad.

Patient inclusion: Following patients were selected,
- All patients diagnosed and suspicious of malignant masses arising from stomach.
- Patients who have already received some treatment in the form of surgical or chemotherapy or radiotherapy.

Exclusion criteria: Following patients were excluded from the study
- Patients having allergy from contrast material used in CT.
- Patients presenting to radiology department having stomach malignancy past and are cured completely will be excluded from the study.
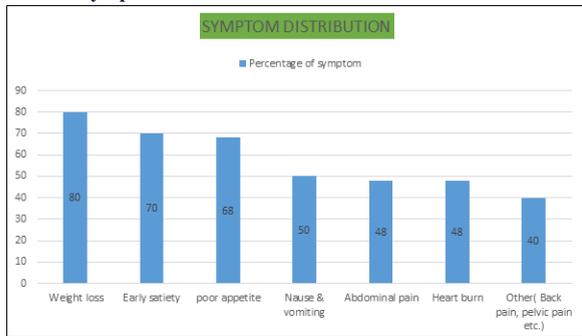- Patients not willing to participate in the study.

RESULTS

The present study included 50 cases of suspected stomach malignancy which were carried out at Gujarat Cancer and research institute, Ahmedabad following observation made according to age, site, nature, USG and CT appearance of masses and study data were analysed.
- In our study the age of patients ranges from 27 to 85 years. Study has largest age group was 51-60 years (6th decade) consisting 23 patients, followed by 41-50 years (5th decade) comprising 13 patients. Age group of 21-30 (3rd decade) had 1 patients, 31-40 years (4th decade) had 3 patients, 61-70 years (7th decade) had 6 patients and with age group >70 years had 4 patients. Youngest patient was 27 years old and eldest patient was 85 years old.

Adenocarcinoma was found to be common in all age groups. Mean age was 54 year.

- In our study, these were 27 male and 23 female patients out of total 50 patients with stomach malignancy yielding a male to female ratio of 1.17:1.0
- Out of 50 patients 45 patients were having adenocarcinoma. 2 patients were having GIST and 2 patients were having lymphoma. 1 case of SCC were also noted. So 90 % patients were having adenocarcinoma, 4 % were having GIST and 4 % lymphoma and only 1% were having SCC.
- In our study out of 50 patients 36 patients had masses arising from distal stomach, 10 patients had masses involving proximal stomach and only 4 patient had diffuse involvement of stomach.

Chart 1. Symptom distribution of stomach cancers

SYMPTOM DISTRIBUTION (Percentage of symptom)

Weight loss 80; Early satiety 70; poor appetite 68; Nause & vomiting 50; Abdominal pain 48; Heart burn 48; Other(Back pain, pelvic pain etc.) 40

Table 1. Detection of lesion

Modality	No of patients	Percentage
CT	46	92%
Trans abdominal USG	23	46%

Table 2. T-staging assessment of gastric cancer on MDCT

Staging	T- staging on HPE	T-staging on MDCT	Accuracy (%)
T1	4	2	50%
T2	7	5	71.4%
T3	22	16	72.7%
T4	17	17	100%
Total	50	40	

Table 3. T-staging assessment of gastric cancer on Trans Abdominal US (TAS)

Staging	T- staging on HPE	T- staging on TAS	Accuracy (%)
T1	2	1	50%
T2	3	2	66.67%
T3	11	9	81.81%
T4	7	5	71.42%
Total	23	17	

Table 4. N (lymph node) staging assessment on MDCT

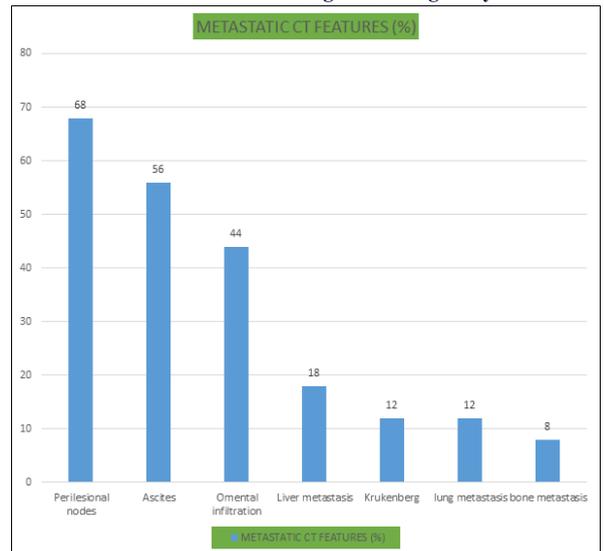| Regional nodes on CECT	Metastatic nodes on HPE +	Metastatic nodes on HPE -	Total
Metastatic nodes +	31	03	34
Metastatic nodes -	05	11	16
Total	36	14	50
Sensitivity= 86.11 % (31/36) Specificity = 78.57 % (11/14) Accuracy = 84 % (42/50)			

Table 5. N (lymph node) staging assessment on Trans Abdominal US (TAS)

| Regional nodes on TAS	Metastatic nodes on HPE +	Metastatic nodes on HPE -	Total
Metastatic nodes +	27	05	32
Metastatic nodes -	09	09	18
Total	36	14	50
Sensitivity= 75.0 % (27/36) Specificity = 64.28 % (09/14) Accuracy = 72 % (36/50)			

Chart 2. Metastatic CT features of gastric malignancy

METASTATIC CT FEATURES (%)

Perilesional nodes 68; Ascites 56; Omental infiltration 44; Liver metastasis 18; Krukenberg 12; lung metastasis 12; bone metastasis 8

IMAGES

Case-1: Adenocarcinoma Of Distal Stomach With Bone Metastasis And Pleural Effusion (t4n2m1)
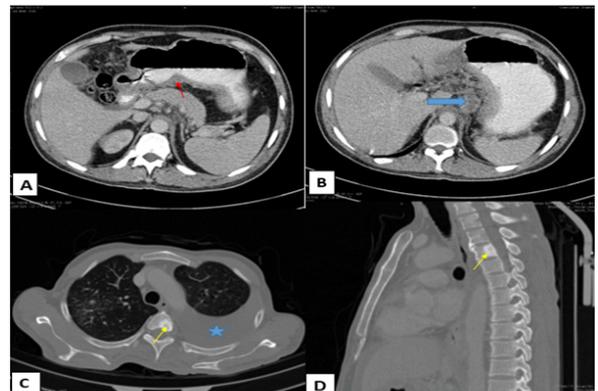

Case of adenocarcinoma: A) Axial CECT image shows asymmetric wall thickening in distal stomach with surrounding fat stranding (red arrow). B) Axial image shows perlesional necrotic node in gastro-hepatic region (Blue arrow). C) Upper thorax cuts shows sclerotic bone metastasis (yellow arrow) and right moderate pleural effusion (asterix). D) Sagittal bone window shows sclerotic bone metastasis in posterior body.

Case-2: Adenocarcinoma Of Distal Stomach With Perilesional Nodes (t4 N2 M0)
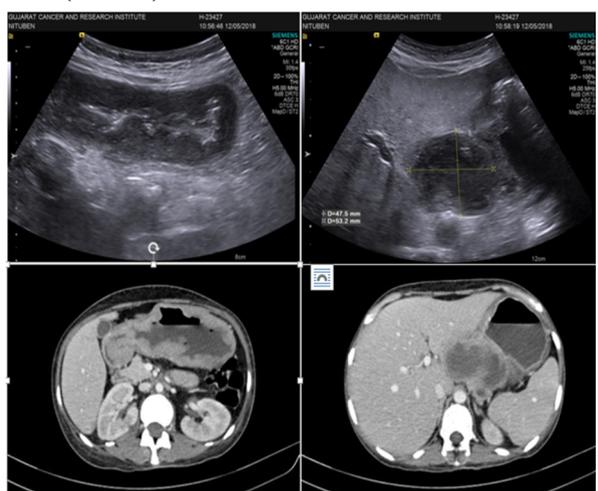

Case of Adenocarcinoma: 35 year old female shows asymmetric wall thickening on USG with perilesional hypoechoic metastatic node (Top); CECT of the same patient shows diffuse asymmetrical wall thickening of stomach with metastatic necrotic node (Bottom).

Case-3: Adenocarcinoma Of Body Of Stomach With Ovarian Metastasis (T4, N3, M1)
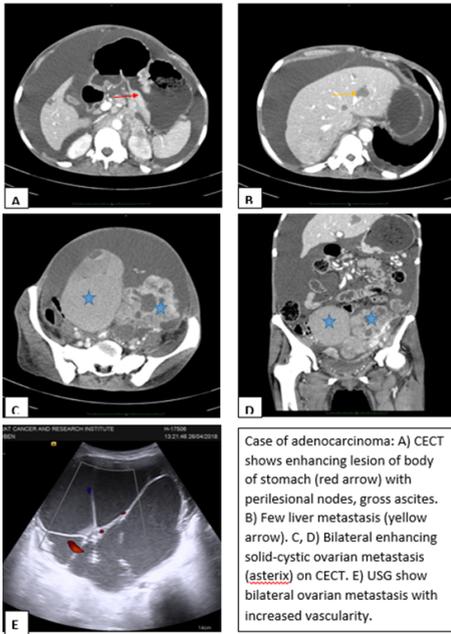

Case of adenocarcinoma: A) CECT shows enhancing lesion of body of stomach (red arrow) with perilesional nodes, gross ascites. B) Few liver metastasis (yellow arrow). C, D) Bilateral enhancing solid-cystic ovarian metastasis (asterix) on CECT. E) USG show bilateral ovarian metastasis with increased vascularity.

Case-4: Exophytic Gist Arising From Proximal Stomach
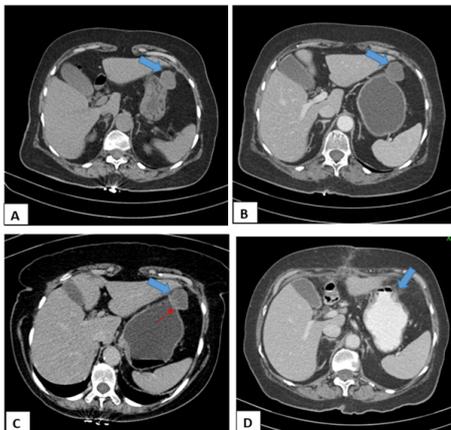
Case of GIST: A) Axial NECT image shows homogenous mass (Thick arrow) arising exophytically from anterior wall of proximal stomach: B) CECT image shows no post contrast enhancement (Thick arrow); C) Delayed prone cuts shows adjacent wall of stomach appears normal (Red arrow); D) After excision of mass there is only mild post-operative fat stranding noted (Thick arrow).

Case-5: Lymphoma Of Stomach
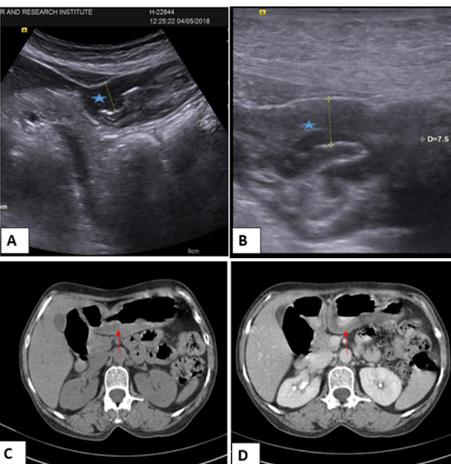
Case of NHL of stomach: A& B) Trans-abdominal USG shows asymmetrical hypoechoic wall thickening of distal stomach (asterix); C) Axial NECT image shows isodense wall thickening of distal stomach (red arrow); D) CECT image shows moderate homogenous enhancement.

DISCUSSION AND CONCLUSION

Total 50 patients of gastric malignancy were studied using 16 slice CT scan machine and SIEMENS S-300 ACUSON USG machine.

Gastric cancer are most common is 6th decade followed by 5th decade with incidence of gastric masses rises rapidly after 50 years of age.

Stomach malignancy are slightly more common in male yielding a male to female ratio of 1.17:1.0

72 % gastric cancer arising from distal stomach, 20 % arising from proximal stomach and only 8 % patient shows diffuse involvement of stomach.

Adenocarcinoma comprises vast majority of gastric cancer (90%). Other reported histopathological masses are lymphoma (4%), GIST (2%) and SCC (2%).

Most common presentation of stomach malignancy was weight loss in 80% of patients followed by early satiety (70%), poor appetite (68%), nausea & vomiting (50%), abdominal pain (48%) and heart burn (48%).

Sensitivity of CT in detecting stomach cancer was 96% while Trans-abdominal USG has sensitivity of 46% in detecting stomach cancer.

Accuracy rates for each T stage with MDCT is 50% for T1, 71.3% for T2, 72.7% for T3 and 100% for T4 while with trans-abdominal US is 50% for T1, 66.67% for T2, 81.81% for T3 and 71.42% for T4. So CT is better for TNM staging than trans-abdominal US.

Sensitivity, specificity and accuracy of CT in detecting nodal metastasis (N-stage) was 86.11 %, 78.57 % and 84 % respectively.

Sensitivity, specificity and accuracy of trans-abdominal US in detecting nodal metastasis (N-stage) was 75 %, 64.28 % and 72 % respectively.

Most common metastatic feature was peritoneal nodules (44%) followed by liver (18%), lung (12%) and ovarian metastasis (12%).

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