International Journal of Sciences & Applied Research

www.ijsar.in

Role of ultrasonography in evaluation and diagnosis of Cholelithiasis and Cholecystitis

Maajid Mohiuddin Malik[1]*, Manjot Kaur[2], Manraj Kaur[3]

[1]Lecturer, College of Paramedical Sciences Adesh University Bathinda, Punjab 151001.
[2]Professor and Head, Department Of Radio-Diagnosis And Imaging Adesh University Bathinda, Punjab-151001.
[3]Associate Professor, Department of Radio-Diagnosis and Imaging Adesh University Bathinda, Punjab 151001.

Corresponding author: *Maajid Mohiuddin Malik, Lecturer, College of Paramedical Sciences Adesh University Bathinda, Punjab 151001.

Abstract

Background: Imaging of the biliary tract for cholelithiasis and its complications has changed dramatically in recent decades. Ultrasonography (US) is the method of choice for detection of cholelithiasis and cholecystitis. In experienced hands it has a sensitivity of 96% and a specificity of 93% in imaging of biliary tract.

Aim and objective: To determine the sensitivity and specificity of USG in evaluation of cholelithiasis. To evaluate associated cholecystitis with cholelithiasis.

Material and methods: The study was conducted in Radio-diagnosis department. A retrospective cross-sectional study was conducted reviewing 46 patients requisitioned for USG abdomen scan. The information obtained was recorded on a self-designed data capture sheet. Data was analyzed using Microsoft Excel 2010.

Results: The study was conducted on 46 patients in which 27 (58.69%) were females and 19 (41.31%) were males. Maximum number of patients was in the age group between 51 and 60 years, about 28%. A total number of patients scanned during ultrasonography were Fourty six (46) out of which Twenty four (24) patients were declared normal, Twenty two (22) patients were diagnosed with biliary tract diseases. The study shows that females are more susceptible to biliary tract diseases as compared males.

Conclusion: Biliary ultrasound (US) is a versatile and useful examination technique. Ultrasound is an accessible, inexpensive, and fast investigation for decision making in patients with biliary tract symptoms and for guidance in the further intervention. Ultrasonography plays important roles in the early diagnosis of anomalies of the biliary system. The most common disease among these patients was cholelithiasis, followed by the cholecystitis.

Keywords: Ultrasonography, gallstone, cholelithiasis, cholecystitis, US

INTRODUCTION

Imaging of the biliary tract for cholelithiasis and its complications has changed dramatically in recent decades. Ultrasonography (US) is the method of choice for detection of cholelithiasis and cholecystitis. Ultrasonography remains the method of choice for detection of gallstones, offering several advantages: high sensitivity and accuracy (> 95%), noninvasiveness, the option of performing a bedside examination, lack of ionizing radiation, relatively low cost, and the ability to evaluate adjacent organs. Most people with cholelithiasis will not experience symptoms or complications related to gallstones. Ultrasonography (USG) is an important modality for imaging of biliary tract. The study was undertaken with the objective of determining the biliary tract disorders. Biliary tract diseases are the common cases, where 30% of cases do not show any symptoms .Before the discovery of ultrasound scan physician were mainly dependent on history, physical examination etc. But accurate diagnosis was not 100%.Study have proved that ultrasound scan is helpful in evaluation of different diseases related to biliary tract.

Ultrasonography is the technique of choice in diagnosing gallbladder calculi. In the mid-1970s ultrasound was only accurate enough to use as an adjunct to oral cholecystography but refinements such as gray scale and real-time imaging mean that in experienced hands it has a sensitivity of 96% and a specificity of 93%. Sonography is also the test of choice in the initial evaluation of jaundiced patients. It is an excellent technique for distinguishing between obstructive and nonobstructive jaundice, although it is less accurate in demonstrating the cause of the obstruction. Ultrasound is painless and relatively inexpensive, and has several advantages over oral cholecystography; it doesn't depend on contrast material, causes no adverse reactions or side-effects, is safe during pregnancy, does not expose the patient to radiation, and is less time-consuming. Ultrasonography (US) is the main initial diagnostic tool for suspected biliary lesions.

Ultrasound examination is a routine examination, non–invasive, low cost and technically easy to achieve. Ultrasound examination marked a hitch leap in the diagnosis of diseases of the biliary tract and gallbladder. As a harmless examination for the health and with a high specificity on diagnosis, this examination has left almost in the past the time of conventional radiologic examinations. (1)

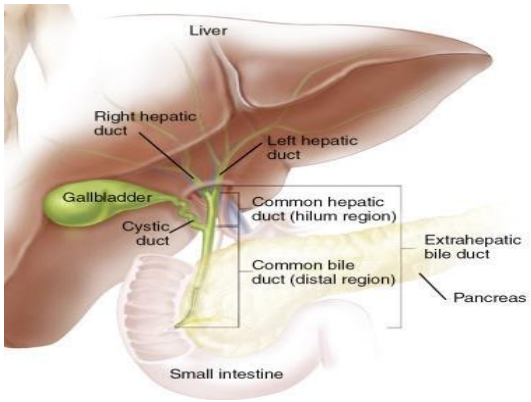
INDICATIONS

- Abdominal pain
- Abdominal pain associated with ingestion of food.
- Colicky right upper hypo-quadrant region.
- Epigastria abdominal pain
- Jaundice
- Abnormal liver function test results
- Severe pain in your upper right or center abdomen
- Pain that spreads to your right shoulder or back
- Tenderness over your abdomen when it's touched
- Nausea
- Vomiting
- Fever

ANATOMY OF BILIARY TRACT

The biliary system consists of the organs and ducts (bile ducts, gallbladder, and associated structures) that are involved in the production and transportation of bile. The transportation of bile follows this sequence. (2)

- When the liver cells secrete bile, it is collected by a system of ducts that flow from the liver through the right and left hepatic ducts.
- These ducts ultimately drain into the common hepatic duct.
- The common hepatic duct then joins with the cystic duct from the gallbladder to form the common bile duct. This runs from the liver to the duodenum (the first section of the small intestine).
- However, not all bile runs directly into the duodenum. About 50% of the bile produced by the liver is first stored in the gallbladder. This is a pear-shaped organ located directly below the liver.
- Then, when food is eaten, the gallbladder contracts and releases stored bile into the duodenum to help break down the fats.



The biliary apparatus consists of the right and left hepatic ducts, the common hepatic duct, the common bile duct, the pear-shaped gallbladder, and the cystic duct. (3)

AIMS AND OBJECTIVE

- To determine the sensitivity and specificity of USG in evaluation of cholelithiasis.
- To evaluate associated cholecystitis with cholelithiasis.

MATERIALAND METHODS STUDY DESIGN

- A retrospective cross-sectional design was used.

SOURCE OF DATA

A secondary source of data was used for the study. It was obtained from the radiology record book of the ultrasonography (USG) unit, of department of radio- diagnosis and imaging Adesh hospital Bathinda Punjab.

STUDY POPULATION

- All records with requests for abdomen scan with an indication of cholelithiasis and cholecystitis.
- A population study will be conducted.
- The study was conducted for a period of one (01) week.

INCLUSION CRITERIA

The inclusion criteria were:

- The study involves patients 16 years or older;
- The study involves patients come for USG abdomen scan.

EXCLUSION CRITERIA

- The exclusion criteria were: non-human studies, reviews, comments, editorials, case reports and cross-sectional studies.
- If a cohort study was reported in more than one publication, we choose the latest article.

INSTRUMENT OF DATA COLLECTION

- Ultrasound machine of the department of radio-diagnosis and imaging.

METHOD OF DATA COLLECTION

- A data capture sheet will be used.
- Data collected will be analyzed thus:
- Subjects were classified according to age group and sex
- Data will be presented in charts tables.
- Data will be analyzed using descriptive statistical tools; frequencies, mean and percentages.

STANDARD IMAGING PROTOCOL

- Scanning Technique, Normal Findings and Common Variants.
- A 3.5-7 MHz probe is typically used to scan the biliary tract.

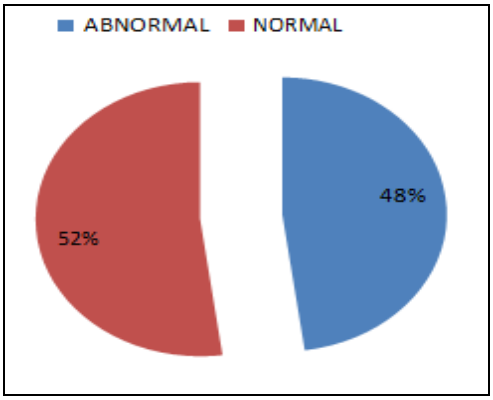
OBSERVATIONS AND RESULTS

A total of Forty six (46) patients within the age range of 16-80 were referred for USG scan of the abdomen to the department of radio-diagnosis with a clinical suspicion of a gallbladder abnormality, during out of them Twenty seven (27) of the patients were females while Nineteen (19) were males. A total number of patients scanned during ultrasonography were Fourty six (46) out of which Twenty four (24) patients were declared normal, Twenty two (22) patients were diagnosed with hepatobiliary diseases. The study shows that females are more susceptible to biliary tract diseases as compared males. (Table 1)

TABLE 1: PATIENTS DIAGNOISED DURING USG SCAN OF BILIARY TRACT ABNORMALITIES

Diagnosis	Number of patients	Male	Female
Normal	24	11	13
Abnormal	22	08	14
Total	46	19	27

PIE CHART: PATIENTS DIAGNOISED DURING USG SCAN OF BILIARY TRACT ABNORMALITIES



The common diseases found in patients were Cholelithiasis, Cholecystitis

A total of 09 (19.565%) patients fall within the age group of 18-30 years,06 (13.04%) patients were within age group of 31-40 years,11 (23.91%) patients fall within the age group of 41-50 years ,13 (28.26%) patients fall within the age group of 51-60 years,05 (10.26) patients fall within the age group of 61-70 years and 02 (4.34%) patients fall within the 71-80 years Majority of the patients were within the age group of 51-60 years and the least number of patients were within age

group of 71-80 years.

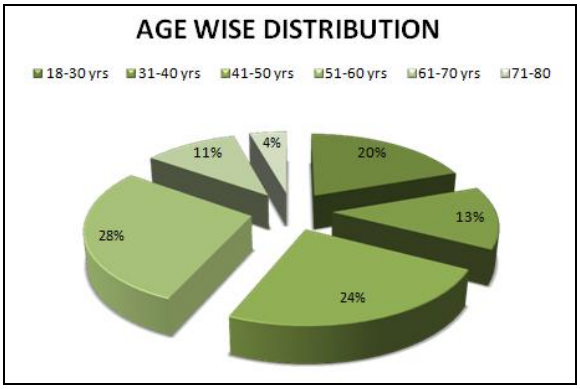


TABLE 2: PATIENTS DURING ULTRASONOGRAPHY SCANNING OF BILIARY TRACT WITH NORMAL DIAGNOSIS

Diagnosis	No. Of Patients	Male	Female
NORMAL	24	11	13
TOTAL	24	11	13

TABLE 3: PATIENTS DIAGNOSED DURING ULTRASONOGRAPHY SCANNING OF BILIARY TRACT WITH DISEASES

1	Cholelithiasis	Chronic cholecystitis	
2	Cholelithiasis.		
3	Cholelithiasis		
4	Cholelithiasis	Acute Cholecystitis	
5	Cholelithiasis	Acute Cholecystitis	
6	Cholelithiasis	Acute Cholecystitis	
7	Cholelithiasis.	.	
8	Cholelithiasis	Chronic Cholecystitis	
9	Cholelithiasis		
10	Cholelithiasis		
11	Cholelithiasis	Chronic Cholecystitis	Pseudo pancreatic cyst
12	Cholelithiasis		
13	Cholelithiasis.		
14	Cholelithiasis	Acute Cholecystitis	Choledocholithiasis
15	Cholelithiasis	Acute Cholecystitis	
16	Cholelithiasis	Acute Cholecystitis	
17	Cholelithiasis		
18	Cholelithiasis	Acute Cholecystitis	
19	Cholelithiasis	Chronic cholecystitis	Hepatisation of GB
20	Cholelithiasis	Chronic cholecystitis	
21	Cholelithiasis	Acute Cholecystitis	
22	Cholelithiasis		Portal hypertension

DISCUSSION

Ultrasonography (USG) is an important modality for imaging of biliary system. The study was undertaken with the objective of determining the hepatobiliary system disorders affecting the biliary tract and to correlate the USG findings. Biliary tract diseases are the common cases, where 30% of cases does not show any symptoms .Before the discovery of ultrasound scan physician were mainly dependent on history, physical

examination etc. But accurate diagnosis was not
100%.Study have proved that ultrasound scan is helpful in evaluation of different diseases related to biliary tract. In our study, the common cause of abdomen pain and epigastric abdominal pain are cholelithiasis and cholecystitis, which could be attributed to the ultrasound in warm climate of Punjab India where the study took place. The study was conducted by Van Randen et al this could be attributed to the colder environmental conditions of Netherlands.(4) Several studies in the past (Evans K et al. 2005, Briskowski et al. in 2008) (5) have also suggested association of higher prevalence of stone formation with higher temperature. In our study, we found that the ultrasound imaging of the biliary tract for cholelithiasis is accurate and fast diagnoses, a similar study was conducted by Gregory A et al. (6) in 2000 and showed that ultrasound is a widely used imaging modality for evaluation of the cholelithiasis and cholecystitis. The another study was conducted by Avadhesh P S Kushwah et al.(7) and showed that the females are more susceptible than males to biliary diseases .The purpose of this review is to provide an overview of ultrasound and its different techniques for imaging of the biliary tract and to discuss current trends and future directions. Ultrasound is not infallible but a safe diagnostic pathway may be drawn up in which ultrasound errors are not allowed to lead to diagnostic disasters. In our study of 46 patients, we found that 24 patients are diagnosed normal with no abnormality, 22 patients are diagnosed with diseases. Our study show 14 females are diagnosed with biliary tract diseases out of 27. While in male the 08 patients out of 19 patients are abnormal.

CONCLUSIONS

Biliary ultrasound (US) is a versatile and useful examination technique. Ultrasound is an accessible, inexpensive, and fast aid for decision making in patients with biliary tract symptoms and for guidance in the further intervention. Ultrasonography plays important roles in the early diagnosis of anomalies of the biliary system. The most common disease among these patients was cholelithiasis, followed by the cholecystitis. The present study also shows that the females are more susceptible to biliary tract diseases as compared to males. However, ultrasonography (US) has certain limitations, should always be considered as supplementary imaging modalities in the assessment of hepatobiliary system disease. Overall we can say that ultrasound is most important and first line preference for urinary tract imaging. The accuracy of the ultrasound in evaluation of biliary tract is >95%.

RECOMMENDATION

There is always a scope of improvement and change in time to come ahead. Thus every study leaves back scopes for other researchers to do something more advanced and varied in order to touch the height of perfection.

- This study is not an exception as it only examined 46 subjects.
- The study can be expanded by including more number of subjects so as to make generalization of the results and practice.
- A study with a larger sample size and in multiple centers can also be carried out.

LIMITATIONS

The ultrasonography (USG) of gallbladder has got following limitations

- It is operator dependent technique requires expertization.

- Respiratory movement makes it difficult to examine.
- Difficult to perform in non-cooperative patients.
- Non preparation makes it difficult to perform.
- In obese patients also it is difficult to perform.

REFERENCES

1. Kola S, Kola I, Pirraci A, Beqiri A. Role of Ultrasonography in the diagnosis of the gallstones. WebmedCentral RADIOLOGY 2013;4(10):WMC004432 doi: 10.9754/journal.wmc.2013.004432.
2. The johns Hopkins university, the john Hopkins hospital, and the johnshealth system. 2020.
3. May 29, 2019. Posted by drzezo in ULTRASONOGRAPH. ©2015 Terese Winslow LLC, U.S. Govt. has certain rights.
4. Van Randen A, Lameris W,VanEs HW, Van Heesewijk, Van Ramshorst B, Ten hove, Boumaw H,Van Leeuwen MS, van Kaulen eM, Bossuyt PM,Stoker J, Boermeester MA. A comparison of the accuracy of ultrasound and computed tomography in common diagnosis causing acute abdominal pain. Euradiol 2011; 21(7):1535-45.
5. Evans K, Castabile RA. Time to development of symptomatic urinary calculi in high risk environment. J Urol .2005 mar;173(3) :858-61
6. Gregory A. Borto, Michael Y. M. Chen, David J. Ott, Neil T. Wolfman, William D. Routh. Gallbladder Stones: Imaging and Intervention. Rsna May 2000 Vol. 20, No. 3 .
7. Avadhesh P S Kushwah , Yashwant Jamre , Puspraj S Baghel , Sonjjay Pande , Suresh Kumar. Role of Ultrasonography and Computed Tomography in Gallbladder Masses and their Correlation with Fine-needle Aspiration Cytology. International Journal of Scientific Study | April 2018 | Vol 6 | Issue 1 : 2321-6379.