



## Re-Arousal of a Vanishing Surgical Procedure: Application of Surgical Cholecystostomy in Critically Ill or Non-Percutaneous-Cholecystostomy Fit Patients of Acute Cholecystitis

Liu HP<sup>1</sup> and Wu YC<sup>1,2,3\*</sup>

<sup>1</sup>Department of General Surgery, Kaohsiung Armed Forces General Hospital, Taiwan

<sup>2</sup>Zuoying Branch of Kaohsiung Armed Forces General Hospital, Taiwan

<sup>3</sup>R.O.C. Military Academy, Taiwan

### Abstract

Today, Surgical Cholecystostomy (SC) is nearly replaced by image-guide percutaneous techniques, and it's been scarcely mentioned since 1980s after the introduction of Percutaneous Cholecystostomy (PC). However, SC may be needed in some situations. Cholecystostomy has been shown to be beneficial in high-risk patient groups to decompress the gallbladder, reducing patients' symptoms and the systemic inflammatory response. It also has been proven to be the most feasible bridging treatment prior to elective cholecystectomy. The majority of PC has often been performed *via* transhepatic route, transversing the liver for theoretically greater catheter stability and lower rate of bile leakage. The transperitoneal route is considered a more suitable option for patients with liver disease and uncorrected coagulopathy. To date, either route of PC is executed with the help of sonography or computerized tomography by radiologist, and that is not always available in some developing districts. Herein, we would introduce this forgotten surgery, SC, to reach the goal of bile diversion similar to transperitoneal PC. We enrolled the total of 9 patients with acute cholecystitis not suitable for transhepatic route, underwent SC since 1999 to 2016 in a single institute. The reasons for the operation of SC are as below: 1. Liver cirrhosis with coagulopathy. 2. Sepsis with coagulopathy. 3. Gallbladder empyema with rupture. 4. Unavailability of radiologist. Among these 9 patients, 6 have undergone following cholecystectomy. And all of the 9 patients were uneventful during 1-year follow-up.

**Keywords:** Percutaneous cholecystostomy; Surgical cholecystostomy; Acute Cholecystitis

### Introduction

The first Surgical Cholecystostomy (SC) was performed by Bobbs in 1867 and the first cholecystectomy by Langenbuch in 1874. Four years later, SC was described when, in 1878, the surgeons Sims, Kocher and Keen each performed this procedure independently of one another [1]. Cholecystostomy is regarded as a safe alternative which occasions a good therapeutic response, especially in surgically high-risk populations [2-4]. The first ultrasound-guided Percutaneous Cholecystostomy (PC) was performed in a jaundiced patient in 1979 by Elyaderani and Gabriele [5]. PC can be used as a treatment for acute cholecystitis in elderly or critically ill patients, allowing subsequent elective cholecystectomy with minimal mortality [6]. Acute calculus or acalculous cholecystitis is a common disease, and cholecystectomy is considered the to be gold standard of management. Although cholecystectomy is generally regarded as a safe operation, the mortality and mobility rates of cholecystectomy are significant, ranging between 14% to 30% in surgical high-risk patients, such as old age, multiple comorbidities or anticoagulant usage [7,8]. The majority of PC has often been performed *via* transhepatic route, transversing the liver for theoretically greater catheter stability and lower rate of bile leakage. The transperitoneal route is considered to be a more suitable option for patients with liver disease and uncorrected coagulopathy [9]. SC is similar to and even superior to transperitoneal PC when it comes to its anatomic approach without bowel injury and the placement of another drainage tube in Morrison's pouch as gallbladder rupture or intraabdominal abscess formation.

### OPEN ACCESS

#### \*Correspondence:

Yu-Chiuan Wu, Department of General Surgery, Kaohsiung Armed Forces General Hospital, No. 2, Zhongzheng 1<sup>st</sup> Rd., Lingya Dist., Kaohsiung City 802, Taiwan, Tel: +886-774-906-33; Fax: +886-774-052-31; E-mail: ranger.wu1113@gmail.com

Received Date: 27 Apr 2023

Accepted Date: 12 May 2023

Published Date: 16 May 2023

#### Citation:

Liu HP, Wu YC. Re-Arousal of a Vanishing Surgical Procedure: Application of Surgical Cholecystostomy in Critically Ill or Non-Percutaneous-Cholecystostomy Fit Patients of Acute Cholecystitis. *World J Surg Surgical Res.* 2023; 6: 1467.

**Copyright** © 2023 Wu YC. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Table 1:** Enrolled 14 patients who underwent surgical cholecystostomy; of these patients, 9 were diagnosed of acute cholecystitis.

	Age	Gender	Hospital stay	Operation Time (min)	Reasons for SC	Following cholecystectomy after SC
No. 1	89	F	33	17	GB empyema with rupture.	nil
No. 2	88	M	14	50	Radiologist was not available	nil
No. 3	44	M	16	40	liver cirrhosis with coagulopathy (platelet: 24 k/uL)	248 days Cholecystectomy
No. 4	60	M	11	30	1. acute coronary syndrome 2. r/o gallbladder rupture	84 days laparoscopic cholecystectomy
No. 5	63	M	34	25	liver cirrhosis with coagulopathy (INR:1.7 3)	68 days Cholecystectomy
No. 6	84	F	18	30	liver cirrhosis with coagulopathy (platelet: 58k/uL)	57 days Cholecystectomy
No. 7	72	F	13	32	Sepsis with coagulopathy (aPTT: 41.9)	4 days Laparoscopic cholecystectomy
No. 8	91	M	15	27	Sepsis with coagulopathy (PT/PTT: 13.6/36.9, INR:1.37)	nil
No. 9	85	M	16	25	Sepsis with coagulopathy (PT/PTT: 13.2/38.1, INR: 1.33)	7 days laparoscopic cholecystectomy

## Purpose

The principle of Surgical Cholecystostomy (SC) in treating acute cholecystitis in critically ill patients is deemed as a milestone for the development of Percutaneous Cholecystostomy (PC). Nowadays, SC is nearly substituted by PC and hence rarely mentioned in English literature in these decades. However, the application of SC provides better ways in treating acute cholecystitis under some specific circumstances. To better comprehend the application of SC, we analyzed the cases treated by SC and reviewed the literature.

## Methods

The selection of patients was from the data base of Kaohsiung Armed Forces General hospital from 1999 to 2016, and we used procedure code of ICD-9: 75201 as a paradigm. We enrolled 14 patients who underwent surgical cholecystostomy; of these patients, 9 were diagnosed of acute cholecystitis (Table 1), while the other 5 were hollow organ perforation or bowel strangulation undergoing combined surgery. Therefore, the 5 patients were excluded.

The protocol of surgical cholecystostomy is according to Surgical Care at District Hospital of World Health Organization [10].

1. The patient is in supine position under local anesthesia. A small incision is made with its midportion directly over the maximum point of tenderness in the right upper quadrant. Pack the gallbladder off with gauze to prevent spillage of infected bile into the peritoneal cavity.

2. Insert 2 purse-string 2/0 absorbable stitches into the fundus. Aspirate the infected bile with a needle and syringe to empty the gallbladder (Figure 1).

3. Incise the fundus with a pointed knife in the center of the purse-string sutures and apply suction (Figure 2). Extract any stones using suitable forceps (Figure 3).

4. Introduce the tip of a Foley catheter through a stab wound in the abdominal wall and then into the gallbladder. Tie the purse-string sutures, the inner one first, leaving the ends long. Inflate the balloon (Figure 4).

5. Secure the catheter with the ends of the second purse-string suture and connect it to a sterile closed drainage system (Figure 5).

6. Placement of a drainage tube (Jackson-Pratt drain) into Morrison's pouch may be indicated if gallbladder rupture or empyema.

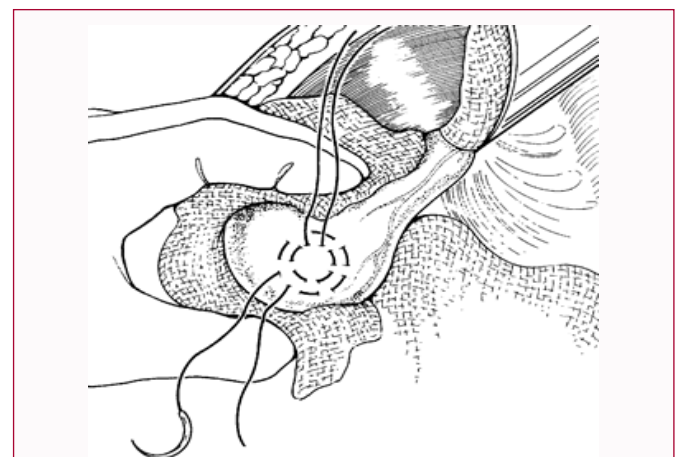
7. Close the laparotomy incision.

## Results

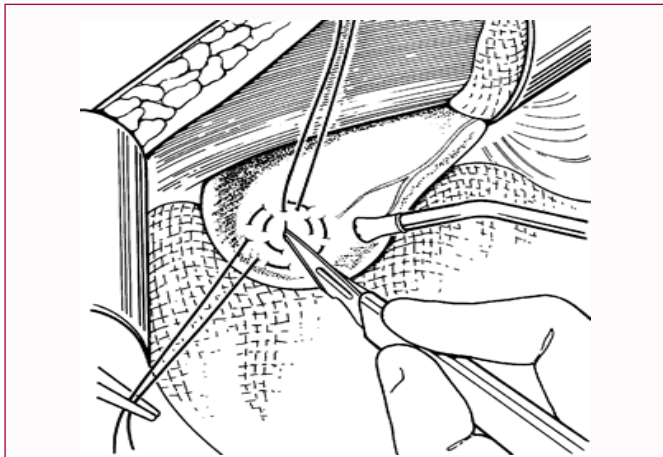
There were 9 patients (6 were male, and 3 were female) retrieved from the data base of Kaohsiung Armed Forces General Hospital, and the average age was 75 years old. They were all diagnosed of acute cholecystitis undergoing surgical cholecystostomy under local anesthesia. The average operation time was 30.6 min. Of the 9 patients, 6 completed subsequent cholecystectomy successfully and recovered well, and the other 3 (Pt. No 1, 2, and 8) remained tube drainage out of poor performance status as in long-term bed ridden and old age (average age was 89 y/o). The reasons for the operation of SC were sepsis with coagulopathy, liver cirrhosis with coagulopathy, gallbladder rupture, and unavailability of radiologist. The 1-year survival rate was 100%.

## Discussion

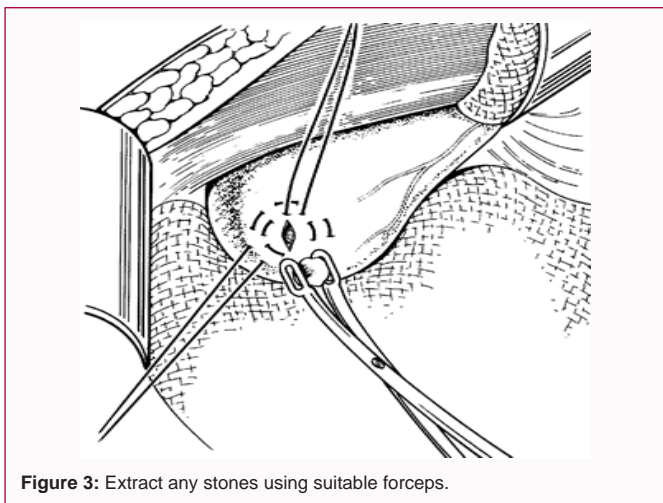
Percutaneous Cholecystostomy (PC) has been shown to be beneficial to high-risk patient groups to decompress the gallbladder, reducing patients' symptoms and the systemic inflammatory response [11]. As early as 1994, Garber et al. [12] demonstrated the safety and efficacy of transperitoneal percutaneous cholecystostomy for patients with cholecystitis. PC can be used as an alternative for the management of acute cholecystitis either as a bridge to surgery or as a definitive management for unfit patients and those who decline a cholecystectomy [13]. The use of anticoagulant medications, such as



**Figure 1:** Insert 2 purse-string 2/0 absorbable stitches into the fundus. Aspirate the infected bile with a needle and syringe to empty the gallbladder.



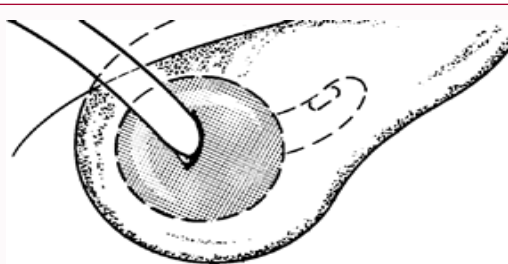
**Figure 2:** Incise the fundus with a pointed knife in the center of the purse-string sutures and apply suction.



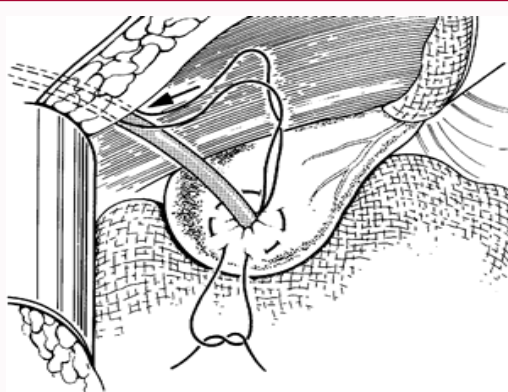
**Figure 3:** Extract any stones using suitable forceps.

aspirin, clopidogrel, or warfarin is common in the patient population of high risk in myocardial infarction and stroke [14-19]. However, in many cases, correction of coagulopathy is not possible because of the emergent nature of the procedure, which is usually performed within 24 h to 48 h after admission or onset of symptoms if the patient is already hospitalized [20]. Furthermore, some patients may not be able to be reversed to normal coagulation parameters because of underlying disease processes, such as acute pulmonary embolism, deep venous thrombosis, acute myocardial infarction, previous cardiac stent placement, or acute stroke, in which the risks from discontinuing anticoagulation would result in higher morbidity or mortality. Even in such cases, ultrasound-guided PC may still be indicated if it is associated with a lower expected morbidity rate than surgery [21-27]. The transhepatic technique has the advantage of providing greater catheter stability and more rapid track maturation to the direct transperitoneal approach. In addition, the transhepatic approach is the safest method in the setting of massive ascites and bowel interposition between the liver and gallbladder. Whereas, the transperitoneal route is considered to be a more suitable option for patients with liver disease and uncorrected coagulopathy [9]. The limitation of transperitoneal PC is shown below:

1. Image-guide technique.
2. Because of variation of bowel peristalsis and bowel gas,



**Figure 4:** Inflate the balloon.



**Figure 5:** Secure the catheter with the ends of the second purse-string suture and connect it to a sterile closed drainage system.

the accurate puncture of gallbladder without bowel injury is rather a challenge.

However, Surgical Cholecystostomy (SC) may be an alternative way for PC *via* transperitoneal route that approach gallbladder in anatomy position without bowel injury; also, SC is feasible without good image tools, and sometimes, an additional drainage tube could be placed in Morrison's pouch if formation of intra-abdominal abscess or ruptured gallbladder in non-operable cases. In our experience, surgical cholecystostomy serves as a safer way to effectively control infection in critically ill patients with liver cirrhosis, or coagulopathy either on sepsis or on anti-coagulants. Furthermore, surgical cholecystostomy is applicable in most general surgeons due to simple principle and low-skill demands.

## Conclusion

There were several limitations of our study, including the retrospective nature of our review of medical records and databases. A selection bias was presented because our study population consisted of a few cases number and most of which were elderly patients. Although SC was less discussed after the prominence of minimally invasive PC, it might be a good way in control infection in critically ill patients with liver cirrhosis, or coagulopathy either on sepsis or on anti-coagulants. The advantages of SC are as below:

1. More suitable option similar to transperitoneal PC for patients with liver disease and uncorrected coagulopathy.
2. A alternative way for PC *via* transperitoneal route that approach gallbladder in anatomy position without bowel injury.
3. SC is feasible without good image tools.
4. Gallbladder stones could be removed during the procedure.
5. An additional drainage tube could be placed in Morrison's

pouch if formation of intra-abdominal abscess or ruptured gallbladder in non-operable cases.

6. Applicable in most general surgeons due to simple principle and low-skill demands.

## References

- Sparkman RS. Bobbs centennial: The first cholecystostomy. *Surgery*. 1967;61(6):965-71.
- Malmstrom P, Olsson AM. Cholecystostomy for acute cholecystitis. *Am J Surg*. 1973;126(3):397-402.
- Gagic N, Frey CF. The results of cholecystostomy for the treatment of acute cholecystitis. *Surg Gynecol Obstet*. 1975;140(2):255-7.
- Gingrich RA, Awe WC, Boyden AM, Peterson CG. Cholecystostomy in acute cholecystitis. Factors influencing morbidity and mortality. *Am J Surg*. 1968;116(2):310-15.
- Elyaderani M, Gabriele OF. Percutaneous cholecystostomy and cholangiography in patients with obstructive jaundice. *Radiology*. 1979;130(3):601-2.
- Akyürek N, Salman B, Yüksel O, Tezcaner T, Irkörüçü O, Yücel C, et al. Management of acute calculous cholecystitis in high-risk patients: Percutaneous cholecystostomy followed by early laparoscopic cholecystectomy. *Surg Laparosc Endosc Percutan Tech*. 2005;15(6):315-20.
- Frazer RC, Nagorney DM, Mucha P Jr. Acute acalculous cholecystitis. *Mayo Clin Proc*. 1989;64(2):163-7.
- Houghton PW, Jenkinson LR, Donaldson LA. Cholecystectomy in the elderly: A prospective study. *Br J Surg*. 1985;72(3):220-2.
- Ginat D, Saad WE. Cholecystostomy and transcholecystic biliary access. *Tech Vasc Interv Radiol*. 2008;11(1):2-13.
- Ambrose Wasunna RL. *Surgical Care at the District Hospital: Acute abdominal condition Gallbladder*. 1<sup>st</sup> Ed. London: World Health Organization. 2003;7-8.
- Akhan O, Akinci D, Ozmen MN. Percutaneous cholecystostomy. *Eur J Radiol*. 2002;43(3):229-36.
- Garber SJ, Mathieson JR, Cooperberg PL, MacFarlane JK. Percutaneous cholecystostomy: Safety of the transperitoneal route. *J Vasc Interv Radiol*. 1994;5(2):295-8.
- Al-Jundi W, Cannon T, Antakia R, Anoop U, Balamurugan R, Everitt N, et al. Percutaneous cholecystostomy as an alternative to cholecystectomy in high-risk patients with biliary sepsis: A district general hospital experience. *Ann R Coll Surg Engl*. 2012;94(2):99-101.
- Mangalpally KK, Kleiman NS. The safety of clopidogrel. *Expert Opin Drug Saf*. 2011;10(1):85-95.
- Vane JR, Botting RM. The mechanism of action of aspirin. *Thromb Res*. 2003;110(5-6):255-8.
- Committee CS. A randomised, blinded, trial of clopidogrel versus aspirin in patients at risk of ischaemic events (CAPRIE). CAPRIE Steering Committee. *Lancet*. 1996;348(9038):1329-39.
- Schleinitz MD, and Heidenreich PA. A cost-effectiveness analysis of combination antiplatelet therapy for high-risk acute coronary syndromes: Clopidogrel plus aspirin versus aspirin alone. *Ann Intern Med*. 2005;142(4):251-9.
- Fiumara K, Goldhaber SZ. Cardiology patient pages. A patient's guide to taking coumadin/warfarin. *Circulation*. 2009;119(8):e220-2.
- Mehta RP, Johnson MS. Update on anticoagulant medications for the interventional radiologist. *J Vasc Interv Radiol*. 2006;17(4):597-612.
- Dabus Gde C, Dertkigil SSJ, Baracat J. Percutaneous cholecystostomy: A nonsurgical therapeutic option for acute cholecystitis in high-risk and critically ill patients. *Sao Paulo Med J*. 2003;121(6):260-2.
- Granlund A, Karlson BM, Elvin A, Rasmussen I. Ultrasound-guided percutaneous cholecystostomy in high-risk surgical patients. *Langenbecks Arch Surg*. 2001;386(3):212-7.
- Borzellino G, de Manzoni C, Ricci F, Castaldini G, Guglielmi A, Cordiano C. Emergency cholecystostomy and subsequent cholecystectomy for acute gallstone cholecystitis in the elderly. *Br J Surg*. 1999;86(12):1521-5.
- Saeed SA, Masroor I. Percutaneous Cholecystostomy (PC) in the management of acute cholecystitis in high-risk patients. *J Coll Physicians Surg Pak*. 2010;20(9):612-5.
- Howard JM, Hanly AM, Keogan M, Ryan M, Reynolds JV. Percutaneous cholecystostomy-- A safe option in the management of acute biliary sepsis in the elderly. *Int J Surg*. 2009;7(2):94-9.
- Griniasos J, Petrou A, Pappas P, Revenas K, Karavokyros I, Michail OP, et al. Percutaneous cholecystostomy without interval cholecystectomy as definitive treatment of acute cholecystitis in elderly and critically ill patients. *South Med J*. 2008;101(6):586-90.
- Bakkaloglu H, Yanar H, Guloglu R, Taviloglu K, Tunca F, Aksoy M, et al. Ultrasound guided percutaneous cholecystostomy in high-risk patients for surgical intervention. *World J Gastroenterol*. 2006;12(44):7179-82.
- Dewhurst C, Kane RA, Mhuirheartaigh JN, Brook O, Sun M, Siewert B. Complication rate of ultrasound-guided percutaneous cholecystostomy in patients with coagulopathy. *Am J Roentgenol*. 2012;199(6):W753-60.