Global Alliance for Infections in Surgery

The management of acute cholecystitis and acute cholangitis

ACT NOW

Acute cholecystitis

Cholelithiasis is a common disorder all over the world. Its prevalence varies widely by region: in Western countries, the prevalence of gallstone disease reportedly ranges from approximately 7.9% in men to 16.6% in women; in Asia, it ranges from approximately 3 to 15%, is nearly non-existent (less than 5%) in Africa, and ranges from 4.21 to 11% in China. Acute cholecystitis develops in 1–3% of patients with symptomatic gallstones.

Diagnosis

The diagnosis of acute cholecystitis is made on the basis of clinical features such as right upper quadrant pain, fever, and leukocytosis and is supported by findings from relevant imaging studies. Ultrasound is the investigation of choice in patients suspected of having acute cholecystitis. Ultrasound typically shows:

- **pericholecystic fluid (fluid around the gall bladder),**
- **distended gall bladder,**
- **oedematous gallbladder wall,**
- **gall stones,**
- **Murphy's sign elicited on ultrasound examination.**

Management

Treatment is predominantly surgical, although the timing of surgery without evidence of gangrene or perforation has been under debate in recent years. Two approaches are available for the treatment of acute cholecystitis: the early option, generally within 7 days of onset of symptoms, offers a laparoscopic cholecystectomy to provide immediate, definitive surgical treatment after establishing diagnosis and surgical fitness of the patient in the same hospital admission, while the delayed treatment option is performed in a second hospital admission after an interval of 6–12 weeks during which time the acute inflammation settles.

Several randomized controlled trials and meta-analysis have investigated early laparoscopic cholecystectomy (ELC) versus delayed laparoscopic cholecystectomy (DLC). ELC appears as safe and effective as DLC. ELC is associated with lower hospital costs, fewer work days lost, and greater patient satisfaction.

Multiple prospective trials have demonstrated that the laparoscopic cholecystectomy is a safe and effective treatment for acute cholecystitis. As a result, ELC has largely become the therapy of choice for acute cholecystitis in operable patients. While the laparoscopic approach is usual, several risk factors predicting the need to convert to an open approach are reported including age >65 years, male gender, acute cholecystitis, thickened gallbladder wall, diabetes mellitus, and previous upper abdominal surgery. Open cholecystectomy remains a feasible option, particularly where in the setting of resource limitations. In many regions of the world, laparoscopic surgery is just evolving in tertiary centers.

Despite the low volume of patients and the absence of fluoroscopy in many hospitals results in treating acute cholecystitis seem to be comparable with high volume centers. Acute cholecystitis in elderly, critically ill patients still today remains a real challenge to treat. Despite the low rate of surgical impact from the laparoscopic approach, many patients are unfit for any surgery. In this subgroup of patients, urgent cholecystostomy with or without delayed laparoscopic cholecystectomy appears to be the correct clinical approach.

Gallbladder perforation is an unusual complication; occasionally, acute cholecystitis, inflammation, and fulminant infection may progress to ischemic necrosis and gallbladder perforation. Prompt surgical intervention is important in decreasing morbidity and mortality rates associated with this situation. The reported incidence of gallbladder perforation in acute cholecystitis is 2–11% and mortality in such cases is as high as 12–16%.

The gallbladder perforation is classified into three types: acute or type I-free perforation with generalized peritonitis, subacute or type II-pericholecystic abscess with localized peritonitis, and chronic or type III-cholecysto-enteric fistula. Perforation of the fundus is usually free perforation leading to generalized peritonitis whereas perforation in the region of body or neck becomes covered with omentum leading to localized collection. Type I and II perforations are reported to occur in a younger age group (around 50 years) whereas type III perforations are commonly seen in more elderly patients. Type I perforations are typically encountered in patients with severe systemic disease (DM, atherosclerotic heart disease) without past history of acute cholecystitis, while type III perforation cases usually have previous history of recurrent attacks of cholecystitis. The diagnosis is difficult and often delayed since the presentation is very much similar to acute cholecystitis. The ultrasound findings in such cases are also similar to the findings of acute cholecystitis, but visualization of the sonographic "hole sign" in the gallbladder wall can hint at the diagnosis of perforated gallbladder. CT scan is more reliable in making the diagnosis as it better demonstrates the defect in the gallbladder wall in addition to pericholecystic collection and free intra-peritoneal fluid.

Perforation is rarely diagnosed pre-operatively. Delayed surgical intervention is associated with elevated morbidity and mortality rates, increased likelihood of ICU admission, and prolonged post-operative hospitalization.

Acute cholangitis

Acute cholangitis is a clinical syndrome characterized by fever, jaundice, and abdominal pain that develops as a result of stasis and infection in the biliary tract. It is also referred to as ascending cholangitis. Cholangitis was first described by Charcot as a serious and life-threatening illness; however, it is now recognized that the severity can range from mild to life-threatening.

The most frequent causes of biliary obstruction in patients with acute cholangitis without bile duct stents are biliary calculi, benign biliary stricture, and malignancy. Malignant obstruction may be due to the presence of tumor in the gallbladder, bile duct, ampulla, duodenum, or pancreas. Benign biliary strictures may be congenital, post-infectious (eg, AIDS cholangiopathy) or inflammatory (eg, primary sclerosing cholangitis).

Management

Imaging studies may include ultrasound of the abdomen, regular or helical computed tomography (CT), magnetic resonance cholangiopancreaticography (MRCP) and endoscopic ultrasound (EUS). CT without contrast is more sensitive than abdominal ultrasound in detecting common bile duct stones. Among these, MRCP and EUS are the most sensitive imaging modalities, which can detect the level and cause of biliary obstruction. The key elements of therapy in acute cholangitis are adequate antibiotic treatment to avoid or manage the infectious complications and biliary decompression to restore biliary drainage in case of obstruction. The clinical presentation varies, and initial risk stratification is important to guide further management.

In severe cholangitis, an early interventional approach is absolutely essential for survival.

The type and timing of biliary drainage should be based on the severity of the clinical presentation, and the availability and feasibility of drainage techniques, such as endoscopic retrograde cholangiopancreatography (ERCP), percutaneous transhepatic cholangiography (PTC), and open surgical drainage.

ERCP is both diagnostic and therapeutic and is considered the criterion standard for imaging the biliary system. ERCP plays a central role in the management of biliary obstruction in patients with acute cholangitis.

There are various endoscopic transpapillary options available, including biliary stent or nasobiliary drain placement above the obstruction site ± sphincterotomy, all of which with their appropriate indications corresponding to disease severity and clinical context.

There are patients in whom ERCP fails because of unsuccessful biliary cannulation, or an inaccessible papilla. In these cases, percutaneous biliary drainage (PTBD) is required. However, PTBD can lead to significant complications, including biliary peritonitis, hemobilia, pneumothorax, hematoma, liver abscesses, and patient discomfort related to the catheter.

The indication for emergent open operation for acute cholangitis is rapidly disappearing. Emergency operation for severe cholangitis carries high mortality rates.

Given the shortened length of hospitalization and the rarity of serious complications endoscopic drainage is preferred to open drainage.

Surgical drainage is reserved when other modalities of biliary drainage are contra-indicated or fail. It is done rarely now-a-days because of high morbidity and mortality.

To avoid prolonged surgery, choledochotomy with T-tube drainage without choledocholithotomy is recommended. Laparoscopic choledochotomy with stone extraction can be done in case of failed endoscopic extraction of common bile duct stone.

Antibiotic therapy of biliary infections

Organisms most often isolated in biliary infections are those isolated in intra-abdominal infections including the gram-negative aerobes, *E. coli* and *K. pneumonia* and anaerobes, especially *B. fragilis*. The role of enterococci in biliary tract infections remains unclear, and specific coverage against these microorganisms is not routinely suggested for community-acquired biliary infections.

Although there are no clinical data to support the use of antibiotics with biliary penetration for these patients, the efficacy of antibiotics in the treatment of biliary infections may depend on effective biliary antibiotic concentrations too. Obviously in patients with obstructed bile ducts, the biliary penetration of antibiotics may be poor and effective biliary concentrations are reached only in a minority of patients.

Among patients with uncomplicated cholecystitis, if source control is complete, no postoperative antibiotic therapy is necessary.

In the setting of complicate acute cholecystitis a short course of antibiotic therapy (3–5 days) after adequate source control is a reasonable option. The prospective trial by Sawyer et al. demonstrated that in patients with complicated intra-abdominal infections undergoing an adequate source control, the outcomes after approximately 4 days fixed-duration antibiotic therapy were similar to those after a longer course of antibiotics that extended until after the resolution of physiological abnormalities.

Patients who have ongoing signs of peritonitis or systemic illness beyond 5–7 days of antibiotic treatment normally warrant a diagnostic investigation to determine whether additional surgical intervention is necessary to address an ongoing uncontrolled source of infection or antibiotic treatment failure.

Antibiotics commonly used to treat biliary tract infections and their biliary penetration ability are illustrated below.

Good penetration efficiency	Low penetration efficiency
Piperacillin/tazobactam	Ceftriaxone
Tigecycline	Cefotaxime
Amoxicillin/clavulanate	Meropenem
Ciprofloxacin	Ceftazidime
Ampicillin/Sulbactam	Vancomycin
Cefepime	Amikacin
Levofloxacin	Gentamicin
Imipenem	