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ORIGINAL ARTICLE

Tube cholecystostomy as a bridge to cholecystectomy in acute cholecystitis: a retrospective study

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ABSTRACT

Objective: To determine the efficacy and safety of percutaneous cholecystostomy tube placement preceding cholecystectomy in the management of acute cholecystitis.

Methods: This descriptive retrospective study was conducted at Interventional Radiology Department at Shifa International Hospital, Islamabad after obtaining ethical approval (IRB# 0381-23, October 10, 2023). Medical records of patients who underwent ultrasound-guided percutaneous cholecystostomy from January 2016 to December 2023 were reviewed using Radiology Information System. Fifty-eight patients with acute cholecystitis were included. Patients with gallbladder perforation, biliary peritonitis, coagulopathy, contrast allergy, or incomplete records were excluded. Data were collected on a structured proforma and analyzed using SPSS version-25. Outcomes assessed included demographic characteristics, comorbidities, type of cholecystitis, subsequent cholecystectomy, and procedure-related complications.

Results: Fifty-eight patients underwent cholecystostomy tube placement; 31 (53.4%) were males and 27 (46.6%) females, with a mean age of 69.4±10.3 years. Calculous cholecystitis was present in 50 (86.2%) patients, while 8 (13.7%) had acalculous cholecystitis. Hypertension (27.5%) and diabetes mellitus (31.0%) were the common comorbidities. Following stabilization, 23 (39.6%) patients underwent cholecystectomy at an average interval of 32 days, predominantly laparoscopic (82.6%). Among acalculous cases, two patients expired, while three had successful tube removal after tubogram confirmation of biliary patency. The remaining calculous cases were managed conservatively. Major complications included accidental tube slippage (n=2;3.4%), drain dislodgement into the peritoneum (n=1; 1.7%), and death (n=2; 3.4%).

Conclusion: Percutaneous cholecystostomy is a safe and effective temporizing or definitive management option in high-risk patients with acute cholecystitis, facilitating delayed surgery or conservative treatment with a low complication rate.

Keywords: Gallbladder (MeSH); Gallbladder Diseases (MeSH); Cholecystitis (MeSH); Cholecystitis, Acute (MeSH); Acalculous Cholecystitis (MeSH); Biliary Tract Surgical Procedures (MeSH); Cholecystectomy (MeSH); Cholecystectomy, Laparoscopic (MeSH); Percutaneous cholecystostomy (Non-MeSH); Treatment Outcome (MeSH).

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INTRODUCTION

Gallbladder and biliary tract disorders present a significant health challenge worldwide, affecting millions and resulting in considerable illness and death. Importantly, the incidence has surged dramatically, with reported cases climbing from 127.3 million in 1990 to 193.5 million in 2019.[1] Acute cholecystitis, one of the commonest surgically treated diseases, that if untreated can lead to serious complications like empyema, gangrene, perforation, bile leakage, pericholecystitis with abscess formation, peritonitis, sepsis, and death. Laparoscopic cholecystectomy is the definitive treatment for this condition, however there is significant morbidity and mortality in high-risk patients, geriatric age group and in patients in sepsis, reaching up to 19%.[2,3] Percutaneous cholecystectomy is a less invasive procedure that can be used in patient that are high risk for surgery or are in sepsis with relief of symptoms in >90% of population. So, it can be basically used as bridge to interval cholecystectomy, providing us time for infection control and stabilizing the patient and by limiting the complications.

Timing of cholecystectomy after drain replacement remains controversial with some studies suggesting that early cholecystectomy, shortly after percutaneous cholecystectomy is associated with higher rate of complications while delayed cholecystectomy on the contrary is suggested by others, providing ample time to subside the inflammation. The decision however depends on the patient's condition and the severity of cholecystitis.[4] Some authors believe that percutaneous cholecystostomy itself is a definitive treatment, especially in the acalculous cholecystitis,[5] that is supported by literature, however our research focuses on the efficacy of percutaneous cholecystostomy for acute cholecystitis patients in dire state, exploring the scientific and clinical implications of tube cholecystostomy as a bridge to cholecystectomy in improving patient's outcome with quantification of reduction in morbidity and mortality. Percutaneous cholecystostomy is a crucial alternative for patients who are unfit for surgical procedures due to acute cholecystitis,

particularly when the risks of surgery are substantial. However, this technique remains underutilized in Pakistan, mainly due to a lack of understanding of its advantages. Despite being a validated and cost-effective treatment option available in healthcare facilities, percutaneous cholecystostomy is still not commonly performed, even in top medical institutions across the country. This lack of awareness has resulted in increased mortality and morbidity rates among at-risk patients with acute cholecystitis, prompting our study to focus on enhancing education and awareness about this advantageous procedure.

METHODS

A descriptive retrospective study was conducted at Interventional Radiology department, Shifa International Hospital, Islamabad, Pakistan. After taking permission from ethical review board (Reference #: 0381-23, dated: October 10; 2023), data was collected from prior medical records of patients via Radiology Information Systm (RIS) who underwent cholecystostomy tube placement at our department from January 2016 until December 2023. Fifty-eight patients who underwent cholecystostomy tube placement secondary to acute cholecystitis were included while excluding those with gall bladder perforation, biliary peritonitis, coagulopathy, allergy to iodized contrast medium or those with incomplete medical record. Non probability consecutive sampling technique was applied. Data was collected on a structured proforma and analysed using SPSS version 25.

Procedure detail: Procedure is performed at our setting under ultrasound guidance using merit 8.5 Fr locking catheter. 2% 10 cc lignocaine is given first for local anesthesia. Under direct guidance 18 G lumber puncture needle is inserted in the gall bladder via extra-hepatic transperitoneal approach. Guide wire followed by 8.5 Fr locking catheter is then introduced under ultrasound guidance. Correct intraluminal positioning of the cholecystostomy catheter within the gallbladder was confirmed by grayscale ultrasonography at the time of insertion (Figure 1). Bile was aspirated to confirm location.

No peri procedural antibiotic or analgesic is given since patient is already on antibiotics and analgesics prescribed by the primary physician. Patients are shifted to ICU post procedure where they're taken care of by the primary physicians.

Post procedure care protocols:

1-Drainage maintenance: Catheter should remain in place until cholecystectomy can be performed.

2- Site care: Keeping the insertion site clean and dry and monitor for signs of infection including redness, swelling or discharge.

3- Flushing protocol: Donot flush the catheter and if blocked, contact the IR team.

RESULTS

During the study period, 58 patients underwent cholecystostomy tube placement. There were 31 (53.4%) males and 27 (46.6%) females. Fourteen patients (24.1%) were younger than 60 years, while 44 (75.8%) were aged 60 years or older. The mean age was 69.4±10.3 years, with a range of 26 to 89 years. Hypertension (27.5%) and diabetes mellitus (31.0%) were the common comorbidities (Table I). Eight (13.7%) out of 58 patients had acalculous cholecystititis while 50 (86.2%) had calculous cholecystitis. Total 23 (39.6%) out of 58 patients received cholecystectomy after stabilisation including 3 patients with acalculous cholecystitis. Surgery was done at an average of 32 days following cholecystostomy tube placement. Out of these, 19 (82.6%) patients had undergone laparoscopic cholecystectomy, two (8.6%) patients had open cholecystectomy, one (4.3%) had partial cholecystectomy and the remaining one (4.3%) had laparoscopic to open conversation.

Among remaining patients with acalculous cholecystitis, 2 (25%) patients expired after the procedure and 3 (37.5%) patients underwent a tubogram performed 6 weeks later in the angiography suite, no obstruction was seen and the tube was removed following surgical consultation and no future surgery was planned. Rest of the patients with calculous cholecystititis, 30 (60%) were monitored through their medical record and had follow up appointments in their local areas since our institute is a tertiary care hospital, where they were managed conservatively. Retrograde cholangiogram (Figure 2) via tube is performed to confirm patency of CBD if contrast freely flows via CBD to duodenum, then we can remove cholecysostomy without surgery. If no free flow of

Table I: Case frequency distribution of each comorbid condition in the study population (n=58)

Comorbid condition	Frequency	Percentage
Diabetes mellitus	18	31.0
Hypertension	16	27.5
Sepsis on admission	7	12
Ischemic heart disease	4	6.8
Hepatitis C	3	5.1
Acute kidney injury	2	3.4
Carcinoma head of pancreas	2	3.4
Pulmonary head hypertension	1	1.7
Stroke	1	1.7
Choledocholithiasis	1	1.7
Lymphoma	1	1.7

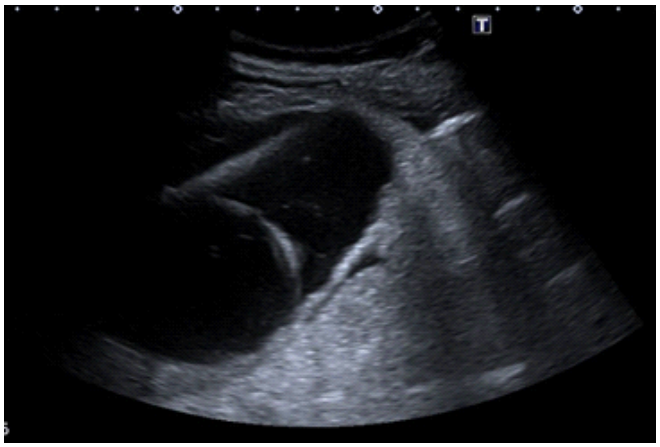

Figure 1: Grey scale ultrasound images shows the adequate placement of cholecystostomy drainage catheter within the gall bladder.

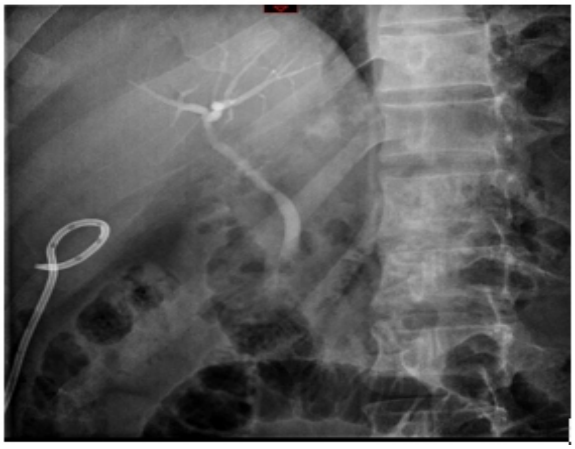

Figure 2: Retrograde cholangiogram showing free flow of contrast via CBD into duodenum.

contrast into duodenum then we can not remove tube without surgery and tube needs to be kept for life if surgically not fit.

The major complications of post-cholecystostomy tube placement in our patients during clinical follow up included accidental tube slippage (n=2/58; 3.4% and drain dislodgement into the peritoneum (n=1/58; 1.7%). Mortality rate was 3.4% (n=2/58).

DISCUSSION

In the present study, cholecystostomy was performed in 58 patients, predominantly elderly (mean age 69.4 years), with 75.8% of patients aged over 60. The procedure was more common in those with calculous cholecystitis (86.2%) since it's more prevalent, while a smaller proportion (13.7%) had acalculous cholecystitis. Cholecystostomy proved to be an effective initial management strategy, with nearly 40% of patients subsequently undergoing definitive cholecystectomy following clinical stabilization. These findings emphasize the role of cholecystostomy as an important therapeutic bridge in the management of complicated cholecystitis, particularly among elderly patients and those with significant comorbid conditions.

When compared with the prior studies performed by Viste A out of 104 patients, successful percutaneous cholecystostomy was done in 103 patients with mild complications in two patients including bile leakage requiring percutaneous biliary drainage. 97% of patients experienced resolution of symptoms, only 30 patients received interval cholecystectomy. There was mortality of 4 patients, none, due to complications of drainage.[6] In another study performed by Mir MA, et al., out of 34 patients, successful percutaneous cholecystostomy was done in all the patients with complication rate of 8%. All patients showed clinical improvement within 48 hours. There was no procedure related to mortality. All the patients underwent cholecystectomy after appropriate optimization.[7]

The data of present study is consistent with the prior studies with favorable outcome given minimal complication rate, only one mortality. Tube cholecystostomy is not readily performed in Pakistan with most of the case is performed in the selective quaternary care centers like ours. The sample size was also very limited as the surgeons usually opt for surgery. The goal of our study is to emphasize the importance of tube cholecystostomy in minimizing the complications in sick patients giving ample time to subside inflammation and then proceed to interval cholecystectomy. Further studies should be performed with increase in sample size and further quantification of the morbidity/mortality should be done. Percutaneous gallbladder drainage was first performed in 1984 for gallbladder empyema and has gradually been noted being a less invasive way of treatment for acute cholecystitis. The central principle appears to reduce the inflammation and pressure in the biliary system, which can give ample time for healing. This approach has several positive aspects, for example using local anesthesia instead of general and has fewer complications compared to the open and urgent surgical intervention. It is even therapeutic for patients with acute acalculous cholecystitis, as it avoids the need for surgery altogether. Additionally, this also gives interventionist the access to biliary system to treat any pathologies like common bile duct calculi, if present.[8]

Percutaneous cholecystostomy is only reserved for certain cases. As per Tokyo guidelines mild acute cholecystitis should be proceeded with laparoscopic cholecystectomy if feasible. On the other hand, moderate and severe cases, lasting beyond 5-7 days, are typically managed conservatively with antibiotics. Patients should be managed with adequate medical treatment before proceeding towards percutaneous cholecystostomy.[9] In patients with poor functional status a bout of fulminant acute cholecystitis may be a terminal event. In such cases it is recommended that cholelithiasis should be treated. Surgery (laparoscopic cholecystectomy) is for treatment of choice for stable patients with cholelithiasis but is not feasible in patients in grave state.[10] This aspect is evaluated by Houghton et al, who categorized patients with underlying medical condition, in his study there was approximately 19% mortality when

undergoing emergency cholecystectomy. This confirms a high surgical mortality (2/9 patients) and concludes that cholecystectomy is not recommended for many patients and hence other nonsurgical techniques should be evaluated for patients with acute acalculous cholecystitis, unsuitable for surgery, which require eradication of cholelithiasis to prevent future bouts of cholecystitis.[11,12]

Limitations of the study

Our research has various X limitations, including its retrospective nature, limited participant count, and being conducted at a single center, which may hinder the applicability of our results. Furthermore, the inconsistent follow-up periods and absence of a control group could affect the precision of our findings. To address these shortcomings, upcoming studies might implement a prospective approach with clearly defined inclusion and exclusion criteria, larger participant populations, and multicenter involvement. Additionally, establishing standardized follow-up protocols and incorporating a control group for comparative analysis would enhance the strength of the evidence. By tackling these limitations, future investigations can yield more reliable insights regarding the effectiveness and safety of cholecystostomy tube placement in treating acute cholecystitis.

CONCLUSION

Our study demonstrates that cholecystostomy tube placement is a valuable management strategy for high-risk patients with acute cholecystitis. It provides effective source control, allows clinical stabilization, and reduces the immediate need for operative intervention. In selected patients, it can serve either as a bridge to delayed cholecystectomy or, in some cases, as definitive treatment. Given its favorable safety profile and low complication rates, this approach should be carefully considered in elderly and medically complex individuals during clinical decision-making.

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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

ZAK & JA: Conception and study design, acquisition, analysis and interpretation of data, critical review, approval of the final version to be published

AM: Acquisition, analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

AMb: Acquisition, analysis and interpretation of data, drafting the manuscript, critical review approval of the final version to be published

AR& MR: Acquisition, analysis and interpretation of data, critical review, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest, whether financial or otherwise, that could influence the integrity, objectivity, or validity of their research work.

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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