



Evaluating Single-Stage Laparoscopic Cholecystectomy with Intraoperative ERCP for Cholecystocholedocholithiasis

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Abstract

Introduction: The management of concomitant cholelithiasis and choledocholithiasis remains complex. While laparoscopic cholecystectomy (LC) is the gold standard for gallstones, addressing common bile duct (CBD) stones requires additional intervention. Single-session LC with intraoperative endoscopic retrograde cholangiopancreatography (ERCP) offers cost-effectiveness, patient convenience, and low complication rates, and has emerged as a promising alternative to traditional two-stage management.

Objective: To evaluate clinical outcomes of single-session LC combined with intraoperative ERCP in patients with cholecystocholedocholithiasis.

Methods: A retrospective study was conducted on 42 patients undergoing single-session LC with ERCP at a tertiary care center from January 2022 to December 2023. Data was recorded prospectively. Primary outcomes included CBD clearance rates, complications, operative time, hospital stay, and need for re-intervention.

Results: Of 42 patients (23 males, 19 females; mean age 47.3 ± 14.2 years), CBD clearance was achieved in 95%. Median operative time was 180 minutes (IQR: 135–240). No major postoperative complications were recorded. ERCP failed to clear stones in 2 cases. Three patients required conversion to open surgery. Mean postoperative hospital stay was 2 days (range: 1–4). Five patients required re-intervention during follow-up.

Conclusion: Single-session LC with intraoperative ERCP is a safe and effective approach for managing cholecystocholedocholithiasis. It achieves high clearance rates with minimal morbidity and reduced hospital stay. Broader adoption is encouraged in centers equipped with the necessary expertise and facilities.

Background

Cholelithiasis affects up to 20% of adults worldwide, with 10–18% harboring concomitant CBD stones [1,2]. Untreated CBD stones may lead to life-threatening complications such as cholangitis and pancreatitis [3]. While ERCP is widely used for CBD clearance, the traditional two-stage approach (pre- or post-LC) prolongs hospitalization, increases anesthetic exposure, and raises healthcare costs [4]. The single-session strategy, the hybrid approach, combining LC with intraoperative ERCP, streamlines treatment and reduces these risks [5,6]. Recent multicenter studies and meta-analyses demonstrate comparable or superior outcomes compared to staged management [7–9]. This study assesses outcomes of this approach in a tertiary care setting.

Patients and Methods

This retrospective cohort included 42 patients undergoing same-session LC and ERCP at King Faisal Specialist Hospital, Madinah, between January 2022 and December 2023.

Inclusion criteria: Patients with confirmed or suspected CBD stones based on ultrasound, MRCP, or liver function tests.

Procedure: ERCP was performed first under general anesthesia using balloon sweep, Dormia basket, or mechanical lithotripsy as required. LC followed using the standard four-port technique. Intraoperative cholangiography (IOC) was routinely performed.

Data collection: Prospectively recorded variables included demographics, comorbidities, operative details, complications

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(graded by Clavien-Dindo), hospital stay, and follow-up outcomes.

Analysis: Statistical analysis was descriptive.

Results

Of 42 patients, 23 (55%) were male and 19 (45%) female, with a mean age of 47.3 years (range: 4–73). The cohort included two pediatric patients (aged 4 and 8 years). Mean BMI was 25 kg/m² (range: 15–40). Comorbidities included diabetes mellitus (21%) and hypertension (18%). Emergency procedures were performed in 3 cases; 39 were elective.

CBD clearance was successful in 40 patients (95%). Conversion to open surgery occurred in 2 cases due to large impacted stones with failed ERCP. Median operative time was 180 minutes (IQR: 135–240). No major postoperative complications (bleeding, bile leak, pancreatitis) occurred. Mean hospital stay was 2 days.

Five patients required re-intervention post-discharge: stent removal in 3, one CBD stricture requiring stenting, and one pancreatic duct stricture managed endoscopically.

Discussion

The findings of this study align with the growing body of evidence supporting single-session LC with ERCP as an effective and efficient approach to managing cholecystocholedocholithiasis. The observed 95% common bile duct (CBD) clearance rate concurs with previously reported high success rates in similar studies performed across diverse clinical settings [3,5,7,9]. Single-session management eliminates the delays and risks, in particular of recurrent cholangitis and pancreatitis, associated with multi-stage approaches [8]. By consolidating treatment into a single session, patients benefit from reduced exposure to repeated anesthesia and fewer hospitalizations, enhancing safety and satisfaction [6,10].

For the above reasons single-session approach is also notably cost effective [11]. This has obvious advantages in resource-constrained settings, where prolonged hospitalizations and repeated interventions can overburden healthcare infrastructure [12]. Additionally, studies have demonstrated significantly reduced direct and indirect costs, including those associated with lost productivity from extended recovery times [7]. Furthermore, comparative analyses of this approach, have reported fewer postoperative complications, lower CBD stone recurrence rates and improved patient satisfaction [13,14].

In pediatrics practice, advancement in choledocholithiasis management has proven to be more elusive and remains a challenge for most units. The paucity of cases and hence the expertise and equipment required to safely undertake single session ERCP/LC in children is generally lacking and consequently there has been only a single previously published case. [15]. That it can be safely performed, has been clearly demonstrated in this limited series.

Technical variations, particularly with respect to the order of interventions, may influence outcomes. While our protocol prioritized ERCP-first, others employ LC-first with on-demand ERCP or rendezvous techniques. The latter, as demonstrated by Zhang et al. and Müller et al, may lower post-ERCP pancreatitis rates, but requires advanced coordination. [13,16,17]. ERCP is highly successful in clearing CBD stones. The two failures in this series were due to technical factors, the lack of SPY glass to break a substantial stone in the first and a non-functional

Dormia Basket in the latter case. In both instances, fallback CBD exploration and stone extraction was successful.

However, implementing the single-session approach is not without challenges. For a start, not all cases may be suitable to this approach as prolonged anesthesia could be a challenge for high-risk cases. Case selection is therefore paramount to successful outcome. We have successfully utilized the hybrid approach for principally elective but also a handful of emergency cases. It necessitates substantial technical expertise and access to advanced equipment, including fluoroscopy-compatible operating rooms and multidisciplinary teams trained in endoscopic and surgical techniques [18]. Additionally, the collaboration of varying departments, namely general surgical, anesthetic, gastroenterological and occasional pediatric surgical, is critical.

Conclusion

Single-session LC with intraoperative ERCP achieves excellent clinical outcomes with high CBD clearance rates, minimal morbidity and without mortality. It offers a patient-centered, resource-efficient strategy suitable for centers with the requisite expertise, multidisciplinary collaboration and facilities. However, widespread adoption is contingent on infrastructure investment and multidisciplinary expertise. Current evidence is building to support single session ERCP and laparoscopic cholecystectomy as the standard of care for suitable patients.

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