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## The outcome of laparoscopic subtotal cholecystectomy in difficult cases – A case series

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## ABSTRACT

**INTRODUCTION:** Laparoscopic subtotal cholecystectomy (LSC) is a widely used technique for managing cholelithiasis with severe cholecystitis. The increasing popularity its utilization is due to the good safety profile and acceptable results. This case series evaluates the short- and long-term results of Indonesian patients who underwent LSC with an objective to determine whether the procedure can be a standard approach for difficult cholecystectomy in our institution.

**PRESENTATION OF CASE:** Thirty-four Indonesian patients (26 men, 8 women) with the mean age of 54.6 years (median 54 years, range 30–84 years) who underwent LSC were retrospectively analyzed. Nineteen patients are suffering from type II diabetes mellitus and fourteen patients with suspected choledocholithiasis underwent ERCP prior to LSC. The major postoperative diagnosis was acute cholecystitis (16 patients), followed by gallbladder empyema (10 patients), chronic cholecystitis (5 patients), history of cholangitis (1 patient), Mirizzi's syndrome (1 patient) and stone retention post-ERCP (1 patient).

**DISCUSSION:** The mean operating time was 158 minutes (median 150 minutes, range 60–240 minutes), mean length of hospital stay of 4.6 days (median 3 days, range 2–33 days) and drain usage for 3.6 days (median 3.0 days, range 1–19 days). Postoperatively there was one case of bilioenteric fistula, one case of stone retention and two cases of prolonged upper gastrointestinal symptoms. There is no case of biliary leakage, peritonitis or wound infection.

**CONCLUSION:** The outcome of LSC in this case series is comparable with other publications showing a general favorability of LSC. Further studies are needed to elucidate the clinical benefits of several LSC technical points such as stump closure, posterior wall diathermy and drain usage. Based on this preliminary finding, LSC can be applied as a standard procedure for difficult cases in our institution.

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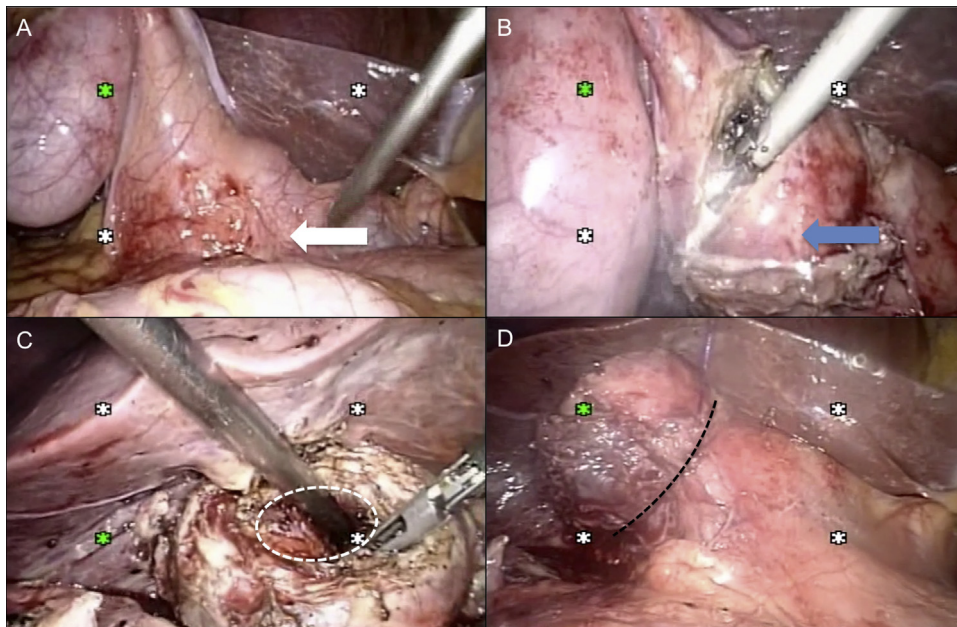
## 1. Introduction

Laparoscopic cholecystectomy (LC) is the gold standard treatment for symptomatic cholelithiasis. The procedure is associated with less operative complications and shorter hospital stay compared to conventional cholecystectomy [1,2]. In the early years of LC, acute cholecystitis and concurrent liver cirrhosis are considered as relative contraindications. Inflamed gallbladder and extended fibrosis around the hepatocystic triangle increases the chances of vascular and bile duct injury. Such condition usually prompts conversion to open cholecystectomy to avoid debilitat-

ing complications [3–5]. With increasing expertise and advances in laparoscopic technology, acutely inflamed gallbladder is now routinely operated laparoscopically. Laparoscopic subtotal cholecystectomy (LSC) is widely used procedure that can be utilized for severe cholecystitis. Numerous publications reported its feasibility, safety, and acceptable results [6–12]. Compared to open cholecystectomy, LSC were associated with less postoperative pain, shorter hospital stay and smaller risk of incisional hernia [6,7]. This case series evaluates the short- and long-term results of Indonesian patients who underwent LSC with an objective to determine whether the procedure can be a standard approach for difficult cholecystectomy in our institution. This work is reported in accordance with the PROCESS guideline [13].

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**Fig. 1.** Laparoscopic subtotal cholecystectomy operative technique. (A) Significant omental adhesions surrounding the hepatocystic triangle (white arrow). (B) Dissection of gallbladder distal to the Hartmann's pouch (blue arrow). (C) Gallstones extracted from the lumen of remnant gallbladder (traced with white-dotted line) followed by cauterization of mucosal surface. (D) Ligation (traced with black dotted line) of remnant gallbladder stump distal from the cystic duct and common bile duct.

## 2. Presentation of case

We conducted a retrospective study involving all patients who underwent LSC from January 2011 to December 2014 at the Cipto Mangunkusumo Hospital (academic), Medistra Hospital (private), and Metropolitan Medical Centre (private) in Jakarta. In total, there are 548 cases of LSC within the selected timeline. We identified 37 difficult cases where LSC was initially attempted. Open conversion was performed in one patient with histopathologically confirmed gallbladder malignancy. Two patients who were unable to be contacted were excluded from this report. Thirty-four patients described in this case series all suffered from symptomatic cholelithiasis with anatomical difficulties. Laparoscopic subtotal cholecystectomy was the first alternative approach considered in all cases. The decision to perform LSC was made intraoperatively by two board-certified digestive surgeons. No operating time limit was set for when LSC was performed, rather it was decided based on the severity of inflammatory adhesions and when further efforts of obtaining the critical view of safety (CVS) were considered too risky.

The operative technique starts with the dissection of the gallbladder peritoneal surface distal (anterior) to the Hartmann's pouch (Fig. 1). Gallbladder contents were evacuated manually, suctioned and irrigated. With better manipulation of the flaccid gallbladder, the excision of both anterior and hepatic gallbladder surface (posterior) was extended to the fundus. The posterior wall is left *in situ* in some cases with severe inflammation. Efforts were made to separate the proximal posterior wall from the liver towards the cystic duct to create an adequate circumferential stump to be ligated with Endoloop® PDSII (Ethicon). If this step was not attainable, the opening was either sutured in interrupted fashion using 2/0 Vicryl® (Ethicon) or left open if the stump is “dry”. Attention is given during stump closure to avoid inadvertent impingement of the main biliary tree. The remnant gallbladder mucosal surface is cauterized with diathermy along with any remaining posterior wall before closure. The operation is finalized by inserting one 18 Fr silicone drain into the subhepatic space for postoperative monitoring.

Perioperative outcomes were acquired from medical records that include operation duration, length of hospital stay, days of drain usage, bile leakage, bile peritonitis, and wound infection. All patients were instructed to return for outpatient control within 4 weeks after hospital discharge to undergo evaluation for possible stone retention. One general surgery resident queried long-term outcome at least three months postoperatively for persisting gastrointestinal symptoms such as dyspepsia, bloating, jaundice and upper abdominal pain.

A total of 34 patients (26 men, 8 women) who underwent LSC were identified with the mean age of 54.6 years (median 54 years, range 30–84 years). Nineteen patients are suffering from type II diabetes mellitus and endoscopic retrograde cholangio-pancreatography (ERCP) was performed preoperatively in fourteen patients with suspected choledocholithiasis. The major postoperative diagnosis was acute cholecystitis (16 patients), followed by gallbladder empyema (10 patients), chronic cholecystitis (5 patients), cholecystolithiasis with history of cholangitis (1 patient), Mirizzi's syndrome (1 patient), and stone retention post-ERCP (1 patient). On average LSC was completed in 158 minutes (median 150 minutes, range 60–240 minutes), with mean length of hospital stay of 4.6 days (median 3 days, range 2–33 days) and drain usage for 3.6 days (median 3.0 days, range 1–19 days). No case of biliary leakage, peritonitis or wound infection was reported.

Three months post LSC two patients suffered from prolonged dyspepsia, bloating, nausea and upper abdominal pain without ultrasonographic evidence of stone retention. Both patients were treated conservatively and their symptoms resolved gradually over the next three months. Free intraperitoneal air with significant drain production was found in one non-diabetic 48-year-old female 3 days postoperatively. Bilioenteric fistula resulted from chronic cholecystitis was determined to be the etiology of this case. She was treated conservatively with broad-spectrum antibiotic and discharged after 33 days of hospitalization and 19 days of drain use without long-term adverse outcome.

There was one case of asymptomatic stone retention discovered ultrasonographically during outpatient control within a month post

**Table 1**  
Summary of Results.

Patient demographics	No. of patients/ <sup>a</sup> see footnote
Total	34
Male	26
Female	8
Age (years old) <sup>a</sup>	54.6; 54; 30–84
<b>Diagnosis</b>	
Acute cholecystitis	16
Chronic cholecystitis	5
Gallbladder empyema	10
History of cholangitis	1
Mirizzi's syndrome	1
Stone retention post ERCP	1
<b>Perioperative outcome</b>	
Duration of operation (minutes) <sup>a</sup>	158; 150; 60–240
Length of hospital stay (days) <sup>a</sup>	4.6; 3.0; 2–33
Length of drain usage (days) <sup>a</sup>	3.6; 3.0; 1–19
Closed remnant gallbladder	29
Bile leakage	0
Bile peritonitis	0
Wound infection	0
<b>Outpatient &amp; long-term follow-up</b>	
Dyspepsia	2
Bloating	2
Jaundice	0
Upper abdominal pain	2
Retained stone	1
<b>Other parameters</b>	
Diabetes mellitus post-ERCP	9
	14

<sup>a</sup> Data presented as mean, median and minimum-maximum respectively.

– LSC. The patient was scheduled for endoscopic intervention or reoperation as needed (Table 1).

### 3. Discussion

The rationale of open conversion is to enable direct visualization and better manipulation in hope for achieving total cholecystectomy (TC) while avoiding bile duct injury. However, open conversion does not always ensure better results [6,7,12]. Surgery is dependent on the operator's skill and experience, thus some may find open procedure is equally, or even more challenging than laparoscopy. Especially on the advent of laparoscopy era where newer generations of surgeons that is better adapted in laparoscopic surgery. Wolf AS et al. found that patients who underwent open conversion suffered the most major complications (5.9%) compared to open only (4.4%) or laparoscopic only (1.2%) [14]. This finding reiterates the benefit of opting open cholecystectomy only for selected patients, adjusted to the surgical team's proficiency.

In difficult cases where the CVS cannot be obtained safely, it is generally agreed that subtotal cholecystectomy (SC) is preferable than TC. Consequently, the comparison of postoperative outcome between open versus laparoscopic SC was investigated. The result from meta-analysis performed by Elshaer et al. are in favor of LSC; less risks of stone retention (OR 0.5; 95% CI 0.3–0.9), wound infection (OR 0.07; 95% CI 0.04–0.2), subhepatic collection (OR 0.4; 95% CI 0.2–0.9), reoperation (OR 0.5; 95% CI 0.3–0.9) and mortality (OR 0.2; 95% CI 0.05–0.9) [6]. However, bile leak occurred considerably more in LSC (OR 5.3; 95% CI 3.9–7.2); 42% (n = 100) in patients whom the remnant gallbladder was left open and 16.5% (n = 1061) in their counterparts. Although bile leak and subhepatic collections were less frequent in closed stumps, weighted analysis did not find any significant risk difference when compared to open stumps [6]. None of the patients in this case series suffered from bile leak, including five patients whom the remnant gallbladder was left open. Persisting proximal cystic duct obstruction or re-obstruction post LSC

can prevent bile leakage, creating a dry stump. Another possible explanation is by thorough diathermic coagulation of the remnant gallbladder mucosa that prevents remnant gallbladder mucosal secretion, promoting inflammatory adhesions thus early closure of the distal cystic duct opening.

Technical fault during stump closure and changing anatomy due to resolution of inflammation or subhepatic collection can affect the suture integrity, causing leakage. The rationale for inserting drain is to use it as a safe guard for potential bile leak and formation of subhepatic collections. If the remnant gallbladder is dry at the end of LSC, placing abdominal drain longer than 48 hours maybe unnecessary [10].

Approximately 5–10% of patients who underwent cholecystectomy may continue to experience upper gastrointestinal symptoms, a condition called postcholecystectomy syndrome (PCS) [15]. The etiology of PCS can be both biliary: retained cholelithiasis, remnant cystic duct lithiasis (RCDL), and biliary strictures; or nonbiliary: functional dyspepsia, peptic ulcer, gastroesophageal and reflux disease, which is the suspected etiology of the two patients with prolonged gastrointestinal complaints. The bile is thought to be etiology of gastroduodenal symptoms and diarrhea in PCS, while right upper quadrant pain is associated with dilation of hollow viscus [16]. The risk of PCS can be higher in LSC due to the underlying pathology and nature of surgery. For instance, closing the remnant gallbladder in a reconstituting manner can recreate the lumen by which stones may reform. There is also a risk of missing stones in the residual Hartmann's pouch and cystic duct that is not accessible or visualized during LSC. Some ways mitigate this problem is by meticulous cleaning or by performing intraoperative cholangiography. Low-pressure irrigation must be performed carefully during stump cleaning to avoid pushing the stone into the common bile duct.

Posterior gallbladder wall removal theoretically increases the chance of hemorrhages from the liver. However, several authors reported low incidence of postoperative hemorrhages following removal of the posterior wall and there is no significant difference in the risk (OR) between removal and nonremoval group [6,12,17]. We believe that it is best to avoid posterior wall removal in patients who cannot tolerate long operation, since it can be time consuming, especially in cirrhotic patients whom are susceptible to postoperative hemorrhage.

The mean operating time was 158.4 minutes, median 150 minutes, and the range from 60 to 240 minutes. It is generally longer compared to other studies reporting mean operating time of 120 minutes, 62 minutes [9,12], and median operating time of 65, 90, and 125 minutes [8,10,18]. Improving technical proficiency is essential for executing quicker operation. However, limiting risky effort to achieve CVS in difficult cases and starting LSC early is equally important in order to shorten the operation. The median length of hospitalization and drain use is comparable to other studies [6,7,10,11,19].

External validity is compromised because of the retrospective study design. All patients were also affected by recall bias during phone interview. Using a system-specific validated questionnaire such as the Gastrointestinal Quality of Life Index (GIQLI) will improve data accuracy and is recommended for future studies [20]. The GIQLI questionnaire assesses the patient's subjective perception of overall life quality that should give a better perspective the actual impact of LSC.

### 4. Conclusion

This case series is the first to report the outcome of LSC in Indonesian patients and their characteristics. The postoperative outcome in this report is comparable with other publications show-

ing a general favorability of LSC. However further studies are needed to elucidate the clinical benefits of several LSC technical points such as stump closure, posterior wall diathermy and drain usage. Laparoscopic subtotal cholecystectomy is a valuable approach for managing difficult cases with high risks of complications. It is feasible, safe and showed acceptable results. Based on this preliminary finding, LSC can be applied as a standard procedure for difficult cases in our institution.

### Conflicts of interest

We declare no conflict of interest.

### Funding

Nothing to declare.

### Ethical approval

Ethical approval was granted by the Universitas Indonesia and Cipto Mangunkusumo Hospital.

### Consent

Consent exempted.

### Authors contribution

1. Caroline Supit: conception of study design, data collection, analysis, manuscript writing, revision and manuscript submission.
2. Tommy Supit: data analysis, manuscript writing and revision.
3. Yarman Mazni: performed LSC, data analysis, manuscript revision, and approved manuscript submission.
4. Ibrahim Basir: conception of study design, performed LSC, data analysis, manuscript revision, and approved manuscript submission.

### Guarantors

Caroline Supit and Ibrahim Basir.

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