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PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.2529022>Available online at: <http://www.iajps.com>**Review Article****SONOGRAPHIC MURPHY SIGN IN CALCULUS AND
ACALCULUS CHOLECYSTITIS**

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Abstract:

Cholecystitis is a very common condition affecting the adults. It is more prevalent among females who consume high fat-diets. If not early and properly treated, cholecystitis may lead to gallbladder gangrene and necrosis. Therefore, early accurate diagnosis of the condition is fundamental. Diagnosis of acute cholecystitis depends on a combination of clinical presentation and radiological findings. The most useful and reliable test for diagnosis is abdominal ultrasonography, and the most sensitive and specific sonographic sign of acute cholecystitis. Sonographic Murphy sign refers to the presence of maximal tenderness over the right upper abdominal quadrant when the sonographer press with the ultrasound probe over this area to visualize the gall bladder. It has a good specificity, sensitivity, and positive predictive value particularly when combined with other signs such as cholelithiasis. The aim of this article is to review and discuss the use of sonographic Murphy's sign in suspected cases of acute cholecystitis.

Keywords: acalculous, calculous, cholecystitis, gallstone, Murphy sign, sonography.

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INTRODUCTION:

Cholecystitis is a common disorder characterized by inflammation of the gall bladder with or without stone formation. Acute calculous cholecystitis often results from cholelithiasis. In the United States (U.S.), it is estimated that up to 20% of the population have cholelithiasis and almost one third of these patients experience acute cholecystitis [1]. Cholecystitis is prevalent among patients between 30 and 80 years of age and is more common among women [2]. The vast majority (about 90-95%) of cases of cholecystitis occur due to gall bladder stones obstructing the gall bladder neck or duct (i.e. acute calculous cholecystitis) [3]. Only 5-0% of cases occur without cholelithiasis (acute acalculous cholecystic). Acute acalculous cholecystitis often occurs in children or elderly. It is rare in adults and only affects those who are severely ill such as following burns, major surgeries, or severe trauma [2]. Acute calculous cholecystitis represents more than one third of all surgical emergencies [4]. It is estimated that more than half million cholecystectomy operations are performed annually in the United States [5]. Obstruction of the gall bladder outlet (either the neck or duct) results in mucosal chemical injury by the biliary salts and subsequent inflammation. Accumulation of biliary secretion leads to distension of the gall bladder and considerable increase in intraluminal pressure. This subsequently exerts physical compression to the blood flow to the gall bladder resulting in bladder gangrene and necrosis in advanced cases. Secondary bacterial infection occurs in more than two thirds of the patients [6,7].

Clinically, patients with acute cholecystitis present with epigastric and right upper abdominal quadrant pain radiating to the back and right scapula. The pain is colicky at the start then becomes constant and it often starts one to two hours after ingestion, particularly with high-fat meals. If secondary infection occurred, fever, nausea, vomiting, and leucocytosis present. Physical examination usually reveals abdominal guarding, tenderness in the right upper abdominal quadrant, and sometimes a palpable gall bladder (in only one third of patients)^{3,8}. General examination reveals low-grade fever, tachycardia, and sometimes jaundice. However, absence of physical signs does not rule out cholecystitis⁹. Diagnosis of cholecystitis is best carried out on radiological basis, and the most useful radiological imaging for diagnosis of acute cholecystitis is ultrasonography [10]. Laboratory findings are inconsistent and non-specific.

Ultrasonographic examination of abdomen reveals characteristic findings in patients with cholecystitis.

One of these very characteristic findings is the sonographic murphy's sign that will be detailed in this article.

SONOGRAPHIC MURPHY SIGN IN CALCULOUS AND ACALCULOUS CHOLECYSTITIS

Though several imaging modalities are available for diagnosis of cholecystitis (e.g. abdominal computed tomography (CT), abdominal magnetic resonance imaging (MRI), plain radiography, and hepatobiliary scintigraphy), abdominal ultrasonography remains the gold standard [11-13]. Ultrasonography carries the advantages of being cheaper, readily available, and more sensitive to cholecystitis than abdominal scintigraphy [10].

For visualization of the gall bladder, ultrasonographic examination is performed at the right upper abdominal quadrant with longitudinal, oblique, and intercostal scans [10]. The sonographic findings in patients with acute cholecystitis are generally non-specific. They include thickened gall bladder wall (>3mm), sludge, stones, pericholecystic fluid, polyps, and gall bladder distension [14]. The most commonly visualized findings are wall thickening, sludge, and polyps. Gall bladder distension and the pericholecystic fluid are less common. The sonographer should do his best to visualize the stones particularly at the neck or duct of the gall bladder. If the gall bladder got perforated, the wall of the gall bladder may not be seen [10]. One important and very characteristic sign of cholecystitis is the sonographic Murphy's sign¹⁵. Despite of being absent in more than two thirds of the patients, positive Murphy's sign in combination with cholelithiasis are the most sensitive sonographic findings in acute cholecystitis [16].

Sonographic Murphy sign refers to the presence of maximal tenderness over the right upper abdominal quadrant when the sonographer press with the ultrasound probe over this area to visualize the gall bladder [17]. It is an important radiological finding that denotes underlying inflammation of the gall bladder particularly when associated with clinical manifestations of inflammation such as right upper abdominal pain, colic, and dyspepsia following fatty meals. Abdominal examination may reveal underlying tender mass, and a clinical Murphy sign [18]. The clinical Murphy sign is elicited by deeply palpating the right upper abdominal quadrant and simultaneously asking the patient to inspire. If the patient feels pain on inspiration and stops respiration suddenly, the Murphy sign is positive⁸. The

sonographic Murphy sign is not a synonym for the clinical Murphy's sign. Sonographic Murphy's sign is more sensitive and specific because the gall bladder can be visualized with the ultrasonography probe unlike the blind physical examination of the abdomen to elicit the clinical Murphy's sign¹⁹. The sonographic Murphy's sign can be detected when the patient inspires and holds a deep breath whilst the clinical Murphy's sign occurs during inspiration. Also, the output detected differs between the sonographic and the clinical Murphy's sign i.e. the subjective reporting of pain by patient determines the positivity of sonographic Murphy's sign, whereas abrupt stoppage of inspiration during palpating the gall bladder is the determinant of positive clinical Murphy's sign [18]. Despite of the difference between the two signs, they both indicate acute cholecystitis.

Historically, Murphy's sign was named after an American surgeon named John Benjamin Murphy who discovered it [15]. John Murphy was an imminent surgeon who noted hypersensitivity of patients with cholecystitis when they are deeply palpated at the right upper abdominal quadrant particularly during inspiration. The sonographic Murphy's sign is more reliable and accurate than the clinical Murphy's sign because the sonographer can visualize the gall bladder and subsequently confirm that the gall bladder is moving with inspiration [20].

Sonographic Murphy's sign is very useful for establishing the diagnosis of acute cholecystitis. Research studied demonstrated that a positive sonographic Murphy's sign in combination with visualization of gall bladder stone has a high positive predictive value (about 92%) for acute cholecystitis [21-23]. Bree et al., in their study on 200 patients presenting with probable acute cholecystitis, found that the sonographic Murphy's sign had 56% and 35% sensitivity and specificity in acute cholecystitis, respectively [15]. The positive predictive value was only 43% and the negative predictive value was 82%. However, the combination of cholestasis on sonographic examination along with the positive sonographic Murphy's sign increases the specificity to 77% [10].

CONCLUSION:

Sonographic Murphy's sign is an important sign for diagnosis of acute cholecystitis. It comprises eliciting pain at right abdominal quadrant by pressing the ultrasonography probe at the visualized gall bladder during breath holding. Despite the low sensitivity and specificity of the sonographic Murphy's sign (particularly when not combined with clinical

manifestations or other ultrasonographic signs), it remains the most sensitive and specific ultrasonographic finding in patients with acute cholecystitis. When present in combination with cholelithiasis, sonographic Murphy's sign carries a high sensitivity, specificity, and positive predictive value to acute cholecystitis.

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