Narrative Review on Complicated Cholecystitis: An Update on Management

Abstract

Complicated cholecystitisis a term used to describe the local complications that occur in acute cholecystitis. It included gangrenous, empyema and perforation of the gallbladder. The diagnosis of these conditions involves clinical, laboratory investigations and imagingmodalities. The treatment of complicated cholecystitis is by performing a cholecystectomy, either by an open or laparoscopic method. Laparoscopic cholecystectomy is associated with a high conversion rate due to inflammation of the gallbladder which makes dissection difficult. Subtotal cholecystectomy is an alternative surgical procedure in patients who have adhesions at the calot'striangle. We have conducted this review article to look at the types of complicated cholecystitis, and the diagnosis and treatment of theseconditions.

Keywords-Complicated cholecystitis, Gangrenous cholecystitis, emphysematous cholecystitis, empyema of gallbladder and perforation of gallbladder.

Introduction

Acute calculus cholecystitis is one of the most common complications of gallstone disease and it accounts for 20% of patients who present with symptomatic gallstone disease. It has a higher incidence in female patients with an overall incidence of 18.8% in females and 9.5% in males.(1)

The Tokyo Guidelines have classified the severity of acute cholecystitis into three grade, Grade 1 is mild acute cholecystitis with no organ dysfunction, Grade 2 is moderate acute cholecystitis which is characterized by elevated white sell count, Palpable tender mass over the right hypochondrium, duration of symptoms of more than 72 hours and marked local inflammation like gangrenous or emphysematous cholecystitis. Grade 3 is characterized by acute cholecystitis that is associated with any of the following organ dysfunction cardiovascular, respiratory, neurological, renal, hepatic or haematological.(2–5)

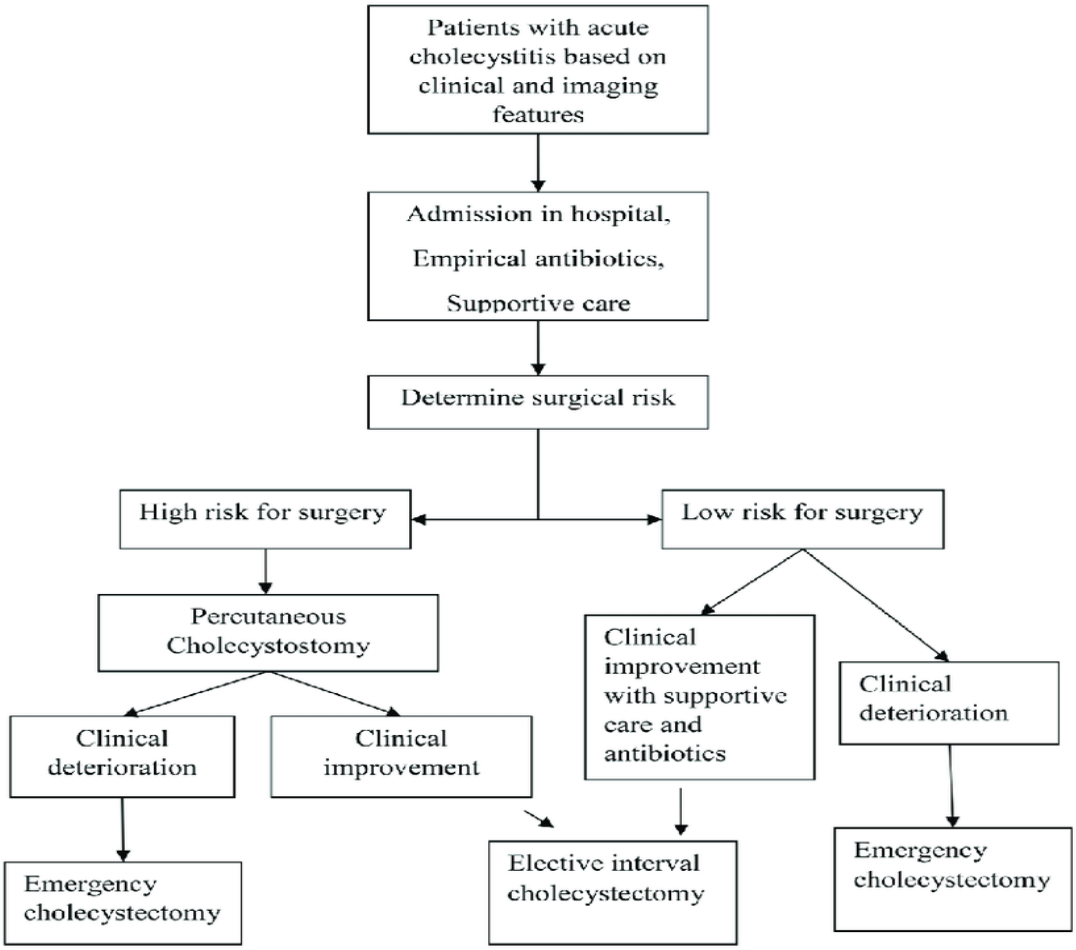
The progression of the acute inflammatory changes that occur in acute cholecystitis can lead to a few local complications of the gallbladder like gangrenous cholecystitis which is characterized by necrosis of the gallbladder wall, and it is the most common complication of acute cholecystitis. Emphysematous cholecystitis is due to intramural proliferation of gas-forming organisms like clostridium. Empyema of the gallbladder which is associated with purulent material in the gallbladder and perforation of the gallbladder which is usually seen in the fundus.(6)

The grading of acute cholecystitis according to severity is important as it can help to assess which patients will benefit from performing an early laparoscopic cholecystectomy and those that may benefit from optimization and performing a delayed cholecystectomy. Complicated cholecystitis is the term used to describe gangrenous, emphysematous, empyema and perforation of the gallbladder which occurs in cases of acute cholecystitis. The early diagnosis and treatment of these conditions is important as it is associated with high morbidity and mortality.(7–10)

As there is no current consensus in the diagnosis and management of complicated acutecholecystitis regarding the treatment according to the Tokyo Guidelines, the definition of complicated cholecystitis and the management of this condition. We conducted a literature review using PUBMED, the Cochrane database of systemic reviews, Google scholar and Semantic Scholar looking for randomized control trials, non-randomized trials, observational and cohort studies, clinical reviews, systemic reviews, and meta-analysis from 1990 to 2024. The following keywords were used, "complicatedcholecystitis", "Gangrenouscholecystitis", "emphysematouscholecystitis", "empyema of gallbladder "and "perforation of gallbladder". All articles were in English, and all articles were assessed by manual cross referencing of the literature. Commentaries, case reports and editorials were excluded from this review. Adult male and female patients were included in this study. Pediatric and pregnant patients with complicated acute cholecystitis were excluded.

Table 1: the Tokyo Guidelines for severity grading for acute cholecystitis

Severity	**Criteria**
Grade 1-Mild	Acute cholecystitis with mild inflammation and no organ dysfunction
Grade 2-Moderate	Acute cholecystitis with any of the following features 1- like duration of symptoms above 72hrs, 2- leukocytosis, 3- mass over the right hypochondrium 4- Marked local inflammation like pericholecystic fluid collection.
Grade 3-severe	Acute cholecystitiswith any of the following organ dysfunction 1-Cardiovascular dysfunction-hypotension 2-Neurological dysfunction-altered consciousness 3-Respiratory dysfunction-tachypnea 4-Renal dysfunction-oliguria 5-Hepatic dysfunction



Flowchart 1: the management of acute cholecystitis according to the Tokyo Guidelines

Discussion

Gangrenous Cholecystitis

This is a serious complication of acute cholecystitis that occurs due to vascular insufficiency that leads to gangrene of the gallbladder. It is seen in up to 18% of patients who present with acute cholecystitis, and it is associated with a mortality of up to 50%. This condition is seen in patients with co-morbidities like diabetes mellitus and in older patients(11,12). Gangrenous cholecystitis is diagnosed by a combination of clinical, laboratory and imaging modalities like ultrasound of the abdomen. Male patients are more prone to develop this condition and the presence of leukocytosis and C. Reactive protein values that are more than 100 are usually suggestive of this condition(13–16). Imaging modalities that can aid in the diagnosis of gangrenous cholecystitis include ultrasonography which can demonstrate sloughed mucosal membrane, focal wall bulge, ulceration and disruption. Computerized tomography can be used in some patients where it may demonstrate irregular mural and wallenhancement, other findings on computerized tomography include irregular or absent wall, pericholecystic abscess and lack of gallbladder wall enhancement(17,18).

The mortality of gangrenous cholecystitis increases in patients with medical conditions like coronary artery disease, elevated serum bilirubin and the presence of systemic inflammatory response syndrome(19,20). Delayed presentation of the patient to the hospital with an increase in the time from the onset of presentation and subsequent treatment can increase the mortality of gangrenous cholecystitis(21).

The treatment of acute gangrenous cholecystitis is by performing a cholecystectomy without delay. The introduction of laparoscopic cholecystectomy has seen a shift in trend from open cholecystectomy towards laparoscopic cholecystectomy. The advantages of laparoscopic cholecystectomy include its minimally invasive nature, reduced morbidity and length of hospital stay. There is a risk of conversion to open cholecystectomy due to problems that may be encountered during dissection but with time and better practice, the conversion rate will come down(22,23).

Empyema of the gallbladder

Empyema of the gallbladder is a complication of acute cholecystitis which is characterized by superinfection and suppuration of the stagnant bile in the gallbladder due to obstruction of the cystic duct. The lumen of the gallbladder is then filled with pus and mucopurulent material.It is a severe form of acute cholecystitis and is seen in 10%-15% of cases(24,25).

The diagnosis of empyema of the gallbladder is confirmed by ultrasonography which can demonstrate thickening of the gallbladder wall, distended gallbladder wall, pericholecysticfluid and echogenic material in the lumen of the gallbladder. Computerized tomography findings of empyema of the gallbladder are often indistinguishable from acute cholecystitis(26,27)

The treatment of empyema of the gallbladder involves resuscitation with fluids and starting intravenous antibiotics. A cholecystectomy should be performed as early as possible to prevent complications like sepsis and multi-organ failure. The best time to perform it is within 72 hours from admission to the hospital. Traditionally an open cholecystectomy was performed for empyema of the gallbladder, but laparoscopic cholecystectomy is now being performed due to its minimally invasive nature, reducedmorbidity, mortality and length of hospital stay.The

conversion rate is slightly high due to the distension of the gallbladder, gross inflammation at the calots triangle and adhesions over the gallbladder(28–32)

Perforation of the gallbladder

This is a rare complication of acute cholecystitiswhich carries a mortality rate of 12% to 42%. Gallbladder perforation was classified by Niemeier into three types, type one was perforation into the free peritoneal cavity, type 2 was subacute perforation with abscess formation and type 3 was perforation with fistula formation between the gallbladder and adjacent viscera. Thisclassification is useful in the management of this condition(33,34)Due to the high risk of mortality from gallbladder perforation, early diagnosis and treatment of this condition is important to prevent this. Empirical antibiotics and monitoring the patient in a high-dependency unit is important(35,36).

Gallbladder perforation is seen in 2% to 12% of patients who present with acute cholecystitis and the risk factors for perforation include delay in diagnosis, a delay in seeking treatment of more than 72 hours, male sex and age of more than 60 years. Patients who present with severe forms of inflammation are at risk of gallbladder perforation(37,38).The management of perforation is by performing a cholecystectomy, and laparoscopic cholecystectomy is increasingly being used due to its minimally invasive nature, early recovery and reduced post-operative complications. Some have suggested that emergency cholecystectomy is indicated for Type 1 and 3 perforations and Type 2 perforationis managed with percutaneous cholecystostomy(39,40)

Several studies were conducted to look at the outcomes of perforation of the gallbladder and these studies concluded that early diagnosis and treatment of this condition is essential. Cholecystectomy should not be delayed, and laparoscopic cholecystectomy can be attempted but there is a high conversion rate. These patients were managed in the hospital for a longer period to manage their co-morbidities and they required prolonged intravenous antibiotics(41–45)

Type	**explanation**
One	Perforation of the gallbladder into the peritoneal cavity and it is not surrounded by any protective adhesions.
Two	Perforated gallbladder surrounded by an abscess that is walled off by adhesions
Three	The formation of a fistula between the perforated gallbladder with other viscera

Table 2 the types of gallbladder perforation according to the Niemeier classification

Subtotal cholecystectomy for complicated cholecystitis

Subtotal cholecystectomy is a well-recognized option when a total cholecystectomy is not possible due to dense inflammation at the calot's triangle and the possibility of injury to the common bile duct is high. In this procedure, a portion of the gallbladder is left behind(46).It can be performed as an open or laparoscopic procedure, the gallbladder is incised, and the contents are aspirated, and the anterior wall is removedwhile leaving the posterior wall intact, closure of the gallbladder stump with either sutures or staplers and a drain is inserted. In some cases of severe inflammation, the stump is left open, but this can lead to persistent bile leak. The most common complication is bile leak and abscess formation(47). Several studies have shown that laparoscopic subtotal cholecystectomy is a feasible and safe procedure, and it can be used for the management of complicated cholecystitis. The use of hemostatic instruments like the Harmonic scalpel will help in the dissection of the gallbladder. The stump can be sutured with an endo loopor hemlock can be applied.(48).

Conclusion

Complicated cholecystitisis seen in about 15% of cases of acute cholecystitis but its diagnosis and treatment are a challenge to the general surgeon. The diagnosis of this condition is often delayed and performing a cholecystectomy is difficult due to the inflammation and adhesion around the gallbladder and calot'striangle. The conversion rate is high as most general surgeons will encounter difficulty when dissecting the calotstriangle. The post-operative management is also prolonged as antibiotic coverage is prolonged and the use of drains will hinder the movement of the patient. The stay in the hospital will also be prolonged.

The management of complicated cholecystitis should involve consultation with senior members of the surgical team, thediagnosis and time of surgery should not be delayed and if there are no laparoscopic surgical services, thenopen cholecystectomy should be performed as early as possible to prevent complications like sepsis.

Conflict of interest-There is no conflict of interest

Disclaimer (Artificial intelligence)

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Details of the AI usage are given below:

1.

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3.

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