IMAGING EVALUATION OF CARCINOMA STOMACH BY ULTRASONOGRAPHY AND COMPUTED TOMOGRAPHY- A COMPARATIVE STUDY OF 50 CASES

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ABSTRACT

BACKGROUND

Stomach cancer is the second most common cancer among men and third most among women in Asia and worldwide. Almost all gastric cancers are adenocarcinomas (95%). Other histological types include lymphomas and carcinoid tumours. The data obtained from the National Cancer Registries indicates that gastric cancer is a leading problem in North-Eastern and Southern states of Indian subcontinent.

The objective of our study was to evaluate the USG and CT imaging features of cases of stomach carcinoma referred to the Radiology Department, GMCH.

MATERIALS AND METHODS

This descriptive study of Ultrasonography and Computed Tomography were done in all patients of the study group. Histopathological study was done either by ultrasound-guided fine needle aspiration cytology, upper GI endoscopic biopsy or from post-operative specimen. Only histologically proven stomach carcinoma cases were included in our study. The age group of the patients ranged from 30 years to 90 years.

RESULTS

50 cases of stomach carcinoma were studied and among 50 cases 33 were male and 17 were female. Parameters like pattern of tumour growth, adjacent organ involvement, nodal spread and histological type of tumour were evaluated and tabulated.

CONCLUSION

Various findings like male predominance with male-to-female ratio of 1.9: 1, 5th - 7th decade as the age group with maximum number of cases etc. can be obtained from the present study. Computed Tomography is more accurate than ultrasonography in detecting extent of tumour, patterns of tumour growth, adjacent organ involvement, lymph node spread and metastasis.

KEY WORDS

Stomach Carcinoma, Ultrasonography, Computed Tomography.

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BACKGROUND

Stomach cancer is the second most common cancer among men and third most among women in Asia and worldwide. The data obtained from the National Cancer Registries indicates that gastric cancer is a leading problem in North-Eastern and Southern states of Indian subcontinent. Gastric cancer is relatively rare before the age of 40, but its incidence steadily climbs after that and peaks in the seventh decade of life. It is more common in men than women. Predisposing conditions that can increase the risk of developing gastric carcinoma include dietary factors, Helicobacter pylori gastritis, atrophic gastritis, pernicious anaemia, adenomatous gastric polyps and hereditary factors. Patients may present with dyspepsia, anorexia and weight loss as well as abdominal pain that is vague and insidious in nature. Nausea, vomiting and early satiety may occur with bulky tumours

that obstruct the gastrointestinal lumen or infiltrative lesions that impair stomach distension.⁽¹⁾

50% of patients with stomach cancer are asymptomatic in the early stages and present as advanced gastric carcinoma (Invading into muscularis propria or beyond), which carries a much worse prognosis with a 5 years survival rate at about 60% or less.⁽²⁾

Adenocarcinoma is the most common histological type in 95% of cases. However, other histological types include leiomyosarcoma, GI stromal tumour, lymphomas, secondaries and carcinoid tumours. In addition, there are a number of non-neoplastic tumour like lesions that should be considered in the differential diagnosis of stomach carcinoma like hyperplastic and hamartomatous polyp, inflammatory pseudotumour and ectopic pancreatic rest.

About 30% of gastric cancers are located in the antrum, 30% in the body and 30% in the fundus or cardia region. The remaining 10% are diffusely infiltrating lesions that involve the entire stomach.⁽³⁾

Multidetector Computed Tomography (MDCT) has a primary role in diagnosing and characterising gastric cancer as it offers an excellent evaluation of the gastric lumen, gastric wall and the adjacent structures. It also complements upper gastrointestinal endoscopy in establishing the diagnosis and defining the extent of the disease.

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Ultrasonography being readily available can be used for initial diagnosis in cases with clinical suspicion.

Aims and Objectives

1. To diagnose and characterise gastric carcinoma by ultrasonography and computed tomography.
2. To correlate ultrasonography and computed tomographic findings.

MATERIALS AND METHODS

This descriptive study was conducted in the Department of Radiology, Gauhati Medical College and Hospital from June 2016 to July 2017. 50 patients who were referred to the Department of Radiology from both indoor and outdoor units presenting with symptoms suspicious of stomach carcinoma and subsequently confirmed by HPE were included.

The age group of the patients ranged from 30 yrs. to 90 yrs. Both male and female sexes were studied.

Methods

Brief clinical history of the patients referred to the Department of Radiology with symptoms suggestive of or already diagnosed case of stomach carcinoma was taken. The history comprised of chief complaints, mode of onset, duration of illness, occupational history, personal history and past history. Both general, systemic and laboratory examinations of the patients were done.

Imaging

The patients were kept on empty stomach for at least 6 hours before the ultrasonographic examination. Real time B-mode ultrasonography was done with Antares Colour Doppler Ultrasound System (Make: Siemens) real time scanner and Samsung RS80A Ultrasound System.

For computed tomographic examinations, patients were again kept on empty stomach for at least 6 hrs. Written consent of the patient and attendants were taken for contrast examination. Before performing the scan, the procedure and objective were explained to the patient. Patients were given 750 mL of water, approximately 15 mins before scanning. An additional 250 mL along with effervescent was given immediately prior to the study to improve gastric distension. The machine used is Philips MX16 (16-Slice CT) scanner.

CT Scan was performed using the Following Protocols-

1. **Positioning:** Patients were scanned in the supine position with their arms above their heads. Scans were performed in the axial axis from cephalic to caudal levels. Prone imaging for better delineation of the proximal stomach was also used in selected cases.
2. **Scanning:** After positioning the patient, the topogram was taken. Spiral scanning was done. The abdomen scans were obtained as contiguous 5 mm slice. Both plain and contrast enhanced CT scans were obtained. 100 mL of a non-ionic water-soluble contrast medium were injected intravenously as a bolus dose to image the abdomen. Delayed sections through the abdomen were obtained to see the delayed enhancement pattern of the mass and excretion of both kidneys.

Histopathological Examination

These were performed either by USG guided or endoscopic fine needle aspiration cytology/ biopsy or from post-operative specimen.

RESULTS

Sex Distribution- In our present series 50 patients with stomach cancer were evaluated, out of which 33 were male and 17 were female. Males accounted for 66% and females accounted for 34% of the total number of cases.

Age Distribution- The age distribution was as per table below.

Age Groups	No. of Cases	Percentage
30-40	5	10
41-50	7	14
51-60	11	22
61-70	14	28
71-80	10	20
81-90	3	6

Table 1

Maximum numbers of cases were in the 7th decade of life followed by 6th decade.

Clinical Presentations- The clinical presentations were as per table below.

Symptoms	No. of Cases	Percentage (%)
Pain abdomen	25	50
Vomiting	29	58
Dyspepsia	45	90
Lump abdomen	20	40
Loss of appetite	40	80
Weight loss	33	66

Table 2

In our study dyspepsia was complained by 90% of patients, loss of appetite in 80% and weight loss was found in 66% of patients.

Patterns of Tumours

The patterns of tumours were as per table below.

Patterns of Tumour	No. of Cases
Intraluminal polypoidal mass	11(22%)
Focal wall thickening	30(60%)
Diffuse wall thickening	9(18%)

Table 3

In our study, focal wall thickening was found in maximum no. of cases (60%).

Part of Stomach Involved

In our study, the most common site of involvement was antropylic region (36%) followed by fundus and cardia (26%).

	No. of Cases	Percentage
Antropylic region	18	36
Cardia and fundus	13	26
Body	10	20
Diffuse involvement	9	18

Table 4

Involvement of Adjacent Organs

Out of 50 cases of carcinoma stomach in our study, the involvement of adjacent organs was detected by USG and CT as follows.

Adjacent Organs	No. of Cases Detected	
	USG	CT
Transverse colon	3	6
Liver	3	5
Pancreas	2	4

Table 5

Hence, in our study the most common adjacent organ involved by carcinoma stomach were transverse colon (12%) followed by liver (10%). The involvement of adjacent structures was understaged by USG as compared to CT scan.

Lymph Node Involvement

Out of 50 cases of stomach carcinoma, lymph node involvement were detected by CT in 40 (80%) cases and USG in 34 (68%) cases.

Lymph Node Groups	No. of Cases Detected	
	USG	CT
Celiac	23	32
Left gastric	11	28
Right gastric	11	15
Gastrohepatic	16	30
Pancreaticosplenic	10	19
Right gastroepiploic	9	14

Table 6

The enlarged lymph nodes were seen as iso- to hypo-attenuated, round-to-oval soft tissue densities with homogeneous/ heterogeneous enhancement on post contrast study. In our study, the most common group of lymph node involved were celiac followed by gastrohepatic. The largest node detected by CT in our study was 30 mm sized celiac node.

Figure 1. (A and B) USG Image showing Wall Thickening of Fundus and Proximal Body of Stomach extending to GE Junction along with Enlarged Gastrohepatic Node (Yellow Arrow in B), (C) Coronal and Axial CECT Scans showing Heterogeneously enhancing Irregular Wall Thickening of Fundus of Stomach with extension into the GE Junction. Lung deposit is noted in the Left Lower Lobe in Image C along with Enlarged Gastrohepatic Node (19.4 mm GSA Dimension) in D

Figure 2. (A) Antropyloric Wall Thickening on USG in a patient presenting with symptoms of Gastric Outlet Obstruction. (B & C) Same Patient on Sagittal and Coronal CT showing Circumferential Wall Thickening in the Antropyloric region causing Luminal Narrowing and Upstream Distension of the Stomach

Figure 3. (A) USG Image showing Wall Thickening of the Fundus of the Stomach extending to GE Junction. (B and C) CECT Axial and Coronal Images reveals Heterogeneously Enhancing Fundal Wall Thickening extending to the GE Junction. Axial CT Image in addition shows Few Prominent to Enlarged Gastrohepatic Nodes

Figure 4. (A) USG showing Circumferential Antropyloric Stomach Wall Thickening. (B) Axial CECT of the same patient showing Transmurally Enhancing Circumferential Antropyloric Wall Thickening extending to greater and lesser curvature with Adjacent Perigastric Nodes and Omental Fat Stranding with Nodularity

DISCUSSION

In this descriptive study, the number of male patients was 33 (66%) and female patients was 17 (34%). Most other studies show a male preponderance in almost all countries with rates of two to four times higher among males than females.^(4,5) Age of youngest patient was 37 years and the oldest patient was 83 years. Stomach cancer incidence is known to increase with age with the peak incidence occurring at 60 - 80 years.⁽⁶⁾ In our study, maximum number of cases were in the 7th decade of life followed by 6th decade.

In our study, dyspepsia was complained by 90% of patients, loss of appetite in 80% and weight loss was found in 66% of patients.

Three types of tumour growth was noted- diffuse and focal wall thickening and intraluminal polypoidal mass. Focal wall thickening involving either the proximal (Cardia and Fundus) or distal (Antropyloric Region) stomach was the most common form of stomach carcinoma and represents 60% of all tumours. Intraluminal polypoidal mass represented 22% of cases, while the least common form of stomach carcinoma was diffuse pattern, representing 18% of tumours.

Focal wall thickening of proximal stomach was difficult to diagnose by ultrasonography alone; however, with a high index of clinical suspicion and special emphasis on the GE junction most of the cases were picked up and later confirmed with CT scan of abdomen and HP correlation.

In our study, antropyloric region (36%) was the most common site of cancer stomach followed by cardia and fundus (26%) and body (20%) of stomach. According to Thomas et al, occurrence of gastric cancer in the stomach is relatively evenly distributed with 30% occurring in the antrum, 30% in the body and 40% in the fundus and cardia.

The most common adjacent organ involved by carcinoma stomach were transverse colon followed by liver and pancreas. The involvement of all these organs was understaged by USG compared to CT scan.

At CT positive lymph nodes are identified on the basis of size, shape and enhancement pattern (i.e. more than 8 - 10 mm along the short axis, nearly round shape, central necrosis and marked or heterogeneous enhancement). Based on these criteria, the most common group of lymph node involved in our study were celiac followed by gastrohepatic and left gastric stations. CT is better than ultrasound for detecting local spread of the disease and detecting lymphadenopathy. The diagnostic accuracy of CT scan in staging of the disease has been reported in various studies.

In our study out of 13 cases of carcinoma of the cardia and fundus of stomach, longitudinal spread to the distal oesophagus was present in 8 cases (61%). According to Haren et al oesophageal involvement in carcinoma of the cardia and fundus was 60%, which correlated well with our study.⁽⁷⁾

CT scanning has several pitfalls. CT depicts 75% of nodes larger than 5 mm in diameter, but it does not depict tumour in normal-sized nodes. CT is not useful in distinguishing between enlarged nodes due to reactive changes and those

due to tumour. Small nodes may contain tumour and large nodes may result from inflammatory causes. Moreover, loss of fat plane between the gastric wall and the left lobe of the liver and between the tumour and pancreas may be due to an inflammatory reaction. In cachectic patients, a loss of fat planes may simulate direct organ invasion.

CONCLUSION

From our present study of 50 cases of stomach carcinoma, the following conclusions can be drawn: Maximum number of cases was seen occurring between the 5th and 7th decades. Female: male ratio was 1.9: 1. Major risk factor was H. pylori infection; most common pattern of tumour growth was focal wall thickening of stomach and adenocarcinoma was the most common histological type.

Adequate history and strong clinical suspicion is required for diagnosis of Ca Stomach. USG being readily available can be used as a primary tool for detecting cases of carcinoma stomach during routine abdominal sonograms. However, Computed Tomography was found to be superior to ultrasonography in diagnosing and characterising the primary tumour as well as detecting adjacent organ and lymph node involvement.

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