

Primary Sites of Gastric Carcinoma with Metastatic Spread Detected by Transabdominal Hydrosonography: Experience of 76 Cases in Bangladesh

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Abstract

Background: Metastasis is frequently occurred among the gastric carcinoma patients. **Objectives:** The purpose of the present study was to detect the different primary sites of gastric carcinoma by ultrasonography with the metastatic spread. **Methodology:** This cross-sectional study was carried in the department of Radiology and Imaging of Dhaka Medical College, Dhaka from July 2009 to June 2011 for a period of two (2) years. Clinically suspected gastric carcinoma patients attended at indoor and outdoor Surgery department of Dhaka Medical College Hospital, Dhaka were selected as study population. All the patients were examined by ultrasonography of upper abdomen and or Ba-meal X-ray. Detailed clinical history and relevant points in clinical examination and investigations were noted. The sonographic findings were noted. The extent of tumour infiltration and metastasis was assessed in all patients with suspected gastric malignancy. All these patients were properly follow up and collect the endoscopic biopsy and/or surgical resection biopsy reports. In all patients who underwent operation the extent of tumour infiltration and metastasis was looked for and was noted. **Results:** A total number of 76 patients were included in this study. Among 76 patients, 3 unwilling to take part in the study, 4 patients refused to undergo endoscopy or surgery, 5 patients were unfit for the same and in 4 cases, and histopathological reports were not available. Ultimately 60 patients were evaluated finally. The commonest site of involvement of gastric carcinoma as determined by ultrasound was the antrum 13 out of 23 cases (56.52%). Among them metastatic para-aortic lymph nodes were seen in seven patients and hepatic metastases was detected in five patients' ascites was seen in eleven patients. **Conclusion:** In con-

clusion, the most common site of gastric carcinoma is the antral part of stomach and majority are metastasized in peritoneum.

Keywords

Gastric Carcinoma, Metastasis, Ultrasonography, Primary Sites

1. Introduction

Incidence of gastric carcinoma as well as other gastric malignancies is increasing day by day in the whole world as well as in Bangladesh [1]. Gastric carcinoma is the fourth most common tumour in the world. Its incidence being particularly high in countries such as Japan, Chile, Costa Rica, Colombia, China, Russia, Bulgaria and four to six fold less common in USA, UK and Canada [2]. It is more common in lower socioeconomic groups. Globally, it is the second leading cause of cancer-related death, with 700,000 deaths annually [3]. The prevalence rates in developing Asian countries such as Bangladesh, India, Thailand and Vietnam have been reported to be especially high at 92%, 81%, 74% and 75%, respectively [4]. Age range of gastric carcinoma is 31 - 80 years with male preponderance [5].

Ultrasonography is one of the modern diagnostic tools in our country which are now widely used and a cheap, available imaging modality [6]. It has currently been shown that transabdominal ultrasound performed after ingestion of water and injection of a hypotonic agent along with the use of multi-frequency transducers provides detailed and unique evaluation of the stomach [5]. Various study has been done earlier to show the usefulness of the diagnosis of gastric carcinoma with high sensitivity and accuracy. Ultrasound is often used as the first imaging modality in a large variety of abdominal complaints and clinically unsuspected gastric carcinoma may be imaged first by it [7] [8]. Gastric carcinoma easily metastasized. Therefore, transabdominal sonography ranks with the initial methods used for diagnosing gastric carcinoma. The purpose of the present study was undertaken to detect the different primary sites of gastric carcinoma by transabdominal hydrosonography with the metastatic spread.

2. Methodology

This was a cross-sectional observational study and was carried out at the Department of Radiology and Imaging of Dhaka Medical College, Hospital, Dhaka from July 2009 to June 2011 for a period of two (2) years. Prior to commencement of this study, the research protocol was approved by the thesis committee (local ethical committee). Patients with clinical suspicion of gastric carcinoma were selected as study population. Purposive sampling technique was followed for data collection. Ultrasound examinations were performed using real time image units (Toshiba 400, Siemens-G 20, Logic-A 200) and transducer frequency varied between 3.5 - 7.5 MHz as required for proper visualization. Patients were taken up for examination in empty stomach after overnight

fasting and in cases of gastric outlet obstruction, after Ryle's tube aspiration. 20 mg Hyoscine-N-butyl bromide was injected intravenously to achieve optimal distension and to suppress gastric peristalsis. The patients were then given 250 ml to a maximum of 1000 ml of water orally or through Ryle's tube. Transabdominal US was performed 3 min after ingestion of water. Scanning was done in longitudinal, transverse and left subcostal oblique planes. The appearance of each disorder on US scans was analyzed in terms of wall thickness, wall stratification, the most thickened layer and the echogenicity of the most thickened layer. Wall thickness was measured by means of the internal software-driven caliper on the transverse view of the most thickened lesion. Diagnosis of gastric carcinoma was based on localized or circumscribed wall thickening more than 5 mm, in the distal antrum more than 8 mm, hypoechoic wall echotexture, loss of normal wall stratification, luminal narrowing, absent or reduced peristalsis, heterogeneous intraluminal mass or polypoidal projection, breached serosa with exogastric extension and multiple responses. Based upon the above feature the diagnostic of gastric carcinoma also include: invading into surrounding organs, interruption of the serosal layer of gastric wall, masses indistinguishable from adjacent organs, tumour and organs moving synchronously slow or no movement as breath changed. Following organs or structures were examined: liver, pancreas, gallbladder, aorta, spleen and hilum of the spleen, diaphragm, duodenum, para aortic lymph nodes and metastasis to peritoneum as evidenced by ascites. Following sonographic features were taken as the diagnostic criteria of metastatic lymph nodes: length 2 cm or more, irregular shape, indistinct border, fusional shape, infiltrative signs, and inhomogeneous hypoechogenicity. The followings were considered as "infiltrative signs" of lymph nodes: ill-defined border, indistinguishable from the adjacent structures or loss of movement. Any of these features was considered suggestive of metastatic lymphadenopathy. Invasion of adjacent organs was confirmed by operative findings. All the relevant collected data were compiled on a master chart first and was then organized by using scientific calculator and standard statistical formulae. Percentages were calculated to find out the proportion of the findings.

3. Results

A total number of 76 patients were included in this study. Among 76 patients, 3 unwilling to take part in the study, 4 patients refused to undergo endoscopy or surgery, 5 patients were unfit for the same and in 4 cases, and histopathological reports were not available. This cross sectional study was done on 60 purposively selected patients whose age ranged from 31 to 80 years. All patients who attended in the Department of Radiology and Imaging at Dhaka Medical College, hospital, Dhaka, having clinically suspected gastric carcinoma during the period from July 2009 to June 2011 were enrolled. Among 60 patients included in this study the age ranged between 31 - 80 years (**Table 1**).

Transabdominal hydrosonography diagnosed 23 cases of gastric carcinoma correctly. The commonest site of involvement of gastric carcinoma as determined by ultrasound was the antrum 13 (56.52%) out of 23 cases. The gastro esophageal junction

with involvement of fundus was seen in four (17.39%) cases, the body was also involved in four cases and diffuse involvement of the stomach was seen in two cases (Table 2).

Transabdominal hydrosonography demonstrated exogastric extension and distant metastasis in seventeen patients of gastric carcinoma. Among them metastatic para-aortic lymph nodes were seen in 7 (41.1%) patients and hepatic metastases was detected in 5 (29.4%) patients. Ascites was seen in 11 (64.7%) patients. Sonography detected involvement of duodenum in 3 (17.6%) patients. Involvement of the gallbladder and hilum of the spleen were seen during operation in one patient each (Table 3).

Table 1. Age distribution of study population (n = 60).

Age group (yrs)	Frequency	Percentage
31 - 40	2	3.3
41 - 50	6	10.0
51 - 60	22	36.7
61 - 70	25	41.7
71 - 80	5	8.3
Total	60	100.0

Age range (31 - 80) years

Table 2. Sites of involvement of gastric carcinoma as determined by ultrasound confirmed by histopathology (n = 23).

Site	Frequency	Percentage
GE Junction & Fundus	4	17.4
Body	4	17.4
Antrum	13	56.5
Diffuse Involvement	2	8.7
Total	23	100.0

Table 3. Exogastric extent and distant spread of gastric carcinoma as determined by ultrasound.

Exogastric extent & metastasis	Frequency	Percentage
Liver	5	29.4
Para aortic lymph nodes	7	41.1
Ascites	11	64.7
Pancreas	6	35.2
Duodenum	3	17.6
Gallbladder	0	0.0
Spleen & hilum of the spleen	0	0.0
Transverse colon	2	11.7

4. Discussion

In this cross sectional study the age incidence high in between 61 to 70 years range and is about 41.67% which corresponds to most of the previous study [5] [9] [10]. However in a study age distribution is different and showed that 50 - 60 years range incidence is higher [11]. In Bangladesh patients are from low socioeconomic condition and come to hospital at end stage of their diseases; thus the presentation is late. However, the study mostly agreed with other study done in Asian population [5] [11].

In two cases of gastric carcinoma, diffuse circumferential wall thickening has been seen on hydrosography. Endoscopy interpreted one case as normal. Owing to the diffuse wall thickening seen on sonography a repeat endoscopy has been undertaken. A repeat endoscopic biopsy revealed it to be a case of scirrhous carcinoma. This may be attributed to the well-known difficulty of endoscopy in diagnosing these tumours as the overlying mucosa appears normal, its diagnostic yield is higher in exophytic lesions than in infiltrative lesions [6]. Another case of diffuse circumferential wall thickening has been diagnosed as gastric lymphoma. Pancreas is a common organ invaded by gastric carcinoma [11]. In this study invasion of the pancreas was identified by transabdominal hydrosography in six patients. In two cases the tumour mass was seen to directly continue in the pancreatic region; in the other four cases pancreatic infiltration was identified as a focal change in the pancreatic echotexture. The above six cases of invasion of the pancreas was confirmed at surgery. In addition 3 patients having pancreatic metastasis undetected by transabdominal hydrosography were detected at surgery. In two patients pancreas is invaded slightly. In the remaining one, the tail of pancreas was invaded which was not detected by sonography due to interference of bowel gas and ribs.

During surgery transverse colon was found to be invaded in three patients. Of them, correct diagnosis was made by transabdominal hydrosography only in 1 patient where complete circumference of transverse colon was markedly invaded. In two others undetected by transabdominal hydrosography, transverse colon was slightly invaded and bowel gases interfered severely. Involvement of the gallbladder and hilum of the spleen seen at operation in one patient each was not seen preoperatively on sonography. Splenic hilum could not be observed completely with transabdominal hydrosography leading to the detection failure. In this study liver metastases were seen in five patients. Hypoechoic lesions were seen in three patients, both hypoechoic and hyperechoic lesions were seen in the two patient. Tumours invading liver located in anterior wall of stomach or lesser curvature and were close to the liver. The relationship between tumour and liver could be visualized clearly by using ultrasonographic beam through liver without interference of bowel gases. Ascites was seen in eleven patients, only six of these patients had presented clinically.

Para-aortic lymphadenopathy was identified at sonography in seven patients. However, bowel gas was unfavorable for detection of lymph nodes. Thus, though sonography misdiagnosed or under diagnosed the presence and exogastric extent of gastric carcinoma in a few cases, it did provide accurate diagnosis and a rough estimate of its ex-

tent in the majority of the cases. The possible reasons for misdiagnosis or under diagnosis were as follows: the procedure did not perform adequately, because the investigator had limited experience of this procedure, the transducers that were available and used in this study had frequencies up to 7.5 MHz. So resolution more than this limit was not technically possible, location of gastric carcinoma also affected the diagnosis. Transabdominal hydrosoneography may fail to guarantee a correct diagnosis for carcinoma locating in gastric fundus or cardia. Four cases of gastric carcinoma not diagnosed by transabdominal hydrosoneography in this study were located in the above locations. Location of the involved organs and size of the metastases also affects the diagnosis of exogastric extension. It is difficult to clearly visualize the hilum of the spleen and the tail of the pancreas by transabdominal hydrosoneography. Invasions of the tail of pancreas (1 patient) and hilum of the spleen (1 patient) were not detected with transabdominal hydrosoneography in this study. Similar result has been reported by Samad *et al* [9].

Regarding limitation, this study involved only a limited number of patients. A larger study population could have given more precise results regarding diagnostic validity of this method. The most common site of involvement of correctly diagnosed gastric carcinoma as determined by transabdominal hydrosoneography was the antrum thirteen out of 23 cases (56.52%). The findings of the present study are in agreement with the well-established fact that carcinoma stomach most commonly involves the antrum [5].

5. Conclusion

In conclusion, the most common site of gastric carcinoma is the antral part of stomach followed by body of the stomach as well as the fundus with gastroesophageal junction. Furthermore, the most frequent metastatic site of gastric carcinoma is the peritoneum followed by para aortic lymph nodes and liver. However, large scale study should be carried out to see the real scenario of Bangladesh.

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