

SONOGRAPHIC FINDINGS IN UNCOMPLICATED AND COMPLICATED ACUTE CHOLECYSTITIS : STUDY OF 33 CASES

บุษบา ภัคดีรัตน์
รพ. รักษบุรี

ABSTRACT :

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Department of Radiology, Ratchaburi Hospital, Ratchaburi, Thailand.

Ultrasound (US) is a reliable diagnostic method in gallbladder disease. Ultrasonographic findings characteristic of uncomplicated and complicated acute cholecystitis are discussed. Of 33 cases diagnosed clinically as cholecystitis in Ratchaburi hospital from June 1993 to March 1997, US diagnosis was accurate in 24 cases (72.7%). Correlation between sonographic, surgical and pathologic findings was analysed.

บทคัดย่อ :

บุษบา ภักดิ์รัตน์. การวินิจฉัยภาวะถุงน้ำดีอักเสบเฉียบพลันที่มีและไม่มีภาวะแทรกซ้อนด้วยคลื่นเสียงความถี่สูง : รายงานผู้ป่วย ๘๘ ราย (วารสารแพทย์เขต 7 2540 ; 4 : 337-344).

กลุ่มงานรังสีวิทยา, รพ. ราชบุรี.

การศึกษารวบรวมลักษณะเฉพาะในการวินิจฉัยภาวะถุงน้ำดีอักเสบเฉียบพลัน ที่มีและไม่มีภาวะแทรกซ้อน ด้วยคลื่นเสียงความถี่สูง ในผู้ป่วยที่มีอาการเจ็บหน้าท้องด้านขวาบน ซึ่งวินิจฉัยเบื้องต้นว่าเป็นโรคถุงน้ำดีอักเสบ ระหว่างเดือนมิถุนายน 2536 - มีนาคม 2540 โดยเปรียบเทียบผลการตรวจด้วยคลื่นเสียงความถี่สูงกับลักษณะที่พบจากการผ่าตัดและผลการตรวจทางพยาธิวิทยา จำนวน 33 ราย ได้ผลตรงกัน 24 ราย คิดเป็นความแม่นยำ (accuracy) = 72.7%.

Introduction

Early surgery is of great benefit in patients with acute cholecystitis (AC).¹ Rapid and accurate preoperative diagnosis is important. The ultrasound (US) is suitable as a first line investigative method.² In experienced hands diagnosis can be made with ease and rapidity. US is cost efficient and can be used to detect AC, together with its complications such as gangrene and near perforation. This allows definitive surgery to be performed promptly, thus reducing mortality.³

The aim of this study was to evaluate the prospective value of us diagnosis in cases of significantly ill patients with right upper quadrant abdominal pain, clinically suspicious of AC. US diagnosis was correlated with surgical findings and pathologic diagnosis.

Material and method

The series included 33 cases evaluated by US in Ratchaburi Hospital from June 1993 to March 1997. Twelve were men and twenty-one were women, aged 28-85 years (average 58.1 years). US was performed as an emergency examination. These patients had RUQ pain, presumably caused by AC. US was performed on the first day of admission, followed by emergency surgery within 24 hours afterwards.

A convex real-time US equipment was used, with a transducer frequency of 5 MHz (Hitachi EUB 450).

All patients fast at least 8 hours before examination. They were examined in supine and left oblique positions so that the gallbladder (GB) could

be viewed in longitudinal and transverse planes, along with adjacent abdominal organs.

The criteria used for diagnosis of acute cholecystitis^{2,4} are :

1. Presence of calculus (cholelithiasis) in GB, in cystic duct or impacted in GB neck
2. Positive sonographic Murphy's sign
3. GB distension of over 5 cm. in maximum longitudinal antero-posterior axis
4. Over 3 mm. thickening of GB wall
5. Sonolucent halo or multiple striation in GB wall
6. Pericholecystic fluid collection
7. Intraluminal membrane and or focal mural irregularities or mass in GB wall

Criteria 5, 6, 7 are indicative of complicated AC.² Criteria 1 through 5 are definite for AC. If criteria 5 and 7 are also found (multiply striated GB wall and intraluminal membrane), GB gangrene can be diagnosed.⁵ If this is accompanied by increased echogenicity of non-dependent bile, the diagnosis is empyema.⁶

Diagnostic criteria in detail :

Calculi are primary sonographic criterion for diagnosis of AC, especially if present in cystic duct or impacted in the GB neck. Locating a stone may be difficult since it is not surrounded by bile.⁷

GB wall thickening of over 3 mm. This is a nonspecific finding which can be present in many conditions, including the contracted GB in a non-fasting patient, cholecystitis, adenomyomatosis, GB

tumor, hepatitis and pericholecystic abscess.⁸ It may possibly result from portal hypertension in the chronic alcoholic.

Although thickened GB wall may occasionally be seen in cholecystitis, it is not always the diagnostic sign of cholecystitis.

GB sludge can be composed of calcium bilirubinate granules and cholesterol crystals, both of which are non-shadowing echogenic material. It may also be seen in biliary stasis, prolonged fasting, extrahepatic biliary obstruction and chronic cystic duct obstruction (GB hydrops).⁷

Sonographic Murphy's sign. Transducer triggered pain over the sick GB is one of the most reliable signs of acute GB disease.⁶ It is more specific than a clinical Murphy's sign because sonographic Murphy's sign is both operator and patients dependent.⁹

GB distension. The normal GB is less than 4 cm. in diameter. Distension is nonspecific because it can be a result of biliary stasis due to prolonged fasting without cystic duct obstruction.⁷

Multilayered striation of GB wall. This consists of several alternating, irregular, discontinuous lucent and echogenic bands. Visualisation of more than 3 layers is specific for AC, which can be distinguished from thickening due to non GB disease.¹⁰

Intraluminal membrane and or mural irregularity or mass in GB wall. Markedly shaggy appearance or focal irregularity of GB wall are suggestive of gangrenous cholecystitis. Formation

of intraluminal membrane in AC may be related to strands of fibrinous exudate within GB as well as necrotic mucosa.³

Pericholecystic fluid collection. Fluid in the GB wall can be seen just prior to perforation.⁶ Collection of fluid close to GB fossa or free fluid in the abdomen without ascites creating disease is a sign of complicated GB disease where perforation already has occurred.

A variant of AC produced by gas forming bacteria associated with local gangrene is common and incidental to perforation. Sonographic reverberation shadow arising from GB can be helpful in making diagnosis of acute emphysematous cholecystitis.¹¹

Results

33 cases were collected from June 1994 to March 1997, Twelve were male and 21 were female, all presented clinically with RUQ pain. Preoperative diagnosis was made by US. Surgery was performed and pathologic diagnosis was made in all cases.

Features for establishing the diagnosis of AC and complications are presented in table 1. US diagnosis in correlation with surgical and pathological findings in 24 cases are listed in table 2.

In 9 cases that pathological findings did not correspond with US diagnosis (table 3), timing played an important role. The time gap between US diagnosis and surgery is important. Delayed surgery allows the process of inflammation to progress to more advanced stages.

Table 1 US features in AC with complications.

| US findings | No. of patients | percentage |
|--|-----------------|------------|
| - Ultrasonographic Murphy's sign | 33 | 100 |
| - Dilatation of over 5 cm. | 3 | 9 |
| - Wall thickening of over 3 mm. | 25 | 75 |
| - Cholelithiasis in GB | 30 | 90 |
| - Cholelithiasis in GB and common bile duct | 2 | 6 |
| - Lucent wall (striated wall over 3 mm. thick) | 8 | 24 |
| - Pericholecystic fluid | 1 | 3 |
| - Thick sludge (non-dependent) | 7 | 21 |
| - Intraluminal echogenic membrane | - | - |

Table 2 US diagnosis in concordant with surgical and pathological findings (24 cases).

| Diagnosis | No. of patients |
|---------------------------|-----------------|
| - AC without complication | 11 |
| - AC with empyema | 6 |
| - AC with gangrene | 6 |
| - AC with perforation | 1 |

Table 3 US diagnosis in discordant with pathological findings (9 cases).

| US diagnosis | Duration* | Surgical diagnosis | Pathological diagnosis |
|--------------------------|-----------|-------------------------------------|--|
| AC | 1 day | Cholecystitis | Empyema GB |
| AC | 1 day | GB wall thickening | Chronic & acute cholecystitis & gangrene |
| AC | 2 days | Chronic cholecystitis & wall nodule | Chronic cholecystitis & empyema |
| AC | 12 hrs | Gangrenous GB & twisted GB bed | Hemorrhagic infarct of GB |
| Gangrenous cholecystitis | 1 day | Gangrene | Severe chronic cholecystitis |

Table 3 (ต่อ)

| US diagnosis | Duration* | Surgical diagnosis | Pathological diagnosis |
|--------------------------|-----------|------------------------------|---------------------------------|
| AC | 1 day | Cholecystitis | Chronic cholecystitis |
| AC | 1 day | Thick wall & fluid around GB | Empyema GB |
| Gangrenous cholecystitis | 1 day | Gangrene | Empyema Gb |
| Empyema GB | 1 day | Empyema | Acute necrotizing cholecystitis |

*Period between US diagnosis and surgery

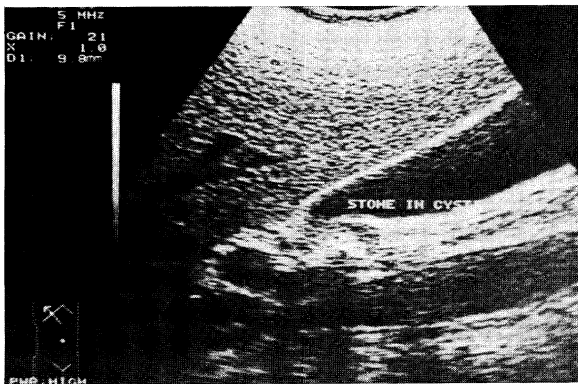


Figure 1 Longitudinal scan shows stone in cystic duct.

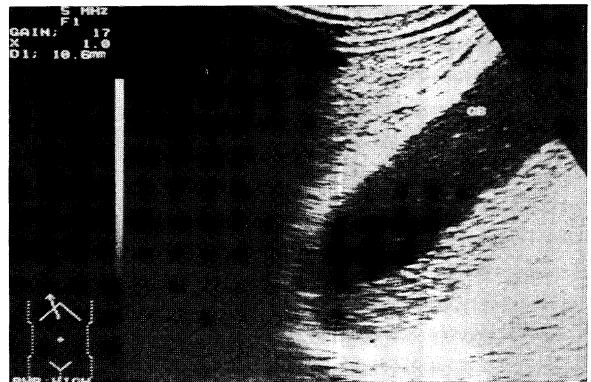


Figure 2 Gallbladder wall thickening of over 3 mm. in acute cholecystitis.

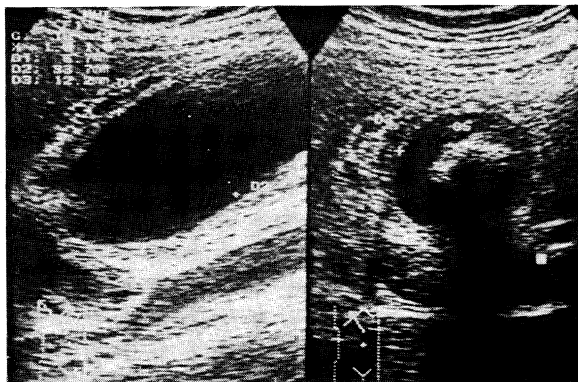


Figure 3 Striated lucency. Irregular, alternating, discontinuous bands of echogenicity in gangrenous cholecystitis.

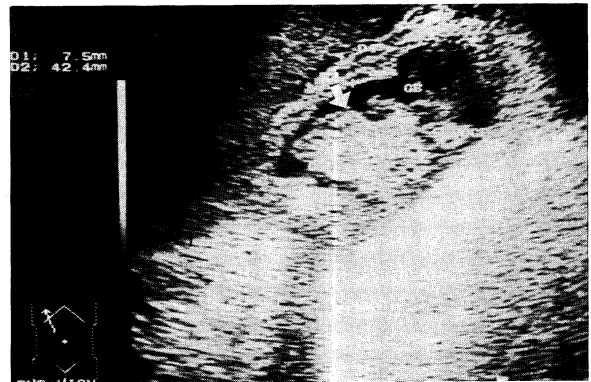


Figure 4 Thick, non-dependent sludge (arrow) in GB empyema.

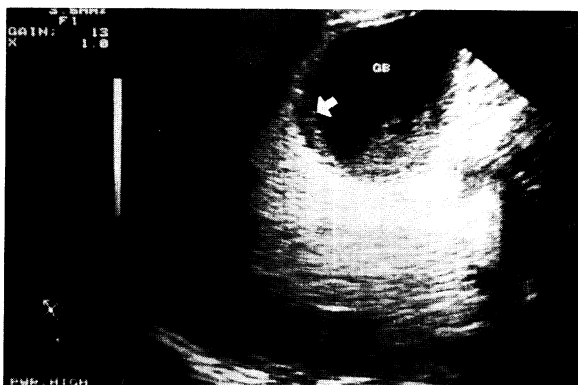


Figure 5 Pericholecystic fluid collection (arrow) in perforated GB.

Discussion

Many investigators have described US features in AC. Accuracy as high as 96% in detecting GB abnormalities has been reported.⁷

Raghavendra et al.¹⁰ noted that 70% of their patients with AC had GB thickening, wall anechoicity, GB dilatation and cholelithiasis. The high sensitivity of sonographic Murphy's sign is well accepted.⁹

Emphyema, gangrene and perforation can be detected by US with the presence of thick sludge, striation of wall with or without intraluminal membrane and pericholecystic fluid collection, respectively. Observation of complications requires experience, especially the subtle presence of intraluminal membrane, which also depends on instrument resolution and probe frequency. However, the US is suitable as first line examination in the management of patients with RUQ pain. It is a rapid and cost-efficient method.⁴

Complicated cholecystitis should prompt close observation on the part of the clinician. Early surgery has to be considered in time to avoid life-

threatening complications.³

Conclusion

It is well accepted that early surgery for patients with AC is of true benefit. Rapid and accurate pre-operative diagnosis is important. US is the most accurate investigative method.⁴

The primary sonographic criterion for diagnosis of AC is demonstration of gallstone in cystic duct or GB neck.² Striated wall of GB and sonographic Murphy's sign are indicative of AC.

Differentiating uncomplicated AC from complicated AC is difficult without the associated findings of intraluminal membrane or mural thickening, pericholecystic fluid collection and non-dependent bile sludge.

HIDA scintigraphy (cholescintigraphy) is second in accuracy. If clinical and US findings are not well correlated, cholescintigraphy is suitable as the investigative method.¹²

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