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A COMPARISON OF LAPAROSCOPIC AND OPEN CHOLECYSTECTOMY IN PATIENTS WITH COMPENSATED CIRRHOSIS AND SYMPTOMTIC GALL STONES

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Background: *The advantages of laparoscopic cholecystcytomy (LC) for most patients have been extensively published. However its benefits and successful use in patients with cirrhosis are less documented.*
Methods: *A randomized prospective study,. where fifty patients with symptomatic gallstone cholecystectomy disease between January 1999 and December 2001 undergone either open cholecystectomy (OC) or laparoscopic. These patients were randomized into 2 groups: Group I included 24 patients who underwent OC, and Group II included 26 patients who underwent LC. Patients age, sex, clinical presentation and child – Turcotte – Pugh (CTP) class were documented. No patients in this study had CTP class C cirrhosis.*
Main outcome measures: *operative time, postoperative pain (measured by visual analogue scale), hospital stay, blood loss, morbidity, recovery time (return to work), and liver function tests abnormalities.*
Results: *there was no operative mortality. Conversion to OC was necessary in3 patients. Mean surgical time was significantly longer in OC group (group I) than LC group (group II). (mean ± SD, 96.6 ± 32 minuets vs 58.7 ± 23.8 minuets, P = 0.037). No patients in Group II required any blood replacement in contrast to 9 patients (37.5 %) in Group I. Intraoperative bleeding remained significantly higher in Group I. (P = 0.043). No patients in Group II had wound complications compared with 5 patients (29.14 %) in Group I. The Group I had significantly longer hospital stay than Group II (mean 9.0± 1.3 days (median 7) Vs 2.3 days ±1.9 (median 2.5); P = 0.001.*
Conclusion: *Our results demonstrate that laparoscopic cholecystectomy can be performed safely in patients with CTP class A and B cirrhosis. It offers several advantage over open cholecystectomy, including lower morbidity, shorter operative time, and reduced hospital stay with less need for blood transfusions.*

Key Words: Liver Cirrhosis, Child Turcotte-pugh classification, Open cholecystectomy and laparoscopic cholecystectomy.

INTRODUCTION

Infection with hepatitis C virus (HCV) has become the most important public health problem in Egypt. There is a high incidence of anti-HCV seropositivity among the Egyptian population, with an overall age-adjusted prevalence of HCV antibodies of 21.9% [(1)]. Schistosoma mansoni (SM) is endemic in Egypt. The prevalence of Schistosoma mansoni in the Nile River Delta extends to 45% of the population [(2)]. Chronic viral hepatitis C and infection with SM are the two major causes of chronic liver disease in Egypt [(3)].

Gallstones are twice as prevalent in patients with cirrhosis than in the general population [(4)]. Factors implicated in the higher incidence of gall stone formation include hypersplenism, increased levels of estrogen, and increased intravascular haemolysis with reduction in gall bladder emptying and motility [(5)].

The technical challenge and risks of performing open cholecystectomy (OC) in patients with compensated cirrhosis and symptomatic gall stone disease have been well documented [(6)]. The severity of cirrhosis assessed with child–Turcotte-pugh (CTP) classification, is a major determinant in deciding which treatment approach is optimal [(7)].

Since the introduction of laparoscopic cholecystectomy (LC), a controversy regarding which procedure is preferable for patients with cirrhosis has arisen [8]. Several studies reported good results and suggested liberal use of LC in patients with early–stage cirrhosis and symptomatic gall stone disease [9]. No definite data have been offered to prove LC should be the first surgical line in patients with cirrhosis. The present study is a prospective analysis comparing the results of OC and LC in patients with compensated cirrhosis and symptomatic gall stone disease. The purpose of this study was to compare the risks and benefits of performing open cholecyctectomy (OC) and laparoscopic cholecyctectomy (LC) in patients with compensated cirrhosis.

PATIENTS AND METHODS

Between December 1999 and December 2001, a consecutive 50 patients with hepatic cirrhosis and symptomatic gall stone disease underwent cholecystectomy at Mansoura University Hospital, Mansoura Egypt. These patients were subjected to a thorough history and clinical examination focused on manifestations of gall stone disease and chronic liver disease. The following laboratory investigations were performed:

-Urine and stool analysis.

-Liver function tests (serum bilirubin , ALT, AST, prothrombin time , (INR) and Serum albumin)

-Whole blood picture ; kidney function tests.

-HCV and HBV markers.

The diagnosis of schistosomiasis was based upon positive stool analysis or positive rectal snip for schistosomal egg. A history of repeated antischistosomal treatment and / or positive indirect hemagglutination assay (IHA) for schistosomiasis indicated previous exposure[10]. Patients positive for Schistosoma Mansoni (SM) with negative viral markers were considered pure SM. Patients with positive anti HCV antibodies, high liver enzymes, positive HCV by RT-PCR , and negative for schistosomiasis were assigned to the pure HCV group. Patients positive for both HCV and schistosomiasis made up the mixed (HCV + S) group. Patients positive for HBV and negative for HCV are considered pure HBV group. Patients positive for both HCV and HBV made up the mixed (HCV + HBV) group).

The diagnosis of cirrhosis had been proven on clinical basis, laboratory results, macroscopic intra-operative appearance and liver biopsy [15 patients preoperative and 13 patients intra-operative].

The prepared slides were examined by a pathologist to detect and stage fibrosis as Knodell et al [11] and the histopathologic activity index based on the assessment of portal inflammatory infiltrate, interface hepatitis and parenchymal necrosis (Fig 1,2,3 & 4) The diagnosis of gall bladder Lithiasis had been determined in all patients by clinical history and abdominal ultrasonography.

Randomization was carried out using presealed envelops immediately before the surgery. The child–Turcotte–Pugh classification system was used to assess the severity of cirrhosis. No patients in this study had a CTP class C cirrhosis.

All operations were performed under general anesthesia; hepatotoxic drugs were avoided. Estimated intra-operative bleeding was recorded from surgical reports, and blood loss was classified as less than 200 mL, 200 to 500 mL, and more than 500 ml. Blood replacement was also documented. Surgical and anesthetic times were documented as were intraoperative findings, perioperative complications, and length of hospital stay. A standard laparoscopic procedure was used for all patients, as described by Doubois et al [12]. Conventional cholecystectomy employed a 13 cm subcostal incision (10 patients) or upper right paramedian incision (14 patients).

Post operative subjective pain score on mobilization using the VAS (Visual analogue scale) was recorded on the 1st, 3rd 7th post operative days [13]. Also the serum interleukin-6 was measured at the 6 hour, and the 12 hour, postoperative using immunoassay (IMMULITE – IL-6, DPC Biermann Gmbh, Bad Nauheim Germany).

The patients are followed up weekly for the 1st month, monthly for first three months and every three months for a range of 12 months to 36 months, clinically, laboratory (Liver Function) and radiological (abdominal ultrasound).

Statistical comparisons between the OC and LC groups were made with Fisher's exact test for categorical variables and Wilcoxon's rank sum test for variables with continuous or ordinal distributions.

RESULTS

The Patients demographic data, and clinical presentation of gall bladder disease, etiology of liver disease, and its severity are shown sequential in (Tables 1, 2& 3).

Three cases were converted from laparoscopic to open cholecystectomy (one patient due to dense vascular adhesions, patient due to difficult dissection of Calôts triangle and another patient due to uncontrollable liver bed bleeding). (Table 4): showed shortened surgical time and hospital stay for LC group in comparison to OC group ($P<0.05$).

There was a significant intraoperative blood loss in OC group (P<0.05). Ten patients necessitating blood transfusion ranging from 1-2 units, but the estimated post operative blood loss was statistically insignificant between both groups (Table 5).

Table (6) showed a significantly reduced pain (subjective) score in LC group and similarly less burden on the patients metabolic response as reflected by lowered IL-6 level at the 6th hour and the 12th hour postoperative (P < 0.05).

No operative mortality in both groups. Lastly (Table 7) showed patients morbidity which is more frequent in OC group than LC group (P<0.05), with statistically significant difference as regard readmission in OC group [three patients with encephalopathy, one patient with ascetic fluid leak, one patient with wound hemorrhage, and one patient with wound infection necessitating debridment] and deterioration of liver function in OC group. Although bile leakage was more common in LC group (11.5%) but it showed no significant value.

Table (1): ***patient's demographics data***

Patients	*OC group*		*LC group*		*P value*
	n(24)	*(%)*	*n (26)*	*(%)*	
Age :					
Mean ± SD	42.3± 15.3		40.6± 14.1		NS*
Sex :					
Male	10	(41.7)	10	(38.5)	NS
Female	14	(58.3)	16	(61.5)	
clinical presentation					
Acute cholecystitis	2.0	(8.3)	I	(3.8)	NS
Biliary colic	22.0	(91.7)	25	(96.2)	

*Non-significant

Table (2): ***Etiology of liver disease***

Etiology	*OC Group*		*LC Group*	
	n(24)	*(%)*	*n(26)*	*(%)*
Mixed HBV & HCV	3	(12.5)	3	(11.54)
Pure HBV	1	(4.17)	2	(7.69)
Pure shistosomal	3	(12.5)	4	(15.38)
Pure HCV	9	(37.5)	11	(42.31)
Mixed shistosomal & HCV	7	(29.17)	7	(26.92)

Table (3): ***Severity of hepatic cirrhosis***

CTP	*OC group*		*LC group*	
	n(24)	*(%)*	*n(26)*	*(%)*
A	17	(71)	22	(85)
B	7	(29)	4	(15)
C	0	(0)	0	(0)

Table (4): ***Surgical time and hospital stay***

	OC group n(24)	*LC group n(26)*	*P value*
Surgical time (min)			
Mean ±SD	96.6 ± (32)	58.7 ± (23.8)	<0.05
Range	50.0 - I34	47 - 116	
Hospital stay (day)			
Mean ±SD	9.0 ± (1.3)	2.3 ± (1.9)	<0.05
Range	3 - 17	1 - 8	

Table (5): ***Intra- & post operative blood loss (ml)***

	OC group		*LC group*		*P value*
	n(24)	*(%)*	*n(26)*	*(%)*	
Intra operative					
<200	9	(37.5)	20	(76.9)	<0.05
200 – 500	6	(25)	4	(15.4)	
> 500	9	(37.5)	2	(7.7)	
Blood transfusion					
Yes	10	(41.7)	0	(0.0 %)	<0.05
No	14	(58.3)	26	(100)	
Postoperative loss					
<200	20	(83.33)	25	(96.15)	NS*
200 – 500	2	(8.3)	1	(3.84)	
>500	2	(8.3)	0	0	

*Non-significant

Table (6): ***post operative pain and interleukin 6 (U/ml)***

Postoperative pain	*OC group*		*LC group*		*P value*
	Mean	*±SD*	*Mean*	*±SD*	
1stday	8.7	0.77	3.9	.41	<0.05
3rdday	5.46	0.47	2.1	0.35	<0.05
7thday	4.41	0.73	1.3	0.48	<0.05
Postoperative IL- 6	Mean	Range	Mean	Range	
6th hour	1150	1250–750	450	550-450	<0.05
12th hour	900	1100-700	400	500-320	<0.05

Table (7): ***Patients morbidity***

	OC group		LC group		P. value
	n(24)	(%)	n(26)	(%)	
Morbidity	16	(60)	8	(30.7)	<0.05
Pulmonary infection	3	(12.5)	1	(3.8)	NS*
Urine retention	2	(8.3)	0	0	NS
Deterioration of liver function	8	(40)	4	(15.4)	< 0.05
Ascitic fluid leak	4	(16.7)	1	(3.8)	NS
Bile leakage	1	(4.2)	4	(11.5)	NS
Encephalopathy	1	(4.2)	0	0	NS
Wound complications					
Hemorrhage	2	(8.3)	1	(3.8)	NS
Infection	5	(20.8)	0	0	
Readmission	6	(25)	0	0	< 0.05
Incisional hernia	4	(16.7)	0	(0)	<0.05

*Non-significant

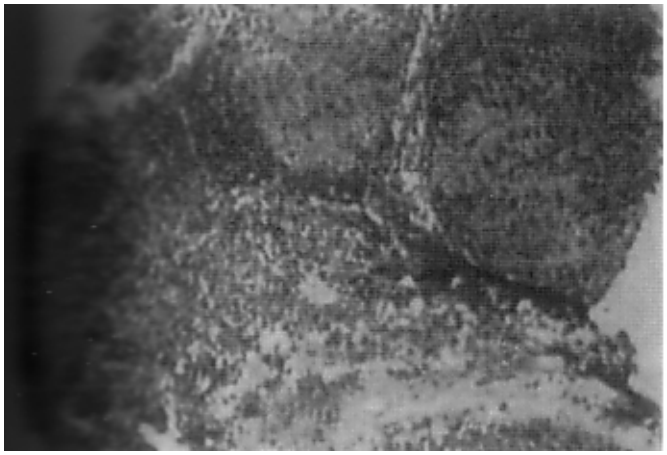

Fig. (1) A case of chronic hepatitis with marked activity and cirrhosis showing interface hepatitis with marked lymphocytic infiltration (H & E x 40).

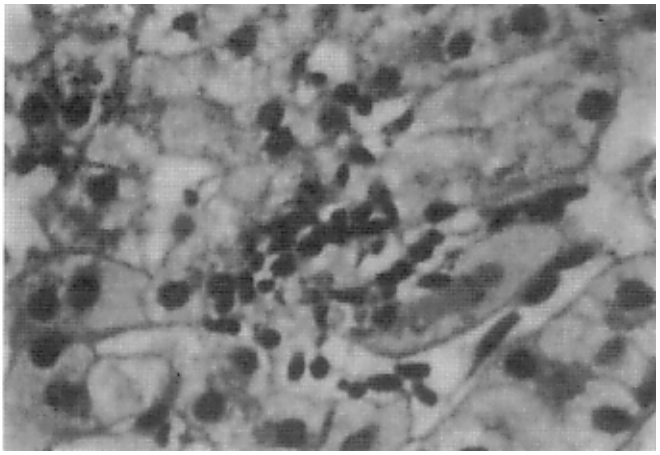

Fig. (2) : A case of hepatitis C showing focal liver cell necrosis replaced by inflammatory cells (H & E x 100).

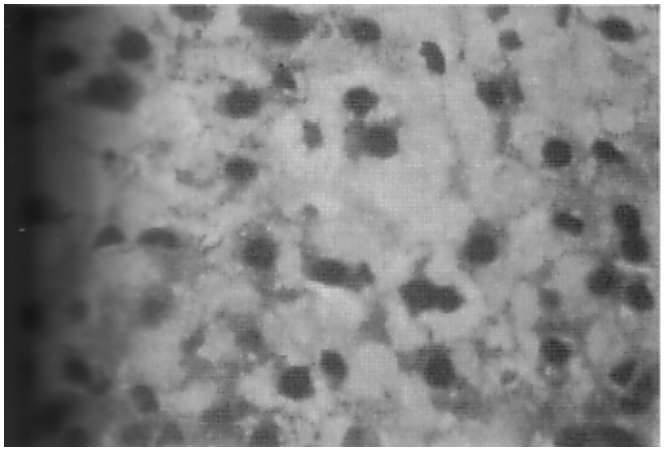

Fig. (3) : A case of hepatitis B showing ground glass hepatocytes (H & E x 100).

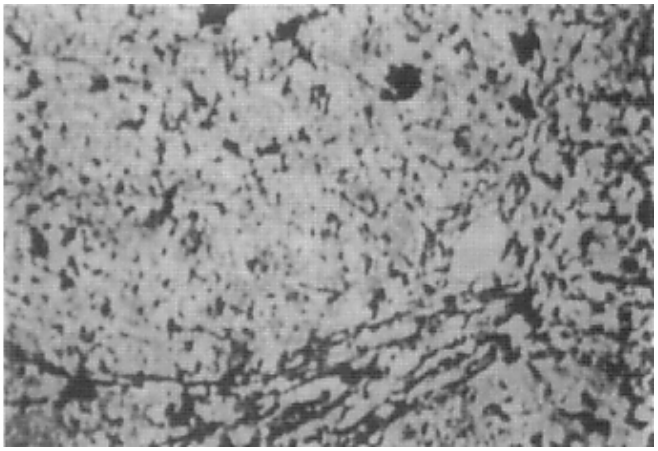

Fig. (4) : Liver biopsy with schistosomal granuloma with central hilharzial ovum in the portal area (H & E x 100)

DISCUSSION

In the early 1980s, open cholecystectomy in patients with cirrhosis was associated with a postoperative mortality ranging from 7% to 26% [7 ,14-16]. Excessive blood loss, postoperative liver failure, and sepsis were responsible for most of these deaths. The importance of stratifying patients according to CTP criteria as a method to predict perioperative complications was clearly demonstrated.

By the late 1980s better surgical results had been published for cirrhotic patients with normal hepatic synthetic function who underwent elective cholecystectomy[4&6]. Open cholecystectomy was subsequently considered an acceptable therapeutic option in patients with CTP class A and B cirrhosis. If the patient had class C cirrhosis and symptomatic gallstone disease, attempts were made to improve the patient's hepatic function and control of ascites to allow for a safer elective operation [17]. Since the introduction of LC, the question of whether cirrhotic patients might benefit from this less invasive approach has been arisen, but not fully answered.

Several recent studies [15,18-19] have demonstrated that LC in child A and B cirrhosis was safer and better tolerable than OC. There were less incision – related complications, no mortality, low morbidity, shorter operative time and

hospital stay and fewer transfusion requirements.

In this study the absence of mortality and low morbidity in the laparoscopic group confirm the privileged indication of laparocopic cholecystectomy in cirrhotic patients, also the low conversion rate similar to non cirrhotic patients narrow the spectrum of conversion and enhance laparoscopist to maintain that low conversion threshold. These data also confermed by Marino et al [18] and Saeki et al [20] Also the shortened surgical time for laparoscopic group with meticulous surgical procedure and the shortened hospital stay is related to the less morbidity and better local and systemic responses (physiologic, immunologic & metabolic) to this minimal invasive surgery.

In this study the reduced blood loss in the laparoscopic group, whether operative or postoperative, is related to the meticulous dissection (magnified surgical field) and the pneumoperitomeum barohaemostatic effect. These data correlate with the finding of Yardel et al [8] and Yardel et al [19].

The serum Il-6 level postoperatively was significantly increase, more in open cholecystectomy than laparoscopic one. These data proved that the serum IL-6 correlate well with the intensity of operative trauma[21-22]. The low subjective pain threshold and low objective interleukin 6 levels in LC group signify less body physiologic response to this minimal invasive procedure and support its liberal use in these fragile patients as reported by Schafer et al [23]. Similarly the absence of intraoperative intestinal retraction and less pain in the laparoscopic group explain the low occurrence of postoperative ileus and urine retention .

Moreover the absence of parietal incision in the laparoscopic group declines the incidence of pulmonary complications, incisional hernia, and readmission. These finding also reported by Poggio et al [24].

Also the reduced bleeding, intraoperative & postoperative, minimal dissection and shorter operative time all explain the lack of deterioration in liver function [25].

Nevertheless the shortened hospital stay, less morbidity and absent re admission decrease the total patient costs similar to that reported by Sleeman et al [26].

Lastly laparocopy as an alternative to open cholecystectomy is both beneficial to the patient and the surgeon. Laparoscopic cholecystectomy in cirrhotic patients prevents the hypervascular adhesions that contraindicate orthotopic liver transplant[27] and lessens the contamination risk to the medical and paramedical personnel [28].

CONCLUSION

An elective LC should be considered for every patient with CTP class A or B cirrhosis and symptomatic gallstone to prevent minimized biliary tract complications and the procedure had better outcome (less mortality and morbidity), shortened operative time and hospital stay, tolerable loco-systemic body response, wide range of safety (neither decomposition nor prevent orthotopic liver transplant), less economic, and preserve surgeon's safety.

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