Laparoscopic Cholecystectomy in Cirrhotic Patients

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Rezumat

Colecistectomia laparoscopică la cirofici

Introducere: Colecistectomia laparoscopică ar trebui să fie standardul de tratament al litiazei biliare simptomatice și a colecistitei acute la cirofici. Studiul nostru retrospectiv își propune să analizeze siguranța și complicațiile postoperatorii ale colecistectomiei laparoscopice la bolnavii cirofici în funcție de scara Child-Pugh a cirozei.

Material și metode: În perioada 01 ianuarie 2010 - 31 ianuarie 2020 am efectuat în Clinica I Chirurgie Iași 111 colecistectomii laparoscopice la bolnavi cu ciroza clasa Child-Pugh A, B și C. În aceeași perioadă s-au practicat și 5421 colecistectomii la bolnavi noncirofici.

Rezultate: Morbiditatea postoperatorie a fost de 16,2% și a inclus: hemoragia, complicații parietale, abcese intraperitoneale, complicații medicale. Rata colecistectomiilor dificile (grad 3 după Cuschieri) a fost de 28,8% (32 bolnavi). Aderentele subhepatice vascularizate s-au întâlnit la un sfert din bolnavi. Accidentele intraoperatorii au fost mai frecvente 27 (24.3%) la cirofici. Rata de conversie a fost de 6,3% (7 cazuri). Durata medie a intervenției chirurgicale a fost de 84 min. Spitalizarea postoperatorie medie a fost de 4,7 zile. Bolnavii cu clasa Child - Pugh B și C au avut o rată mai mare de complicații postoperatorii.

Concluzii: Colecistectomia laparoscopică poate fi o metoda sigură la bolnavi cu litiază biliară simptomatică sau complicată la bolnavi selectați cu ciroză clasa Child A și B, dar cu o rată mai mare de conversii și de morbiditate. Rezultatele postoperatorii sunt dependente mai ales de managementul perioperator al funcției hepatice.

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Cuvinte cheie: colecistectomia laparoscopică, litiaza biliară, ciroza hepatică

Abstract

Introduction: Laparoscopic cholecystectomy is the gold standard procedure in patients with cirrhosis and symptomatic gallbladder disease or acute cholecystitis. In this retrospective study we evaluated laparoscopic cholecystectomy in patients with cirrhosis based on Child-Pugh score as a predictor of morbidity.

Methods: In the First Surgical Clinic of Iasi, from 01 jan 2010 to 31 jan 2020, we performed 111 laparoscopic cholecystectomies in Child-Pugh A, B, and C cirrhotic patients.

Results: Intraoperative difficulty (grade 3 Cuschieri) was experienced in 32 patients (28.8%). Highly vascular sub hepatic adherences have been reported in a quarter of all patients. Intraoperative incidents were more frequent 27 (24.3%) compared to laparoscopic cholecystectomy performed in other patient groups. The conversion rate to open cholecystectomy was 6.3% (7 cases). Mean operative time was 84 min. Mean duration of hospitalization stay was 4.7 days.

Conclusions: The morbidity rate was 16.2% of patients and included bleeding, intraabdominal fluid collections and wound complications more common in patients with Child-Pugh Cirrhosis B and C. The results are dependent of the perioperative management of the liver function.

Key words: laparoscopic cholecystectomy, gallbladder lithiasis, liver cirrhosis

Introduction

Laparoscopic cholecystectomy (LC) is considered a safe, gold-standard procedure in selected patients with symptomatic gallbladder lithiasis and hepatic cirrhosis, especially Child-Pugh (C-P) score A and B patients. The procedure should be performed in hospital centers specialized in the field of hepatobiliary surgery, centers which also have multidisciplinary teams of surgeons, anesthesiology and intensive care specialists and gastroenterology. The complex interdisciplinary teams can preoperatively properly manage these frail patients (the careful investigation and improvement of hepatic function, adequate nutritional support, correction of the coagulopathy, safe intraoperative hemostasis) thus ensuring lowest morbidity and mortality rates.

Methods

A retrospective analysis of a prospective database was performed. The information was collected using research charts which were filled out at patient discharge, containing pre-

operative information, surgical details of each LC performed and postoperative evolution. This prospective database was created to assess the LC in the cirrhotic patients admitted in the First Surgical Clinic of „St Spiridon” Hospital in Iași. The study had been approved by the ethical committee of the University of Medicine and Pharmacy “Grigore T. Popa” Iași. Included in the study were patients which have been diagnosed with cirrhosis prior to the current hospital admission or which were diagnosed intraoperative (macroscopically aspect of the liver or liver biopsy). The patients which were prior diagnosed with cirrhosis have been hospitalized in the Gastroenterology and Hepatology Clinic and thoroughly investigated (completed liver tests, viral markers, abdominal ultrasound, fibroscan and in some instances abdominal computer tomography and upper gastrointestinal endoscopy). The diagnosis of gallstones or acute cholecystitis was established using ultrasound imaging. Data recorded in the research charts included general patient information, comorbidities, details regarding

the cirrhosis (earlier diagnosed or during the current hospitalization, etiology liver function tests, coagulation profile, serum creatinine levels, platelet count, C-P and MELD classification), clinical presentation (symptomatic cholelithiasis, acute cholecystitis). The data acquired was compared to the data of non-cirrhotic patients which underwent LC (5421 patients).

Preoperative patient preparation included correction of the coagulopathy using vitamin K, correction of the hypoproteinemia using adequate nutritional support, and administering platelet transfusion in cases with severe thrombocytopenia. The trocars were introduced outside of the area with high risk of hemorrhage (Hasson technique), the dissection was gentle with minimal liver manipulation in order to avoid or minimize bleeding and thus future sub hepatic adhesions (bearing in mind the possibility of a future liver transplant). In rare occasions (3 cases) subtotal cholecystectomies using staplers were performed. These patients presented with acute cholecystitis and this procedure was chosen in order to avoid any intraoperative visceral, biliary or vascular accidents and or to avoid risky dissection near the portal pedicle. If warranted, control of bleeding gallbladder bed was achieved using either argon cauterization or TachoSil®.

The collected data was statistically analyzed using SPSS v. 17 (t-student for continuous variables and Chi-square test (χ^2) to analyse the categorical data statistically). Statistical significance was judged at a probability to error of $p < 0.05$.

Results

111 cirrhotic patients underwent LC for gallstone disease between 01 jan 2010 to 31 jan 2020 in the Department of hepatopancreato-biliary (HPB) surgery of the First Surgical Clinic of Iasi (*Table 1*). In the same time, 5421 patients with symptomatic cholelithiasis but without cirrhosis underwent LC.

From the total of 111 cirrhotic patients with LC, 320 (28.8%) were males, and 79 (71.2%)

females; with a mean age of 57 ± 12 years. The laparoscopic cholecystectomy was done due to acute cholecystitis in 27.4% of cases. When compared to the non-cirrhotic patients, we can observe a significant difference in incidence ($p = 0.015$, χ^2 test). Thus in the cirrhotic group there is a higher incidence of cholelithiasis in the male patients (28.8% vs 14.8%, χ^2 test ns) and also this diagnosis occurred at an older age (57 ± 12 years vs 49 ± 11 years, t-student, ns). The etiology of the cirrhosis was alcoholic liver disease (26.1%), chronic infection with hepatitis virus C (25.2%) or hepatitis virus B (16.2%). In regard to C-P score, most were class A patients, followed by class B and only one case of class C at which emergency forced us to operate.

LC was more difficult (grade 3 Cuschieri) in cirrhotic patients (28.8%) compared to non-cirrhotic patients (19.2%). The presence of highly vascularized subhepatic adhesions were described in one quarter of cirrhotic patients (*Fig. 1*). Also, intraoperative incidents were more common: 27 cases (24.3%). These incidents included: gallbladder perforation – 17 cases, lost gallstones inside the peritoneal cavity – 2 cases, bleeding (gallbladder bed) – 4 cases, perforation of gallbladder during extraction – 2 cases, bleeding from the cirrhotic liver – 2 cases. In order to control the bleeding in the gallbladder bed, argon cauterization was used in 16.2% of cases and in only one case conversion to open surgery was required in order to achieve hemostasis.

Mean operative time of LC in cirrhotic patients (84 minutes) was almost double than mean operative time in the non-cirrhotic group (46 minute) ($p = 0.0001$, t-student). Same it can be observed in conversion to open surgery (6.3% compared to 2.9%, $p = 0.0001$, χ^2 test). Causes which determined conversion (7 patients): plastic peritonitis – 2 cases; gangrenous acute cholecystitis – 2 case; uncertain anatomy – 1 cases; associated CBD stones – 1 case; persistent bleeding from a liver wound – 1 case.

There were no biliary or visceral lesions which required interventions (morbidity Clavien III, IV). Postoperative wound

Table 1.
Characteristics of patients

Characteristics of patients	LC in cirrhotics patients No (%) 111	LC in noncirrhotics patients No (%) 5421	Statistical signifi-
cance			
Gender males	32 (28.8%)	802 (14.8%)	ns
Females	79 (71.2%)	4519 (85.2%)	ns
Age (years) Mean	57 ± 12 y	49 ± 11 y	ns
Co-morbidity	33.4 %	22.4	ns
Cirrhosis causa Hep. Virus C	25.2 %	-	
Virus B	16.2 %	-	
Toxic	26.1 %	-	
Cryptogenetic	22.5 %	-	
Acute cholecystitis	27.4%	22.7	p=0.15
CTP score	A	74.8%	-
	B	25.3%	-
	C	0.9%	-
Lab ex. Mean: Bilirubine (mg/dl)	1,44 ± 0,78	0,92±0,39	p =0.003
Albumine (g/dl)	3,77 ± 0,76	4,43±0,29	p =0.0001
Platelet count	107000 ± 47000	190000±60000	p=0.0001
INR	1,80 ± 0,76	0,98±0,06	p= 0.03
GGT (U/l)	62.2 ± 14.5	-	
Operative adhesions	24.1%	16.3%	
Operative bleeding	20%	6 %)	p= 0.0001
Using argon device	16.2%	-	
Using Tachosil	10.8%	-	
Blood transfusion	3.6%	-	
Plasma transfusion	4.5%	-	
Difficult LC	28.8%	19.2%	p= 0.0001
Operative time (min)	84 ± 31	46 ± 29	p= 0.0001
Conversion to open	6.3 %	2.9 %	p=0.001
Morbidity	18 (16.2%)	4.2%	p= 0.0001
Mean postoperative hospital stay	4.7 =/ -3.7	2.7± 2	p= 0.09
Mortality	1 (0.9%)	-

Figure 1. LC in cirrhotic patient. Intraoperative aspects

infections or hemorrhagic incidents were the most common postoperative complications, which were treated conservatively (12 cases) or required reintervention (6 cases). Morbidity was 16.2% and included sub hepatic abscess (2 cases), gallbladder bed bleeding (2 cases), post-operative wound bleeding (2 cases), surgical wound infection (2 cases), respiratory tract infections (3 cases), urinary tract infections (3 cases), phlebitis (2 cases), ascites (1 case), hepatic failure (1). All these complications were observed in class B and C C-P cirrhotic patients. There was one fatality reported: a class C C-P cirrhotic patient which presented with acute cholecystitis and angiocholitis, with important medical history and post-operatively developed hepatorenal syndrome.

The mean hospital stay was 4.7 days in the cirrhotic group, compared to 2.7 days for non-cirrhotic patients ($p=0.09$, t-student)).

Discussions

The prevalence of gallstones in cirrhotic patients is three times higher than in non-cirrhotic (hemolysis secondary to concurrent hypersplenism, decreased biliary acidity, impaired gallbladder emptying, metabolic liver failure) (1). Alcoholic cirrhosis increases the risk for pigment biliary stones, as it was observed in our data (26.1%). Cholelithiasis also has a greater incidence in male cirrhotic patients, usually a decade older than population incidence, and also with a more complex medical history.

Laparoscopic cholecystectomy (LC), although initially contraindicated in cirrhotic patients, has gradually replaced open cholecystectomy as standard surgical procedure in gallstone disease (2,3). Multiple studies have highlighted the advantages of minimally invasive approach in comparison to open surgery, with emphasis on lower morbidity, shorter hospitalization, reduced costs and a quicker recovery, as shown also in our study (4,5).

We gathered from literature 24 studies regarding LC in cirrhotic patients, from the early studies in 1998, which enlisted more than 22 patients, until present day. These

studies reported 1805 LC in cirrhotic patients, C-P class A- 71.8%, class B- 25%, and class C – 3.2%. Morbidity rate was 21.8%, mortality rate 1.2% and a mean hospitalization of 3.1 days. Mean operative time was 132 minutes with a conversion to open surgery rate of 7.7%. If the clinical presentation was of acute cholecistitis, LC was performed in 32.6% of cases (2-25) (*Table 2*).

Our study, along the literature data, suggest that LC in the cirrhotic patient (in comparison to non-cirrhotic patients) is more difficult, with longer operative time and hospital stay, with more frequent intraoperative incidents and higher morbidity, sometimes life-threatening (especially in class C patients). The laparoscopic approach is recommended in cirrhotic patients because open surgery is more prone to complications and double hospitalization time.

LC in the cirrhotic patient also poses risks. Patients with liver cirrhosis have an increased risk for hemorrhage and infection. Quillin et al. reported a study which included 94 cirrhotic patients which underwent LC a conversion rate of 11%. Postoperative morbidity was associated with low serum albumin, international normalized ratio (INR) outside normal values, CTP class B or C and the need of blood transfusions (22). In this study the mortality rate was 4%, all patients being C C-P score.

Patients MELD score (Model for End Stage Liver Disease) is the best predictive factor for morbidity. Delis et al enlisted 220 patients with cirrhosis and LC. They reported no fatalities, a conversion to open surgery rate of 5.45% and morbidity of 19%. A MELD score higher than 13 was a predictive factor for morbidity. The authors of the study recommend that in difficult cases with acute cholecystitis a subtotal cholecystectomy should be performed, as we also did in 4 cases. Also the authors advocate the use of intraoperative ultrasound imagery to safely describe the local anatomy and transillumination of the abdominal wall to avoid collateral circulation, as we also systematically use in our clinic (18).

Other authors recommend the usage of

Table 2. Literature review: LC in cirrhotics

Author (year)	Patients No	Gender (M/F)	CP A	CP B	CP C	Acute Cholec %	Op. Time min	Conv. Rate %	Morbidity %	Mortality %	Hosp. Stay - days
Sleeman et al. 1998 (2)	25		16	9	0		116	-	32	0	2.7
Friel et al. 1999 (3)	30		23	7	0		139	17	23	0	3.1
Morino et al. 2000 (4)	33		27	4	2		114	6	-	0	2.8
Clark et al. 2001 (5)	25		14	9	2		107	-	52	4	4
Yeh et al. 2002 (6)	226		193	33	0		87	4.4	6.6	0.8	4.7
Cucinotta et al 2003 (7)	22		12	10	0		115	9	36	0	5
Cobb et al. 2004 (8)	50		39	10	1		155	4	16	0	3
Ji et al. 2004 (9)	38		19	15	4		63	5	13	0	4.6
Curro et al. 2005 (10)	42	17/25	22	16	4	52.4	128	7.1	35	4.7	7.3
Palanivellu et al. 2006 (11)	265	142/123	-	-	-	35.1	65	0.75	15	0	4
Tayeb et al. 2008 (12)	30	9/21	24	6	0	-	80	6.6	23.3	0	3.2
Leandros et al. 2008 (13)	34	19/15	23	11	0	23.5	96	8.8	14.4	2.9	3
Mancero et al. 2008 (14)	30	18/12	23	7	0	-	132	-	23.3	0	2.3
Cappellani et al. 2008 (15)	40		20	10	10		111	8	25	8	6
Pavlidis et al. 2009 (16)	38	14/24	29	9	0	18.4	-	15.7	8	0	4.4
El Awadi et al. 2009 (17)	55	26/29	47	8	0	3.6	76	7.3	12.7	0	2
Delis et al. 2010 (18)	220	106/114	194	26	0	29.5	95	5.5	11.6	0	4
Bessa et al. 2011 (19)	40		27	13	0		95	7.5	32.5	0	4
Lledo et al. 2011 (20)	43		26	15	2		84,3	7,2	37.2	0	3.1
Nguyen et al. 2011 (21)	68		47	19	2	31	120	5.9	7.4	0	2
Quillin et al. 2013 (22)	94	47/47	73	20	1	2	114	11	34	4	2.6
Khan et al. 2013 (23)	82		46	24	12		80	3.7	50	0	3.2
Kassem et al. 2018 (24)	62	42/20	35	27	0	90.3	72.9	3.2	1.6	0	2
Gad E. H. et al 2020 (25)	213	114/99	127	77	9	26.3	109	3.8	22.1	2.3	2.4
Total	1805		71.8%	25%	3.2%	32.6%	132 min	7.7 %	21.8%	1.2%	3.5 days

Harmonic scalpel in order to reduce hemorrhagic incidents (25, 26).

Despite the advances in laparoscopic surgery, the conversion to open surgery rate remains high (double in our study). The conversion is performed either by intraoperative decision due to unclear anatomy, inflammation or adherences which impede a safe dissection, or by necessity due to serious complications such as biliary, visceral or vascular lesions which can lead to life threatening situations (26). The higher risk of postoperative infections of the cirrhotic patient is explained by the impairment of liver function which can lead to endotoxemia infection and sepsis (27). Cirrhotic patients must be thoroughly monitored postoperatively and, if the case, included in the hepatic transplant program.

Conclusions

Laparoscopic cholecystectomy is safe for patients with Child Pugh A cirrhosis and should be carefully indicated in patients with Child Pugh B cirrhosis, with a high but acceptable rate of morbidity and conversion rate.

LC in cirrhotic patients poses a greater degree of difficulty and thus should be performed by experienced surgical teams, specialized in hepatobiliary tract surgery, thus able to tackle the more frequent intraoperative incidents or complications. Postoperative results are highly dependent on patient selection and the management of the liver function.

Conflict of Interest

The authors do not have any conflicts of interest to declare.

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