

Study of Acute cholecystitis using Ultrasound among Adult Patients

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Abstract: The aims of this study were to review the value of ultrasound in evaluating the characterization of acute cholecystitis, to point out ultrasound findings related to it and to explain the risk factors which increase the susceptibility for this disease.

Methodology: This study was carried out during a period from January 2019- April 2019. A total of 50% of patients were investigated by ultrasound machine whom presented to Al- Mostaqbal Hospital Department of ultrasound Radiology Jeddah, Saudi Arabia, admitted to hospital with complaints of right upper quadrant pain, fever, bloating, nausea, vomiting and jaundice. **Results:** Out of 50% examined samples, the most affected age group was older than 60 (36%) while the age group (50- 60) represented the lowest percentage (18%). Female patients were more affected than male patients with percentages (60%) and (40%) respectively. The most common symptom was right upper abdominal pain, fever, bloating, nausea, vomiting and jaundice (48%) (18%) (16%) (12%) (6%) respectively. The most sensitive US finding in acute cholecystitis is the presence of gall bladder stones (25) (50%), cholelithiasis in combination with the sonographic Murphy sign (13) (26%). Gallbladder wall thickening (>3 mm) (3) (6%), pericholecystic fluid (3) (6%) and fatty liver (3) (6%) are secondary findings. Other less specific findings include gallbladder distension (2) (4%) and sludge (1) (2%). **Conclusion:** Ultrasound scanning is the investigation of choice in suspected patients of acute cholecystitis. Sonograms typically show gallstones, and Murphy's sign, pericholecystic fluid (fluid around the gall bladder), distended gall bladder and oedematous gallbladder wall.

Key Word: Acute cholecystitis, Murphy's sign, Ultrasound.

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I. Introduction

Cholecystitis is inflammation of the gallbladder. The gallbladder is a small, pear-shaped organ on the right side of your abdomen, beneath your liver. The gallbladder holds a digestive fluid that's released into your small intestine (bile) ⁽³⁾. In most cases, gallstones blocking the tube leading out of your gallbladder cause cholecystitis. This results in a bile buildup that can cause inflammation. Other causes of cholecystitis include bile duct problems, tumors, serious illness and certain infections ⁽³⁾. If left untreated, cholecystitis can lead to serious, sometimes life-threatening complications, such as a gallbladder rupture. Treatment for cholecystitis often involves gallbladder removal. ⁽³⁾

Gallstones are dependent on several factors including age, sex, race, Obesity, pregnancy, nutrition habits, sickle cell disease, have been identified to increase risk of gallstones. Acute calculus cholecystitis is three times more common in women than in men up to the age of 50 years, and is about 1.5 times more common in women than in men thereafter. In most people gallstones develop without symptoms; although some of them also experience symptoms such as severe pain due to bile duct obstruction. Serious complications of gallstones are acute cholecystitis, pancreatitis ⁽¹²⁾.

Ultrasonography (US) remains the preferred initial imaging modality for the evaluation of suspected acute calculus cholecystitis due to its relatively low cost, easy accessibility, short examination duration and lack of ionizing radiation ⁽⁹⁾. The distinct advantages of US over other imaging techniques are its high sensitivity and specificity in detecting gallstones, and its ability to elicit 'Murphy's sign' using the ultrasound transducer ⁽⁹⁾.

II. Material And Methods

1. Patient position: left lateral decubitus position.

2. Patient preparation:

1/Fast for 6 hours. No food or drink.

2/ Preferably book the appointment in the morning to reduce bowel gas.

3. Equipment selection:

- 1/ Use the highest frequency probe to gain adequate penetration. This will be between a 2-7MHz range curved linear array or sector probe with Colour Doppler capabilities.
- 2/ Start with 6MHz and work down to 2 or 3 for larger patients.
- 3/ Assess the depth of penetration required and adapt. The gallbladder should be able to be scanned using a 7MHZ as it is so superficial.
- 4/ Narrow the dynamic range.

4. Scanning Technique:

- 1/ Looking supine and left lateral decubitus .
- 2/ Use the liver as a window specially when rolling the patient onto left side.
- 3/ Measure the wall < 3mm.
- 4/ Check with colour Doppler for increased vascularity of the wall .
- 5/ Assess the cystic duct, Neck, Body and Fundus.

5. Statistical analysis :

Data was analyzed using SPSS version 16. Descriptive statistics , includes frequency and percentages were calculated.



Fig 1: A 63- year – old female with acute cholecystitis

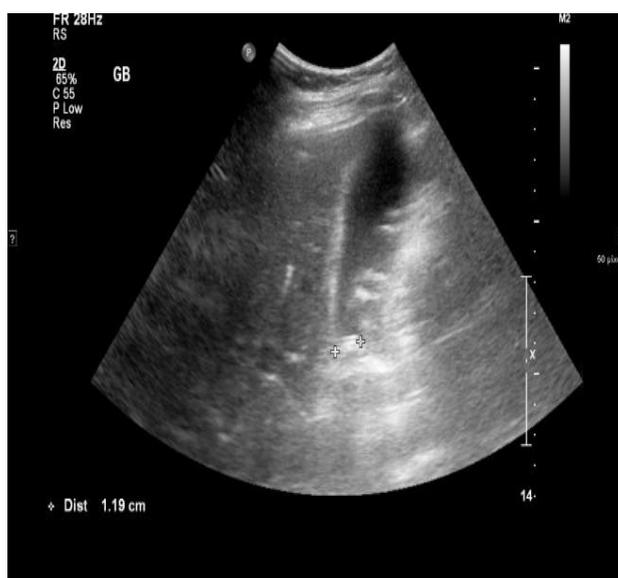


Fig 2: A 71- year – old male with acute cholecystitis

III. Result

Table no 1: Show frequency distribution for sex among population sample

Gender	Frequency	Percentage
Female	30	60%
Male	20	40%
Total	50	100%

Table no 2: Show frequency distribution for age among population sample

Age of presentation	Frequency	Percentage
30 - 40	12	24%
40 - 50	11	22%
50 - 60	9	18%
> 60	18	36%
Total	50	100%

Table no 3: Show frequency distribution for presenting complain among population sample

Presenting complain	Frequency	Percentage
Right upper quadrant pain	24	48%
Fever bloating	9	18%
Nausea	8	16%
Vomiting	6	12%
Jaundice	3	6%
Total	50	100%

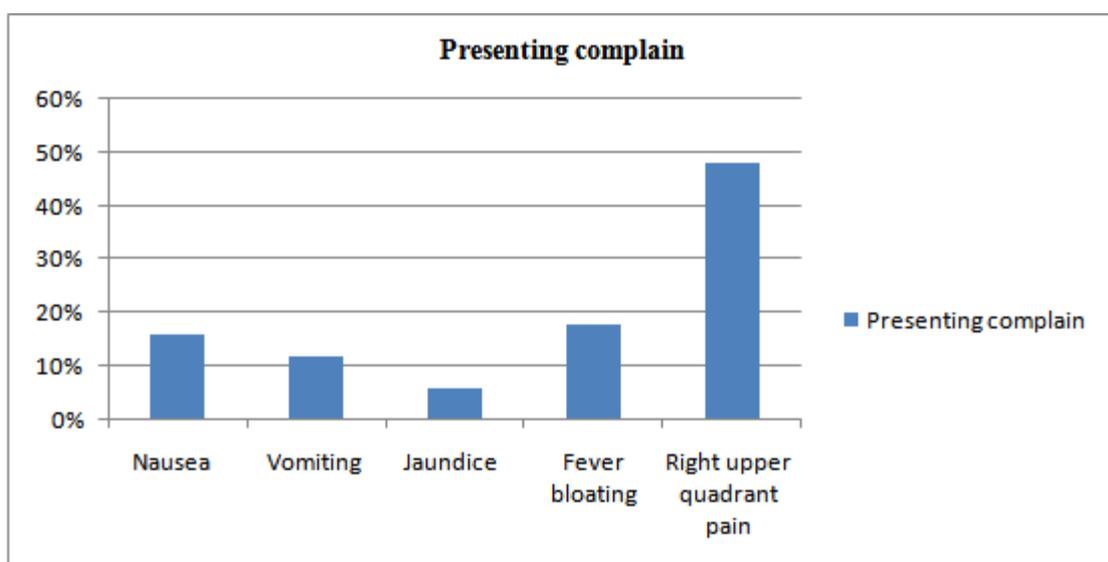


Fig no 1: Show frequency distribution for presenting complain among population sample

Table no 4: Show frequency distribution for ultrasound finding

Ultrasound finding	Frequency	Percentage
Gall bladder stones	25	50%
Cholelithiasis + Positive Sonographic Murphy Sign	13	26%
Gall bladder wall thickening	3	6%
Pericholecystic fluid	3	6%
Fatty liver	3	6%
Gallbladder distension	2	4%
Gallbladder Sludge	1	2%
Total	50	100%

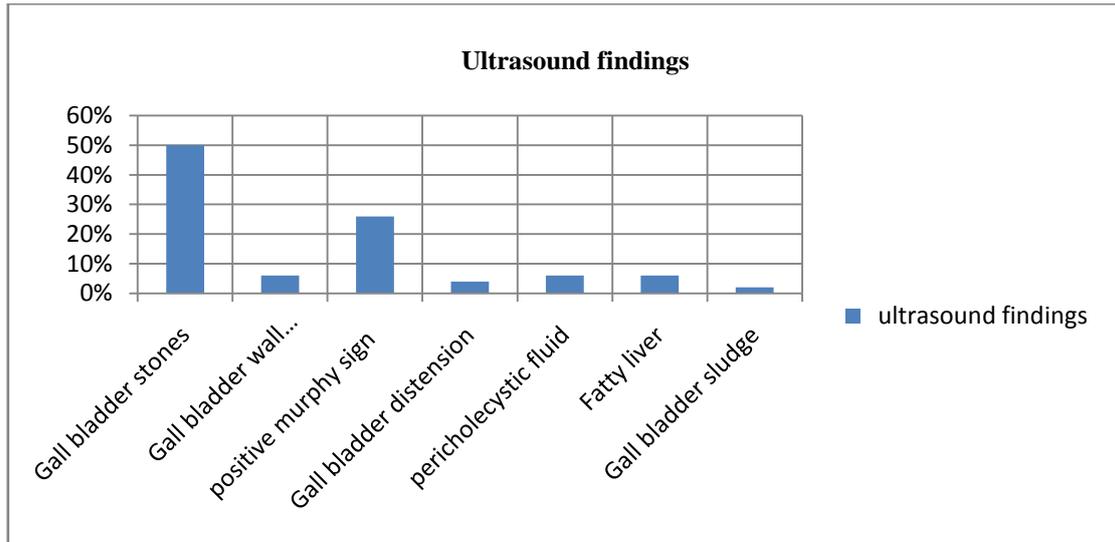


Fig no 2: Show frequency distribution for ultrasound finding

Table no 5: Show frequency distribution for obesity among population sample

Obesity	Frequency	Percentage
YES	35	70%
NO	15	30%
TOTAL	50	100%

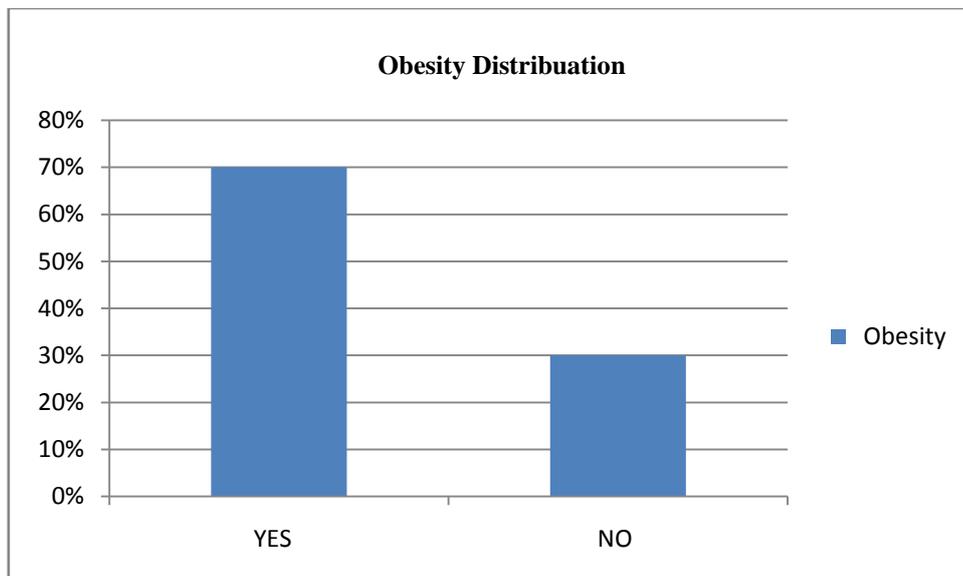


Fig no 3: Show frequency distribution for obesity among population sample

Table no 6: Show frequency distribution for pregnancy among female patient

Obesity	Frequency	Percentage
YES	6	20%
NO	24	80%
TOTAL	30	100%

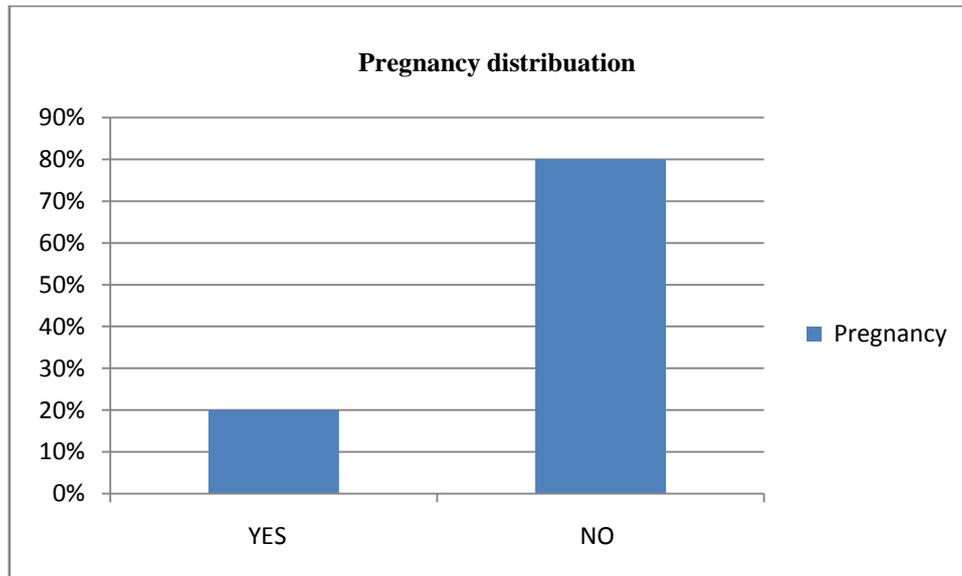


Fig no 4: Show frequency distribution for pregnancy among female patient

IV. Discussion

The statistical analyses of the above results showed highly incidence of acute cholecystitis in female 30 (60%) while the male represented lowest percentage 20 (40%) (Table 1), A similar study conducted in 2015 showed same results suggest , Within the period of examination, 1884 laparoscopic cholecystectomies were performed. The diagnosis was acute cholecystitis in 779 cases (462 female, 317 male)⁽⁸⁾.

Table 2 shows frequency distribution for age groups among 50 population sample : the age group (> 60 year) represented the highest percentage 18(36%) , while the age group (50 - 60 year) represented the lowest percentage which contributed 9(18%). A similar conclusion by Tom wiggins, Sheraz R. Markar et al , 2018 , age of 60 years or older has been demonstrated to be independently associated with increased morbidity following cholecystectomy for acute cholecystitis⁽¹³⁾.

Our study showed that, Right upper quadrant pain is the most complain represented with acute cholecystitis 48% following by fever floating 18%, nausea 16%, vomiting 16%, and jaundice 6% (Table 3 and Figure 1).

Table 4 and Figure 2 show the main findings of acute calculous cholecystitis on US include in addition to the presence of stones 25(50%): Positive Sonographic Murphy Sign 13 (26%), Gall bladder wall thickening 3(6%), Pericholecystic fluid 3 (6%), Fatty liver 3(6%) , distension of the gallbladder lumen 2(4%) and gallbladder sludge 1(2%). In asimilar study by Ralls et al involving 497 patients with suspected acute cholecystitis, the positive predictive value of the presence of stones and a positive ultrasonographic Murphy sign was 92% and that of stones and thickening of the gallbladder wall was 95%. The negative predictive value of the absence of stones combined with either a normal gallbladder wall or a negative Murphy sign was 95%.⁽⁹⁾. Some ultrasonographers recommend the diagnosis of cholecystitis if both a ultrasonographic Murphy sign and gallstones (without evidence of other pathology) are present⁽⁹⁾.

Ultrasound has the best sensitivity and specificity for evaluating patients with suspected gallstones⁽⁹⁾. As reported in the literature⁽⁹⁾, Some ultrasonographic findings are more strongly associated with acute cholecystitis than others: a positive Murphy's sign (pain is provoked by either the transducer or the sonographer's palpation under guidance, in the exact area of the gallbladder) is reported to have sensitivity as high as 88%⁽⁹⁾.

Ralls et al.⁽³⁾, report that one of the most important advantages of ultrasound over other imaging techniques in the investigation of acute cholecystitis is the ability to assess for a sonographic Murphy sign, which is a reliable indicator of acute cholecystitis with a sensitivity of 92%⁽³⁾. An increased gallbladder wall thickness of > 3.5 mm has been found to be a reliable and independent predictor of acute cholecystitis⁽³⁾. Visualization of gallbladder wall thickening in the presence of gallstones using ultrasound has a positive predictive value of 95% for the diagnosis of acute cholecystitis⁽¹⁰⁾.

Table 5 and Figure 3 show relation between obesity and the incidence of acute cholecystitis. Obesity is a chronic inflammatory condition and is strongly linked to raised levels of pro-inflammatory factors and may lead to fatty infiltration of multiple internal organs including the gallbladder and liver, causing organ dysfunction, Also, this study was performed to evaluate the

relationship between body mass index (BMI) and acute cholecystitis. We investigated the clinical implications of BMI as a predictive factor of cholesterol associated cholecystitis. When linked to other similar results by Jai Hoon Yoon et al, 2014; We suggest that BMI can be used as one of the predictive factors of steatocholecystitis for obese patient⁽⁷⁾.

The study results reported in Table 6 and Figure 4 that: No relation between pregnancy and the incidence of acute cholecystitis. Similar to the international studies which reported that: Biliary tract disease is a relatively uncommon, heterogenous disease in pregnancy. Specifically, acute cholecystitis can be especially difficult to recognize in pregnancy⁽¹⁾.

V. Conclusion

US is currently considered the preferred initial imaging technique for patients who are clinically suspected of having acute calculous cholecystitis. US is preferred by the majority of radiologists because of lower costs, better availability after hours, and more evidence regarding its accuracy for cholecystitis.

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