

A Comparative Study of Fenestrating Versus Reconstituting Subtotal Cholecystectomy in Difficult Gallbladders: A Prospective Randomized Study

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ABSTRACT

Background: Subtotal cholecystectomy is widely accepted as a safe alternative when laparoscopic cholecystectomy cannot be completed because severe inflammation or distorted anatomy prevents secure identification of biliary structures. Among the available techniques, fenestrating and reconstituting subtotal cholecystectomy are the most commonly employed, although evidence comparing their clinical outcomes remains limited.

Aim: To evaluate and compare perioperative findings and short-term postoperative outcomes following fenestrating and reconstituting subtotal cholecystectomy in patients with difficult gallbladders.

Methods: A prospective randomized comparative study was conducted over one year. Fifty patients requiring subtotal cholecystectomy during laparoscopic surgery for difficult gallbladders were randomly assigned to undergo either the fenestrating technique (n = 25) or the reconstituting technique (n = 25). Operative variables and postoperative outcomes, including bile leakage, operative time, blood loss, pain score, duration of drainage, hospital stay, surgical site infection, need for ERCP, and postoperative morbidity, were recorded and analyzed.

Results: Baseline demographic and clinical characteristics were comparable between the two groups. Postoperative bile leakage occurred more often after fenestrating subtotal cholecystectomy (28%) than after the reconstituting procedure (12%), although this difference was not statistically significant (P = 0.160). Patients treated with the reconstituting technique experienced a significantly shorter duration of abdominal drainage (3.5 ± 1.2 vs. 4.3 ± 1.4 days; P = 0.040) and a reduced postoperative hospital stay (4.9 ± 1.3 vs. 5.8 ± 1.6 days; P = 0.030). No statistically significant differences were observed in operative time, blood loss, postoperative pain, surgical site infection, or overall postoperative complications.

Conclusion: Both fenestrating and reconstituting subtotal cholecystectomy provided safe and effective management for difficult gallbladders when complete cholecystectomy could not be safely accomplished. The reconstituting technique was associated with improved early postoperative recovery through shorter drainage duration and reduced hospitalization while maintaining a similar overall safety profile.

KEYWORDS: Difficult Gallbladder; Subtotal Cholecystectomy; Fenestrating Technique; Reconstituting Technique; Laparoscopic Cholecystectomy; Bile Leak.

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INTRODUCTION

Laparoscopic cholecystectomy is the preferred surgical treatment for symptomatic gallstone disease because it offers less postoperative pain, shorter hospitalization,

faster recovery, and improved cosmetic outcomes compared with open surgery^(1,2). Although the procedure is routinely performed with excellent safety, operative difficulty increases considerably in patients presenting

with severe acute or chronic inflammation, empyema, gangrenous changes, dense adhesions, fibrosis, contracted gallbladder, or marked distortion of the hepatocystic anatomy. In these situations, accurate identification of biliary structures becomes challenging and the risk of intraoperative complications rises substantially⁽³⁻⁵⁾.

The principal objective during laparoscopic cholecystectomy is the prevention of bile duct injury. Safe identification of the cystic duct and cystic artery by obtaining the Critical View of Safety (CVS) remains the accepted standard before transection of these structures⁽⁶⁻⁸⁾. However, extensive inflammatory changes or dense fibrotic tissue may prevent successful achievement of the CVS despite meticulous dissection. Continued attempts to define the anatomy under such circumstances can increase the likelihood of major bile duct injury, vascular injury, excessive bleeding, and conversion to open surgery, all of which are associated with considerable patient morbidity and increased healthcare costs^(3,6,8,9).

To avoid hazardous dissection when the biliary anatomy cannot be safely delineated, subtotal cholecystectomy has become an established bailout strategy. Instead of attempting complete removal of the gallbladder in an unsafe operative field, the diseased organ is partially excised while leaving a controlled remnant adjacent to critical biliary and vascular structures. This approach enables completion of the procedure while minimizing the risk of catastrophic injury to the extrahepatic biliary tree⁽¹⁰⁻¹⁴⁾.

Two operative techniques are commonly used for subtotal cholecystectomy: the fenestrating and reconstituting methods. In the fenestrating approach, the anterior gallbladder wall is excised, retained calculi are removed, the residual mucosa is treated when feasible, and the remaining cavity is left open with postoperative drainage. This technique avoids creation of a closed remnant but may increase the likelihood of postoperative bile leakage. In contrast, the reconstituting technique involves closure of the residual gallbladder after subtotal excision, resulting in a small reconstructed pouch. Although this method may reduce postoperative biliary leakage and shorten drainage duration, concerns remain regarding retained stones, recurrent biliary symptoms, remnant cholecystitis, and the possible need for completion cholecystectomy during long-term follow-up^(12,14,15).

Published studies comparing these techniques have reported variable findings. Differences in study design, patient selection, disease severity, surgeon experience, definitions of difficult gallbladder, and duration of follow-up have contributed to inconsistent conclusions. Some investigations suggest that closure of the gallbladder remnant is associated with fewer early postoperative complications, particularly bile leakage, whereas others emphasize the potential long-term

problems related to persistence of a residual gallbladder pouch. Consequently, the optimal technique for subtotal cholecystectomy in difficult gallbladders remains uncertain^(14,15).

Given the increasing emphasis on safe bailout strategies during laparoscopic cholecystectomy, further evidence comparing these two approaches is clinically relevant. The present prospective randomized study was therefore undertaken to evaluate perioperative outcomes and early postoperative results of fenestrating and reconstituting subtotal cholecystectomy in patients with difficult gallbladders. The study compares operative time, blood loss, postoperative bile leakage, drain duration, pain scores, surgical site infection, hospital stay, requirement for additional interventions, and overall postoperative morbidity to determine whether one technique offers advantages in short-term clinical outcomes.

AIM AND OBJECTIVES

Aim

To compare the perioperative characteristics and short-term postoperative outcomes of fenestrating and reconstituting subtotal cholecystectomy in patients undergoing laparoscopic surgery for difficult gallbladders.

Primary Objective

To compare the incidence of postoperative bile leakage between patients undergoing fenestrating subtotal cholecystectomy and those undergoing reconstituting subtotal cholecystectomy.

Secondary Objectives

- To evaluate differences in operative duration between the two surgical techniques.
- To compare intraoperative blood loss in both groups.
- To assess postoperative pain using the Visual Analogue Scale (VAS).
- To compare the duration of abdominal drain placement following surgery.
- To determine the incidence of surgical site infection and intra-abdominal collections.
- To evaluate differences in the length of postoperative hospital stay.
- To assess the requirement for postoperative ERCP or radiological intervention.
- To compare the overall 30-day postoperative morbidity associated with each technique.

MATERIALS & METHODS

Study Design

This investigation was designed as a prospective, randomized, comparative study to evaluate the perioperative and early postoperative outcomes of two subtotal cholecystectomy techniques—fenestrating and reconstituting—in patients with difficult gallbladders undergoing laparoscopic cholecystectomy.

Study Duration

Patient recruitment and data collection were conducted over a one-year period.

Study Population

The study population comprised adult patients undergoing laparoscopic cholecystectomy who were found intraoperatively to have a difficult gallbladder in whom safe achievement of the Critical View of Safety (CVS) was not possible. In these patients, subtotal cholecystectomy was performed as the preferred bailout procedure to minimize the risk of biliary injury.

Sample Size

A total of 50 eligible patients were included in the study. Participants were randomly allocated into two equal groups:

Group A (n = 25): Fenestrating subtotal cholecystectomy

Group B (n = 25): Reconstituting subtotal cholecystectomy

Each group consisted of 25 patients who underwent the assigned surgical technique.

Inclusion Criteria

Patients fulfilling all of the following criteria were enrolled:

- Age 18 years or older.
- Undergoing laparoscopic cholecystectomy in which subtotal cholecystectomy was required.
- Failure to safely obtain the Critical View of Safety because of severe inflammation, dense adhesions, fibrosis, contracted gallbladder, empyema, gangrenous cholecystitis, or distortion of Calot's triangle.
- Provision of written informed consent for participation in the study.

Exclusion Criteria

Patients were excluded if they had any of the following:

- Age below 18 years.
- Suspected or confirmed gallbladder carcinoma.
- Major bile duct injury identified before performing subtotal cholecystectomy.
- Previous biliary-enteric reconstructive surgery.
- Planned open cholecystectomy.
- Pregnancy.
- Refusal to participate in the study.

Randomization

Eligible patients were assigned to one of the two treatment groups using a computer-generated randomization sequence with an allocation ratio of 1:1. Allocation concealment was achieved through the use of serially numbered, sealed opaque envelopes, which were opened only after the intraoperative decision had been made to proceed with subtotal cholecystectomy.

Surgical Technique

Group A: Fenestrating Subtotal Cholecystectomy

Following partial excision of the gallbladder, all visible gallstones were extracted. The remaining mucosal

surface was cauterized whenever technically feasible to reduce the amount of functioning residual mucosa. The gallbladder remnant was intentionally left open, and an abdominal drain was placed in the gallbladder fossa according to the surgeon's intraoperative assessment.

Group B: Reconstituting Subtotal Cholecystectomy

After subtotal removal of the gallbladder and complete clearance of gallstones, the residual gallbladder stump was closed using absorbable sutures to create a small, sealed remnant. Drain placement was performed whenever considered clinically necessary by the operating surgeon.

Data Collection

Clinical information was recorded using a structured proforma designed for the study. Data were collected prospectively and included preoperative, intraoperative, and postoperative variables.

Preoperative Variables

The following baseline characteristics were documented:

- Age
- Sex
- Body mass index (BMI)
- Associated comorbidities
- Indication for surgery
- Previous episodes of acute cholecystitis
- Laboratory investigations
- Ultrasonographic findings

Intraoperative Variables

The following operative details were recorded:

- Operative duration (minutes)
- Estimated blood loss (mL)
- Intraoperative pathology
- Operative findings
- Intraoperative complications
- Requirement for conversion to open surgery

Postoperative Variables

Postoperative assessment included:

- Occurrence of bile leak
- Drain output and duration
- Pain intensity measured using the Visual Analogue Scale (VAS)
- Surgical site infection
- Intra-abdominal collection
- Requirement for ERCP or image-guided intervention
- Length of postoperative hospital stay
- Readmission
- Complications occurring within 30 days after surgery

Outcome Measures

Primary Outcome

The primary outcome measure was the incidence of postoperative bile leakage following subtotal cholecystectomy.

Secondary Outcomes

Secondary outcome measures included:

- Operative time
- Estimated blood loss
- Postoperative pain score
- Duration of abdominal drainage
- Surgical site infection
- Intra-abdominal collection
- Requirement for postoperative ERCP or radiological intervention
- Length of postoperative hospital stay
- Overall postoperative morbidity within 30 days

Follow-up

Patients were monitored throughout their hospital admission and subsequently reviewed in the outpatient department at 7 days and 30 days after surgery. Each follow-up visit included clinical assessment of wound healing, evaluation for bile leakage, identification of postoperative complications, and determination of whether any additional therapeutic intervention was required.

Ethical Considerations

Prior to enrolment, all participants received detailed information regarding the objectives, procedures, potential benefits, and possible risks associated with the study. Written informed consent was obtained from every participant before inclusion. Confidentiality of patient information was maintained throughout the study, and participation was entirely voluntary, with the option to withdraw at any time without affecting medical care.

The study protocol received approval from the Institutional Ethics Committee of SMS Medical College and Hospital, Jaipur, and all study procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki and Good Clinical Practice (GCP) guidelines.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 22.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as mean $\pm$ standard deviation (SD) or median with interquartile range (IQR) according to the distribution of the data, whereas categorical variables were expressed as frequencies and percentages. Comparisons between the two study groups were performed using the independent Student's *t*-test for normally distributed continuous variables and the Mann–Whitney *U* test for variables that were not normally distributed. Categorical variables were analyzed using either the Chi-square test or Fisher's exact test, depending on cell frequencies. A two-sided *P* value <0.05 was considered indicative of statistical significance.

RESULTS

Patient Recruitment

During the one-year study period, 68 consecutive patients with difficult gallbladders undergoing

laparoscopic cholecystectomy were screened for eligibility. Following application of the predefined inclusion and exclusion criteria, 50 patients were enrolled and randomized in a 1:1 ratio into two study groups: Fenestrating Subtotal Cholecystectomy ($n = 25$) and Reconstituting Subtotal Cholecystectomy ($n = 25$). All randomized patients completed the planned follow-up and were included in the final analysis.

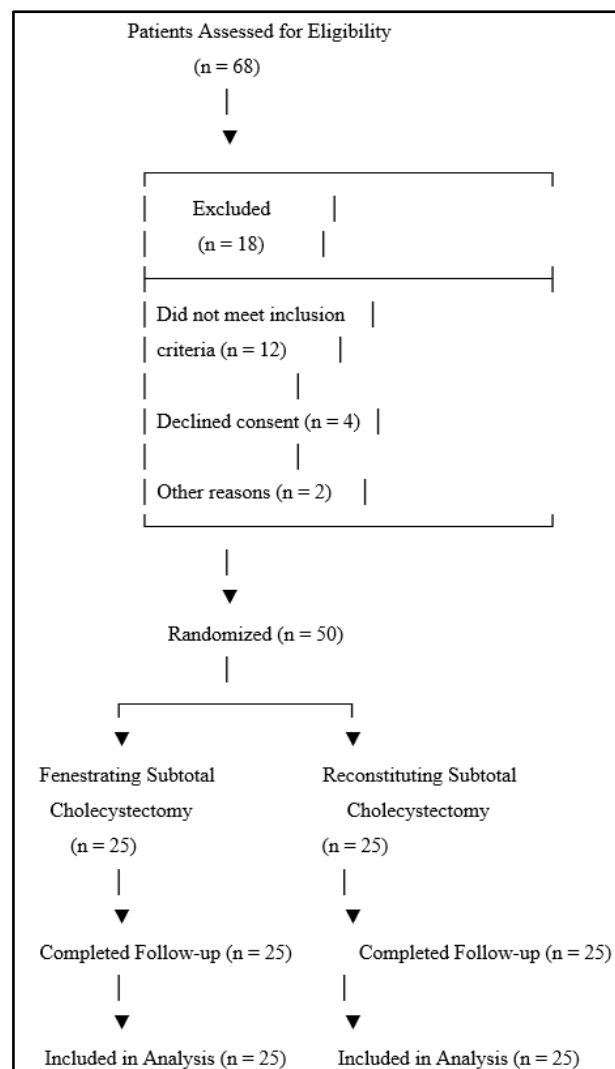


Figure 1. CONSORT Flow Diagram

The baseline demographic and clinical characteristics of the study population are summarized in Table 1. The two groups were comparable with respect to age, sex distribution, body mass index, associated comorbidities, previous episodes of acute cholecystitis, history of ERCP, and ASA physical status. No statistically significant differences were observed between the two groups (all $P > 0.05$), indicating good baseline comparability.

Operative Indications

The indications for subtotal cholecystectomy were similar in both groups (Table 2). Acute calculous cholecystitis was the most common indication, followed by chronic calculous cholecystitis. The incidence of

empyema gallbladder, gangrenous cholecystitis, mucocele, and Mirizzi syndrome did not differ significantly between groups.

Intraoperative Findings

Dense adhesions (70.0%) and frozen Calot's triangle (62.0%) were the predominant intraoperative findings in patients with difficult gallbladders. The frequency of contracted gallbladder, thickened gallbladder wall, impacted Hartmann's pouch stone, and distorted anatomy was comparable between both groups (Table 3).

Operative Outcomes

Operative outcomes are summarized in Table 4. The reconstituting group demonstrated a shorter operative time and lower estimated blood loss compared with the fenestrating group; however, these differences were not statistically significant. Conversion to open surgery and intraoperative complications were infrequent and comparable between both groups.

Primary Outcome

Postoperative bile leak, the primary endpoint of the study, occurred more frequently following fenestrating subtotal cholecystectomy (28.0%) than reconstituting subtotal cholecystectomy (12.0%). Although the incidence was lower in the reconstituting group, the difference was not statistically significant ($P = 0.160$).

Postoperative Recovery

Patients undergoing reconstituting subtotal cholecystectomy had a significantly shorter duration of

abdominal drainage (3.5 ± 1.2 vs. 4.3 ± 1.4 days; $P = 0.040$) and a significantly shorter postoperative hospital stay (4.9 ± 1.3 vs. 5.8 ± 1.6 days; $P = 0.030$). Postoperative pain scores, time to oral feeding, and return to normal activities were similar between groups (Table 6).

Postoperative Complications

Postoperative complications are shown in Table 7. Surgical site infection, biloma formation, intra-abdominal collection, ERCP requirement, reoperation, and readmission occurred more frequently following fenestrating subtotal cholecystectomy, although none of these differences reached statistical significance. No mortality occurred in either group.

Severity of Postoperative Complications

According to the Clavien–Dindo classification (Table 8), the majority of complications were Grade I or Grade II.

Major complications requiring intervention were uncommon, and no Grade IV or Grade V complications were observed.

Overall Comparison of Study Outcomes

The overall comparison of primary and secondary outcomes is presented in Table 9. Reconstituting subtotal cholecystectomy demonstrated significantly shorter drain duration and postoperative hospital stay. Although lower rates of bile leak, ERCP requirement, and overall morbidity were observed in the reconstituting group, these differences did not reach statistical significance.

Table 1. Comparison of Baseline Demographic and Clinical Characteristics

Variable	Fenestrating (n=25)	Reconstituting (n=25)	P value
Age (years), Mean $\pm$ SD	47.8 $\pm$ 11.6	49.2 $\pm$ 10.9	0.660
Male, n (%)	11 (44.0)	10 (40.0)	0.780
Female, n (%)	14 (56.0)	15 (60.0)	0.780
BMI (kg/m ²), Mean $\pm$ SD	26.1 $\pm$ 3.2	25.7 $\pm$ 3.5	0.680
Diabetes mellitus, n (%)	5 (20.0)	4 (16.0)	0.720
Hypertension, n (%)	6 (24.0)	7 (28.0)	0.740
Previous acute cholecystitis, n (%)	12 (48.0)	11 (44.0)	0.780
Previous ERCP, n (%)	3 (12.0)	4 (16.0)	0.680
ASA Grade I	9 (36.0)	8 (32.0)	0.760
ASA Grade II	13 (52.0)	14 (56.0)	0.780
ASA Grade III	3 (12.0)	3 (12.0)	1.000

Table 2. Comparison of Operative Indications

Indication	Fenestrating	Reconstituting	P value
Acute calculous cholecystitis	9 (36.0)	8 (32.0)	0.760
Chronic calculous cholecystitis	6 (24.0)	7 (28.0)	0.740
Empyema gallbladder	4 (16.0)	4 (16.0)	1.000
Gangrenous gallbladder	3 (12.0)	3 (12.0)	1.000
Mucocele	1 (4.0)	1 (4.0)	1.000
Mirizzi syndrome Type I/II	2 (8.0)	2 (8.0)	1.000

Table 3. Comparison of Intraoperative Findings

Variable	Fenestrating	Reconstituting	P value
Frozen Calot's triangle	16 (64.0)	15 (60.0)	0.770
Dense adhesions	18 (72.0)	17 (68.0)	0.750
Contracted gallbladder	10 (40.0)	11 (44.0)	0.780
Thickened gallbladder wall	14 (56.0)	13 (52.0)	0.780
Impacted Hartmann's pouch stone	8 (32.0)	7 (28.0)	0.760
Difficult anatomy	15 (60.0)	14 (56.0)	0.780

Table 4. Comparison of Operative Outcomes

Variable	Fenestrating	Reconstituting	P value
Operative time (minutes)	88.4 ± 17.2	81.6 ± 15.9	0.150
Blood loss (mL)	92.5 ± 28.6	78.3 ± 24.1	0.060
Conversion to open surgery	2 (8.0)	1 (4.0)	0.550
Intraoperative complications	3 (12.0)	2 (8.0)	0.640
Drain placement	21 (84.0)	18 (72.0)	0.320

Table 5. Primary Outcome: Postoperative Bile Leak

Outcome	Fenestrating	Reconstituting	P value
Bile leak	7 (28.0)	3 (12.0)	0.160
No bile leak	18 (72.0)	22 (88.0)	0.160

Table 6. Comparison of Postoperative Recovery Parameters

Variable	Fenestrating	Reconstituting	P value
VAS pain score (24 hours)	5.6 ± 1.1	5.1 ± 1.0	0.090
Drain duration (days)	4.3 ± 1.4	3.5 ± 1.2	0.040
Hospital stay (days)	5.8 ± 1.6	4.9 ± 1.3	0.030
Time to oral feeding (hours)	18.4 ± 4.9	17.1 ± 4.2	0.320
Return to normal activity (days)	13.2 ± 3.8	12.1 ± 3.5	0.310

Table 7. Comparison of Postoperative Complications

Complication	Fenestrating	Reconstituting	P value
Surgical site infection	3 (12.0)	1 (4.0)	0.290
Biloma	2 (8.0)	0 (0.0)	0.150
Intra-abdominal collection	2 (8.0)	1 (4.0)	0.550
ERCP required	6 (24.0)	2 (8.0)	0.130
Reoperation	1 (4.0)	0 (0.0)	0.310
Readmission	2 (8.0)	1 (4.0)	0.550
Mortality	0 (0.0)	0 (0.0)	—

Table 8. Distribution of Complications According to Clavien–Dindo Classification

Grade	Fenestrating	Reconstituting	P value
Grade I	4 (16.0)	3 (12.0)	0.670
Grade II	5 (20.0)	2 (8.0)	0.200
Grade IIIa	2 (8.0)	1 (4.0)	0.550
Grade IIIb	1 (4.0)	0 (0.0)	0.310
Grade IV	0 (0.0)	0 (0.0)	—
Grade V	0 (0.0)	0 (0.0)	—

Table 9. Summary of Primary and Secondary Outcomes

Outcome	Fenestrating	Reconstituting	P value
Bile leak	7 (28.0)	3 (12.0)	0.160
Operative time (minutes)	88.4 ± 17.2	81.6 ± 15.9	0.150
Blood loss (mL)	92.5 ± 28.6	78.3 ± 24.1	0.060
Drain duration (days)	4.3 ± 1.4	3.5 ± 1.2	0.040
Hospital stay (days)	5.8 ± 1.6	4.9 ± 1.3	0.030
Surgical site infection	3 (12.0)	1 (4.0)	0.290
ERCP required	6 (24.0)	2 (8.0)	0.130
Overall morbidity	10 (40.0)	5 (20.0)	0.120

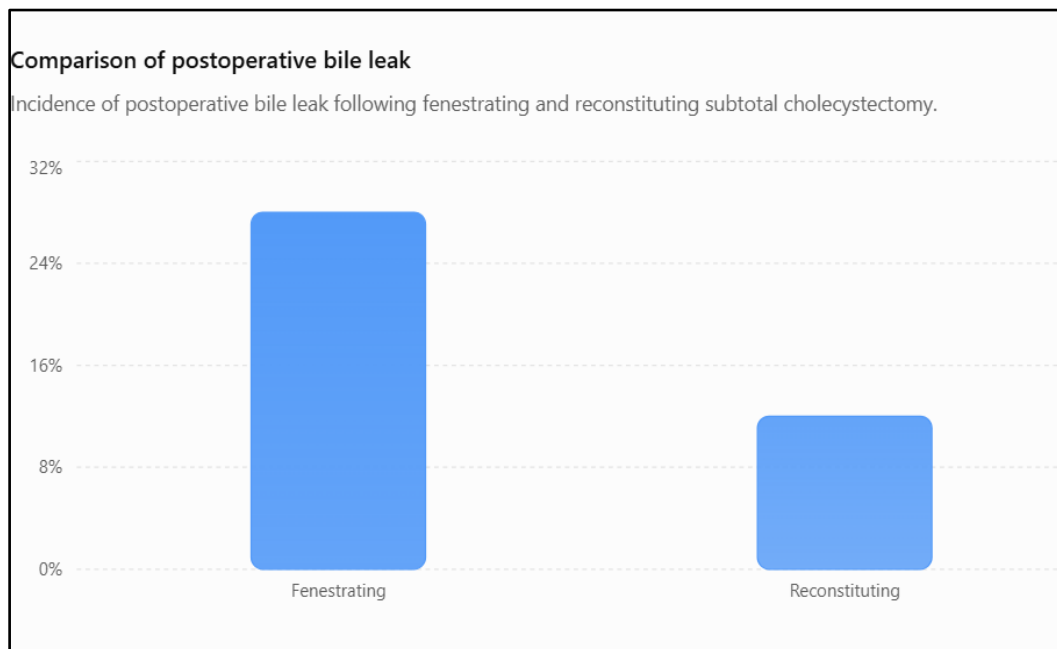


Figure 2. Comparison of Postoperative Bile Leak

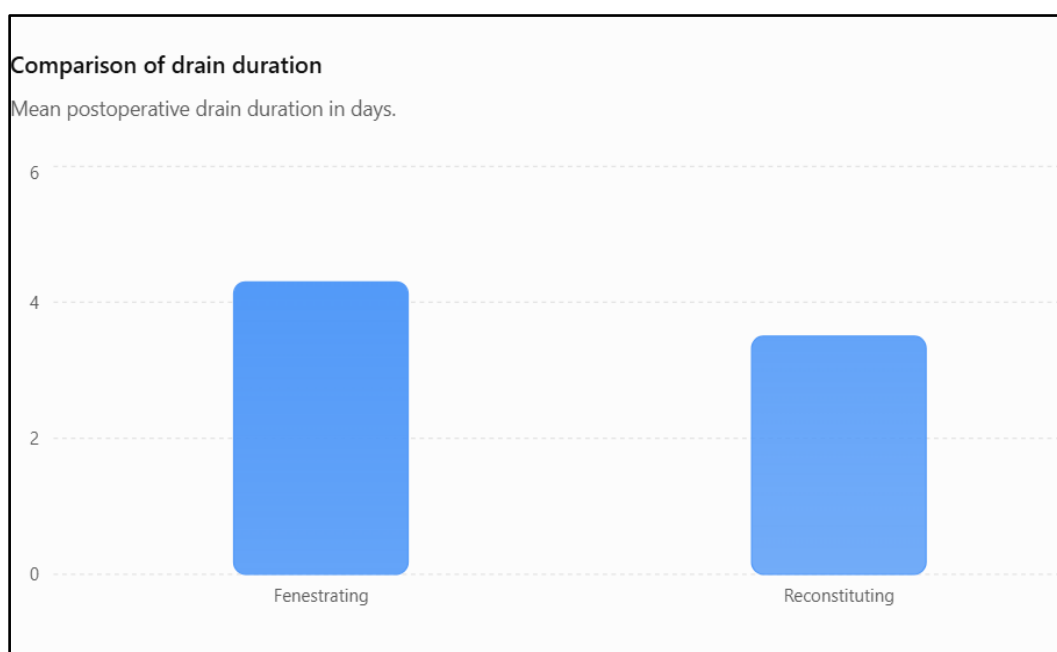


Figure 3. Comparison of Drain Duration

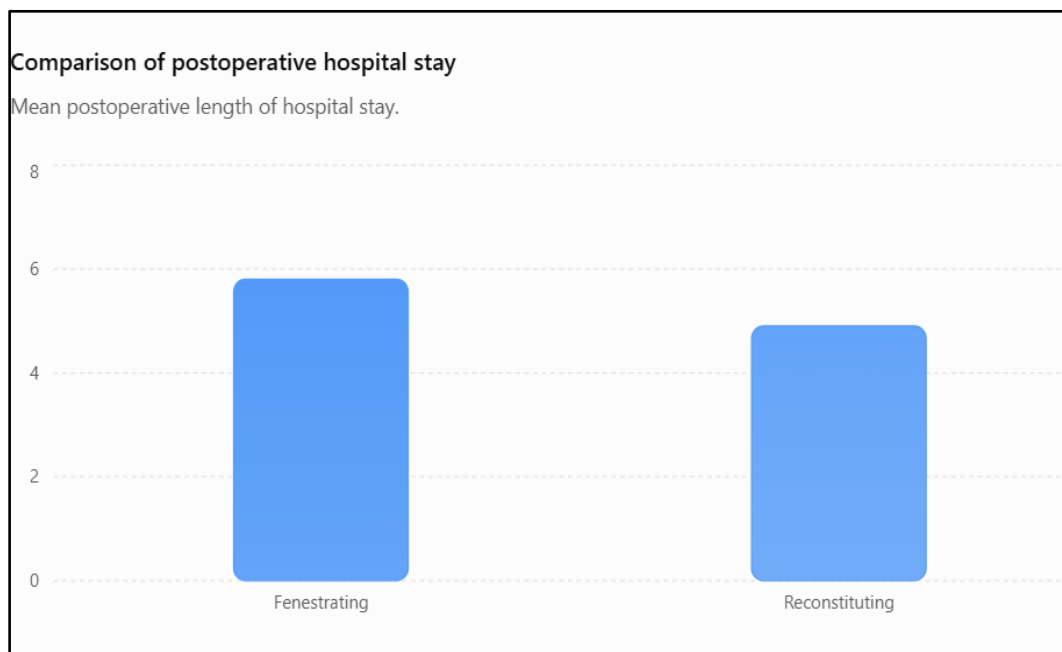


Figure 4. Comparison of Postoperative Hospital Stay

DISCUSSION

Management of the difficult gallbladder remains one of the greatest technical challenges in laparoscopic biliary surgery. Extensive inflammation, fibrosis, dense adhesions, empyema, or distortion of Calot's triangle may obscure normal anatomical landmarks, increasing the risk of bile duct and vascular injury during dissection. When safe identification of biliary structures is not possible, subtotal cholecystectomy provides an effective bailout strategy that allows completion of the procedure while avoiding hazardous dissection^(6,7,10-14). The present prospective randomized study compared fenestrating and reconstituting subtotal cholecystectomy with respect to perioperative findings and early postoperative outcomes in patients with difficult gallbladders. The demographic and clinical characteristics of patients in both treatment groups were comparable, with no statistically significant differences in age, sex distribution, body mass index, comorbid illnesses, previous episodes of acute cholecystitis, history of ERCP, or ASA physical status. This balanced distribution reduced the possibility that differences in baseline characteristics influenced postoperative outcomes and allowed a more reliable comparison of the two surgical techniques.

Acute calculous cholecystitis represented the most frequent indication for subtotal cholecystectomy in the present study, followed by chronic calculous cholecystitis. Dense adhesions and a frozen Calot's triangle were the predominant intraoperative findings encountered during surgery. These observations emphasize that subtotal cholecystectomy is primarily required in patients with advanced inflammatory disease in whom conventional laparoscopic dissection cannot be performed safely^(12,14-16).

Operative duration and estimated blood loss were lower in the reconstituting group than in the fenestrating group, although neither difference reached statistical significance. These findings suggest that both procedures can be performed with comparable intraoperative safety. The lack of statistical significance also indicates that operative difficulty is likely to be influenced more by the severity of local inflammatory changes than by the choice of subtotal cholecystectomy technique itself^(10,12,14). Postoperative bile leakage was selected as the primary outcome because it represents the most frequently reported complication following subtotal cholecystectomy. In the present study, bile leakage occurred more commonly after fenestrating subtotal cholecystectomy (28%) than after the reconstituting procedure (12%). Although this difference did not achieve statistical significance, the numerical reduction observed with the reconstituting technique may be clinically relevant. Closure of the residual gallbladder is likely to reduce persistent biliary drainage from the remnant, which may explain the lower incidence of postoperative bile leak observed in this group.

Among the secondary outcome measures, reconstituting subtotal cholecystectomy demonstrated clear advantages with respect to postoperative recovery. Patients undergoing this procedure required abdominal drains for a significantly shorter period and were discharged earlier than those treated with the fenestrating technique. These findings indicate that reconstruction of the gallbladder remnant may facilitate earlier control of biliary drainage and contribute to faster postoperative recovery without increasing operative risk⁽¹⁴⁾.

Other recovery parameters, including postoperative pain, time to initiation of oral feeding, and return to normal daily activities, were comparable between the two

groups. This suggests that both subtotal cholecystectomy techniques provide similar early functional recovery and that the principal differences between them relate mainly to postoperative drainage and duration of hospitalization rather than overall patient comfort or rehabilitation^(12,14).

Although postoperative complications such as surgical site infection, biloma, intra-abdominal collection, ERCP requirement, reoperation, and readmission were observed more frequently after fenestrating subtotal cholecystectomy, none of these differences reached statistical significance. Nevertheless, the consistently lower complication rates in the reconstituting group suggest a favorable trend that may become statistically significant in studies involving larger patient populations. Importantly, no postoperative mortality occurred in either group, and most adverse events were classified as Clavien–Dindo Grade I or II, indicating that complications were generally minor and successfully managed with conservative treatment^(12,14).

The strengths of the present investigation include its prospective randomized design, inclusion of two well-matched treatment groups, standardized data collection, and complete short-term follow-up of all enrolled patients. These methodological features improve the reliability of the comparison between the two subtotal cholecystectomy techniques and reduce the risk of selection bias.

Several limitations should also be considered when interpreting the findings. The study was conducted at a single tertiary care institution and included a relatively small sample size, which may have limited the statistical power to detect significant differences for less common postoperative events. Furthermore, follow-up was restricted to the early postoperative period; therefore, long-term outcomes such as recurrent biliary symptoms, retained or recurrent gallstones within the remnant gallbladder, remnant cholecystitis, and the need for completion cholecystectomy could not be evaluated. Future multicentre studies with larger patient cohorts and extended follow-up are needed to determine whether the early advantages observed with the reconstituting technique translate into superior long-term clinical outcomes.

Overall, the findings of this study indicate that both fenestrating and reconstituting subtotal cholecystectomy are safe bailout procedures for difficult gallbladders when the Critical View of Safety cannot be obtained. The reconstituting technique demonstrated significantly shorter drain duration and hospital stay, together with lower rates of postoperative bile leakage and other complications, although several differences did not reach statistical significance. These results support the use of reconstituting subtotal cholecystectomy as a valuable option for selected patients while highlighting the need for larger randomized trials to establish the long-term comparative effectiveness of both approaches.

CONCLUSION

Both fenestrating and reconstituting subtotal cholecystectomy were safe and effective bailout procedures for difficult gallbladders. Reconstituting subtotal cholecystectomy was associated with significantly shorter drain duration and hospital stay, while showing a lower incidence of postoperative bile leak and overall morbidity, although these differences were not statistically significant. Larger multicentre studies with long-term follow-up are needed to confirm these findings and evaluate long-term outcomes.

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