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Diagnosis ofacute cholecystitis using ultrasonography

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Abstract:*The aim of this study was to analyse the performance of ultrasonography in the diagnosis of acute cholecystitis.We performed an observational retrospective study which included100 patient with clinical suspected of AC were randomized into two groups. The first group included these patients with final diagnosis of acute cholecystitis and other group included patients with final alternative diagnosis to acute cholecystitis. Study found that the incidence of AC is high in obese, AC incidence is higher within the age of 41-50 years, female (57%) more affected, Khartoum population suffer more than Omdurman and Kassala (71%), also tenderness is observed on examination with 38% and is not exist with 61% . it concluded that ultrasound had a great value in increasing accuracy in diagnosis of acute cholecystitis and it decreases the false negative diagnostic rate and improves the clinical outcome.*

Key words:*Cholecystitis, acute - Gallbladder - Ultrasound, gallbladder. acutecalculouscholecystitis ultrasound diagnosis*

I. Introduction:

Acute cholecystitis (AC) occur as a result of inflammation of the gallbladder was usually secondary to cystic duct obstruction. AC occurs more commonly in children and adults who are critically ill in the form of severe trauma and burns or major surgery, anatomy of gallbladder and extra hepatic biliary systemis essential to all sonologists and surgeons[1]. Developmental anatomy is essential because gallbladder and biliary anomalies are not uncommon and the failure to recognize such a congenital problem can result in significant per-operative morbidity [2]. In U/S the gall-bladder is a pear shaped anechoic structure, smooth wall in the inferior aspect of the right lobe of the liver [3], anomalies ofthe gallbladder are generally of minimal clinical significance [4]. Gall-bladder and the duct draining the gallbladder take the course of normal common bile duct to the duodenum [5]. All the hepatic cells continually for a small amount of secretion called bile [6]. The presence of bile salt and proteins is responsible for the observation of gallbladder bile is isotonic to plasma [7], gallstones are the commonest biliary pathology [8].Modern ultrasound (US) examination of the gall bladder is an effective tool in the diagnosis of acute cholecystitis (AC), especially when used on patients admitted for emergency surgery [9-12]. Cholescintigraphy (CS) and US are the first diagnostic imaging modalities that should be used [13,14]. Only when ultrasound and scintigraphic signs are unsatisfactory or equivocal [15], would it be necessary to perform computed tomography (CT). With the new real-time scanners, US examination of the gallbladder has become an area of great clinical development. Real-time scanners permit quick and easy visualization of the gallbladder in the majority of patients. Calculi approximately 1 m m in diameter can be imaged under ideal circumstances [16]. Acute cholecystitis usually results from obstruction of the gallbladder neck, with subsequentinfection. The gallbladder therefore appears abnormally distended and spherical in shape and the gallbladder wall is edematous and thickened [17]. All these features, including the obstructing calculus, can be imaged by US and may be extremely valuable in correctly establishing the diagnosis.The aim of this study was to analyze the performance of ultrasonography in the diagnosis of acute cholecystitis

II. Materials and methods:

Ultrasonic confirmatory studies were performed in different hospitals and clinics in Kassala State from Oct 2008 to Oct 2009 on 100 patients who were clinically suspected of having AC (upper abdominal pain, fever, and leukocytosis). Of these patients, 69 were men and 31 were women, aged between 31 and 89 years (mean, 69).

With ultrasonic signs (gallbladder distention , thickening of gall bladder wall , cholelithiasis, sonolucent halo in the gallbladder wall,fluidsonolucent band surrounding the gallbladder, intraluminal echogenic mass. The ultrasonic examinations were performed on linear electronic real-time equipment with a transducer frequency of 3.5 MHz. Cross-sections were made transversely, longitudinally, and obliquely, with the patient lying on his or her left side.

The data had been collected with clinical data sheet and ultrasound images.

III. Result

The study group included 100 patients with a mean ageof ± years. The descriptive analysis of patientdistribution in age and gender an increased incidence of cholecystitis in female(57%) patients, regardless of age group, the most affected group ranged between (41-50) years. For the group of patients diagnosed ultrasonographically

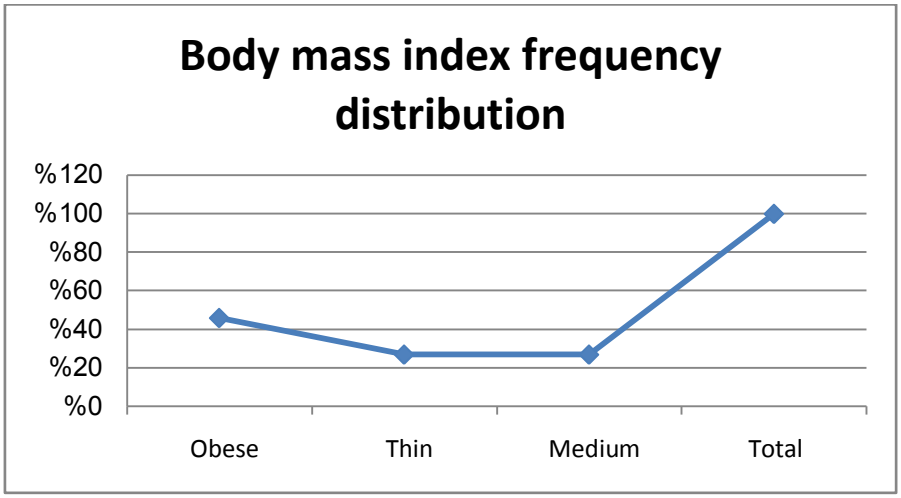

Figure 1.Body mass index frequency distribution

For the group of patients diagnosed ultrasonographically with acute cholecystitis In order to correlate the clinical aspects we analyzed the symptoms and objective signs as recorded. The ultrasonographic examination performed in setting offers information on the parietal alterations. We assessed ultrasonographically in themobility of the calculi in the gallbladder 10.0% calculiwere mobile and 16.6%were fixed, Another parameter submitted to analysis was the concordance between of number of gallbladder stone and body mass index , We found a good correlation between the sizes measured and mass index

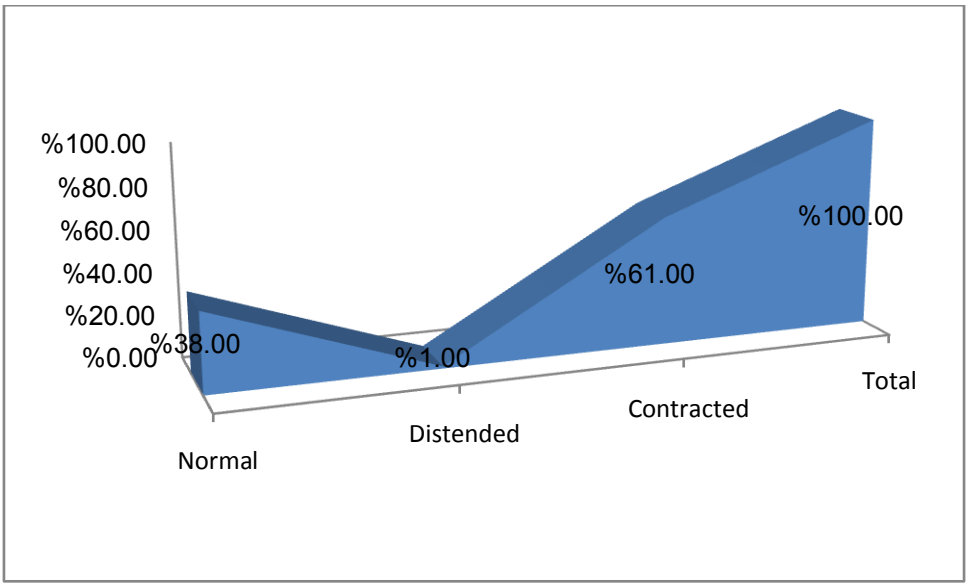

Figure e 2. G.B shape frequency distribution:

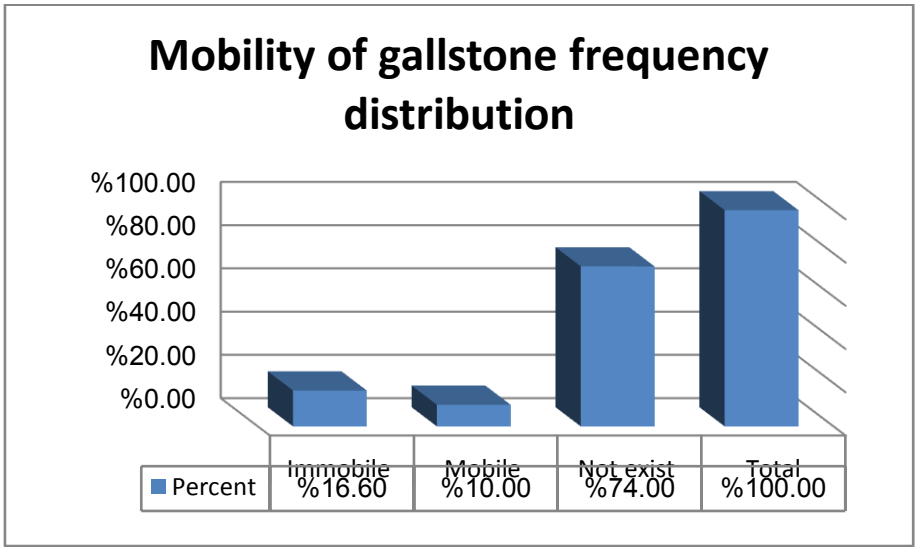

Figure 3.Analysis of mobile versus immobile incidence of gallstones in the gallbladder in US examination

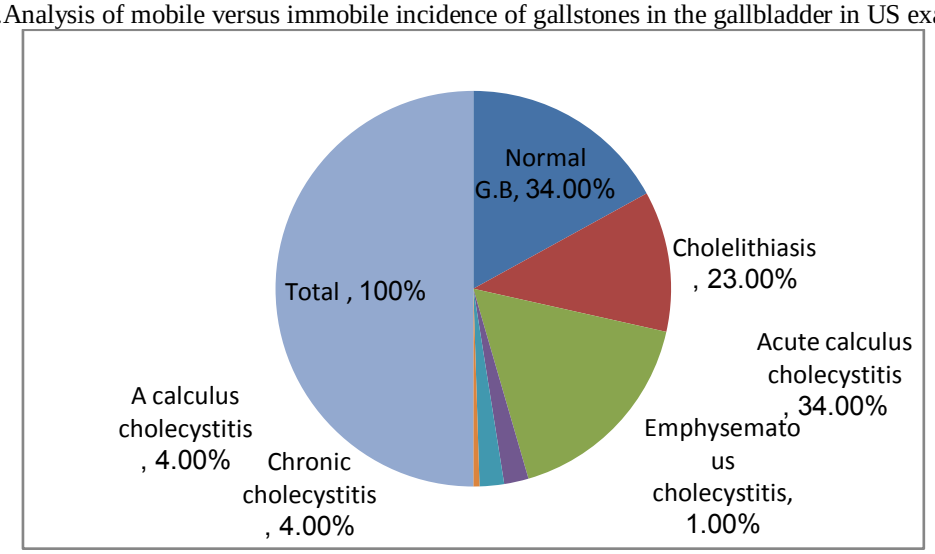

Figure 4.Shows variable distribution of the final diagnosis, it revealed that most of the patient complain of ACC.

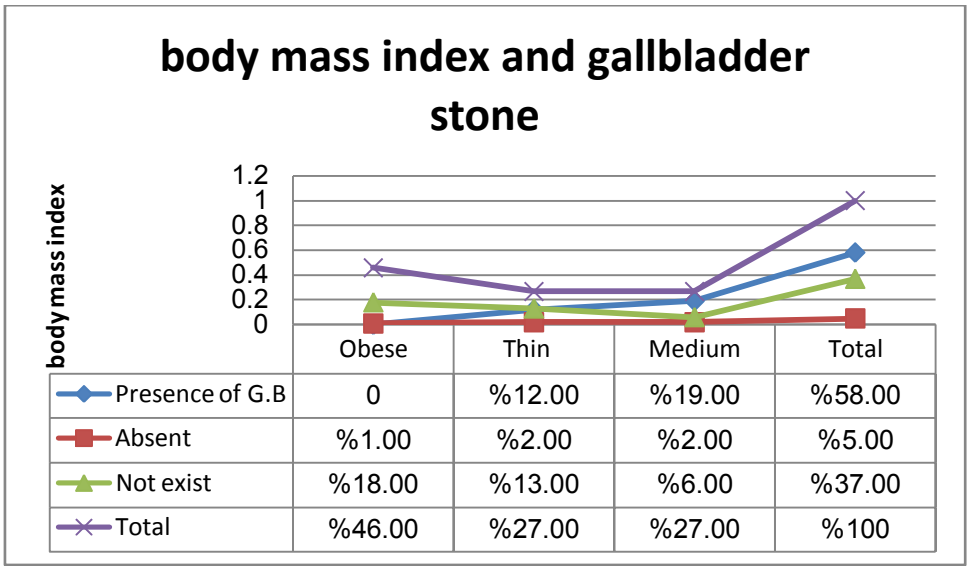

Figure 5. Body mass index and gallbladder stone

Table 1. Frequency distribution of final diagnosis:

	GB stone			
Final diagnosis	Presence	Absent	Not	Total
Normal G.B	2.0%	2.0%	30.0%	34%
cholecystitis	23.0%	0%	0%	23.0%
Acute cholecystitis	0%%	2.0%	2.0%	4.0%
chronic Cholecystitis	4.0%	0.0%	0.0%	4.0%
Emphysematous cholecystitis	1.0%	0.0%	0.0%	1.0%

Table 2.bladder wall thickness assessed by ultrasonography

	Minimum	Maximum	Mean	Std deviation
Wall thickness	2.3	8.0	3.808	1.5345

Table (3): The relationship between age and GB stones age:

	GB stones			
Age group	Presence	Absent	Not exist	Total
10-20	2.0%	0.0%	4.0%	6.0%
21-30	2.0%	0%	7.0%	9.0%
31-40	9.0%	2.0%	9.0%	20.0%
41-50	28.0%	1.0%	10.0%	39.0%
51-60	14.0%	1.0%	6.0%	21.0%
61-70	2.0%	1.0%	1.0%	4.0%
> 70	1.0%	0.0%	0.0%	1.0%

Table (4): Frequency distribution of wall thickness:

Groups	Mean	Std deviation	Minimum	Maximum
Presence of G.B stones	4.22	1.65	2.4	8.0
Absent	3.62	1.37	2.6	6.0
Not exist	3.18	1.14	2.3	7.0

IV. Discussion

Acute cholecystitis is the most frequent complication of biliary lithiasis, with the incidence increasing with age, as demonstrated after analyzing thenumber of admissions and cholecystectomies in patients overthe age of 60 [18,19]. US is one of the methods most frequently used in thediagnosis of acute cholecystitis; however, several studies have stressed the limitations of the method related to the operator's expertise, the ultrasound machines used and the possibility of performing the investigation at the bedside [19-21]. There are also studies proving the accuracy and advantages of US performed in emergency as compared to hepato-

biliaryscintigraphy[22,23]or computer tomography [24].Summers and **Colab**. studied a better accuracy of US performed in the emergency setting than that of the same method performed by radiologists for the identificationof surgical conditions such as acute cholecystitis[25].The originality of the study resides in the correlation of the clinical and ultrasonographic aspects with intra-operatory findings, as well as in the analysis of sonographicrole in the diagnosis of different forms of cholecystitis.The incidence of acute cholecystitis was higher in female patients,andmost of the patient who complain of acute calculuscholecystitis created at age between (41-50) years old, The results of the present study confirm the variations in lithiasis incidence, as stated in the epidemiological literature [26,27]. We also found an increased incidence of the disease in patients from an urban areas, revealed that most of Khartoum population complain a lot from (ACC) ,represent71% ,comparewith Kassala and Omdurman. But the difference decreased in the over 60 age grou,represent5.0%.It was observed thatacute calculuscholecystitiswere common in obese patients (46%).There is, however, an important proportion of patients presenting with tenderness when putting the probe on the right upper quadrant area(38%).Jaundicerepresents 21% of patients whocame with high leucocytosisand 79% were not with high leucocytosis. There is strong relation between body mass index and gallbladder stone, gallstone 19% percentage as increase when compare with thin and medium patient, this due to increase consumption of fatty ducts which elevate the cholesterollevels..Strong relation between the body mass index and gallstones, there is 53% of the patient who came for abdomen ultrasound and the other 47% percentage is for thin and medium patients.It was documented that the sonographic features most frequently encountered in patients with acute cholecystitiswas parietal thickening, also described in literature as correlating with the inflammatory process (28,29). Thestatistical analysis of the mean gallbladder wall thickness(2.3 to 8.0mm),The results of our study confirm the literature data showing statistically significant correlations between the parietal dimensions described ultrasonographically and those measured during surgery byBingener et al [28]. Chen and Colab.reported an increasein the conversion risk at a sonographically-measured parietal thickness of more than 6 mm [30,31]. The literature data describe gallstones lodged in the infundibulum as a favoring factor of inflammation [32]. The correlation between the ultrasonographicaspect of immobile calculus with the severity of cholecystitis, The result was an increased incidence of acute inflammatory processes in cases with mobile gallstones. The risk analysis confirms the role of emergency US in the assessment of patients with clinical suspicion for acute cholecystitis, especially in patients without previous history of lithiasis. The increased risk the latter have in developing severe forms of acute cholecystitis stresses the contribution of US in optimising surgical therapy, in accordance with actual protocoles for the acute approach of lithiasis complications such as cholecystitis[33,34].In our study, we analyzed the contribution of US in the diagnosis of biliary lithiasis during acute cholecystitis forms (27.33%).

V. Conclusions

The incidence of acute cholecystitis in the studied group was higher in patients from urban areas, The symptoms and signs found during emergency examination were not specific for the severity of any of the particular type of acute cholecystitis.The statistical analysis of the mean parietal thickness as assessed ultrasonographically in each pathologic type of acute cholecystitis and allowed to discriminate the severity of inflammation in cholecystitis. US is a method of high accuracy for the diagnosis of biliary lithiasis its complication, acute cholecystitis (87.35%).The ultrasonographic assessment of gallstone size had a concordance with the sizes measured during surgery. The risk analysis for lithiasis complications and the high risk for patients without previous lithiasis history to develop severe forms of acute cholecystitis stresses the essential contribution of US in optimizing surgical therapy.US can be used as a first intention examination in the Emergency Department for the triage of patients with complicated biliary lithiasis requiring surgical therapy.

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