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SINGLE-STEP LAPAROSCOPIC CHOLECYSTECTOMY AND ERCP IN THE MANAGEMENT OF CHOLEDOCHOLITHIASIS: A SAFE AND EFFECTIVE APPROACH

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Abstract

Objective:
To evaluate the safety, efficacy, and outcomes of the single-step approach combining laparoscopic cholecystectomy (LC) and endoscopic retrograde cholangiopancreatography (ERCP) in the management of choledocholithiasis.

Methods:
This is a prospective observational study that was undertaken at the Hameed Latif Hospital between the years 2020 and 2024. One hundred patients diagnosed with choledocholithiasis with the help of magnetic resonance cholangiopancreatography (MRCP) went through a single-session of LC and ERCP. Among the data that were gathered were operative time, complications, hospital stay, and time of returning to work.

Results:
No conversions to open surgery, wound infections, bile leaks, or pancreatitis were observed. Operating time was 2 hours in 70 patients, 4 hours in 13, 3 hours in 10, and 1 hour in 7. The average hospital stay was 2–3 days, and all patients resumed normal activities within 5–7 days.

Conclusion:
The single-step approach is a safe and efficient treatment option for choledocholithiasis, yielding excellent clinical outcomes and rapid recovery.

Keywords: Choledocholithiasis, Laparoscopic Cholecystectomy, ERCP, Single-Step Procedure, Minimally Invasive Surgery

Introduction

One of the most prevalent instances of biliary pathology is the presence of the gallstones in the common bile duct (CBD), i.e., choledocholithiasis that can be found in approximately 1015% of patients undergoing cholecystectomy to treat the gallstone disease (Chandasekhara et al., 2019; Cianci and Restini, 2021; Sebghatollahi, Parsa, Minakari, and Azadbakht, 202 Choled Treatment of this disease has also undergone a major change over the recent decades, primarily due to the

creation of minimally invasive surgery that tends to reduce morbidity and hospitalization and maintains a high level of stones clearance (SAGES, 2010; Bradley et al., 2020; Bosley, Zamora, and Neff, 2021).

The two-step procedure with endoscopic retrograde cholangiopancreatography (ERCP) and stone removal followed by laparoscopic cholecystectomy (LC) has long been considered the standard of care (Cuschieri, 1993; Wang, Song, Xie, and Song, 2023; Kirkegaard-Klitbo et al., 2023). This sequential strategy has some drawbacks though. The patients receive a prolonged stay in the hospital, repeated anesthetic interventions and high medical expenses. Further, the interval between ERCP and LC may be a risk factor of repeat hepatic events, including cholangitis and pancreatitis, thus affecting the overall outcomes adversely (Zani et al., 2008; Du et al., 2020). The latest advances that have been made regarding the endoscopic and laparoscopic integration enabled the single-step or single-team operation where ERCP and LC are performed in the same anesthetic session (Mohamed, Saada, Fouad, and Ismail, 2023). This multimodal approach has received significant interest due to its possible ability to simplify management, reduce patient suffering, and improve postoperative healing (Trikudanathan et al., 2014). A number of studies have shown that not only is single-session ERCP and LC feasible, but it also has similar or better outcomes than the two-step approach (Muhammedoğlu and Kale, 2020; Sethi and Chen, 2010; Costamagna et al., 1997). The emerging evidence highlights the clinical and cost benefits of the minimally invasive, coordinated method, particularly in high volume facilities with multidisciplinary experience. Physiologically, having both procedures within the same session can decrease the chances of cystic duct obstruction and frequent CBD stones, because the removal of the gallbladder takes place as soon as the clearance of the bile duct is done (Sebghatollahi, Parsa, Minakari, and Azadbakht, 2023). It decreases the possibilities of stone recurrence and removes the necessity of repeated endoscopic interventions (Aleknaite et al., 2021; Testoni et al., 2016). In addition, timely cholecystectomy after ERP has a low inflammatory reaction and avoids adhesions, thus lowering the likelihood of developing open surgery (Trikudanathan et al., 2014). Single-step strategy has also been demonstrated to reduce the total length of stay, speed up the recovery to normal activity, and enhance patient satisfaction, which are gaining more importance in the current surgical practice (Sethi & Chen, 2010).

Although these are the benefits, the implementation of single-step LC and ERCP in the developing world has been slower because of the unavailability of modern endoscopic devices, lack of qualified staff, and institutional issues in coordinating multidisciplinary services. The absence of local evidence concerning the safety and effectiveness of this combined method has further hindered the popularization of the method in Pakistan and other healthcare systems with limited resources. Therefore, it is urgently necessary to evaluate the clinical results of this combined approach in regional healthcare.

The current prospective study was done to assess the safety, efficacy, and outcome of the single-step method of combining laparoscopic cholecystectomy and ERP in the treatment of choledocholithiasis at a tertiary care unit in Pakistan. This study will also help provide meaningful local evidence about single-session management by examining the working parameters, complication rates, and dys ptosis after surgery. The implications of the study results can be largely related to the optimization of biliary tract disease treatment and patient outcomes and, in general, the increased use of minimally invasive surgical practices in the context of the region.

Materials and Methods

Study Design and Setting

It was a prospective observational study project at Hameed Latif Hospital, Lahore, in the period between January 2020 and December 2024. Prior to the start, ethical approval was obtained.

Participants

One hundred patients who had been diagnosed of choledocholithiasis were included. MRCP was done to confirm all patients. Criterion of Inclusion Age 1875 years, and Fitness to undergo

endoscopic and laparoscopic procedures. Patients with uncorrectable coagulopathy or suspected malignancy were eliminated.

Procedure

Patients who had undergone ERCP to clear CBD stones underwent laparoscopic cholecystectomy during the same procedure under general anesthesia. Operative time, intraoperative results, and postoperative recovery were recorded.

Outcome Measures

Primary outcomes were conversion rate, operative complications and hospital stay. Return to normal activity and complete clearance of the stones were regarded as secondary outcomes.

Results

Out of 100 patients (30 men and 70 women), no one had to be converted to open surgery. No postoperative wound infection, bile leakage or pancreatitis were reported. In all patients, full clearance of the stones was attained. The duration of operation was 2 hours in 70 patients, 4 hours in 13, 3 hours in 10 patients and 1 hour in 7 patients. Mean hospital stay was 2–3 days. In all cases, there was a return to work of 5-7 days.

Table 1. Clinical Outcomes of Patients Undergoing Single-Step Laparoscopic Cholecystectomy with ERCP (n = 100)

Parameter	Findings
Total patients	100
Gender distribution	30 males (30%), 70 females (70%)
Conversion to open surgery	None
Postoperative wound infection	None
Bile leakage	None
Postoperative pancreatitis	None
Stone clearance	Complete in all patients (100%)
Operating time	1 hour: 7 patients (7%) 2 hours: 70 patients (70%) 3 hours: 10 patients (10%) 4 hours: 13 patients (13%)
Mean hospital stay	2–3 days
Return to work	Within 5–7 days in all cases

Figure 1: Operating Time Distribution

Bar graph showing distribution of operating times among patients.

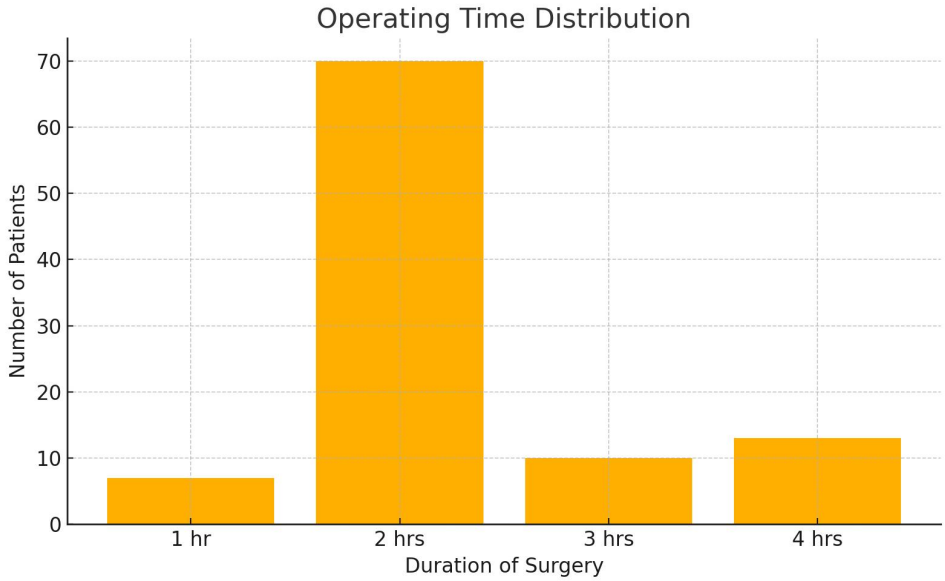

Operating Time Distribution
Number of Patients
0
10
20
30
40
50
60
70
1 hr
2 hrs
3 hrs
4 hrs
Duration of Surgery

Figure 2: Postoperative Complications

Bar graph showing absence of postoperative complications across all 100 patients.

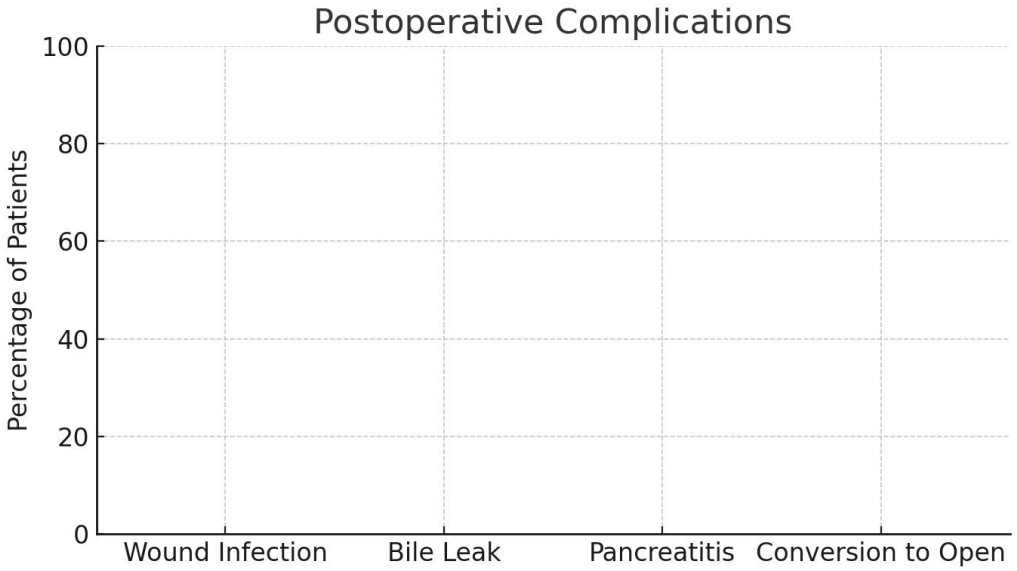


Figure 3: Return to Work Timeline

Graph showing that 100% of patients returned to normal work within 5–7 days after surgery.



Discussion

This prospective study proves that the single-step method of laparoscopic cholecystectomy (LC) with endoscopic retrograde cholangiopancreatography (ERCP) is a safe, effective, and time-efficient method of treating choledocholithiasis. Clearance of bile duct stones was done in our group of 100 patients without any conversion to open surgery or significant postoperative complications, including bile leakage, pancreatitis, or wound infection. These are not the first results that demonstrate that the single-session management of the gallbladder and common bile duct stones proves to be more efficient than the traditional two-stage management (Trikudanathan et al., 2014; Testoni et al., 2016).

The lack of postoperative complications in our series does not support the idea that this combination approach is a safe procedure in the case of an experienced multidisciplinary team of endoscopists and laparoscopic surgeons. Similar high impact studies have also outlined that the single step approach decreases morbidity and hospitalization linked to the procedure without any impact on

clinical effectiveness (Sethi and Chen, 2010; Costamagna et al., 1997). We established that the length of stay in our analysis was 2-3 days, which is not inconsistent with meta-analyses that were carried out in the recent past that revealed that single-session procedures provided a lot shorter hospitalization and quicker recovery compared to sequential ERP and LCs (Wang et al., 2019). The economic and functional advantage of this combined approach is further emphasized by this early release and early resumption at the work in 5-7 days, which is particularly relevant in resource-constrained settings, such as in Pakistan, where the burden reduction of hospitals is a priority on the agenda of the public health.

Regarding the process efficiency, the average duration of operation in our group (3/4 of 2 hours) denotes the technical feasibility and the optimum working process which might be achieved in case of appropriate coordination of the work of the surgical and endoscopic teams. Past research has indicated that the duration of procedural time and intraoperative issues can be alleviated through standard operating procedures, access to modern imaging machinery, and pre-procedural preparation (Gurusamy et al., 2012). Notably, timely cholecystectomy after bile duct clearance will help to avoid recurrent biliary complications including cholangitis or pancreatitis which tend to complicate delayed LC following standalone ERCP (Zani et al., 2008).

Clinically, the high success rate and low morbidity rates experienced prove that single-step LC and ERCP may be regarded as the best treatment choice employed in choledocholithiasis when the technical skills and equipment are available. It is not only implemented to decrease repetitive exposure to anesthesia but also achieves patient satisfaction by providing non-invasive holistic care in one hospital stay. However, the obstacles like low access to specialized equipment and trained staff are still obstacles in creating healthcare systems. Enhancing multidisciplinary team work, making investments in endoscopic training and institutional protocols would help in increasing the pace of implementation of this evidence based approach in the region.

To sum up, our results allow assuming that single-step LC, combined with ERCP, offers better patient outcomes, operational efficiency, and less healthcare usage than the traditional two-stage method. This strategy is a major step to enhancing the standard of biliary surgery in tertiary centers in Pakistan and other developing countries to make local practice meet the current international standards in minimally invasive hepatobiliary surgery.

Conclusion

Laparoscopic cholecystectomy combined with ERCP in a single-step operation is a safe, efficacious, and patient-friendly method of managing choledocholithiasis with minimum postoperative events and shortened recovery.

Authors' Contribution

Hassan Shaukat: Conception, Methodology, Data Collection, Writing - Original Draft.
Fizza Batool: Writing, Analysis of Data, Review and Editing.
Azhar Hussain: ERCP Procedures, Supervision, Writing, Review and Editing.

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