

# Comparing one-stage and two-stage treatment approach of cholelithiasis and choledocholithiasis

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## Abstract

**Aim:** Complicated bile duct stones with choledocholithiasis may cause serious morbidity and mortality. The aim of this study was to evaluate; cost, frequency of the imaging methods used and the length of the hospital stay after the one-stage and two-stage procedures.

**Material and Methods:** Endoscopic Retrograde Cholangio Pancreatography (ERCP) and Laparoscopic Cholecystectomy (LC) was performed in 16 out of 250 LC cases and was named as Group A; other 12 patients have had interval LC 6-8 weeks after the ERCP procedure and were named as Group B. All ERCP and LC were performed by the same surgeon.

**Results:** The duration of hospitalization in Group A was 6 [4-9.5] days and was statistically significantly longer in the group B patients which was 8.5 [9.5-10.5] days ( $p < 0.0470$ ). The frequency of the use of the imaging methods was 3 [2-4.5] in Group A and 6 [4.5-7.0] in B ( $p < 0.001$ ). The cost of the procedures were significantly lower in the Group A compared to B ( $p < 0.047$ ) and was 2411.3 [1855.6-2819.9] and 2839.9 [2495.5-3237.1] Turkish Lira (TL) respectively.

**Conclusion:** Simultaneous ERCP and LC are safe and a feasible in selected cases and advantageous in terms of the total cost and the length of the hospital stay. There is need for more studies to clarify the timing of the surgical treatment after the ERCP.

**Keywords:** Endoscopic Retrograde Cholangio Pancreatography; Laparoscopic; Interval cholecystectomy.

## INTRODUCTION

The timing of the treatment of both cholelithiasis and the choledocholithiasis is still controversial at present. During the interval between laparoscopic cholecystectomy (LC) after endoscopic retrograde Cholangio Pancreatography (ERCP); the biliary stones, in some patients may lead to acute cholecystitis and biliary pancreatitis. More importantly, the patients remain passive in their social activities during this period of 6-8 weeks until LC. In our opinion main reason affecting the waiting period is due to the fact that surgery and ERCP is being performed by different clinics. Degrate Lve et al. analyzed 103 patients who underwent early cholecystectomy and interval cholecystectomy in their retrospective study. In both groups, the severity of comorbidities and the pancreatitis were similar at admission. There were no differences in terms of; conversion rate, operation length, total length of hospital stay and the general complication rates. However,

interval patients had a 33.3% recurrence rate for recurrent biliary pancreatic events and acute cholecystitis (AC). The difference regarding this complication among the groups was statistically significant (1).

The aim of this study was to evaluate and compare; the cost, frequency of the imaging methods used and the length of the hospital stay of our patients after the one-stage and two-stage procedures performed in our surgery unit. Management of the AC with choledocholithiasis patients was managed by early surgery (within 24-48 hours). Although nearly one third of these patients have spontaneously dislodge small stones in the common bile duct (CBD) without needing any intervention within 6 weeks, untreated CBD stones can cause complications such as cholangitis and pancreatitis. For this reason, it is generally recommended to detect and treat choledocholithiasis with the cholecystectomy. We aimed to treat patients with complicated cholelithiasis with choledocholithiasis by early surgery.

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## MATERIAL and METHODS

Among 250 ERCP performed patients between 01.01.2014 and 31.12.2016; retrospectively 16 consecutive ERCP and LC performed patients were identified as Group A and 12 patients that had ERCP but were operated 6-8 weeks following ERCP were classified as Group B. The exclusion criterions were; laparotomy history, any malignancy suspicion or malignancy diagnosis and diagnostic ERCP cases. Both groups were evaluated for their total hospital stay, cost, frequency of use of imaging modalities, and the duration of their hospital stay after ERCP and LC.

### Statistical Analysis

The continuous variables were tested by Shaphiro Wilk test. Student t test was used for comparison of two independent groups of variables with normal distribution and Mann-Whitney U test was used for the comparison of two independent variables with a non-normal distribution. Chi-square test was applied to assess the relation between the categorical variables. Statistical analysis was performed with SPSS (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.). P value < 0.05 was accepted as statistically significant.

## RESULTS

In our study, 16 patients had simultaneous ERCP / LC and

named as Group A and 12 patients that were treated with LC 6-8 weeks after the ERCP was named as Group B. The age of the 28 subjects included in the study were between 24 and 95 years. The mean age was  $54.38 \pm 19.7$  in Group A and  $58.08 \pm 18.83$  in Group B. Of all cases 60.7% of the participants were males (Table 1).

There were no complications during the ERCP and the LC in both groups. The duration of hospitalization in Group A was 6 [4-9.5] days and was statistically significantly longer in the group B patients which was 8.5 [9.5-10.5] days ( $p < 0.0470$ ). The length of hospitalization after both the surgery and the ERCP was 3 [2-3.5] days and 5 [4-6] days ( $p < 0.002$ ) in Groups A and B, respectively. The length of the hospitalization in group A was significantly shorter. The frequency of the use of the imaging methods was 3 [2-4.5] in Group A and 6 [4.5-7.0] in Group B ( $p < 0.001$ ). The cost of the procedures were significantly lower in the Group A compared to Group B ( $p < 0.047$ ) and was 2411.3 [1855.6-2819.9] Turkish Lira (TL) and 2839.9 [2495.5-3237.1] TL respectively.

## DISCUSSION

Kim SB et al. (2) stated that the acute biliary pancreatitis (ABP) is a serious complication of gallstone disease with increased morbidity and mortality; also they have shown that there was a recurrence rate of 50-90% for patients with ABP that were followed without having a cholecystectomy

**Table 1. Patient demographics and hospital data**

Variables	Group 1 (n=16)	Group 2 (n=12)	p
Age*	54.38 ± 19.7	58.08 ± 18.83	0.620
Female	7(43.8)	4(33.3)	0.576
Male	9(56.2)	8(66.7)	
Total Cost	2411.3 [1855.6-2819.9]	2839.9 [2495.5-3237.1]	0.047**
Cost of hospital stay	602.8[463.9-704.9]	709.9[623.9-809.3]	0.047**
Number of Imaging Modality	3 [2-4.5]	6 [4.5-7.0]	0.001**
Total length of stay	6 [4-9.5]	8.5 [9.5-10.5]	0.047**
Length of stay after LC/ERCP	3 [2-3.5]	5 [4-6]	0.002**

afterwards. However, incidence and risk factors for recurrent pancreatobiliary complications after remission of ABP have not been well established in the literature. The incidence of recurrent pancreatobiliary complications was 19.3% in their study and was significantly increased in patients that were undergoing delayed cholecystectomy.

Two patients in group B in our study, admitted to emergency department with ABP on the seventh and thirteenth day after the ERCP attacks. Because the bilirubin values of the patients who had the second episode were high, MRCP was performed; in one of those 2 cases a stone in the common bile duct (CBD) was detected and an ERCP and then LC were performed. Only LC was applied to the second patient. Pain and dyspepsia complaints were observed following the operation these two patients.

Uysal E et al. (3) reported that early LC in the acute cholecystitis treatment can be preferred and also showed

that there were no significant difference between the early and delayed LCs in terms of; conversion rate, duration of the operation and the total complication rates. In addition, they also reported a shorter hospital stay and a lower 30-day re-admission rate in AC treatment with an early LC.

Hayama S et al. (4) declared that during the early LC in AC; necrotizing cholecystitis is a risk factor for a difficult procedure. They reported that the high number of white blood cell (WBC) count and the old age should be the factors to delay the surgery. Calot triangle could not be safely dissected in only 1 patient with AC in our group A and subtotal LC was performed. There was one elderly patient in group B and also the WBC level was high and in this case the LC was also difficult.

Sutton AJ et al. (5) in their study proposed that urgent cholecystectomy in cholelithiasis is less costly and more effective than the delayed cholecystectomy because it is

likely that this approach will be beneficial to the healthcare provider by lowering the costs and also will provide improved health outcomes for patients. In our study the total cost was significantly lower in group A 602.8 Euros (€) [463.9-704.9] compared to group B 709.9 € [623.9-809.3] ( $p < 0.047$ ).

The Tokyo Guidelines (TG13) (6) does not fully reflect the information obtained from the evidence-based medicine, although it does offer some algorithms but the clinical practice shows better results.

Preoperative ERCP in Ahn KS et al. (7) study has been shown to be an important risk factor in difficult LC. For this reason, experienced surgeons should apply LC after preoperative ERCP. It was seen that the degree of inflammation in the ERCP group was much more severe and the LC operations were more difficult than the non-ERCP group. Even though the duration of the procedures were longer and the conversion rates were higher they still reported that there was no need to delay the post-ERCP LC in those groups.

Cao AM et al (8) in their acute cholecystitis series has shown that; in the early laparoscopic cholecystectomy the incidence of wound infection is lower, the total length of stay is shorter and the costs are reduced; without any difference in mortality, biliary injury and conversion rates compared to each other. These results support that; early laparoscopic cholecystectomy is the best care and that should be routinely considered in patients with an acute cholecystitis. There was no morbidity due to a biliary injury and the primary disease in both groups with AC diagnosis in our study groups as well. De Sousa S et al. (9) confirms that cholecystectomy can be performed (and should be performed) even in the presence of moderate abnormal liver function tests in their study. If the CBD stone is suspected, the Intra-operative cholangiogram (IOC) can be performed but only half of the CBD stone patients can be confirmed by a filling defect. All stones can be safely treated after surgery (with ERCP mainly).

Patients with a suspected CBD stone in our study underwent preoperative MRCP to determine if there was stone in the bile duct or not. IOC was performed only once in our study not to rule out CBD stone, but because of the suspicion of a bile duct injury and it proved that there was no injury. The moderately high Liver Function Tests (LFT) was not an obstacle for us to perform a LC. Median ALT level was 129 [107-196] U/L in Group A and it was 26 [15-128] U/L in Group B ( $p > 0.096$ ). The AST level was 70 [51-127] U/L and 26 [14-129] U/L in Group A and B respectively but no statistical significant difference was found. The GGT values were significantly higher ( $P > 0.013$ ) in group A 331.5 [189-711] U/L than the group B, which was 77.5 [50.5 -191] U/L. This elevation was raising the suspicion of cholestasis and possibility of a CBD stone. In these cases, MRCP showed the definitive ERCP indications by displaying the CBD stones if there are any.

Roulin D et al. (10) randomly assigned patients with

acute cholecystitis and with symptoms longer than 72 hours to early LC or delayed LC. Early LC was performed immediately after hospitalization. Delayed LC was planned at least 6 weeks after the first antibiotic treatment. They stated that the early LC could be safely performed for acute cholecystitis, even after 72 hours after initiation of the symptoms, and was associated with less morbidity, shorter total hospital stay, and reduced cost when compared with the delayed cholecystectomy after an antibiotic treatment. There were no complications during ERCP and LC in both groups. The duration of hospitalization in our group A was 6 [4-9.5] days and was statistically significantly longer in the group B with 8.5 [9.5-10.5] days ( $p < 0.0470$ ). The duration of hospitalization after the surgery and ERCP was 3 [2-3.5] and 5 [4-6] days ( $p < 0.002$ ) in Groups A and B, respectively. The frequency of use of imaging methods was 3 [2-4.5] in Group A and 6 [4.5-7.0] in Group B which was significantly lower in Group A ( $p < 0.001$ ). The cost was significantly lower in group A ( $p < 0.047$ ) than in group B which was (2411.3 [1855.6-2819.9] and 2839.9 [2495.5-3237.1] respectively).

Joshi MR et al. (11) performed ERCP and then the LC afterwards in the operating room conditions at the same session. They reported that the removal of the gall bladder and the extraction of the common bile duct stones in a single step; with laparoscopic and endoscopic method is possible with acceptable results. A one-stage approach has lower pancreatitis rates compared to a two-stage approach; also it shortens the length of the hospital stay, reduces the cost and requires only one anesthesia delivery to the patient. Compared with the procedures that require choledochotomy; the risk of bile leakage is lower and the duct clearance rates are higher than the trans-cystic approach, and equivalent to the success of the standard two-stage approach. The obstacles are; need for a large-scale operating room logistics and the simultaneous availability of an appropriate endoscopic expertise (12).

Zhu HY et al. (13) published a meta-analysis with 1300 patients who had a single-stage and two-stage treatment for cholecysto-choledocholithiasis; and declared similar mortality and complication rates and also demonstrated that the single-stage strategy is better in terms of stone clearance, length of stay in the hospital and total duration of the operation. We also believe that a single-stage approach is advantageous and also safe for the patient. The most important factors affecting this approach is that the endoscopic retrograde cholangiopancreatography (ERCP) and the laparoscopic colesistectomy (LC) are being performed by different clinics generally. Because the ERCP unit is generally different from the operating room and the ERCP team and the surgical team works independently ERCP and LC cannot be simultaneously performed at the same session. Even though this approach has not been accepted and listed in some very prestigious algorithms yet in the literature (14) (15) we think that in the future this approach will be getting into the algorithms by the help of more randomized controlled studies being performed.

## CONCLUSION

In conclusion we believe that even in a low volume state hospital like ours with enough surgical and endoscopic experience; simultaneous ERCP with LC in the treatment of cholelithiasis and accompanying choledocholithiasis is a safe and a feasible method in selected cases which is also advantageous in terms of the cost and the length of hospital stay. But there is still a need for more randomized controlled studies to clarify the idea of the timing of treatment.

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