

Preoperative Endoscopic Sphincterotomy vs. Laparoscopic Common Bile Duct Exploration

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Abstract

Background: the traditional treatment of patients with gallstone and common bile duct stone are preoperative endoscopic sphincterotomy followed by laparoscopic cholecystectomy. Recently many surgeons had challenged this approach by single session laparoscopic common bile duct exploration and cholecystectomy.

The aim of this review is comparing between these therapeutic approaches regarding success rate, clinical outcome, duration and cost of hospitalization

Methods: A systematic search was conducted by electronic search engine, the titles of the relevant articles were acquired, and the references of the retrieved articles were checked and reacquired if they were relevant. **Results:** laparoscopic common bile duct exploration was associated with decrease in cost vary between 140\$ to 6,393\$, lower complication rate (7% vs 8.25%) and shorter median hospital stay (5.6 vs. 7.2 days) if it compared with preoperative endoscopic sphincterotomy followed by laparoscopic cholecystectomy.

but they have almost similar successful rate, mortality rate, and requirements for additional procedures.

Conclusions: In an elective clinical setting, if the patient is otherwise fit, single stage laparoscopic cholecystectomy and common bile duct exploration may be better treatment than two stage preoperative endoscopic sphincterotomy followed by laparoscopic cholecystectomy.

Keywords: laparoscopic common bile duct exploration, laparoscopic cholecystectomy, endoscopic sphincterotomy, CBD stones, ERCP.

Introduction

The prevalence of common bile duct (CBD) stones in patients who undergoing cholecystectomy was reported to be between 8% & 18%^(1,2,3). CBD stones can be suspected pre-operatively by symptoms or signs of jaundice, pancreatitis or cholangitis, by derangement in liver function tests, or on imaging showing duct dilation or actual ductal stones. In the era of laparoscopic cholecystectomy and before laparoscopic CBD exploration (LCBDE) became well known procedure, most CBD stones found before surgery were managed by either endoscopic retrograde cholangiopancreatography (ERCP) with or without endoscopic sphincterotomy (ES) followed by laparoscopic cholecystectomy (LC) or open cholecystectomy and exploration of CBD.

However, as laparoscopic clearance of CBD stone has become more technically feasible now days, many laparoscopic surgeon Challenge this traditional management by single stage LC & LCBDE. The laparoscopic exploration can be accomplished either through trans cystic approach or via choledochotomy, under fluoroscopy control or using choledochoscopy. The stone either flushed to the duodenum with saline or retrieved by spontaneous evacuation, Dormia basket, Fogarty balloon catheter or laser lithotripsy. Following CBD clearance the procedure finished with external biliary drainage (cystic tube or t-tube), internal stent, or primary closure^(4,5,6).

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Objectives

To compare two stage management of CBD stone ; ERCP followed by LC (ERCP&LC) with single stage LCBDE & LC regarding duration of hospitalization, success rate, cost, morbidity, and mortality.

Methods

A systematic search was conducted by Google, Pubmed database, Cochrane database SpringerLink, HINARY access, Highwire press and others using the following keywords: laparoscopic exploration of common bile duct, endoscopic retrograde cholangiopancreatography, endoscopic sphincterotomy, ERCP, and LCBDE. The title of the relevant articles were acquired, the references of the retrieved articles were checked and reacquired if they were relevant. The criteria for selection of literature when they had two groups; one for the two stage management including preoperative ERCP followed by LC, the other group include single session LC with LCBDE. The articles that were excluded from this

review including those which compare between postoperative ERCP and LCBDE or open CBD exploration because they are out of the scope of this research, and those which contain one arm of the procedure because they are non-comparative studies.

Results

There were five published data^{10,11,12} found that compared between the total cost of preoperative ERCP/LC and LCBDE/LC (table 1). Three of these studies revealed that LCBDE was associated with decrease in cost vary between 140\$ to 6,393\$ if it compared with ERCP/LC. While Schroepel et al¹⁰ & Benjamin et al¹¹ showed that preoperative ERCP is less costly than LCBDE but they did not taking in consideration the cost of subsequent LC.

Table 1 cost comparison between preoperative ERCP vs. LCBDE

Reference	year	No. of patients	Preoperative ERCP/LC	LCBDE
Schroepel TJ et al. ⁽⁹⁾	2007	117	13,026\$*	15303\$
Urbach DR et al. ^{(9) §}	2001		1917\$**	1431\$**
Benjamin K et al. ^{(10) §}	2007		24900\$*	28900\$
Liberman M A et al. ⁽¹¹⁾	1996	76	21,125\$	14,732\$
Rogers S et al. ⁽¹²⁾	1999	112	11900\$	11760\$

* The cost of the subsequent LC was not added.

** The costs are those in excess of the cost of a laparoscopic cholecystectomy

§ The number of the patients was not given in the article

There were five published articles^(13,14,15,16,17) found that compare the clinical outcome between the two methods of treatment of CBD stones, three

of which are prospective randomized studies^(13,14,15), the other two are retrospective studies^(16,17) (table 2).

Table 2 the sources of the clinical outcomes.

references	year	Study design	Total no. of patients	ERCP&LC*	LCBDE
ACuschieri <i>et al</i> ⁽¹³⁾	1999	Prospective randomized	300	150	150
Liberman M A <i>et al</i> ⁽¹²⁾	1996	retrospective	76	17	59
Heng-Hi Lien <i>et al</i> ⁽¹⁴⁾	2005	retrospective	162	80	82
Rogers S <i>et al</i> ⁽²³⁾	1999	Randomized control	112	56	56
Sogarkis G <i>et al</i> ⁽¹⁵⁾	2002	randomized	78	42	36

*preoperative ERCP followed by LC

A total of 728 patients were collected from these studies; 345 underwent preoperative ERCP followed by LC, 383 patients underwent

LCBDE. The clinical outcomes are summarized in table 3.

Table 3 the clinical outcome.

	ERCP&LC (n= 345)		LCBDE (n=383)	
	median	range	Median	range
Duration of hospital stay(days)	7.23	1.9-9	5.68	1.3-6
Successful rate	85.33%	84-88%	86%	84.4-88%
Complication rate	8.25%	2.8-41%	7%	3.7-15.8
Mortality rate	1.3%	0-2.3	1.15%	0-1.7%
Requirement for other procedure*	13%		12.6%*	

* Only A. Cuschieri *et al* study clearly define the requirement of other procedure

Discussion

Before era of laparoscopy preoperative ERCP for suspected choledocholithiasis was not common, since reports of preoperative ERCP followed by open cholecystectomy failed to demonstrate a reduction in morbidity or mortality when compared to open cholecystectomy with CBD exploration^{13,14}. In 1989, when laparoscopic cholecystectomy (LC) was introduced, preoperative ERCP became the standard approach for patients with suspected CBD stone, and LC would be performed only after the duct was shown to be free of stones to avoid conversion to open exploration¹⁵. Subsequently, there was dramatic increase in ERCP with negative finding reaching 20-74%^{16,17}. But as result of intraoperative cholangiogram was performed during laparoscopic cholecystectomy, many missed CBD stones had been encountered and many surgeon attempt CBD clearance laparoscopically at the same session. The value of endoscopic sphincterotomy is obvious in those who were unfit for general anesthesia and emergency situation like in cholangitis and pancreatitis, while in young healthy patients single session management would be more attractive especially without much morbidity and mortality with preservation of the sphincter. Moreover, B Millat et al found that LCBE provide a good option for CBD clearance in case of failure of ERCP, with success rate exceeding 90%¹⁸.

A main drawback in considering the review article is that there are few randomized trials that can give firm conclusion. The only exception in this field is found in the randomized prospective study including many centers in Europe and Australia which accomplished by A Cuschieri et al, who compared between the two methods of treating CBD stone in case of gall bladder in situ, and they found that LCBE associated with significant shorter hospital stay than preoperative ERCP/LC but they had equivalent success rate and morbidity¹⁹.

However, the data collected in this review revealed that patients with gall stone as well as CBD stones who treated by preoperative ERCP

followed by LC had longer hospital stay, higher morbidity and associated with more cost if they are compared with single session LCBE and LC, but they have similar success rate, mortality rate and requirement for additional procedure to treat the retained stone and other complications (table 1 & table 3). S.E. Tanter et al found during reviewing articles that as concern as short term sequelae LCBE were superior to preoperative ERCP regarding mortality rate and number of hospital admission but slightly higher morbidity rate, and they recommend LCBE to avoid long term sequel of cutting the sphincter of Oddi²⁰.

Conclusions

Based on current evidence we therefore suggest the following approach for managing bile duct stones with an intact gall bladder. Sphincterotomy would be the initial procedure in acute cholangitis or severe gall stone pancreatitis. In an elective clinical setting, if the patient is otherwise fit, laparoscopic cholecystectomy and bile duct exploration may be a better approach.

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