

Original Research Article

# Evaluation of gastric carcinomas with high resolution transabdominal sonography

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	International Archives of Integrated Medicine, Vol. 4, Issue 3, March, 2017. Copy right © 2017, IAIM, All Rights Reserved. Available online at <a href="http://iaimjournal.com/">http://iaimjournal.com/</a>	
	ISSN: 2394-0026 (P)	ISSN: 2394-0034 (O)
	Received on: 07-03-2017	Accepted on: 12-03-2017
	Source of support: Nil	Conflict of interest: None declared.
<b>How to cite this article:</b> Nitishkumar Dhanajirao Yeslawath. Evaluation of gastric carcinomas with high resolution transabdominal sonography. IAIM, 2017; 4(3): 50-55.		

## Abstract

**Introduction:** Assessment of the stomach is not commonly included in routine scanning protocol of upper abdominal ultrasound (USG).

**Aim:** To evaluate the efficacy of high-resolution trans abdominal sonography in the evaluation of gastric carcinomas.

**Materials and Methods:** 42 patients diagnosed gastric carcinoma were included in the study. The patients were taken for conventional abdominal sonography followed by high resolution trans abdominal sonography. An UGI endoscopy was done in all cases and biopsy taken from pathological / suspicious site. The accuracy of high resolution sonography of the fluid filled stomach was evaluated in the diagnosis of gastric carcinoma as compared to endoscopy.

**Results:** Commonest age group in the study with gastric carcinoma was 61-70 years of 35.7% and females are more affected than males of 54.7%. Commonest symptoms with which patients of gastric carcinoma presented was weight loss (73.8%) and abdominal pain (69%). This represented the advance stage of the disease at which most of our patients present. The commonest site of gastric involvement in carcinoma was the antrum – 19 out of 42 cases (45.2%). In all 42 patients of gastric carcinoma (97.7%) wall layering is lost. Wall thickness was increased in all the cases (100%). Wall echotexture is hypoechoic in all the patients. There was luminal narrowing and reduced peristalsis seen in all the 42 (100%) cases. Heterogeneous intraluminal masses were seen in 38 out of 42 (90.5%) cases of gastric carcinoma. Serosal involvement was seen in 35 out of 42 (83.3%). Invasion of pancreas is most common site involvements of spread of gastric carcinoma is 42.8%.

**Conclusion:** High resolution sonography is a supportive diagnostic modality and is a supplementary diagnostic procedure to endoscopy.

## Key words

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High resolution trans abdominal sonography, Ultrasound, Gastric carcinoma.

## Introduction

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In most of the centres, routine scanning protocol of the upper abdomen includes the liver, gallbladder, pancreas, kidneys and spleen. Little attention has been paid to the stomach. It is a common belief among sonographers and radiologists that gastric pathology cannot be picked up by ultrasound [1]. Indeed, some part of the gastric wall may be obscured by intraluminal gas. However, ingestion of water just before the examination will help to displace intraluminal gas and provide an acoustic window for visualisation of the posterior wall. Another limitation in trans abdominal ultrasound is in the detection of early mucosal lesions. Early tumours that have not yet reached the stage of frank submucosal invasion and formed a reasonable tumour bulk may not be readily picked up by trans abdominal ultrasound. Ultrasound is often used as the first imaging modality in a large variety of abdominal complaints and clinically unsuspected gastric carcinomas may be imaged first by it.

## Materials and methods

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A total of 42 patients with a clinical diagnosis of gastric disease referred to radiology department were included in the study. After clinical history, relevant points in clinical examination and relevant investigations were carried out. The patients were then subjected to conventional abdominal sonography followed by high resolution sonography of the fluid filled stomach. An UGI endoscopy was done on all 42 cases. Any abnormality detected was noted and biopsy taken from pathological or suspicious site. In patients who underwent surgery operative findings were noted and histopathological correlation obtained wherever possible.

Ultrasound examination was performed using a real time ultrasound with 3 MHz, 5 MHz and/or 7.5 transducers as required. Patients were taken up for examination empty stomach after

overnight fasting and in cases of gastric outlet obstruction after Ryle's tube aspiration. The patients were given 500 ml to a maximum of 1000 ml of tap water to drink. Scanning was done in longitudinal, transverse and left sided subcostal oblique positions. The aim of the procedure was to remove air from the segment of the stomach under investigation by appropriate positioning. The normal stomach was identified using the following criteria:

- Good distensibility of the stomach.
- Uninterrupted layering of the wall.
- Identification of the five layers in the gastric wall. From the inside to the outside.
- Identification of continuous peristalsis when the effect of Buscopan wear off.

The diagnosis of gastric lesions was based on

- Wall thickness more than 5 mm, in the distal antrum more than 8 mm.
- Loss of normal wall stratification.
- Circumscribed widening of the individual layers.
- Luminal narrowing
- Absent or reduced peristalsis.
- Considerable paucity of echoes in the wall.
- Abnormalities of the surrounding connective tissues

## Results

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It is a clinical study of 42 patients diagnosed as gastric carcinoma and referred to radiology department were included in study.

Commonest age group in the study with gastric carcinoma were 61-70 years of 35.7% and females were more affected than males of 54.7%. Commonest symptoms with which patients of gastric carcinoma presented was weight loss (73.8%) and abdominal pain (69%). This

represented the advance stage of the disease at which most of our patients present (**Table – 1**).

**Table - 1:** Demographic details in study.

Characteristic	No of patients	%
<b>Age intervals in years</b>		
31-40	2	4.7
41-50	6	14.3
51-60	10	23.8
61-70	15	35.7
>70	9	21.4
Total	42	
<b>Gender</b>		
Male	19	45.2
Female	23	54.7
<b>Signs and Symptoms</b>		
Weight loss	31	73.8
Abdominal pain	29	69.0
Abdominal fullness	19	45.2
Belching	11	26.1
Loss of appetite	26	61.9
Nausea and vomiting	28	66.6
Fatigue	19	45.2

The commonest site of gastric involvement in carcinoma was the antrum – 19 out of 42 cases (45.2%). The gastro-oesophageal junction with involvement of fundus was seen in ten (23.8%) cases, the body was involved in three cases and diffuse involvement of the stomach was seen in 9 case 21.4% (**Table – 2**).

**Table - 2:** Site of gastric involvement in carcinoma by sonography.

Site	No of patients	%
Gastro oesophageal junction with involvement of fundus	10	23.8
Body	9	21.4
Antrum	19	45.2
Diffuse involvement	4	9.5

In all 42 patients of gastric carcinoma (97.7%) wall layering was lost. Wall thickness was increased in all the cases (100%). Wall

echotexture is hypoechoic in all the patients. There was luminal narrowing and reduced peristalsis seen in all the 42(100%) cases. Heterogeneous intraluminal masses were seen in 38 out of 42 (90.5%) cases of gastric carcinoma. Serosal involvement was seen in 35 out of 42 (83.3%) as per **Table - 3**.

**Table - 3:** High resolution sonography finding in gastric carcinoma.

Characteristics	No of patients	%
<b>Wall layering</b>		
Preserved	0	
Partially lost	1	2.3
Lost completely	41	97.7
<b>Wall thickness</b>		
Normal	0	0
Increased	42	100
<b>Wall echotexture</b>		
Normal	0	0
Hypoechoic	42	100
Hyperechoic	0	0
<b>Lumen</b>		
Normal	0	0
Narrow	42	100
<b>Peristalsis</b>		
Normal	0	0
Reduced / absent	42	100
<b>Intraluminal mass/ polypoidal</b>		
Present	38	90.5
Absent	4	9.5
<b>Serosal involvement</b>		
Intact	7	16.6
Breach	35	83.3

Invasion of pancreas was most common site involvements of spread of gastric carcinoma was 42.8% (**Table – 4**).

## Discussion

Few studies have been conducted into the usefulness of abdominal ultrasound as a diagnostic tool for assessing the stomach. However, the small amount of literature there is has shown trans abdominal ultrasound to be a

reliable modality for the diagnosis of gastric carcinoma.

**Table - 4:** Exogastric extent and distant spread of gastric carcinoma found in carcinoma.

Exogastric extent and distant spread	No of patients	%
Liver	6	14.2
Para aortic LN	5	11.9
Free fluid	6	14.2
Invasion of the pancreas	18	42.8
Involvement of the transverse mesocolon	1	2.3
Involvement of the gastrohepatic and gastrocolic ligament	1	2.3
Other sites	3	7.1

Singh and Chowdhury [1] correctly identified all cases of gastric carcinoma with transabdominal sonography in their study of symptomatic patients undergoing endoscopy for investigation. They also found ultrasound was able to determine which layers were affected and the local anatomical relationship which endoscopy alone cannot. Rappacinni, et al. 1988 [8] found stomach wall thickening was visible by transabdominal ultrasound in all cases of gastric carcinoma diagnosed by endoscopy and biopsy. Abdominal ultrasound can also be used to screen for secondary spread (local lymph nodes and liver metastases) at the time of initial assessment. The stomach can be easily visualised with transabdominal ultrasound. One study able to visualise the gastric antrum in 100% of patients although the body and fundus were not viewed so readily [2]. A six-hour fast is required for an ultrasound examination of the stomach. The patient should be given 400 mL of still water to drink immediately prior to imaging. This must be consumed as quickly as possible to minimise ingestion of air.

In present study, Commonest age group in the study with gastric carcinoma are 61-70 years of

35.7% and females are more affected than males of 54.7%. In previous studies typically present after the age of 40 and affects twice as many men as women. Risk factors include smoking, poor diet, excessive alcohol consumption, obesity, chronic atrophic gastritis, hypertrophic gastropathy (Ménétrier's disease) and gastric polyps [3, 4]. There is a well-recognised association between gastric carcinomas and the helicobacter pylori bacterium [4, 5, 6].

In our study Commonest symptoms with which patients of gastric carcinoma presented were weight loss (73.8%) and abdominal pain (69%). This represented the advance stage of the disease at which most of our patients present. The commonest site of gastric involvement in carcinoma was the antrum – 19 out of 42 cases (45.2%). In all 42 patients of gastric carcinoma (97.7%) wall layering is lost. Wall thickness was increased in all the cases (100%). Wall echotexture is hypoechoic in all the patients. There was luminal narrowing and reduced peristalsis seen in all the 42 (100%) cases. Heterogeneous intraluminal masses were seen in 38 out of 42 (90.5%) cases of gastric carcinoma.

Our findings are in concordance with that of Yeh and Rabinowitz [6] who stated that ultrasonographic features of gastric tumours can be divided into three main categories. The sonographic features seen were also in agreement with that of Worlieck, et al. [7] who stated that a localized carcinoma may be seen as a hypoechoic or moderately echoic circumscribed wall thickening with irregular contours and interrupted wall layering and a scirrhous carcinoma may be visualized as an extensive predominantly hypoechoic mural infiltration, partly uniform partly irregular or polypoid thickening of the wall; a lack of distensibility of the stomach wall with narrowing of the lumen or stenosis.

One of the strongest indicators of gastric adenocarcinoma on ultrasound is thickening of the stomach wall [7, 8]. Rapaccini, et al. [8] reported a mean antrum thickness of 5.1 mm (±

1.1 mm) in normal subjects and mean antrum thickness of 15.9 mm ( $\pm$  4.4 mm) in neoplastic subjects. The gastric antrum of the patient in this case measured 12 mm, which is consistent with neoplasm by these findings. Marginal wall thickening (5–8 mm) without a loss of normal wall stratification is more suggestive of a benign process rather than neoplasm.

Serosal involvement was seen in 35 out of 42 (83.3%). Our study is in correlation with study done by Wong M, et al. [9] and Singh and Chowdhury [1]. Invasion of pancreas is most common site involvements of spread of gastric carcinoma is 42.8%. Simeone, et al. [10] had shown the role of ultrasound in the assessment of the invasion of pancreas by gastric carcinoma.

Invasion of the transverse mesocolon in one patient and invasion of the gastrohepatic and gastrocolic ligaments seen in one patient at surgery was not seen on sonography preoperatively. Liver metastasis is observed to be of 14.2%. Derchi, et al. [11] had stated that when patients of gastric carcinoma are referred for evaluation of liver metastases it is worthwhile to get additional information about tumour extent by performing a complete sonographic examination of the abdomen and pelvis and by making an attempt to visualize the primary neoplasm and its relations to surrounding structures. Preoperative knowledge of both local and distant tumour extent may greatly help surgeons to plan more accurately their therapeutic approach and may even obviate the need for laparotomy with far advanced disease who may receive other types of treatment.

Thus high resolution transabdominal sonography of the fluid filled stomach allows unique and detailed evaluation of the gastric wall layers not available by either endoscopy or barium meal. It not only shows the thickened gastric wall but also shows which layers are involved. The pattern of involvement of wall layers, echotexture of the wall as well as the extent of wall thickness can suggest the diagnosis of malignant lesions. Heterogeneous intraluminal

masses, hypoechoic wall echotexture, luminal narrowing, reduced peristalsis and circumferential wall thickening with loss of wall layering suggest a malignant lesion while increased wall thickness with maintained wall stratification suggests a benign lesion. Intraluminal abnormalities, contiguous structures, adjacent extrinsic masses are also well demonstrated.

## Conclusion

Sonography allows better evaluation of the entire extent of lesions where the endoscope cannot negotiate the proximal growth or area of narrowing in a cost effective manner without any radiation hazard. Thus the study concludes that high resolution sonography of the fluid filled stomach is a supportive diagnostic modality and suggests itself as a supplementary diagnostic procedure to endoscopy.

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