

## CLINICAL VIGNETTE

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# Acute Acalculous Cholecystitis

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### Case

An 89-year-old female presented to the Emergency Department after acute onset of abdominal pain with nausea and vomiting. Her pain which started earlier in the day had improved, but her nausea persisted. She had no change in bowel movements and was free of fever, chills or recent travel. Her PMHx includes chronic obstructive pulmonary disease, atrial fibrillation, hypertension, and resected bladder cancer.

On exam the patient was afebrile and resting comfortably. Her exam was significant for right upper quadrant tenderness to palpation and positive Murphy's sign. Her labs included marked elevations in AST, ALT, and alkaline phosphatase. Her pancreatic enzymes and complete blood count were normal.

Abdominal ultrasound revealed marked gallbladder wall thickening and hyperemia. No gallstones were visualized but a sonographic Murphy's sign was present. There was a small amount of pericholecystic fluid. CT of the abdomen and pelvis showed marked gallbladder wall thickening. She was admitted for acalculous cholecystitis and underwent laparoscopic cholecystectomy.

### Discussion

Acute acalculous cholecystitis (AAC) is defined as inflammation of the gallbladder with no evidence of gallstones in the gallbladder, and represents 2-15% of all cases of acute cholecystitis.<sup>1</sup> AAC has been traditionally known to occur in critically ill patients with high morbidity and mortality.<sup>2</sup> Although typically found in critically ill, hospitalized patients, it also presents in ambulatory patients, as with this case. Acute cholecystitis may develop at any time in patients with gallstones, especially after episodes of biliary colic. Acute cholecystitis is especially dangerous when it accompanies a serious illness or major surgery. Rarely reported before 1950, AAC is now recognized as a complication of serious medical and surgical illness.<sup>3</sup> The mortality rate remains at least 30% because diagnosis continues to be challenging. Affected patients are chronically ill and the disease itself can progress rapidly with high incidence of gangrene (>50%) and perforation (>10%).<sup>2</sup>

AAC is not limited to surgical or injured patients or restricted to the ICU. Diabetes, malignancy, abdominal vasculitis, congestive heart failure, cholesterol embolization and shock or

cardiac arrest have been associated with AAC. It has male predominance, with 80% of cases older than 50 years.<sup>3</sup>

### Pathophysiology

The pathogenesis of AAC is still ill defined and appears to be multifactorial.<sup>2</sup> The precise mechanism is unknown. The most postulated theories are bile stasis, sepsis and ischemia of the gallbladder wall.

Biliary stasis results from changes in the smooth muscle of the gallbladder and sphincter of Oddi dysfunction. This is associated with changes in bile composition and results in gallbladder injury.<sup>4</sup> Volume depletion may also lead to increased bile concentration which can inspissate in the absence of gallbladder emptying. Several early clinical studies suggest that gastrointestinal hypomotility and functional obstruction can also result in bile stasis.<sup>3</sup> Stasis can change the chemical composition of bile making the gallbladder mucosa susceptible to local injury.<sup>1</sup>

Gallbladder ischemia is central to the pathogenesis of AAC with multifactorial etiologies.<sup>3</sup> Hypotension, atherosclerosis or increased luminal pressure secondary to increased bile viscosity has also been implicated as a possible cause.<sup>2</sup> Interrelationship between ischemia and stasis can result in gallbladder hypoperfusion.

Whereas gallstone related disease is associated with arterial dilation and extensive venous filling, AAC is associated with multiple arterial occlusions and minimal to absent venous filling.<sup>3</sup> This reinforces the central role of vascular occlusion and microcirculatory disruption in the pathogenesis of AAC

Vasoactive mediators also play a role in the pathogenesis of AAC. Although bacterial infection is likely a secondary phenomenon, the host response to gram-negative bacteremia or splanchnic ischemia/reperfusion injury may be of primary importance.<sup>1</sup> IV injection of *Escherichia coli* lipopolysaccharide, a potent stimulus of inflammation and coagulation has experimentally resulted in ACC in several mammalian species.<sup>1</sup>

## Clinical Diagnosis

Since ACC is uncommon, diagnosis is often delayed, with increased mortality.<sup>4</sup> There is no unique marker definitively identifying AAC with high accuracy.<sup>5</sup> Physical exam and lab evaluation are unreliable.<sup>1</sup> Key symptoms for diagnosis are pain in the right upper abdomen radiating to the scapula, and epigastric region. Fever, nausea, and vomiting may be present.<sup>4</sup> Leukocytosis, transaminitis, and jaundice may occur but are nonspecific.<sup>1</sup>

The majority of patients with AAC are seriously ill and unable to communicate their symptoms, further complicating diagnosis. Rapid and accurate diagnosis is essential because ischemia can progress quickly to gangrene and perforation.<sup>2</sup> AAC should be considered in every critically ill patient with clinical sepsis.<sup>2</sup>

## Diagnosis

Ultrasound of the gallbladder is the most accurate modality to diagnose AAC in the critically ill patient.<sup>1</sup> It is noninvasive, can be performed at bedside and has good sensitivity and specificity for diagnosing AAC. It can also reveal alternative diagnoses. It has high sensitivity for gallstones and for detecting abnormal wall thickening.<sup>4</sup> Ultrasound can identify Murphy's sign, evidence for a tense and swollen gallbladder, pericholecystic fluid and the absence of gallstones.<sup>4</sup> The clinical and radiologic manifestations of AAC are the same as those of acute calculous cholecystitis except for lack of gallstones.<sup>4</sup>

Strong suspicion for AAC by ultrasound requires two major criteria or one major and two minor criteria.<sup>6</sup> Major criteria include: gallbladder wall thickness > 3 mm, pericholecystic fluid, intramural gas, and sonographic Murphy sign. Minor Criteria include echogenic bile or sludge in the lumen and transverse diameter greater than 5 cm.

Computed tomography (CT) and nuclear magnetic resonance imaging (MRI) can be used in cases where ultrasound is insufficient.<sup>4</sup> Plain abdominal radiographs are advised to exclude a perforated viscus and to find evidence for alternative diagnoses such as bowel ischemia or renal stones.<sup>4</sup> Cholescintigraphy (HIDA SCAN) can help diagnose acute calculous cholecystitis but can be falsely negative.<sup>1</sup> It can document absence of gallbladder filling which is seen in AAC. It has low sensitivity in diagnosing ACC but high specificity.<sup>6</sup> Unfortunately it can take hours to perform, limiting use in critically ill patients as delayed therapy can be fatal.

## Treatment

The treatment of AAC includes antibiotics, after blood cultures and either cholecystectomy or cholecystostomy tube placement. The historical treatment for AAC has been cholecystectomy, which is definitive therapy.<sup>2</sup> This allows for complete inspection of the gallbladder which is important due to the high incidence of gangrene and perforation in acute ACC.<sup>3</sup>

Percutaneous cholecystotomy can be a lifesaving minimally invasive alternative. Since patients with AAC are often critically ill with contraindications to surgery, cholecystotomy controls AAC in 85-90% of patients.<sup>1</sup> If gallstones are present, subsequent elective cholecystectomy is usually recommended.<sup>3</sup> Patients with AAC treated with cholecystotomy should improve rapidly within 24 hours.<sup>1</sup> Once AAC has resolved, cholecystectomy is typically not required.

Antibiotic therapy does not substitute for drainage in AAC but remains an important adjunct.<sup>3</sup> The most common bacteria isolated from bile in acute cholecystitis are *E. Coli*, *Klebsiella* species and *Enterococcus faecalis*. Antibiotic therapy should be directed against these organisms.

## Conclusion

AAC should be suspected in critically ill or injured patients with sepsis in whom the source of infections cannot be immediately identified.<sup>1</sup> The high mortality rate is mainly due to the serious underlying medical conditions and the rapid progression of the disease to gangrene and perforation. Rapid diagnosis with labs, ultrasound, and timely cholecystectomy or in certain cases, cholecystotomy is the treatment of choice.

## REFERENCES

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