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A Shift in Timing: The Role of Early Laparoscopic Cholecystectomy in Patients with Complicated Acute Cholecystitis – A Case Series

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ABSTRACT

Laparoscopic cholecystectomy has become the gold standard for the treatment of acute cholecystitis due to its minimally invasive nature, which significantly reduces patient recovery times and postoperative complications. This case series presents four cases of acute cholecystitis, each managed successfully via laparoscopic cholecystectomy, without conversion to open surgery. The clinical outcomes and intraoperative findings underscore the effectiveness of laparoscopic techniques, even in complex cases such as empyema, gangrenous cholecystitis, and perforation with abscess formation. The discussion includes a review of the relevant literature, highlighting the advantages of early laparoscopic intervention in acute cholecystitis and addressing the challenges posed by severe inflammation. This case series emphasizes the importance of laparoscopic surgery as the preferred treatment modality for acute cholecystitis.

KEYWORDS: Laparoscopic cholecystectomy, acute cholecystitis, gallbladder stones, empyema, gangrenous cholecystitis, perforation, conversion, hospital stay.

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INTRODUCTION

Acute cholecystitis is a common surgical emergency, often arising as a complication of gallstone disease and affects up to 10% of patients with symptomatic gallbladder stones. It is characterized by inflammation of the gallbladder due to obstruction of the cystic duct, neck, or Hartmann's pouch, typically by gallstones, leading to distension, ischemia, and secondary infection (1). The condition presents clinically with right upper quadrant pain lasting 8-12 hours, localized tenderness, and signs of systemic infection such as fever and leukocytosis (2). Complications of acute cholecystitis range from mucoceles to severe infections like gangrenous cholecystitis and gallbladder perforation, each carrying unique challenges in management (2).

Ultrasound remains the primary diagnostic tool due to its high sensitivity, revealing impacted stones, thickened gallbladder walls, and free pericholecystic fluid. Computed tomography (CT) and magnetic resonance imaging (MRI) play supplementary roles, especially in complicated cases where ultrasound findings are ambiguous (3).

Traditionally, the management of acute cholecystitis involved conservative treatment followed by delayed cholecystectomy after the acute inflammation subsided. However, with the advent of laparoscopic techniques, the paradigm has shifted towards early intervention. Laparoscopic cholecystectomy has become the treatment of choice for acute cholecystitis, offering several benefits over open surgery, including reduced postoperative pain, shorter hospital stays, and faster recovery times (4).

For decades, open cholecystectomy was the mainstay of treatment for acute cholecystitis. The introduction of laparoscopic surgery in the 1990s was initially met with caution and early laparoscopic cholecystectomy was considered risky due to concerns about increased complications, such as bile duct injury and the need for conversion to open surgery (5). However, advances in laparoscopic techniques and instrumentation have allowed surgeons to perform this procedure safely, even in cases of severe inflammation or complicated cholecystitis. Current guidelines strongly recommend early laparoscopic

cholecystectomy within the first 72 hours of symptom onset for most patients with acute cholecystitis (6).

This case series presents four patients with varying presentations of acute cholecystitis, all of whom underwent successful laparoscopic cholecystectomy without conversion to open surgery. The cases highlight the broad applicability of this minimally invasive technique and its safety and effectiveness in managing even the most complicated cases of gallbladder inflammation.

CASE PRESENTATION

Case 1: Mucocele of the Gallbladder with Single Stone

A 48-year-old female presented to the emergency department with a two-day history of right upper quadrant pain, fever, and nausea. On physical examination, she was febrile with tenderness localized to the right upper quadrant and a positive Murphy's sign. Blood tests showed leukocytosis, and liver function tests were within normal limits. An abdominal ultrasound revealed a distended gallbladder with a single impacted stone at Hartmann's pouch, and thickened gallbladder walls. There was no evidence of bile duct dilation or choledocholithiasis.

The patient was taken to surgery within 24 hours of admission. A laparoscopic cholecystectomy was performed using the standard four-port technique. Dissection of Calot's triangle was accomplished with careful identification of the cystic duct and artery. The gallbladder was distended, but the mucocele did not complicate the procedure. The surgery was completed without complication, and there was no need to convert to open surgery. The patient recovered uneventfully and was discharged on postoperative day 3.

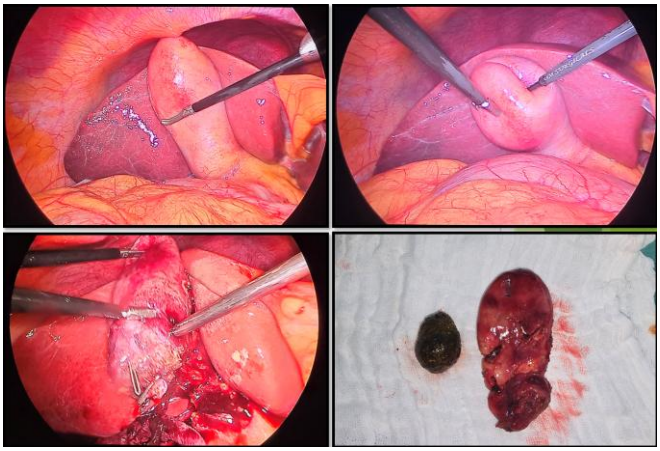

Figure 1. Laparoscopic views of acute cholecystitis and mucocele of the gallbladder with single gallstone (Case 1)

Case 2: Mucocele of Gallbladder with Multiple Stones

A 54-year-old male presented with acute onset of severe right upper quadrant pain, vomiting, and fever lasting two days. His medical history was significant for gallstones diagnosed six months prior, but he had not required surgical intervention at the time. On examination, he was febrile and had localized tenderness over the gallbladder with a positive Murphy's sign. Blood tests showed elevated white cell counts and mild derangement in liver function tests. An ultrasound demonstrated multiple gallstones, thickened gallbladder walls, and pericholecystic fluid, indicative of acute cholecystitis.

Laparoscopic cholecystectomy was performed within 36 hours of symptom onset. The intraoperative findings included a markedly distended gallbladder with multiple stones but no evidence of perforation or abscess formation. Dissection of the critical structures was achieved without complications, and the gallbladder was removed intact. The patient recovered well postoperatively and was discharged on postoperative day 3. At his follow-up appointment, he reported no further complications.

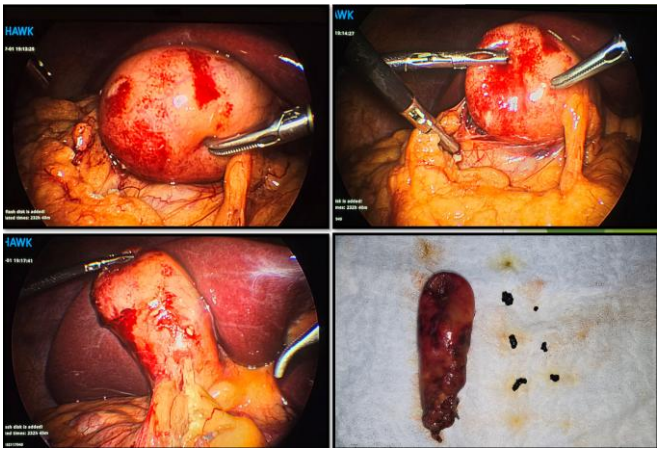

Figure 2. Laparoscopic views of acute cholecystitis and mucocele of the gallbladder with multiple gallstones (Case 2)

Case 3: Empyema of the Gallbladder

A 70-year-old female with a history of intermittent right upper quadrant pain for several weeks presented with high fever, confusion, and abdominal pain. On examination, she was febrile, hypotensive, and had significant tenderness in the right upper quadrant. Laboratory results showed elevated inflammatory markers and abnormal liver function tests. Abdominal ultrasound revealed a distended gallbladder with multiple stones and echogenic material within the lumen, consistent with empyema.

After initial resuscitation with intravenous fluids and antibiotics, the patient underwent laparoscopic cholecystectomy. The procedure was technically challenging due to the presence of pus within the gallbladder and extensive adhesions between the gallbladder and surrounding structures. Despite these difficulties, the gallbladder was successfully removed laparoscopically without injury to the bile ducts. The patient recovered well postoperatively, and was discharged on postoperative day 3 with no further complications.

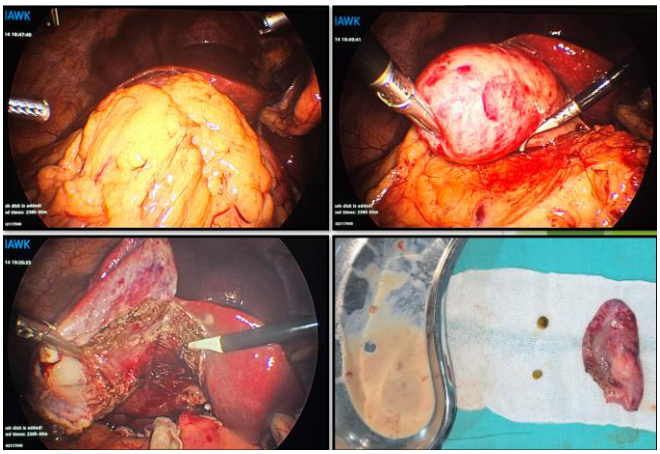

Figure 3. Laparoscopic views of acute cholecystitis and empyema of the gallbladder with gallstones (Case 3)

Case 4: Gangrenous Cholecystitis with Pericholecystic Abscess

A 65-year-old female with underlying diabetes presented to the emergency department with severe right upper quadrant pain, fever, and vomiting. On examination, she was tachycardic, febrile, and had a distended abdomen with guarding over the right upper quadrant. Blood tests revealed leukocytosis and significantly elevated liver enzymes. An abdominal ultrasound demonstrated a thickened gallbladder wall with pericholecystic fluid and multiple gallstones. There was also evidence of a localized abscess, suggesting gallbladder perforation.

The patient was taken for emergency laparoscopic cholecystectomy. Intraoperative findings confirmed gangrenous cholecystitis with a perforated gallbladder and a pericholecystic abscess. The gallbladder was removed successfully after drainage of the abscess. The postoperative course was uneventful, and was discharged on postoperative day 3. She remained well at follow-up one months later.

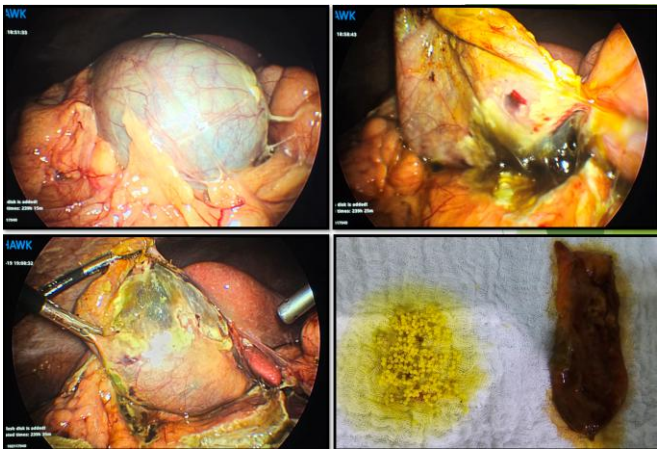

Figure 4. Laparoscopic views of acute gangrenous cholecystitis resulting perforated gallbladder and pericholecystic abscess with multiple gallstones (Case 4)

DISCUSSION

The cases presented in this series illustrate the versatility and effectiveness of laparoscopic cholecystectomy in the management of acute cholecystitis, even in complex scenarios such as mucocele, empyema, gangrenous cholecystitis, and gallbladder perforation with abscess formation. The ability to perform these surgeries laparoscopically, without the need for conversion to open surgery, highlights the evolution of surgical techniques and the growing body of evidence supporting the use of early laparoscopic intervention in acute cholecystitis.

Historically, patients with acute cholecystitis were managed conservatively, with delayed cholecystectomy performed weeks to months after the resolution of inflammation. This approach was primarily based on the fear of increased intraoperative complications, such as bile duct injury and the need for conversion to open surgery, during the acute inflammatory phase. However, the advent of laparoscopy has changed this approach. Numerous studies and randomized controlled trials have demonstrated that early laparoscopic cholecystectomy, performed within 72 hours of symptom onset, is safe and associated with better outcomes compared to delayed surgery.

The 2018 Tokyo Guidelines and other international recommendations emphasize the importance of early surgery for acute cholecystitis, within 72 hours of symptom onset (6). Numerous studies have supported the benefits of early laparoscopic cholecystectomy, particularly within the first 72 hours of symptom onset (1). A Myanmar study in 2018 showed a significant reduction in conversion rates from laparoscopic to open surgery in early cholecystectomy (2.2%) compared to delayed cholecystectomy (17.8%). This finding aligns with global studies that demonstrate lower rates of wound infection, shorter hospital stays, and quicker recoveries in early laparoscopic surgery groups. Moreover, no increase in morbidity or mortality was observed, further supporting the safety of early intervention (9).

Laparoscopic cholecystectomy offers several advantages over open surgery. These include smaller incisions, reduced postoperative pain, shorter hospital stays, and faster return to normal activities. The minimally invasive nature of the procedure also reduces the risk of wound infections and pulmonary complications, which are more common after open cholecystectomy. Additionally, improved visualization during laparoscopy allows for more precise dissection of the inflamed gallbladder, reducing the risk of bile duct injury. As highlighted in the literature, surgeon experience and proper identification of anatomical landmarks, such as Rouviere's sulcus, are critical for safe dissection.

One of the key concerns with early laparoscopic cholecystectomy is the potential for conversion to open surgery, particularly in cases with severe inflammation, gangrene, or perforation. However, as demonstrated in this

case series, even complicated cases can be managed successfully using laparoscopic techniques without conversion. Advances in surgical instruments, such as articulating graspers and energy devices, have facilitated safer and more efficient dissection in difficult cases. Furthermore, the experience of the surgeon plays a critical role in minimizing complications and avoiding conversion to open surgery.

Despite its benefits, laparoscopic cholecystectomy is not without risks. The most significant complication is bile duct injury, which can have serious long-term consequences. However, with careful dissection and adherence to established surgical principles, the risk of bile duct injury can be minimized. In our case series, no bile duct injuries were reported, reflecting the safety of the procedure when performed by experienced surgeons.

Although early laparoscopic cholecystectomy is now considered the gold standard for most cases of acute cholecystitis, there are situations where delayed surgery may still be appropriate. For instance, in patients with severe comorbidities or those who are hemodynamically unstable, initial conservative management with intravenous fluids, antibiotics, and percutaneous cholecystostomy may be warranted. In such cases, delayed laparoscopic cholecystectomy can be performed once the patient's condition stabilizes.

Recent advances in laparoscopic techniques, including the use of enhanced imaging modalities and robotic-assisted surgery, have further improved outcomes in complex cases of acute cholecystitis. Intraoperative fluorescence cholangiography, for instance, allows for better visualization of the biliary anatomy and has been shown to reduce the incidence of bile duct injury. Enhanced recovery after surgery (ERAS) protocols, which focus on optimizing perioperative care, have been shown to improve patient outcomes by reducing postoperative pain, promoting early mobilization, and shortening hospital stays.

In our case series, all patients benefitted from early laparoscopic intervention. None of the cases required conversion to open surgery, highlighting the safety and feasibility of this approach in experienced hands. Furthermore, the successful management of complex cases such as mucocle, empyemam gangrenous cholecystitis and gallbladder perforation with pericholecystic abscess formation reinforces the role of early laparoscopic surgery as the gold standard for complicated acute cholecystitis.

CONCLUSION

Laparoscopic cholecystectomy has become the gold standard for managing acute cholecystitis, including in patients with complex complications such as mucocle, empyema and gangrenous cholecystitis with pericholecystic abscess. This case series demonstrates the feasibility and safety of early laparoscopic cholecystectomy in such cases, highlighting the advantages of minimally invasive surgery. All patients were discharged on the third postoperative day without requiring intensive care, reinforcing the efficacy of early laparoscopic intervention in reducing hospital stays and improving recovery times. With ongoing advancements in surgical techniques and perioperative care, early laparoscopic cholecystectomy will continue to be the standard of care for complicated acute cholecystitis.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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