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

Radiology

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ABSTRACT

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

Objectives: To evaluate the diagnostic accuracy of USG and computed tomography (CT) for staging of carcinoma gall bladder.

Methodology: 26 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, gall bladder cancer was most common in 30-50 year age patients (54%), with gall bladder cancers were 2-3 times more common in females compared to males. Patients presented as either mass replacing gall bladder fossa or wall thickening is in equal distribution with less common presentation as intraluminal mass with USG scored slightly better over CT in cases of mild wall thickenings of gall bladder however, CT was more sensitive in detection of infiltration of lesions in adjacent liver. Among early stages in gall bladder malignancies (stage I and II), USG and CT were not sensitive in accurately differentiating stage I from stage II lesions. USG has significantly lower sensitivity than Computed tomography (CT) in detecting enlarged lymph nodes while CT was highly sensitive in detecting metastatic lesions in different regions of body.

Conlcusion: USG being less expensive and radiation free, is the first line investigation in patients of gall bladder 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

INTRODUCTION

The gallbladder is a sac like structure in the gallbladder fossa. It is divided into fundus, body, infundibulum (Hartman's pouch, which is the portion of body that joins the neck) and neck. It has a pear or teardrop shape, situated lateral to the second part of the duodenum and anterior to the right kidney and transverse colon.[1]

Useful landmarks for the evaluation of the gallbladder are the edge of the right hepatic lobe and the liver hilum. In the right subcostal oblique section, the landmark structure to be used is the interlobar fissure and the gallbladder will be found by aligning the probe with the fissure and then tilting it. The gallbladder is located inferiorly or laterally to the fissure (between liver segments IV and V). It should be evaluated regarding the size, wall thickness and content.

Gallbladder carcinoma is defined as cancer arising from the gallbladder and the cystic duct. It is often diagnosed late due to its non-specific nature of symptoms and signs common to other benign diseases such as cholelithiasis or chronic cholecystitis.[2]

Imaging studies may reveal a mass replacing the normal gallbladder, diffuse or focal thickening of the gallbladder wall, polypoidal mass within gall bladder lumen.

On USG, discontinuous thickening of the gallbladder mucosa, diffuse thickening of the gallbladder wall (>12 mm), mural calcification, a mass protruding into the lumen, a fixed mass in the gallbladder, and loss of the interface between the liver and the gallbladder are all signs commonly associated with gallbladder cancer.

Appearances on CECT can include a low-attenuation mass, enhancing mass with ill-defined borders, eccentric gallbladder wall thickening or a fungating mass.

TNM classification:[9]

TABLE 5: TNM staging of gallbladder cancer

Primary tumor (T)			
TX	Primary tumor cannot be assessed		
T0	No evidence of primary tumor		
Tis	Carcinoma in situ		
T1	Tumor invades lamina propria or muscular layer		
T1a	Tumor invades lamina propria		
T1b	Tumor invades muscular layer		
T2	Tumor invades perimuscular connective tissue; no extension beyond serosa or into liver		
T3	Tumor perforates the serosa (visceral peritoneum) and/or directly invades the liver and/or one other adjacent organ or structure, such as the stomach, duodenum, colon, pancreas, omentum, or extrahepatic bile ducts		
T4	Tumor invades main portal vein or hepatic artery or invades two or more extrahepatic organs or structures		
Regional lymph nodes (N)			
NX	Regional lymph nodes cannot be assessed		
N0	No regional lymph node metastasis		
N1	Metastases to nodes along the cystic duct, common bile duct, hepatic artery, and/or portal vein		
N2	Metastases to periaortic, pericaval, superior mesentery artery and/or celiac artery lymph nodes		
Distant metastasis (M)			
M0	No distant metastasis		
M1	Distant metastasis		
Stage grouping			
Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
Stage II	T2	N0	M0
Stage IIIA	T3	N0	M0
Stage IIIB	T1–3	N1	M0
Stage IVA	T4	N0–1	M0
Stage IVB	Any T	N2	M0
	Any T	Any N	M1

From Edge SB, Byrd DR, Compton CC, et al (eds): AJCC Cancer Staging Manual, 7th ed. New York, Springer, 2010.

Carcinoma of the gallbladder is usually found incidentally in a resected cholecystectomy specimen. In fact concurrent gallstones are present in the majority of gallbladder carcinomas.[3,4,5]

Gallbladder carcinoma spreads lymphatically to the lymph nodes around the cystic duct, common bile duct and pancreaticoduodenal region. Venous spread occurs into segment IV. Direct invasion into the segments IV and V, duodenum, colon, anterior abdominal wall, and common hepatic duct is common. Intraductal or perineural spread is also possible.[6,7]

Clinical history, geographic background, risk factors, patient's age and gender are often crucial for arriving at diagnosis of these tumors. Accurate characterization and staging of the malignancies will determine resectability and impact on subsequent management.

Surgery is the mainstay of treatment in resectable gall bladder tumors, ranging from simple cholecystectomy to cholecystectomy with extensive radical resection. In nonresectable and metastatic disease, chemotherapy with gemcitabine and cisplatin or chemoradiation can prolong survival.[8]

MATERIALS AND METHODS

This study was conducted on 26 patients with suspected gall bladder malignancy during the period of July 2017 to September 2018. 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. A total number of 26 patients were included in the study. 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,

- Those patient with suspected gall bladder malignancy on ultrasound examination.
- Patients already detected to have gall bladder malignancy on other imaging modalities like MRI and were advised USG/CT scan for the purpose of pre-treatment staging.
- Assessment of newly detected and diagnosed cases and post chemotherapy and radiotherapy patients were included in the study.
- Patient who gave consent for CT scan.

Exclusion criteria:

Following patients were excluded from the study

- Post-surgery patients were excluded.
- Those patients who refused to give consent for CT scan.
- Patients reactive to contrast material were excluded from my study.

Informed consent

All patients were subjected to scanning after explaining the entire procedure and the risks involved. They were made aware of the methodology in their own language and their queries answered. All studies were done in the presence of a radiologist with standby anesthetic support.

RESULTS

The present study included 26 cases of suspected gall bladder malignancy from July 2017 to September 2018 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.

Table 1. Age distribution of patients with gall bladder cancers detected by radiologic investigations.

Sr. No	Age(years)	No. of patients	Percentage
1	30-50	14	54%
2	51-70	10	38%
3	>70	2	8%

Table 2. Gender specific distribution of gall bladder cancers

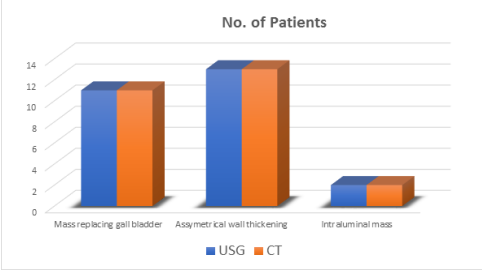
Gender	No of patients	Percentage
Male	8	30.8%
Female	18	69.2%
Total	26	100%

Table 3. USG findings in gall bladder cancers (morphological pattern)

Findings	No. of patients	Percentage
Mass replacing gall bladder	11	42%
Asymmetrical wall thickening	13	50%
Intraluminal mass	2	8%

Table 4. CT findings in gall bladder cancers (morphological pattern)

Findings	No of patients	Percentage
Mass replacing gall bladder	11	42%
Asymmetrical wall thickening	13	50%
Intraluminal mass	2	8%



In our study, mass replacing gall bladder (11 patients) and gall bladder wall thickening (13 patients) were equally prevalent in gall bladder tumors, with wall thickening being slightly more common. Intraluminal polypoidal mass (2 patients) was less commonly seen.

Table 5. USG findings in gall bladder cancers (echogenicity)

Echogenicity	No of patients	Percentage
Hypoechoic	22	85%
Isoechoic	3	11%
Hyperechoic	1	4%

Table 6. CT findings in gall bladder cancers (Attenuation and enhancement)

Attenuation	No of patients	Percentage
Hypodense	25	96%
Isodense	1	4%
Hyperdense	0	0%

Enhancement	No of patients	Percentage
Homogenous	2	8%
Heterogenous	24	92%

Out of 26 patients, 19 patients were positive for abdominal lymphadenopathy and 15 patients were positive for metastasis to distant organs.

Table 7. USG and CT findings in gall bladder cancers (Abdominal lymphadenopathy)

	No. of patients	Percentage
USG	11	64.70%
CT	17	100%
Total	17	100%

Table 8. USG and CT findings in gall bladder cancers (Metastasis to distant organs)

	No. of patients	Percentage
USG	14	93.33%
CT	15	100%
Total	15	100%

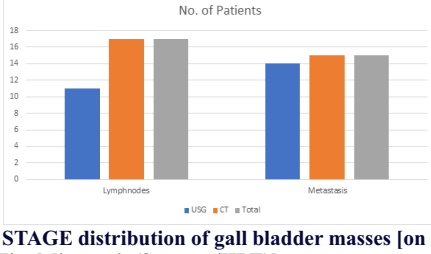
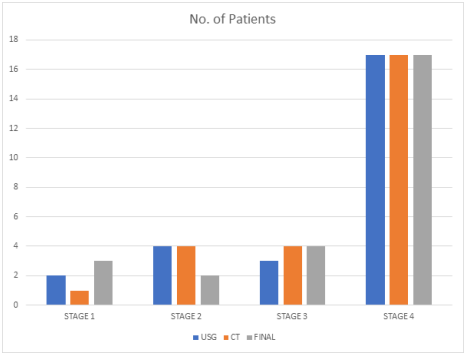
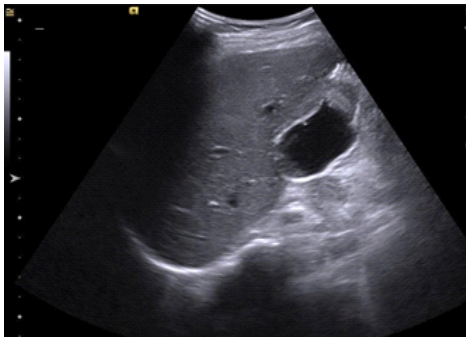


Table 9. STAGE distribution of gall bladder masses [on USG, On CT and Final diagnosis (Surgery/HPE)].

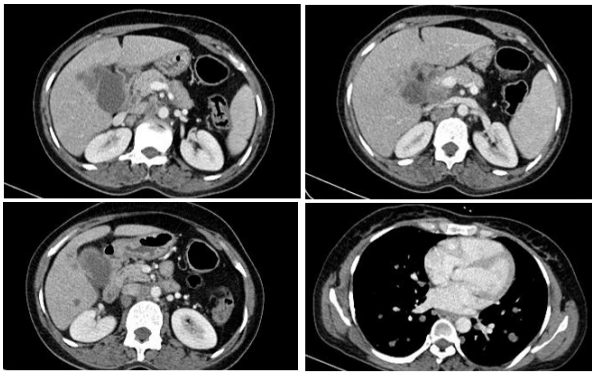
	On USG	On CT	Final
STAGE 1	2	1	3
STAGE 2	4	4	2
STAGE 3	3	4	4
STAGE 4	17	17	17
Total	26	26	26



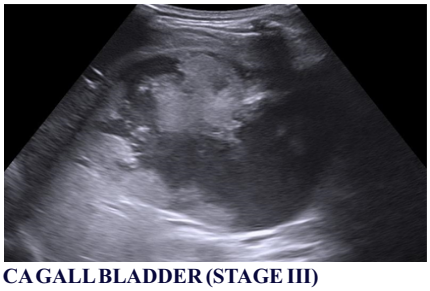


CASE 1: CA GALL BLADDER (STAGE IV)

On USG, there is assymetric wall thickening noted involving gall bladder infiltrating adjacent liver parenchyma.

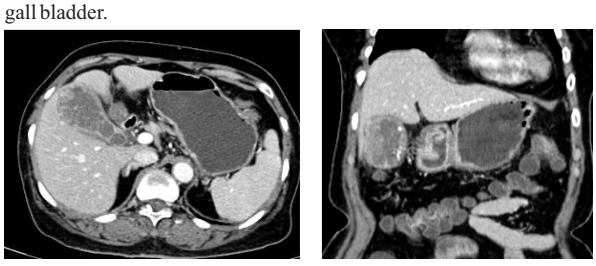


On CT scan, heterogeneously enhancing wall thickening involving gall bladder infiltrating adjacent liver parenchyma with lung and liver metastasis.

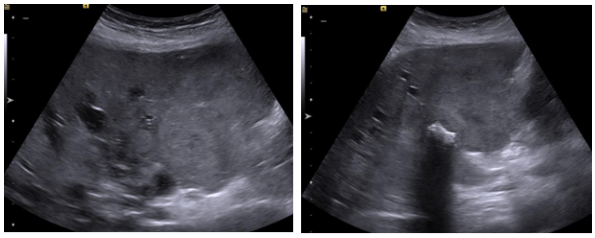


CASE 2: CA GALL BLADDER (STAGE III)

On USG, isoechoic polypoidal intraluminal wall thickening involving gall bladder.

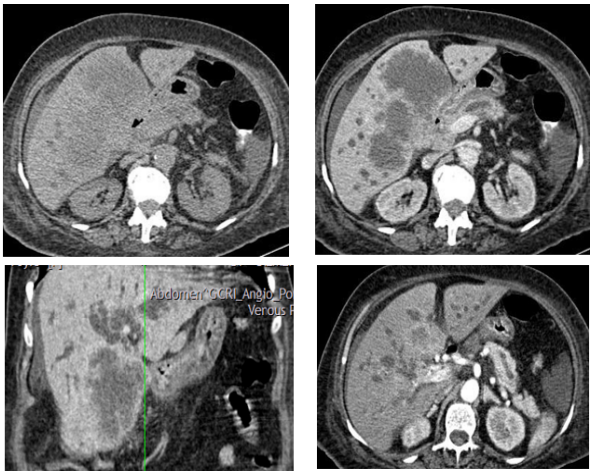


On CT scan, intraluminal polypoidal wall thickening involving gall bladder with periportal lymph node.

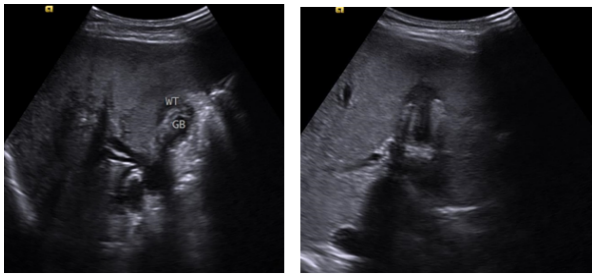


CASE 3: CA GALL BLADDER (STAGE IV)

On USG, heterogenous echotexture mass lesion replacing gall bladder fossa region infiltrating adjacent segments of liver. Calculi within gall bladder also noted.

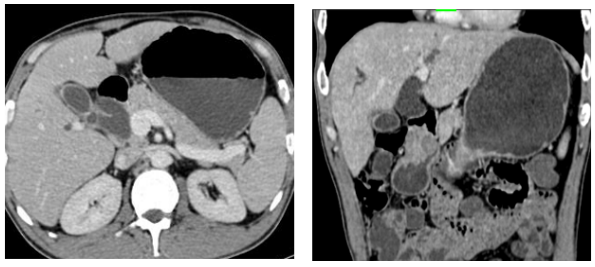


On CT scan, heterogenous enhancing mass lesion repalcing gall bladder fossa and infiltrating adjacent segments of liver with liver metastasis.

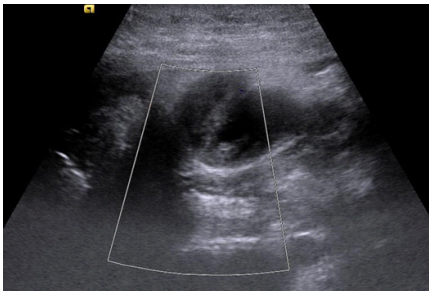


Case 4: CA GALL BLADDER (STAGE II)

On USG, wall thickeing confined to gall ballder wall.

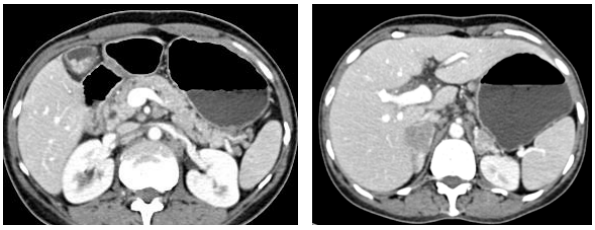


On CT scan, mild hypodense wall thickening involving gall bladder.



CASE 5: CA GALL BLADDER (STAGE IV)

On USG, there is hypoechoic wall thickening involving gall bladder.



CT scan showed enhancing wall thickening involving body of gall bladder with metastatic deposit in bilateral adrenal glands.

SUMMARY AND CONCLUSION

Technically adequate images were obtained in all patients and there was excellent demonstration of relevant anatomy, pathology on USG, MPR images on Computed tomography (CT) scan and tumour characterization on Computed tomography (CT).

Gall bladder cancer was most common in 30-50 year age patients with significant number of patients in 51 to 70 years age.

Within gender specific distribution, gall bladder cancers were 2-3 times more common in females compared to males.

In gall bladder cancer, patients presented as either mass replacing gall bladder fossa or wall thickening is in equal distribution with less common presentation as intraluminal mass. Most of them appeared hypoechoic on USG. On CT, almost all tumors were hypodense on NECT and showed heterogeneous enhancement. Both USG and CT were highly sensitive for detection of pathology in primary lesion among gall bladder cancers.

USG scored slightly better over CT in cases of mild wall thickenings of gall bladder for detecting and differentiating them from benign gall bladder wall lesions like acute/chronic cholecystitis and adenomyomatosis. However, CT was more sensitive in detection of infiltration of lesions in adjacent liver.

Among early stages in gall bladder malignancies (stage I and II), although USG and CT was able to detect pathology in most of patients but both of them were not sensitive in accurately differentiating stage I from stage II lesions.

USG has significantly lower sensitivity than Computed tomography (CT) in detecting enlarged lymph nodes. USG is not suitable for the comprehensive staging of biliary tract malignancy.

CT was highly sensitive in detecting metastatic lesions in different regions of body. USG was highly sensitive for detecting metastatic lesions in liver, but could not detect metastasis in lung.

USG being less expensive and radiation free, is the first line investigation in patients of gall bladder cancers. But CT remains the investigation of choice.

Computed tomography 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.

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