Review Article

Current Management of Acute Cholecystitis: Narrative review article

Abstract

Acute calculous cholecystitis is a common condition that results in upper abdominal pain and this condition is diagnosed with leukocytosis and ultrasound of the abdomen. The Tokyo guidelines has categorized them into three groups according to the severity of the disease. Laparoscopic cholecystectomy is the gold standard in the management of acute cholecystitis with early cholecystectomy being preferred to delayed cholecystectomy. The timing of early cholecystectomy is still being debated. Percutaneous cholecystostomyis used as a bridging procedure for high-riskpatients. We have conducted this review article to look at the role of antibiotics, the timing of cholecystectomy and indication of percutaneous cholecystostomy in the management of acute calculous cholecystitis.

Keywords- “Acute cholecystitis”, “Laparoscopic cholecystectomy”, “Open cholecystectomy”, “Percutaneous cholecystostomy” and “Conservative treatment of acute cholecystitis”

Introduction

Acute cholecystitis is a condition characterized by inflammation of the gallbladder which is caused by obstruction of the cystic duct by gallstones. It causes severe right upper abdominal pain that is associated with nausea, vomiting and fever. It is seen in about 20% of patients who are admitted for biliary colic.(1,2)

Ultrasound of the abdomen is the imaging of choice to make a diagnosis of acute cholecystitis, as it can demonstrate gallbladder wall thickening, pericholecystic fluid collection and a sonographic murphy’s sign. The sensitivity of ultrasound is at 81%. Cholescinthigraphyhas a higher sensitivityof 96%but it is often performed in equivocal cases or in cases where the diagnosis of acute cholecystitis is in doubt.(3–5)

The Tokyo Guidelines graded the severity of acute cholecystitis into three categories, Grade 1 was mild acute cholecystitis with no organ dysfunction, Grade 2 was moderate

acute cholecystitis which was associated with leukocytosis, marked tenderness over the abdomen, prolonged symptoms of more than 72 hours and marked localized inflammation of the gallbladder. Grade 3 is acute cholecystitis that is associated with dysfunction of the cardiovascular system, respiratory system, renal system, neurological system, and hematological system.(6)

The recommended management for the Tokyo Guidelines Grade 1 patients was conservative treatment with intravenous antibiotics followed by early cholecystectomy. Grade 2 patients were managed with emergency cholecystectomy and Grade 3 patients were managed with percutaneous gallbladder aspiration or percutaneous gallbladder drainage.(7)

The definitive treatment of acute cholecystitis is laparoscopic cholecystectomy due to its reduced morbidity and mortality. Conversion to open cholecystectomy is indicated for patients with severe inflammation whereby identification of the structures at calot's triangle are difficult. For patients who are a high risk for surgery, percutaneous drainage of the gallbladder can be used as a bridging procedure to stabilize them and to see if they are fit to undergo an elective delayed cholecystectomy.(8,9)

There has also been a shift in the time of performing laparoscopic cholecystectomy, from delayed cholecystectomy towards early cholecystectomy with the procedure being performed with twenty-four hours of admission.(10)

Table Ⅰ Tokyo Guidelines for the management of acute cholecystitis

Severity	**Criteria**
Grade 1-mild	Acute cholecystitis with mild inflammation, no organ dysfunction
Grade 2-moderate	Acute cholecystitis with any of the following but no organ dysfunction -elevated white cell count -palpable, tender right upper quadrant mass -duration of symptoms exceeding 72 hours -marked local inflammation
Grade 3-severe	Acute cholecystitis with dysfunction with any of the following organs

	-cardiovascular dysfunction-hypotension -Neurological dysfunction-altered consciousness -Respiratory dysfunction-tachypnea -Renal dysfunction-oliguria -Hepatic dysfunction-prolonged coagulation

As there is no current consensus in the management of acute cholecystitis with regards to the treatment according to the Tokyo Guidelines, the time of performing laparoscopic cholecystectomyand if it should be performed as an early or delayed procedure. The definition of early laparoscopic cholecystectomy has also not been defined.The indication of percutaneous cholecystostomy has been defined but the time of removal of tube has also not been defined and the time for performing a cholecystectomy has not been standardized.We have conducted this review article looking for answers for all these factors in the management of acute cholecystitis. 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 2023.The following keywords were used, “acute cholecystitis”, “open cholecystectomy”, “laparoscopic cholecystectomy”, “percutaneous cholecystostomy “and “conservative treatment for acute cholecystitis”. 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 and pediatric patients were included in this study and pregnant patients with acute appendicitis were excluded.

Discussion

The World Society of Emergency Surgery guidelines for the management of acute calculous cholecystitis

The World Society of Emergency Surgeons developed a set of guidelines in 2016 for the management of acute calculous cholecystitis. Therecommendation includes the combination of clinical and biochemical markers to aid in the diagnosis, the use of abdominal ultrasound to confirm the diagnosis. Cholecystectomy remains the gold standard in the management of acute cholecystitis. Antibiotics are only used as an adjunct to treatment. Early cholecystectomy was preferred to delayed cholecystectomy

and laparoscopic cholecystectomy was the preferred surgical method. High risk patients were defined and the role of percutaneous cholecystostomy was introduced to convert septic patients to non-septic patients.(11)

The 2020 World Society of Emergency Surgery updated guidelines, further elaborated that laparoscopic cholecystectomy should be the treatment of choice in all cases of acute cholecystitis and that percutaneous cholecystostomy is indicated in high-risk patient for who surgery cannot be performed. Percutaneous cholecystostomy can convert a septic to a non-septic patient. Early laparoscopic cholecystectomy should be performed within 7 days of admission. Conversion to open cholecystectomy should be done when the anatomy at the calot's triangle is obscured.(12)

The Tokyo guidelines 2013 and 2018(TG13 and TG 18)

TheTokyo guidelines divided the severity of acute calculous cholecystitis into grade 1, where there are mild inflammatory changes, grade 2where there is marked inflammation with leukocytosis, tenderness at the right hypochondrium and fever. Grade 3 is severe inflammation withhypotension, tachypnea, and tachycardia. Grades 1 and 2 were managed with intravenous antibiotics and cholecystectomy. Grade 3 should be managed with intravenous antibiotics and percutaneous cholecystostomy, with cholecystectomy being performed later once the patient was stable. These guidelines also recommend early cholecystectomy.(13,14)

Conservative treatment in acute cholecystitis

This involves the use of antibiotics and among the organisms that are most involved include Escherichia Coli, Klebsiella, enterococcus and anaerobic organisms. Antibiotics are indicated if the patient has fever, abdominal pain and tenderness and leukocytosis. The common antibiotics that are prescribed include the penicillin group of drugs like amoxycillin clavulanic acid, third generation cephalosporins and fluoroquinolones. There is no consensus with regards to the duration of antibiotic therapyand the clinical situation will dictate the duration of therapy.(15–17)

Conservative treatment of acute cholecystitis should often be viewed as a bridge towards surgical treatment and not a definitive form of management. Failure of conservative treatment may often result in emergency cholecystectomy.(18)

Antibiotic therapy is not indicated in the treatment of mild acute cholecystitis as this was seen in a prospective randomized control trial by mazeh et al. This trial concluded that antibiotic therapy did not influence the hospital stay and early outcomes in these patients.(19)

Percutaneous cholecystostomy

This is an image guided percutaneous drainage procedure of the gallbladder that is performed in patients with Tokyo Guidelines grade 3. It is used as a bridging procedure to stabilize patients that are septic. The procedure is done by an ultrasound, and it can be done by a transhepatic or transabdominal route. This procedure is often used in elderly and septic patients. It is associated with a good success rate and low mortality rate.(20–22)

Percutaneous cholecystostomy is often used to stabilize a patient who is septic and convert them to a non-septic patient and perform a delayed cholecystectomy. The common complication of this procedure is catheter displacement and recurrence of abdominal pain.(23–25)

The timing of performing a percutaneous catheter drainage is also important with early placement is associated with reduced hospital stay but the complications and outcomes are the same with delayed catheter placement.(26)

A multicenter randomized control trial comparing laparoscopic cholecystectomy versus percutaneous catheter drainage for acute cholecystitis in high-risk patients was performed by Loozen et aland the results of this trial showed that percutaneous catheter drainage was associated with higher mortality, complications, recurrence, and length of hospital stay when compared with laparoscopic cholecystectomy.(27)

A systemic review and meta-analysis comparing percutaneous catheter drainage versus laparoscopic cholecystectomy in the treatment of high-risk patients with acute calculous cholecystitis by Huang et al concluded that percutaneous drainage was associated with higher morbidity,mortality, recurrence rate and length of hospital stay when compared to laparoscopic cholecystectomy.(28)

Asystemic review and meta-analysis by Markopoullos et al comparing outcome of elderly patients who underwent percutaneous catheter drainage showed that it was associated with increased mortality and readmission rates when compared to cholecystectomy.(29)

Timing of cholecystectomy in acute cholecystitis

The definitive treatment of acute cholecystitis is cholecystectomy,and the type of surgical technique can be an open or laparoscopic method. Since its introduction laparoscopic cholecystectomy has become the gold standard in the surgical management of acute cholecystitis. It is associated with reduced morbidity; length of hospital stays and post operative analgesia usage.(30–33)

Laparoscopic cholecystectomy can either be performed as an early or delayed procedure. Early laparoscopic cholecystectomy is performed within 7 days and delayed laparoscopic cholecystectomy is performed after 2 to 3 weeks' time. Early cholecystectomy is more cost effective and delayed cholecystectomy is associated with increased cost, readmission, and increased morbidity.(34,35)

A multicenter randomized trial comparing early versus delayed cholecystectomy in the management of acute cholecystitis was conducted by Gutt et al. Early cholecystectomy was performed by 24 hours and delayed cholecystectomy was performed by 7 days. The results of the trial showed that early cholecystectomy was associated with reduced complication and cost when compared to delayed cholecystectomy.(36)

Arandomized control trial by Kao et al comparing early versus delayed laparoscopic cholecystectomy for acute cholecystitis and this trial concluded that early laparoscopic cholecystectomy was associated with reduced complication, length of hospital stays and cost when compared with delayed laparoscopic cholecystectomy.(37)

A randomized clinical trial and retrospective cohort study comparing laparoscopic cholecystectomy versus antibiotic therapy for acute cholecystitis in elderly patients found that the length of hospital stay, and complications were lower in the laparoscopic cholecystectomy group. This trial concluded that laparoscopic cholecystectomy showed be offered to elderly patients with acute cholecystitis.(38)

The timing of early laparoscopic cholecystectomy was retrospectively reviewed by zafar et al who concluded that performing the procedure within 2 days of admission was associated with the best outcomes and cost for the patient.(39)

The Tokyo Guidelines of 2013 for the management of acute cholecystitis has recommended that cholecystectomy be performed within 72 hours of onset of clinical presentation for acute cholecystitis.(40,41)

Table ⅠⅠTable showing the complication rates of early laparoscopic cholecystectomy and delayed laparoscopic cholecystectomy.

Study	N=numbers	Study type	Early laparoscopic cholecystectomy	Delayed laparoscopic cholecystectomy
Gutt et al (2013)	**618**	**Randomized control trials**	**Complications-14.1%**	**Complications-40.4%**
Yan et al	**66**	**Retrospective study**	**12.5%**	**8.8%**

Conclusions

Acute calculouscholecystitis is a common condition that presents with upper abdominal pain and is diagnosed with both blood investigations and ultrasound of the abdomen. The Tokyo Guidelines has divided this into three categories with cholecystectomy being the treatment of choice for categories one and two. Category three is treated with percutaneous cholecystostomy and followed by cholecystectomy. The timing of cholecystectomy has slowly moved from delayed to early cholecystectomy. There is no consensus on the definition of early cholecystectomy with most surgeons taking seventy-two hours as the cutoffpoint. Laparoscopic cholecystectomy has become the operation of choice for acute cholecystitis with open cholecystectomy being indicated if there are complications.

To implement early laparoscopic cholecystectomy in acute cholecystitis in most general surgical units, this will require experienced surgeons as most junior surgeons will have trouble if there is inflammation at the calot's triangle and gallbladder. This may also lead to a higher conversion to open cholecystectomy. One solution to this problem is to set up a semi elective operative theatre list to deal with patients with acute cholecystitis.

Percutaneous cholecystostomy has a role to play in elderly, high risk patients who are not fit for surgery. These patients can be stabilized and if fit can undergo a delayed laparoscopic cholecystectomy. There is no consensus on the duration of percutaneous catheter drainage and when to take off the tube.

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