ACCURACY OF PRE-OPERATIVE DIAGNOSIS OF BILIARY TRACT DISEASE
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ABSTRACT

INTRODUCTION
Biliary tract diseases are usually the result of obstruction, infection or both. Obstruction can be extramural (e.g. pancreatic cancer), intramural (cholangiocarcinoma) or intraluminal (e.g. choledocholithiasis). Similar to other infections in other parts of the body, biliary infections are due to three factors; a susceptible host, sufficient inoculums and stasis. The most common symptoms related to biliary tract diseases are right upper quadrant pain, nausea, and vomiting, jaundice, palpable right upper quadrant mass, dyspeptic symptoms and pyrexia of unknown origin.

Ultrasonography is the initial investigation of any patient suspected of disease of biliary tract. It is a non-invasive and painless test which does not expose the patient to radiation and can be performed on critically ill patients.

PURPOSE
The purpose of the study is to evaluate the role of ultrasonography in terms of sensitivity, specificity and accuracy with operative and histopathological findings in the management of biliary tract diseases.

MATERIALS AND METHODS
This study was a prospective clinical study. The study consisted of 104 patients with suspected biliary tract diseases admitted to surgery wards of MKCG Medical College & Hospital from July-2014 to October 2015. After admission detailed clinical history was obtained from each case as per proforma. After that they were subjected to ultrasound after an overnight fast (6 to 8 hours) followed by surgery in appropriate cases.

RESULTS
In this study the sensitivity and specificity of ultrasonography to diagnose acute cholecystitis was 94% and 85% respectively. The sensitivity and specificity in case of chronic cholecystitis was 71% and 97% respectively. In case of others it was 94% and 97% respectively.

KEYWORDS
Ultrasonography, Acute cholecystitis, Chronic cholecystitis.


INTRODUCTION: Despite the diagnostic imaging procedures that have recently become available, patients with right upper quadrant pain continue to present a challenge to both the clinician and the radiologist. Biliary tract disease is coming up so fast on its frequency and distribution (might be due to the advent of the ultrasonography in the arena of investigation) that it has become a prime suspect in patients with right upper quadrant (RUQ) pain and discomfort. As the number of available imaging modalities continues to expand and as their applications become more diverse and sophisticated, clinical and imaging guidelines are becoming increasingly important, despite recent improvements in other non-invasive imaging modalities, particularly with regards to magnetic resonance imaging (MRI) and the introduction of magnetic resonance cholangiopancreatography (MRCP).

Although both intravenous cholangiography and technetium 99m derivatives of iminodiacetic acid (HIDA) can be extremely accurate in the diagnosis of acute cholecystitis, the majority of patients with RUQ pain do not have acute cholecystitis. Several surgical series have shown that only 13-34% of the patients presenting with signs and symptoms of acute cholecystitis will have that condition1. Indeed pathological processes involving the liver, right kidney, bowel, pancreas and even ovary all can show similar symptomatology and can mimic the clinical presentation of acute cholecystitis.
Unlike radionuclide scanning and intravenous cholangiography, ultrasound is non-invasive, function independent, time saving and does not involve any radiation. Reports indicate that ultrasound is more than 90% accurate in the diagnosis of gall bladder disease.²

Hence, considering the craze for ultrasound, the study is designed for a prospective evaluation of the role of ultrasound in terms of sensitivity, specificity and accuracy after matching with operative and histopathological finding, in the management of biliary tract diseases in southern part of Odisha.

MATERIALS AND METHODS: The present work "Accuracy of pre-operative diagnosis of biliary tract disease" was carried out in M.K.C.G Medical College and Hospital, Brahmapur, Odisha on 104 patients with suspected biliary tract diseases admitted to surgery wards of M.K.C.G Medical College & Hospital from July 2014 to October 2015. After admission detailed clinical history was obtained from each case as per the proforma. After that they were subjected to ultrasound after an overnight fast (6 to 8 hours) followed by surgery in appropriate cases.

This study comprises of patient of all age groups, both sexes having biliary tract diseases. However study excluded the patients who refused surgery and who were unfit for surgery.

STATISTICS AND RESULTS: Of the 104 patients in this study, they were placed into one of the three categories. Acute cholecystitis was based in the observation of tenderness directly centered over the gall bladder while chronic cholecystitis was diagnosed in patients with calculi and who had a more diffuse type of pain or who were maximally tender elsewhere the category of others was reserved for patients with normal appearing gallbladder that lacked focal tenderness.

Of the 104 patients in this study, 36 (34.6%) were diagnosed surgically and pathologically as having acute cholecystitis. Ultrasonographically, the diagnosis of acute cholecystitis was made in 44 patients. There were 34 true-positive diagnosis, 10 false-positive diagnosis (pathologically interpreted as chronic cholecystitis in 8 and other in 2), and two false-negative diagnosis.

Maximal focal tenderness was located over gall bladder fossa in 34 out of 36 patients.

Calculi were accurately diagnosed in 30 patients with acute cholecystitis. In the remaining 6 patients stones could not be appreciated. Among these 6 patients were correctly diagnosed of having acute cholecystitis despite lack of visualization of calculi (due to exquisite focal tenderness, sludge, wall thickening and distension of gallbladder).

Two patients had only pus removed at the time of cholecystectomy and 2 patients represented false-negative diagnosis (due to single stone impacted in the cystic duct) when the group of patients having acute cholecystitis was compared with the group that did not have stones i.e. other diagnosis, the sensitivity and specificity of ultrasound for calculi were 93% and 100% respectively.

Sludge was present in 22 patients of acute cholecystitis and 4 patients in chronic cholecystitis. Two patients in the other group were found to have sludge.

A thickened gall bladder wall was observed in 26 out of 36 patients indicating the percentage of patients having thickened gallbladder in acute cholecystitis was 72%. Wall thickening was also present in 10% patients with chronic cholecystitis with a percentage of 38%. 4 patients in the other category also had gallbladder thickening.

Maximal focal tenderness was located over gallbladder fossa in 34 out of 36 acute cholecystitis patients with an overall sensitivity of 94%.

Using presence of sludge to diagnose acute cholecystitis sensitivity was 61%. Sludge was observed in four patients with chronic cholecystitis and two patients in the other diagnosis group.

A thickened gallbladder wall (>3mm) was observed in 26 out of 36 patients with a sensitivity of 72%. Wall thickening was also present in ten patients with chronic cholecystitis and four with other diagnoses.

Pathologically, the diagnosis of chronic cholecystitis was made in 34 of 104 patients (32.7%). Ultrasonographically, the diagnosis of chronic cholecystitis was made correctly in 24 individuals. The twelve cases of errors consisted of two false positive diagnoses, in two patients with acute cholecystitis and ten false negative diagnoses.

Presence of focal tenderness helped in distinguishing acute from the chronic cholecystitis (P<0.001). Ten patients with chronic cholecystitis had mild focal tenderness centered over the gall bladder fossa but maximum tenderness was localized elsewhere in the abdomen. In four patients the pain was caudal to the gallbladder. Surgery revealed right lower quadrant adhesions in three, while degenerating fibroids was evident at ultrasonography and surgery in other. Four additional patients with pain medial to the gallbladder were subsequently proved to have severe pancreatitis secondary to the passage of common bile duct stones. In the other two patients, the cause of focal epigastric pain was never determined.

Calculi were correctly diagnosed in all 32 patients with chronic cholecystitis in whom they were present. Two patients who had no stones were misdiagnosed ultrasonographically and were placed into other category.

Sludge was present in 4 of the 34 patients (12%) and wall thickening was evident in 10 of 26 patients with a percentage of 29%. On a statistical basis the absence of sludge in 88% of the patients and presence of normal gallbladder in 61% were significant in separating acute from chronic cholecystitis (P<0.001 in both variables)

34 patients out of 104 (32.7%) were put in others group. Ultrasound appropriately categorized 32 out of 34 of these patients. There were two false positive that were subsequently shown to have chronic cholecystitis and two-false negative which was diagnosed acute cholecystitis ultrasonographically. In addition to visualizing a normal gallbladder, ultrasound was able to localize the source of symptomatology in 12 patients in the other diagnosis category. The final diagnosis in these 12 patients included
amoebic abscess (4), hepatoma (2), metastatic liver disease with para-aortic adenopathy (2), pancreatitis (2), and duodenal ulcer disease (2). In the remaining 22 patients, other investigations confirmed the absence of acute gall bladder pathology.

Statistically, the most important feature in placing into other diagnosis category was the absence of gall bladder calculi. When compared with either the acute or chronic cholecystitis groups, this finding proved to be highly significant (P<0.0001). Similarly, the absence of tenderness over the gallbladder was highly significant in separating the other from acute gallbladder patients (P<0.0001). Because focal tenderness, sludge and thickened walls were not prominent features in patients either in chronic or other category these variables could not be used to distinguish these two groups.

Cases with common duct more than 10mm were taken into review, as it is a clinical indication for exploration. Out of thirty cases, the exact cause of obstruction was determined only in 28 cases surgically. Out of these, stone as the cause of obstruction was found to be in 19(63.3%) cases, others 4(13.3%) cases, and the cause could not be determined in 2(6.7%) cases.

The category ‘others’ includes choledochocoele (2), carcinoma head of pancreas (1) and round worm in one case. Out of surgically proved cases ultrasonography could detect stone in 15 out of 19 cases (78%), stricture in 1 out of 5 cases (20%) and others in 4 out of 4 cases (100%) giving an overall sensitivity of 77%. For determination of the level of obstruction extrabiliary biliary tract was divided into three parts like porta hepatitis, suprapancreatic and intrapancreatic. Porta hepatitis accounted for 1(3.57%), suprapancreatic 7(25%), intrapancreatic 20(71.43%) cases. In porta-hepatitis all were diagnosed correctly by the USG (100%) in supra pancreatic 6 out of 7(85.7%) and in intrapancreatic 14 out of 20(70%) cases.

**DISCUSSION:** All the patients who were evaluated in this prospective study were clinically diagnosed to be having gallbladder pathology. Clinical criteria like pain in the right upper quadrant, jaundice, palpable right upper abdominal mass, recurrent symptoms of peptic ulcer or pyrexia of unknown origin were taken into account. Yet the final diagnosis revealed that only 34.6% of patients had acute cholecystitis.

Out of 104 patients there were 34 i.e. (34.6%) with acute cholecystitis. Chronic cholecystitis was found in 34 (32.7%) patients and in others there were (32.7%).

A surgical literature similarly suggests that acute cholecystitis is present in only 13%-34% of the cases studied, (Johnson H.C et al, Harington O.B. et al, and Thorpe C.D et al). That means many other organ systems must be considered when evaluating these patients, because majority will be shown not to have acute cholecystitis. Differential diagnosis like pancreatitis, appendicitis, peptic ulcer disease, hepatitis, liver abscess or liver neoplasms should be taken into account.

In this study, ultrasonographically the diagnosis of acute cholecystitis was made in 44 patients. There were 34 true positive diagnoses.

On the basis of ultrasound most authorities diagnose acute cholecystitis if there are gall stones and the gallbladder is focally tender. In the investigation reported by Ralls et al 1985 a positive sonographic Murphy’s sign in conjunction with cholelithiasis has a positive predictive value of 92% for diagnosing acute cholecystitis. Acute cholecystitis occurs in only approximately 20% of the patients who have gall stones. This means that many patients with gallstones have no symptoms, and their right upper quadrant pain may be caused by a different aetiology. As part of sonographic examination for acute cholecystitis, an effort should be made to determine if the stone is impacted in the cystic duct, as 90-95% of cases of acute cholecystitis are caused by obstruction by gallstones in either the gallbladder neck or cystic duct.

False-negative results occur because stones are too small to cast a shadow (usually smaller than 1mm), stones are soft that lack strong echoes & impacted in the gall bladder neck or in the cystic duct which may not be as readily visible.

Though in many institutions emergency radionuclide scan with technetium-99m (99Tc) labelled derivatives of iminodiacetic acid is obtained with a reported accuracy of 98-100% in correctly diagnosing cystic duct obstruction. Yet they cannot be routinely used as majority of the symptomatic patients do not have acute cholecystitis and because nuclear imaging is not as sensitive as ultrasound in diagnosing non biliary pathology.

The sensitivity and specificity of ultrasonography to diagnose acute cholecystitis was 94 and 85% respectively. The sensitivity and specificity in case of chronic cholecystitis was 71% and 97% respectively. In case of others it was 94% and 97% respectively.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Sensitivity</th>
<th>%</th>
<th>Specificity</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute cholecystitis</td>
<td>34/36</td>
<td>94</td>
<td>58/68</td>
<td>85</td>
</tr>
<tr>
<td>Chronic cholecystitis</td>
<td>24/34</td>
<td>71</td>
<td>68/70</td>
<td>97</td>
</tr>
<tr>
<td>Others</td>
<td>32/34</td>
<td>94</td>
<td>68/70</td>
<td>97</td>
</tr>
</tbody>
</table>

**Table 1: Accuracy of USG: Overall accuracy**

So an ultrasound should be performed as the initial screening procedure as two out of three patients have either chronic cholecystitis or a non- biliary cause for the symptoms and that ultrasound is an extremely accurate method to determine whether or not, the gall bladder is abnormal, either acutely or chronically with sensitivity of 94%, and specificity of 97%. In patients with normal appearing non tender gall bladders, the ultrasound may be able to localize the site of pathology (12 in 34 patients) or it may direct the patients work up for further evaluation. If the USG appears normal, but pain is localized to gall bladder fossa, a radionuclide scan is suggested to exclude a stone impacted in cystic duct or acalculous cholecystitis.
Acalculous cholecystitis is more difficult to diagnose ultrasonographically because these generally ill patients have other potential causes for gall bladder wall thickening and are often unable to report whether gall bladder is tender.

Distinguishing acute calculous cholecystitis from acute acalculous cholecystitis by USG is more difficult because it relies heavily on the subjective evaluation of a patient here response. As the patients here were well oriented it was possible in the majority of patients, to localize the site of tenderness precisely or to determine if it was diffuse in nature. In our study 6 patients were given a diagnosis of acute acalculous cholecystitis and 4 had tenderness centered over the gall bladder fossa which came to 66%. Because sludge, thickened gallbladder wall, gallbladder distension and intramural debris in the absence of hypoalbuminemia, heart failure, or hepatic congestion were shown to be statistically significant, these findings may be used as ancillary evidence for distinguishing these two entities.8, 9

If a stone is impacted in the neck of the gallbladder or cystic duct, it will frequently not be seen ultrasonographically.

The exquisite sensitivity of ultrasound to detect dilatation of bile duct has made it the imaging technique of choice in the evaluation of jaundice patients. Localizing the site and cause of obstruction are important for determining what other examination if any, should be performed for further evaluation. This information may also be useful for determining if further interventional procedures such as surgery, endoscopy or PTC are necessary.10 Published figures on the ability to display the level & suggest the cause of obstruction vary dramatically. At one extreme it is 95% (Koenberg et al 1979), and 94% (Haubach et al, 1981) for level of obstruction and 81% and 68% for cause of obstruction respectively.11, 12

<table>
<thead>
<tr>
<th>Causes of obstruction</th>
<th>Findings Pre-operative</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stone</td>
<td>USG 15</td>
<td>82.6%</td>
</tr>
<tr>
<td>Stricture</td>
<td>USG 01</td>
<td>55.5%</td>
</tr>
<tr>
<td>Others</td>
<td>USG 04</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>USG 20</td>
<td>77.7%</td>
</tr>
</tbody>
</table>

Table 2: Diagnostic accuracy of ultrasound in cases of obstruction

The distal CBD calculi could be visualized in approximately 70% of cases. In our study the cause and level of obstruction at porta-hepatis could be diagnosed in 100% of cases.

CONCLUSION: The ultrasound being an inexpensive, non-invasive, timesaving especially in critically ill patients, function independent, with high sensitivity, specificity and accuracy, becomes the primary modality in the investigation and management of biliary tract diseases. As it lacks in ionizing radiation or need for a contrast it also becomes a primary imaging modality in cases where other procedures are contraindicated. Hence it has profound effect in the profile of biliary tract surgery.

However as a matter of caution, one should not ignore the subjective interpretation of ultrasound and its limitations, and in doubtful cases the diagnosis should be substantiated by adducting other methods of investigation like ERCP, MRCP, CT, radionuclide scanning. If one keeps the clinical scenario in mind and always images a patient where he or she hurts, ultrasound is a powerful and effective diagnostic method for evaluating acute right upper quadrant pain.

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REFERENCES:


