

Immediate Versus Interval Laparoscopic Cholecystectomy Post ERCP Regarding Safety, Outcome And Cost

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Citation

Z Matar. *Immediate Versus Interval Laparoscopic Cholecystectomy Post ERCP Regarding Safety, Outcome And Cost*. The Internet Journal of Surgery. 2006 Volume 12 Number 2.

Abstract

Background: The optimal management of choledocholithiasis has to be both safe and cost-effective. Our aim was to evaluate the advantages of immediate over interval laparoscopic cholecystectomy in patients with choledocholithiasis with relation to outcome, safety and cost.

Methods: A total of 400 patients divided into two groups of 200 each were included in the study; group one underwent immediate laparoscopic cholecystectomy whereas group two had interval laparoscopic cholecystectomy, both post ERCP. The length of stay, complications and cost of treatment in both groups were calculated and statistically analyzed.

Results: ERCP followed by immediate laparoscopic cholecystectomy was safe with significant reduction in the average length of stay and average cost of treatment per patient as compared to ERCP followed by interval laparoscopic cholecystectomy. The complications were not significant in either group.

Conclusions: ERCP followed by immediate laparoscopic cholecystectomy was safe and was more cost-effective than interval laparoscopic cholecystectomy post ERCP in patients with choledocholithiasis.

INTRODUCTION

Endoscopic Retrograde Cholangiopancreatography (ERCP) is one of the modalities used in management of biliary tree stones¹. Many national and international studies revealed that this procedure is safe particularly prior to laparoscopic cholecystectomy (LC) while other studies pointed out that ERCP followed by immediate laparoscopic cholecystectomy could decrease the risk of cholangitis and recurrent pancreatitis^{2, 3, 4}. Most of the studies published on ERCP and laparoscopic cholecystectomy in Saudi Arabia were concerned with the safety and success of ERCP and laparoscopic cholecystectomy in the management of gallbladder diseases and acute biliary pancreatitis^{5,6}. To our current knowledge, there are no studies conducted to date to evaluate the cost of ERCP followed by immediate laparoscopic cholecystectomy as compared with ERCP followed by interval laparoscopic cholecystectomy. The aim of our study was to make such a comparison between these two groups of patients managed under our care, regarding safety, length of hospital stay and cost.

MATERIALS AND METHODS

This study was conducted at Aseer (educational) Hospital which is 600 bedded and constitutes the main referral

hospital for 24 District General Hospitals in Aseer Region, in the Southwest of Saudi Arabia.

Management of choledocholithiasis in hospital passed through the following steps:

1. The patients who were referred from General District Hospitals to our hospital through formal referral system were admitted to the surgical ward for management.
2. Confirmed choledocholithiasis cases were managed in our unit by ERCP followed by immediate or interval LC.
3. The protocol of management in our unit is summarized in the appendix A. After three years of work in our unit, from January 2002 to January 2005, the medical records of our cases were reviewed for the following data: age, sex, nationality, onset, co-morbidity, length of stay in hospital, cost of procedures, stone analysis, ERCP findings, result of cholecystectomy, preoperative cholangiogram, complications and type of procedure (ERCP followed either by immediate or by interval laparoscopic cholecystectomy).

Patients who fulfilled any of the following criteria were included in this study: history of obstructive jaundice, high serum bilirubin, elevated liver enzymes, dilated common bile duct (diameter ≥ 7 mm by ultrasonography) and CBD stones diagnosed by ultrasonography.

ERCP followed by immediate laparoscopic cholecystectomy is defined as ERCP and then immediate shifting of the patient to the operating room for LC. Interval laparoscopic cholecystectomy means performing LC one or more days after ERCP.

Those who underwent the first procedure (ERCP followed by immediate LC) were considered as group one while those who underwent the second procedure (ERCP followed by interval LC) were considered group two.

Costs of management for all items of both procedures were calculated according to the costs at the medical supplies in the region in Saudi Arabia Riyals (SAR) and US dollars (USD).

At the end of January 2005, the medical records of all patients admitted for ERCP and LC who were included in the study in the past three years were reviewed and all relevant data were collected. Standard statistical tests were applied to analyze the results.

RESULTS

A total of 400 patients were studied. Of them, 200 patients had undergone ERCP followed by immediate LC and the remaining 200 had ERCP followed by interval LC.

The profile of these cases is shown in Table 1.

Figure 1

Table 1: Characteristics of patients according to procedure

Characteristics	Immediate LC N=200	Interval LC N=200	P-Value
Socio-demographic data			
Age (years $\pm$ SD)	41.8 $\pm$ 18	43.6 $\pm$ 18.4	
Sex			
Male	95 (46%)	86 (43%)	0.04
Female	108 (54%)	114 (57%)	
Nationality			
Saudi	194 (97%)	197 (98%)	0.5
Non-Saudi	6 (3%)	3 (1.5%)	
Ultrasound Findings			
Dilated CBD with stone	51 (25%)	41 (20%)	
Dilated CBD without stone	27 (13%)	16 (8%)	
Normal CBD with stone	84 (42%)	130 (65%)	
Normal CBD without stone	41 (20%)	24 (12%)	
Presence of CBD stone	135 (67%)	162 (81%)	0.07
Hospital Stay: Mean (days) $\pm$ SD	2.1 $\pm$ 0.8	9.3 $\pm$ 2	<0.01
Interval between ERCP and LC (days $\pm$ SD)	1 $\pm$ 0.4	6.8 $\pm$ 2.1	<0.01
Sum of stayed days	416 days	1887 days	
Complications			
Bleeding	0	0	
Infection	0	0	
Transient Pancreatitis	3	0	
Papillotomy	138 (69%)	181 (90%)	<0.1
Conversion to open cholecystectomy	5	6	0.5

The mean length of stay in hospital for ERCP followed by immediate laparoscopic cholecystectomy was 2.1 days compared to 9.3 days in the other group ($p < 0.01$) the total days stayed in the hospital was 416 days for the first group and 1887 days for the second group.

Concerning outcomes, only three cases developed transient pancreatitis in the first group while there was no bleeding or infection in both groups. Conversion to open cholecystectomy was carried out in five cases in the first group and six cases in the second group.

The total cost of all cases in the first group was SAR. 2,875,200(= USD 766,720) in comparison to SAR. 3,469,800 (= USD 925,280) in the second group. It is obvious that by using the first procedure 17% of financial expenditure was saved. Details of the costs of both procedures are displayed in tables 2 and 3.

Figure 2

Table 2: Cost of each item used in both procedures per individual patient in SAR*

Item	ERCP with immediate LC	ERCP with interval LC
Ultrasound	300	600
Chest & Abdomen X-rays	120	120
ECG	50	50
Urine Analysis	25	25
Pregnancy Test**	30	30
Blood Sugar	25	25
LFT	560	840
Amylase	100	300
KFT	120	240
CBC	140	140
Electrolytes	200	740
Coagulation Profile	100	100
Blood Grouping	50	50
Blood Cross Matching	250	250
ERCP	2,500	2,500
Antibiotics	50	531
Analgesics & Sedatives	63	63
Vitamin K	3	15
I.V. Solutions	50	150
Laparoscopic Cholecystectomy	9,500	9,500
Diet (3 meals/day)	40	180
Hospital Bed/ Maintenance	100	900
Total Cost	14,376	17,349

* SAR= Saudi Arabian Riyals ** only for some female patients

Figure 3

Table 3: Estimated Total Cost of Hospital Care per individual patient in SAR* and USD**

Total Cost Per Patient SAR	14,376	17,349
USD	3,833.4	4,626.6
Total cost for 200 patients SAR	2,875,200	3,469,800
USD	766,720	925,280
Money Saved (amount and %)	SAR 594,600 (17%) USD 158,560	

* SAR= Saudi Arabian Riyals

** USD= United States Dollars

Conversion done at the exchange rate during the time of study

DISCUSSION

With advances in surgical care, one day surgery has become one of the most common and welcome approaches. However, evaluation of safety and cost of the commonly used procedures were rarely carried out in Saudi Arabia. In this study, we evaluated two different approaches (ERCP followed by immediate laparoscopic cholecystectomy versus ERCP followed by interval LC) regarding the safety and the costs.

The study revealed that the first group stayed in the hospital for a shorter time than the second group (2.1 days versus 9.3 days). The sum of the days stayed by the first and by the second group was 416 and 1887, respectively. This difference in the length of stay was statistically significant ($p = <0.01$). Such a longer stay will lead to increased cost of health services and could lead to increased incidence of hospital acquired infections. As so many patients will stay for a long time in the hospital, few beds will be vacant for new admissions. Comparing to national and international studies, we found that the average stay in hospital was shorter than that reported by Meshikhes et al.,³ Al Karawi et al.,⁷ Maiore et al.,⁸ and Hamy et al.,⁹

Both procedures were safe and only 3 cases of transient pancreatitis occurred in the first group, which was statistically not significant. These findings differed from many studies which reported a variety of complications such as atelectasis and gall bladder injury which did not occur among our patients.^{3,5,6,10}

Conversion rate to open cholecystectomy was 2.7% in the

first group and 4% in the second group with no statistical significance. These findings were similar to those by Hamour (4%)₄ and Al-Hadi (2.7%)₂, but differ from those reported by Meshikhes (11%)₃ and Romano (7.3%)₁₁.

Generally, the cost of most investigations and procedures carried out for the patients of both groups were similar except for ultrasound, LFT and Electrolytes which were frequently requested for monitoring the patients during longer hospitalization.

It is obvious that using the first approach was cost-effective in comparison to the second approach and about 17% of the total cost was saved. However, this cost should be interpreted carefully due to variations in the costs among different private sectors in Saudi Arabia.

CONCLUSION

This study clearly revealed that using ERCP followed by immediate laparoscopic cholecystectomy is similar in safety to the ERCP followed by interval laparoscopic cholecystectomy in management of gallstones in patients without co-morbidity. The first approach was found to be more cost-effective and time saving in comparison to the second approach.

The results of this study should encourage us to use the first approach in the management of biliary stones, particularly for patients without co-morbidities.

APPENDIX A

General Protocol for Management
Investigations on Admission
Investigations done for all patients

On admission

1. Complete Blood Counts (CBC)
2. Liver Function Tests (LFT)
3. Urea, Electrolytes and Blood Sugar
4. ABO grouping
5. Coagulation Profile
6. Abdominal Ultrasound
7. Urine Analysis
8. Chest X-ray & ECG for patients above 35 years

For patients undergoing ERCP the following medications were given Prophylactic Antibiotics

Intravenous Conscious Sedation for ERCP according to Hospital Policy

Drugs used: Midazolam & Pethidine at the time of the procedure

SUMMARY

In patients with choledocholithiasis, the author recommends ERCP followed by immediate laparoscopic cholecystectomy which is safe and more cost-effective compared to ERCP followed by interval laparoscopic cholecystectomy.

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