

Ultrasonographic Evaluation of Gallbladder Malignancy: Comparison with Histopathology

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A total of 50 cases of clinically suspected gallbladder malignancy were studied in the department of Radiology and Imaging, Dhaka Medical College, Dhaka during the period from January 2006 to March 2007. The purpose of this study was to establish the validity and usefulness of ultrasonography for diagnosis of gallbladder malignancy. Biopsy or FNAC reports considered as the gold standard for diagnosis of gallbladder malignancy. In this series, 34 patients were diagnosed as malignancy and 16 patients as benign condition by Ultrasonography. Finally 29 patients were confirmed as malignancy by histopathology. Ultrasonography were found highly sensitive (93.6%) and useful imaging modality in the diagnosis of gallbladder malignancy.

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Key words: Ultrasonography, diagnosis, gallbladder, malignancy.

Introduction

Gallbladder is an important organ in human body that plays a vital role in fat digestion. Cholelithiasis and cholecystitis are two common benign gallbladder disorders and usually have a good prognosis. Malignancy of gallbladder is a highly lethal disease and runs a fatal prognosis. It is the most common malignant tumor of the biliary tree. It is also the 5th most common gastrointestinal malignancy and comprises about 1 - 3% of all malignancies. Its peak incidence is in the 5th

decade or older and there is a female prediction of 3 – 4 : 1.¹ The incidence of malignancy of gall bladder varies greatly in different areas of the world. There is a high incidence in Mexican Americans and South-western Native Americans. The incidence in Caucasian is 50% greater than in blacks.² Though the incidence of malignancy of gallbladder in our country is not less than western world, there is no broad based study regarding this.

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The aetiology of malignancy of gallbladder remains unknown. There is a well-established association between malignancy of gallbladder and gall stone and chronic cholecystitis. Gall stones are detected in 65% - 95% of malignancy of gallbladder cases.³ About 10% - 25% of patients with porcelain gallbladder have gallbladder malignancy.

The symptoms of malignancy may be superimposed upon chronic cholecystitis with the transition unnoticed by the patient, or the patient may not have any symptom that is due to malignancy at all. Patients commonly presents with upper abdominal pain, jaundice and weight loss. Other symptoms include nausea, vomiting, loss of appetite, fatty food intolerance, dark urine, a mass or tenderness in upper abdomen etc.⁴

Gallbladder malignancy macroscopically exhibit two different patterns: infiltrative and papillary. The tumors are usually found in the fundal region of gallbladder but may arise in corpus and neck. More than 75% of gallbladder tumours are adenocarcinoma. Squamous cell carcinoma is also seen infrequently.⁵ Early diagnosis of malignancy is difficult as there are no specific signs and symptoms and many malignancy are not diagnosed preoperatively. Conventionally, malignancy of gallbladder is diagnosed on the basis of clinical history, abdominal examination and using modern imaging technique like transabdominal ultrasonography. These are subsequently confirmed by post operative histopathology of surgical specimen. Because the clinical presentation is confusing, the radiologist is often the first to suggest the correct diagnosis.

Transabdominal sonography has been found to be useful in suggesting the preoperative diagnosis of gallbladder malignancy but several diagnostic problems may arise in the differentiation from the polyps and acute

inflammatory disease. USG may facilitate treatment of early and curable malignancy by the fortuitous detection of tumour in patients who are asymptomatic and who have symptoms attributable to coexistent stones.

In our country, gallbladder malignancy is not uncommon. Ultrasonography is an important diagnostic tool available in this country to evaluate the hepatobiliary system. By utilization of this advanced imaging modality, malignancy of gallbladder may be detected early and accurately at a time when these tumors are still localized. Thus survival time of the patients can be increased by early removal of tumors. This study was undertaken to evaluate the preoperative diagnostic value of ultrasonography in cases of gallbladder malignancy.

Methods

This cross sectional study was carried out on 50 patients admitted in surgery Unit of Dhaka Medical College Hospital, Dhaka requiring operative intervention for their clinical diagnosis of malignancy and referred to the Radiology and Imaging Department of Dhaka Medical College Hospital to confirm the clinical diagnosis by ultrasonography. The study was carried out from January 2006 to March 2007. Yeh (1997) criteria was followed for ultrasonographic diagnosis of gallbladder malignancy:

Type I: Mass filling the gallbladder

1 a: Diffuse weak echoes in gallbladder

1 b: Strong central echoes in addition to diffuse weak echoes.

Type II: Thickened gallbladder wall due to infiltrating carcinoma.

Type III: A fungating mass on gallbladder wall.

Type IV: A combination of type II and III

Following variables were included according to Wilson Khalik (2005):

Size of gallbladder – (a) normal (3 – 4 cm), (b) contracted (2cm or less) and (c) distended (5 cm or more).

Wall thickness of gallbladder – (a) normal (2.5 – 3 mm) and (b) thickened (more than 3 mm).

Margin of gallbladder - (a) well delineated (thin smooth and regular in outline), (b) poorly delineated (ill defined/irregular or discontinuous in outline) and (c) not delineated (no definite demarcation of gallbladder outline)

Content of gallbladder lumen – (a) clear (completely echo-free, (b) stone (bright echogenic structure with distal acoustic shadow which moves on posture change), (c) mass (irregular mixed echogenic structure with faint distal shadowing or having no shadowing with or without irregular outline) and (d) sludge (low level echoes with fluid level which moves on posture change)

Hepatic parenchymal involvement – (a) direct invasion (mixed echogenic irregular lesion involving gallbladder fossa or adjoining liver parenchyma (b) discrete metastasis (single or multiple foci of echogenic or echopenic hepatic lesion).

Biliary tree dilatation – (a) not dilated (CBD less than 8 mm in diameter) and (b) dilated (intrahepatic double barrel sign/stellate pattern with irregular wall and posterior acoustic enhancement) and (b) dilated (CBD more than 8mm in diameter).

Lymph node enlargement – (a) present (rounded/oval slightly irregular outline hypoechoic or echopenic structure in anatomical location of lymph nodes and (b) absent enlarged lymph nodes.

Ultrasound examination was performed using Gray scale real time ultrasound scanner equipped with 2.5 - 5 MHz₃ Sector, convex curvilinear transducer of Acuson 128x plus,

Antures sonoline. Siemens and Logic ultrasound machine.

Data were collected in predesigned structured data collection sheets. These include clinical history, physical examination, sonographic findings for diagnosis of gallbladder malignancy and its extension and final histopathological examination for confirm diagnosis. Data were analysed by statistical computer program SPSS.

Results

A total of 50 patients with clinical suspicion of gallbladder malignancy were studied. Initially ultrasonography was carried out on all 50 patients. Ultrasonography diagnosed 34 cases of gallbladder malignancy and 16 cases of benign conditions. Among 34 malignancy diagnosed by ultrasonography, final histopathological diagnosis was reached in 19 patients, who underwent surgery by per-operative excision biopsies and in the rest 15 patients by FNAC. Histopathology confirmed 29 cases as malignancy and 5 cases as benign condition.

Among 16 patients considered as benign conditions by ultrasonography, diagnosis of 14 patients, were confirmed correct by histopathology of excised tissue following surgery but histopathology revealed 2 cases as malignancy. So the total number of disease positive was 31. The number of true positive and false positive cases in this study was 29 and 5, respectively. The number of true negative and false negative in this study was 14 and 2, respectively.

Among 50 patients, there were 32(64%) women and 18(36%) men. The age of all patients ranged from 40 to 80 years (Mean \pm SD = 61.7 \pm 8.5). Distribution of the patients according to age is shown in the table I. Majority of the cases were in the 7th decade.

Table I: age distribution of study population (n=50)

Age group in years	No. of patient	Percentage
41-50	04	08%
51-60	16	32%
61-70	22	44%
71-80	08	16%

Table II: Sites of involvement of gallbladder malignancy as determined by ultrasound (n =29)

Ultrasonographic findings	No of patients	Percentage
Sites of involvement		
Fungus	9	31.0%
Body	7	24.1%
Neck	2	6.9%
Diffuse involvement	11	37.9%
Size of gallbladder		
Normal	6	10.3%
Contracted	14	48.3%
Distended	12	41.4%
Wall thickness		
Normal	06	20.7%
Diffusely thickened	08	27.6%
Irregularly thickened	15	51.7%
Gallbladder margin		
Well delineated	04	13.8%
Poorly delineated	19	65.5%
Not delineated	06	20.7%
Gallbladder lumen content		
Clear	0	
Pure stone	04	13.8%
Pure mass	13	44.8%
Stone + mass	11	37.9%
Only sludge	01	3.4%
Biliary tree		
Not dilated	12	41.4%
Dilated	17	58.6%
Hepatic involvement		
Not involved	16	55.2%
Direct invasion	09	31.0%
Discrete metastasis	04	13.8%
Enlarged lymph nodes		
Present	08	27.6%
Absent	21	72.4%

Ultrasonography diagnosed 29 cases of gallbladder malignancy correctly (true positive cases). Ultrasonographic findings of these cases is shown in the table II.

Among 50 cases histopathology revealed 31 cases malignancy. Most common case was adenocarcinoma (table III).

Table III: Histopathological diagnosis 31 cases of gallbladder malignancy.

Findings	No	%
Adenocarcinoma	26	83.9%
Squamous cell carcinoma	1	3.2%
Leiomyosarcoma	1	3.2%
Lymphoma	2	6.5%
Carcinoid	1	3.2%

The validity of ultrasonography for the diagnosis of gallbladder malignancy was confirmed by calculating sensitivity specificity, accuracy, positive and negative predictive value (table IV).

Table IV: Values of test parameters of ultrasonography.

Test parameter	Percentage
Sensitivity	93.6%
Specificity	73.7%
Accuracy	86.0%
Positive predictive value	85.3%
Negative predictive value	87.5%

Discussion

Adenocarcinoma of gallbladder is the most common malignant tumor of the biliary tract. It ranks 5th in frequency of all gastrointestinal malignancies. Over all outcome of this disease is poor. At present, the five year survival rate for this disease is reported to be only 4-12%. Further mores, early diagnosis is difficult as there are no specific sign and symptoms.

Recent improvements in the hepatobiliary imaging technique have been increasingly promising with respect to accurate

preoperative diagnosis and assessment of the extent of malignancy.

Memon et al (2005) have shown in their series that the mean age of the patients having gallbladder malignancy was 70.6 years and range from 42 to 85 years.⁶ In our study the mean age of patients having gallbladder malignancy was 61.7 years with range from 41-80 years probably the change is due to racial variation and shorter average life span.

Paraskevopoulos et al (1974) found that the incidence gallbladder malignancy is higher in female.⁷ In their study on 27 patients, female were 18 and male were 9. The results of present study closely resemble with the above study where out of 50 patients 32 (64%) were females and 18 (36%) were males.

In the present study size of gallbladder was found to be normal in 10.3%, contracted 48.3% and distended 4.4%. Diffuse wall thickening was 30.3%, irregular wall thickening 45.5%, mostly correlated with other studies.^{5,8}

Gallbladder malignancy may appear as mass lesion on imaging study. Mass may protrude into the lumen or large enough to occupy whole of the gallbladder, which is the most common appearance. It was observed in this study that large mass filling the gallbladder lumen found in 44.8%. Sludge was found in 34% patients at USG.⁸

Cholelithiasis is a well established risk factor for the development of gallbladder malignancy. In the present study gall stone were found in 51.7% patients at USG. Dilated biliary tree was found in 58.6% cases. The present study shows hepatic parenchymal involvement in 44.8% and enlarged lymph nodes in 27.6%.

In the present study, sensitivity 93.6%, specificity 73.7%, accuracy 86.0%, positive predictive value 85.3% and negative predictive value 87.5% is closely related to other studies.⁹

Conclusion

The histopathological diagnosis of the present study correlated well with ultrasonographic diagnosis of gallbladder malignancy. It can be concluded that USG is useful imaging modality for diagnosing this diseases. However, further studies can be undertaken by including large number of patients.

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