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A retrospective study

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The aim of the present study is to analyze outcomes after laparoscopic cholecystectomy (LC) and minilaparotomy cholecystectomy (MC) for gallstone disease and determine the algorithm of treatment for different groups of patients according to the age, severity of disease and comorbid conditions. This is a multicenter retrospective review of 2997 patients who underwent LC or MC between January 1, 2002 and December 31, 2008. The patients were categorized into LC (1479) and MC (1518) groups. When preoperative examination data were not reliable, we performed abdominal wall lifting with the retractors to visualise abdominal cavity with laparoscope during minilaparotomy. There were statistically significant differences in conversion rate (47 LC and 22 MC cases) (P=0.002), mean operating time (76 and 55 minutes in LC and MC, respectively) (P<0.001), mean duration of usage of non-narcotic analgesics postoperatively (1.3 and 1.1 days in LC and MC, respectively) (P<0.001), intra (15 LC and 6 MC cases) (P=0.02) and postoperative complications (96 LC and 72 MC cases) (P=0.05) and in mean hospital stay (1.5 and 1.3 days in LC and MC, respectively) (P<0.001). The difference in outcomes was more significant in elderly and senile patients. Following the review of previous trials, the only clear significant difference between both procedures was a shorter operative time using MC 24. MC is an attractive alternative for elderly patients, with their high incidence of acute cholecystitis 23. The minilaparotomy cholecystectomy is effective, safe and optimal operative procedure. Especially, it is important for countries with lower economic capacity.

KEY WORDS: Acute destructive cholecystitis, Cholelithiasis, Laparoscopic cholecystectomy, Minilaparotomy cholecystectomy.

Introduction

The incidence of cholelithiasis has been increasing during last decade. Gallstones are one of the major cause of morbidity in the Western world 1. Gallstones constitute a significant health problem in developed societies, affecting 10% to 15% of the adult population, making gallstone disease one of the most common digestive health problem [2]. Geography and particularly ethnicity play an enormous role in the prevalence of gallstone disease and also the type of stone that forms [3,4]. Cholelithiasis affects about 13% of adult population of the Eastern Europe and Caucasus region as well [4]. Therefore, cholelithiasis remains as actual problem of study of different effective methods of treatment. The optimal management of severe acute cholecystitis in elderly and senile patient with high surgical risk is topical.

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From the late 1980s, the preferred surgical technique for cholecystectomy changed from the classical open procedure to a smaller incision approach and eventually to laparoscopic cholecystectomy (LC) [1]. Unfortunately, the widespread application of LC has led to a concurrent rise in the incidence of major bile duct injuries (BDI) [2]. The other miniinvasive method of cholecystectomy with minilaparotomy (MC) approach attracts less attention. Multiple randomized trials comparing LC and MC have been performed and mostly there is no difference between two groups [1,5]. Nevertheless, it is topical to determine the algorithm of treatment of cholelithiasis for different groups of patients according to the age, severity of disease and comorbid condition.

Materials and Methods

The present multicenter retrospective study included 2997 patients, underwent 1479 LC and 1518 MC during the period between January 1, 2002 and December 31, 2008. Patients undergoing both elective and emergency surgery were included in the study. Informed consent was obtained from each patient before surgery. Exclusion criteria were age younger 18 years, pregnancy, suspected or proven malignancy. Whole number of patients was categorized into two groups – LC and MC. We consider patients of 60 to 69 as an elderly and 70 and more – as a senile. Most of the staff members have practised both methods since early 1990's.

LC was conventional, multiincisional.

Pneumoperitoneum was created using the subumbilical trocar with an intra-abdominal pressure mostly up to 12 mmHg. Surgeons had no specific instructions and were free to choose the details of technique of LC.

The mini-incision is mostly transrectal on MC. It was located immediately above the gallbladder with a muscle splitting technique. In the literature most authors as usual used 8 cm as a cut-off point to differentiate between small-incision and open cholecystectomy [1,5]. Therefore, we performed small-incision cholecystectomy principally through an incision of 3 cm, maximally extended to 5 cm (Fig. 1). When the length of incision exceeded 5 cm, the operation was considered to be a conversion to open cholecystectomy. We utilized a special surgical tool kit with a system of circular and small hook-retractors incorporating an illuminator and long surgical instruments (Fig. 2).

The "gold standard" of investigation prior to operation was ultrasonography. When data were not convincing, we used computed tomography, magnetic resonance tomography, magnetic resonance cholangiopancreatogram and endoscopic retrograde cholangiopancreatography. We did not use intraoperative cholangiography (IOC) routinely. Using routine IOC to prevent bile duct injuries is still controversial. This issue is still the matter of ongoing debate [6-10]. When choledocholythiasis was determined, we performed endoscopic papilla sphincterotomy (EPST) preoperatively. When the results of this procedure were unsuccessful or unsatisfactory we made intervention on bile ducts intraoperatively.

In cases of destructive cholecystitis, when character and extension of exudates in the abdomen was not clearly determined preoperatively, we used laparoscope during MC. We performed abdominal wall lifting with the retractors of surgical tool kit and abdominal cavity visualisation with laparoscope. In case of presence of exudates, we performed its aspiration, then washing out and adequate drainage of the abdominal cavity. It is important that the visualisation can be made with any optical instrument including thoracoscope, cystoscope, and endoscope. Thus, this method is accessible, technically simple and cheap. Consequently, it may be used in the urban and the rural hospitals as well. In literature we could not find description of the similar method of abdominal cavity inspection during MC.

Early oral intake and mobilization were encouraged. Patients left the hospital as soon as they felt capable. Hospital stay was defined as the number of nights in hospital postoperatively. Patients were also encouraged to resume work and normal daily activity as soon as possible.

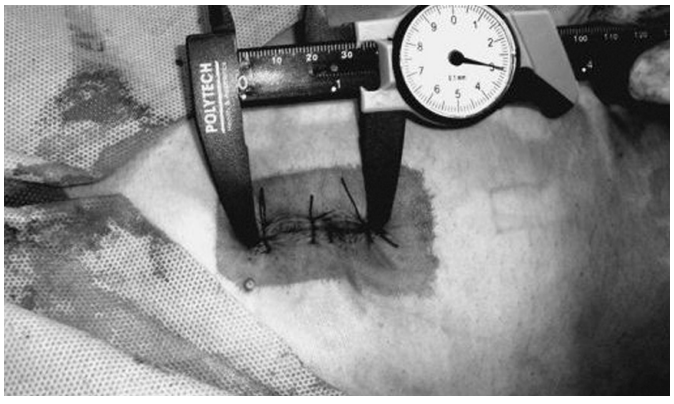

Fig. 1: Wound after minilaparotomy cholecystectomy.

Fig. 2: Special surgical tool kit with a system of circular and small hook-retractors incorporating an illuminator and long surgical instruments.

Data were analyzed by SPSS version 20.0. Comparison of indices between groups was conducted using ANOVA and chi-square methods. Possible effects of all significant differences between the groups on outcome variables were examined. Adjusted analysis was performed by multiple linear regression method. *P* value □).05 (two-tailed) was considered significant.

Results

1479 patients underwent LC and 1518 – MC. Their age varied from 18 to 88. Mean age was 50.7 (SD=14.11; 95% CI, 49.95-51.41) years and 51.3 (SD=14.03; 95% CI, 50.57-52.01) years in LC and MC groups, respectively (*P*=0.24). Mean Body Mass Index (BMI) for LC and MC was 27.5 (SD=4.1; 95% CI, 27.22-27.88) and 27 (SD=2.2; 95% CI, 26.86-27.17), respectively (*P*=0.002). Significantly more number of acute patients was in MC group. Patients with destructive forms of acute cholecystitis also predominated in MC group (Table I). The number of elderly and especially senile patients with destructive forms of acute cholecystitis (mostly gangrenous) in MC group exceeded the number of patients of the same age and the same pathology in LC group (Table II). Phlegmonous form predominated in elderly group of patients (*P*=0.01) and in senile group of patients there was equal incidence of both phlegmonous and gangrenous forms (*P*=0.745).

Each one case of the history of previous diseases and/or operations such as myocardial infarction, small intestine resection, pneumonia was presented in LC group, whereas pancreatitis, myomectomy - in MC group. 1 and 8 cases of previous gastric resections were presented in LC and MC groups, respectively (*P*=0.022). 27 and 25 former appendectomy were presented in LC and MC groups, respectively (*P*=0.609). Concurrent hernioplasty was done in 11 patients in LC group and 8 patients in MC group (*P*=0.455). There was not a single case of umbilical hernia. 29 of LC and 37 of MC patients underwent EPST successfully due to choledocholythiasis prior to cholecystectomy (*P*=0.449).

Some of the patients had a variety of concomitant diseases. Elderly and especially senile patients were more comorbidity (Table III). Patients were distributed by ASA score. The results turned out to be almost equal (ASA I-II – *P*=0.34, ASA II-III – *P*=0.31).

Other complications of the basic disease were noted besides destructive cholecystitis. The number and severity of complications were higher in MC group (*P*<0.001) (Table IV).

Concomitant procedures, such as intraoperative cholangiography (*P*=0.724), choledocholythotomy with external drainage (*P*=0.653) and cholecysto-duodenal defect repair (*P*=0.324) were performed intraoperatively (miniinvasively or after conversion) when preoperative EPST was

TABLE I - *Characteristic and distribution of patients*

Patients	LC group	MC group	*P value*
Female	1198 (81%)	1214(80%)	0.435
Male	281 (19%)	304 (20%)	0.435
Acute	212(14%)	314(21%)	<0.001
Elective	1267 (86%)	1204 (79%)	<0.001
Elderly	310(21%)	303(20%)	0.173
Senile	134(9.1%)	159(10.5%)	0.173
Destructive forms of cholecystitis	145 (9.8%)	262 (17.2%)	0.079
Total	1479 (100%)	1518 (100%)	

TABLE II - *Destructive cholecystitis forms in elderly and senile patients*

Patients	LC group	MC group	*P value*
Elderly with phlegmonous cholecystitis	30 (2%)	38 (2.5%)	0.335
Senile with phlegmonous cholecystitis	9 (0.6%)	18 (1.2%)	0.335
Elderly with gangrenous cholecystitis	6 (0.4%)	18 (1.2%)	0.298
Senile with gangrenous cholecystitis	3 (0.2%)	20 (1.3%)	0.298
Total	1479 (100%)	1518 (100%)	

TABLE III - *Patients comorbidity*

Diseases	LC	MC	*P value*
Diabetes mellitus*	57(27.6%)	51(22.2%)	0.47
Elderly patients	17(8.2%)	15(6.5%)	0.639
Senile patients	8(3.9%)	9(3.9%)	0.91
Cardio-vascular system disorders*	95(46.1%)	102(44.3%)	0.423
Elderly patients	21(10.2%)	37(16.1%)	0.97
Senile patients	31(15%)	40(17.4%)	0.766
Respiratory system disorders*	30(14.6%)	38(16.5%)	0.229
Elderly patients	11(5.3%)	10(4.3%)	0.96
Senile patients	4(1.9%)	11(4.8%)	0.128
Peptic ulcer*	15(7.3%)	11(4.8%)	0.373
Elderly patients	3(1.4%)	4(1.7%)	0.682
Senile patients	2(1%)	1(0.4%)	0.466
Other*	9(4.4%)	28(12.2%)	0.005
Elderly patients	2(1%)	8(3.5%)	0.087
Senile patients	1(0.5%)	6(2.6%)	0.15
Total**	206(100%)	230(100%)	0.617

*Whole study groups
**17 patients of LC group and 35 patients of MC group had 2 and more concomitant diseases

TABLE IV - *Complications of basic disease*

Complications	LC	MC	*P value*
Choledocholythiasis*	40(14.1%)	50(12.4%)	0.409
Elderly patients	9(3.2%)	16(4%)	
Senile patients	5(1.8%)	8(2%)	
Hydrops and Empyema*	60(21.1%)	71(17.6%)	0.28
Elderly patients	17(6%)	22(5.4%)	
Senile patients	6(2.1%)	6(1.5%)	
Perivesical infiltrate and abscess*	42(14.8%)	33(8.2%)	0.2
Elderly patients	13(4.6%)	13(3.2%)	
Senile patients	1(0.3%)	7(1.7%)	
Different types of Mirizzi syndrome*	8(2.8%)	8(2%)	0.732
Elderly patients	4(1.4%)	2(0.5%)	
Senile patients		3(0.7%)	
Different forms of peritonitis*	130(45.8%)	235(58.2%)	0.01
Elderly patients	36(12.7%)	53(13.1%)	
Senile patients	12(4.2%)	36(8.9%)	
Other*	4(1.4%)	7(1.7%)	0.266
Elderly patients		4(1%)	
Senile patients		2(0.5%)	
Total **	284(100%)	404(100%)	<0.001

*Whole study groups
**30 patients of LC group and 28 patients of MC group had 2 or more complications

not successful, as well as in the case of certain complications of the basic disease (*P*=0.663).

Intraoperative complications were 1.2% and 0.4% in LC and MC group, respectively. 8 patients of LC group had intraoperative bleeding from gallbladder bed (4 patients) and as a consequence of cystic artery injury (4 patients). 4 of them had destructive forms of acute cholecystitis. 3 elderly and 1 senile patients were among these 8 patients. There were 4 patients with intraoperative bleeding from gallbladder bed in MC group (*P*=0.971). 1 of them was elderly patient with phlegmonous form of cholecystitis. Bleeding from gallbladder bed was controlled miniinvasively in 2 cases of each group. Conversion was necessary in the rest 2 LC cases and reoperation - in 2 MC cases (*P*=0.163). 2 cases of cystic artery injury were corrected after conversion and the other 2 cases – after reoperation. The other intraoperative complications were gallbladder perforation (6 cases in LC and 2 – in MC) (*P*=0.054) and stones left in the abdomen (3 cases in LC). There was 1 clinical death in the LC group intraoperatively. This senile patient had phlegmonous cholecystitis, local peritonitis, diabetes mellitus. Cardiac resuscitation was successfully achieved. Patient was discharged on 6-th day after admission. Bile duct injuries (BDI) and bile leaks occurred in 3 elective patients of LC group. 2 cases of bile leak from gallbladder bed was reduced and faded independently on the second day. There was 1 case of common bile duct (CBD) injury of II type by Bismuth, E 2 type by Strasberg and III class by Stewart-Way's classification. It was corrected on the same day by reoperation (*P*=0.311). Preoperative examination data were not sufficient in 32 cases of MC group and we used laparoscope to perform abdominal cavity revision. In 13 cases we aspirated exudates from the right parieto-colic gutter and performed adequate drainage of abdominal cavity.

Conversion rate was 47 (3.2%) and 22 (1.4%) in LC and MC groups respectively (*P*=0.002). 3 operations were successfully converted from laparoscopic to miniincisional approach. 25 cases of conversion in LC group were observed at the beginning of the study. The main reasons of conversion, in both groups, were technical difficulties, such as perivesical infiltrate and abscess, Mirizzi syndrome and some intraoperative complications.

Mean operating times for LC and MC were 76 (SD=38.47; 95% CI, 74-78) and 55 (SD=18.33; 95% CI, 54-56) minutes respectively (*P*<0.001). Mean operation duration for elderly patients was 81 (SD=45.11; 95% CI, 76-86) and 59 (SD=19.35; 95% CI, 57-61) minutes in LC and MC group, respectively (*P*<0.001). The same findings during senile patients were 83 (SD=35.39; 95% CI, 77-89) and 61 (SD=22.55; 95% CI, 57-65) minutes (*P*<0.001). Taking into account the differences of some initial data between groups, adjusted mean operating time for MC would be 22 minutes less than the above figure and amounted to 33 minutes.

The mean duration of usage of non-narcotic analgesics postoperatively was 1.3 (SD=0.77; 95% CI, 1.26-1.34) and 1.1 (SD=0.29; 95% CI, 1.085-1.115) days in LC and MC groups, respectively (*P*<0.001). Narcotic analgesics were used for 22 patients of LC and 6 patients in MC group, mostly after conversion. 1.5 (SD=0.19; 95% CI, 1.49-1.51) days in LC and 1.2 (SD=0.08; 95% CI, 1.196-1.204) days in MC groups were the mean duration of their usage (*P*=0.002). Daily dosage of non-narcotic and narcotic agents was almost the same for patients of both groups.

Various postoperative complications are presented in Table V. Each patient of both groups, with pancreonecrosis, underwent reoperation. Percutaneous drainage was performed in 6 LC and 3 MC cases of intraabdominal abscess (*P*=0.191). When the results of these procedures were ineffective, reoperations were necessary in 3 LC and 1 MC cases (*P*=0.17). We used Clavien-Dindo classification for evaluation of severity of surgical complications (*P*=0.035). There were few complications of IV^a and IV^b grade in LC group, while complications of the same grade were not observed in MC group (*P*=0.004).

Mean hospital stay was 1.5 (SD=1.69; 95% CI, 1.4-1.6) and 1.3 (SD=0.74; 95% CI, 1.26-1.34) days for LC and MC, respectively (*P*<0.001). After adjusted analysis of

TABLE V - *Postoperative complications*

Complications	LC	MC	*P value*
Cardio-vascular system disorders*	38(37.2%)	23(31.9%)	0.041
Elderly	11(10.8%)	8(11.1%)	
Senile	15(14.7%)	9(12.5%)	
Respiratory system disorders*	23(22.5%)	18(25%)	0.384
Elderly	9(8.8%)	7(9.7%)	
Senile	11(10.8%)	3(4.2%)	
Intraabdominal infiltration and abscess*	14(13.7%)	7(9.7%)	0.076
Elderly	3(2.9%)	1(1.4%)	
Senile	3(2.9%)	1(1.4%)	
Umbilical hernia*	3(2.9%)		0.079
Elderly	1(1%)		
Senile	1(1%)		
Pancreonecrosis*	1(1%)	1(1.4%)	0.985
DIC*	1(1%)		0.311
Elderly	1(1%)		
Other*	22(21.6%)	23(31.9%)	0.93
Elderly	5(4.9%)	7(9.7%)	
Senile	6(5.9%)	8(11,1%)	
Total**	102(100%)	72(100%)	0.054

DIC, disseminated intravascular coagulopathy
*Whole study groups
**6 patients of LC group had 2 or more postoperative complications

variance between groups, the same data for MC was 1 day. For unconverted patients the hospital stay was 1.4 (SD=1.58; 95% CI, 1.3-1.5) and 1.2 (SD=0.68; 95% CI, 1.17-1.23) days in LC and MC groups, respectively ($P<0.001$), whereas, for converted patients – 4.8 (SD=1.49; 95% CI, 4.37-5.23) and 3.7 (SD=0.88; 95% CI, 3.32-4.08) days in LC and MC groups, respectively ($P=0.002$). There were no rehospitalizations and deaths in either group within 30 days of surgery.

Discussion

Minimally invasive surgery, including LC, became prevalent in clinical practice in the early 1990s. The gold standard for many surgical procedures besides cholecystectomy (Nissen fundoplication, gastric bypass, adrenalectomy, splenectomy) are now laparoscopic approaches. The use of laparoscopic techniques in the surgical resection of the colon and rectum has not received the immediate consensus as videolaparocholecystectomy. Recent multicenter studies show that laparoscopy is as effective as open surgery in the treatment of neoplastic disease of the colon and rectum [11]. The cholecystectomy with single incision laparoscopic surgery with a multilumen trocar is a new technique already used in general surgery, urology and gynecology with good results. However, the operators have some difficulties to moving the instruments because both the operating instruments and laparoscope are introduced through the same incision and on the same axis, the operator and assistant often impede the movements of each other [12]. The widespread acceptance and applications of LC brought not only the obvious benefits but was associated with a troublesome increase in certain complications and, specifically, BDI [2,6,13-15]. Despite expectations that the rate of specific complications would decrease over time as the "learning curve" of LC flattened, the rates appear to have reached a plateau [2,10]. The basic cause of more than one-third of all bile duct injuries is not the inexperience of the surgeon but the use of an improper approach to the fundamental structures of the extrahepatic biliary tree because of a visual perceptual illusion. Correspondingly, in most cases, the problem is not recognized at the time of the initial procedure, particularly in the presence of acute inflammation or chronic fibrosis [7]. A lower feasibility of LC has been found for severe cholecystitis. In the cases of acute severe cholecystitis a threefold of conversion rate has to be taken into account and a significant higher overall postoperative complication rate has been observed. Consequently, a lower threshold of conversion is recommended since this may allow reducing local postoperative complications [16]. In contrast, MC is the alternative miniinvasive method. Moreover, MC has some advantages in comparison with LC. MC requires no extra instrumentation and appears to be a skill which can be acquired by surgical trainees without a marked learning curve [17,18]. Besides, LC, in comparison with MC, is more costly. The procedural costs of LC surpass those of MC and the use of disposable instruments would only increase this difference. Populations of developed countries have relatively fewer financial constraints and differences in patients expectation might have a greater impact on the decision to offer LC, while in areas where minimizing hospital costs is of paramount concern, MC may be considered as an optimal choice. Thus, MC is the preferred operative technique over LC, both from a hospital and societal cost perspective [17,19,20]. MC allows surgeons the possibility of direct visual and palpable control of gallbladder, surrounding tissues and organs [18] and also visual control of almost whole abdomen by our designed method. On the necessity of conversion, mini-approach may be only widened, in contrast to LC. It may avoid large conventional laparotomy with its specific complications. Moreover, LC may be converted not to conventional laparotomy, but to minilaparotomy. It provides the possibility to keep the intervention within the frames of miniinvasion. Mini-incision mostly prevents the development of postoperative hernia. There is the absence of tense carboxiperitoneum during MC. Consequently, there are no respiratory and

hemodynamic changes, caused by high intraabdominal pressure. MC is the open procedure, thus, iatrogenic BDI findings are similar to that of traditional cholecystectomy (0.1-0.2%), unlike LC (0.2-1%) [2,7,9,10,13-15].

In our study patient's distribution according to sex, mean age, was not statistically different. The number of acute cases was significantly higher in MC group. Number of patients with destructive forms of acute cholecystitis was not significantly different in whole study groups as well as among elderly and senile patients. The number of elderly patients with phlegmonous cholecystitis was not significantly different. Senile patients with the same form of the disease were twice as many in MC group. Nevertheless, the difference between them was not found as statistically confirmed because of a small amount of patients. The number of elderly and senile patients, with gangrenous form of cholecystitis, was more in MC group. The difference was not statistically significant because of the same reason. There were not statistically significant differences in the number of history of previous diseases and operations (P=0.616) and concomitant diseases (P=0.617). According to the patient's distribution by ASA classification, no statistically significant difference was shown among patients of two groups. Elderly and especially senile, that is vulnerable patients, often have concomitant diseases and complications of cholelithiasis. Older patients were sicker and more likely to have emergency operations. Frailty of elderly and senile patients independently predicts postoperative complications, length of stay and enhances conventional risk [21,22]. MC is an attractive alternative for elderly patients, with their high incidence of acute cholecystitis and common bile duct stones [23].

The number of complications of the basic disease was significantly more in MC group. There were no statistically significant differences regarding the number and type of concomitant intraoperative procedures (P=0.663). It has shown that both miniinvasive methods have the possibility of intervention in the bile ducts as well as in the adjacent organs.

More number and severe intraoperative complications were presented in LC group (P=0.021). Conversion rate was significantly higher in LC group. More cases of intraoperative complications of LC group needed the conversion. 1 CBD injury Among 3 cases of BDI and bile leaks was corrected reoperatively. There was no BDI in MC group. Following the review of previous trials, intraoperative complications were 13.1% and 7.6 % in laparoscopic and small-incision group, respectively. Most of the intraoperative complications were gallbladder perforations. The bile duct injury proportions were 1.2% and 1.9% in the laparoscopic and small-incision group, respectively. The difference was mainly caused by eight cases of bile leakage of unknown origin in the small-incision group. No statistical difference was observed. The conversion proportions were 13.4% and 16.1% in the laparoscopic and small-incision group, respectively. Results revealed no significant difference [24].

Mean operating time for LC was higher than for MC in whole groups as well as in converted and unconverted patients. The difference of operating time for LC and MC in elderly and senile patients was more than the

TABLE VI - *Algorithm for the treatment of cholelithiasis and its complications*

Patients	Comorbidity	Disease	Method of treatment
with less than 60 years of age	otherwise healthy or no severe comorbidity	any form of cholelythasis	LC and MC are equally applicable
	severe comorbidity	any form of cholelythasis	MC is more acceptable
aged 60 to 70 years	otherwise healthy or no severe comorbidity	symptomatic	LC and MC are equally applicable
		destructive cholecystitis or other complications of basic diseases*	MC is more acceptable
	severe comorbidity	symptomatic	MC
		destructive cholecystitis	MC or PC** with further MC
with more than 70 years of age	otherwise healthy or no severe comorbidity	symptomatic	MC is more acceptable
		destructive cholecystitis or other complications of basic diseases*	MC is more acceptable
	severe comorbidity	symptomatic	MC
		destructive cholecystitis	MC or PC** with further MC

*choledocholythiasis, perivesical infiltrate and abscess, different types of Mirizzi syndrome
**PC - percuteneous cholecystostomy

whole groups. More LC patients used narcotic analgesics. The duration of non-narcotic and narcotic analgesics usage was statistically longer for LC. Results of the overall meta-analysis demonstrated that there was a significantly longer operating time for the LC group by 14.14 minutes. High-quality trials ranging from 10.03 minutes to 16.36 minutes [17,24]. Previous study showed that patients in the LC group reported shorter pain duration during the first postoperative week [5].

More number of LC patients had different types of postoperative complications, but the difference was statistically significant among senile patients (*P*=0.039). According to Clavien-Dindo classification, there was statistically significant difference in grade IV[a] and IV[b]. The difference in reoperations statistically was not confirmed (*P*=0.204). Mean hospital stay was significantly longer in LC group. According to a single previous trial, at least one postoperative complication was identified in 16.3% of LC and 17.4% of MC [5]. The total complication proportions were 26.6% and 22.9% in the LC and MC group, respectively. There was no significant difference present between both groups. Reoperation proportions were 1.6% in both groups [24]. According to the results from overall meta-analysis, length of stay was reduced in the LC group with no significant heterogeneity [17]. Regarding hospital stay, the high-quality trials showed no significant difference between the two operations with the random-effects model, while low-quality trials as well as all trials together do show a significant difference between the two operations with the random-effects model in favor of laparoscopic group [24].

Based on our data, we have developed an algorithm for the treatment of cholelithiasis and its complications for different groups of patients according to the age, severity of disease and comorbid condition (Table VI).

In conclusion, MC seems to be an attractive alternative to laparoscopic approach in the surgical treatment of acute and chronic cholecystitis. MC is easier, faster, safer and less expensive. It is particularly important for countries of low economic capacity. The present study showed better results in a number of outcomes for MC, especially, in elderly and senile patients with severe acute forms of cholecystitis. MC has many advantages and deserves application even in the situation when LC is contraindicated or difficult to perform technically. However, further analyses of miniinvasive methods in management of cholelithiasis are recommended.

Riassunto

Lo scopo di questo studio è quello di analizzare I risultati dopo colecistectomia laparoscopica (LC) e colecistectomia per minilaparotomia (MC) per patologia litiasica e determinare l'algoritmo del trattamento per diversi gruppi di pazienti suddivisi per età, gravità della patologia e comorbilità.

Si tratta si una revisione multicentrica retrospettiva di 2997 pazienti sottoposti a LC o MC tra il 1 gennaio 2002 ed il 31 dicembre 2008, suddivisi in due gruppi principali di LC (1479 pazienti) e MC (1518 pazienti). Laddove non erano disponibili i dati preoperatori si è provveduto al sollevamento della parete addominale con il retrattore per poter visualizzare la cavità addominale per via laparoscopica con una minilaparotomia.

Si sono riscontrate differenze statisticamente significative nei tassi di conversione: 47 nei casi di LC e 22 nei casi di MC (P=0,002), nel tempo operatorio medio (76 e 55 minuti rispettivamente nelle LC e nelle MC con un P<0,001), nella durata media dell'impiego di analgesici non narcotici nel postoperatorio (1,3 e 1,1 giorni rispettivamente nella LC e nella MC con un P<0,001), nelle complicanze intraoperatorio (15 casi nella LC e 6 casi nella MC) e nelle complicanze postoperatorie (96 casi nella LC e 72 casi nella MC), e infine nel tempo medio di degenza postoperatoria (1,5 e 1,3 giorni rispettivamente nella LC e nella MC (P<0,001).

Le differenze riguardo ai risultati si è dimostrata più significativa nei pazienti anziani e nei vecchi.

In relazione ad altri trials si conferma che la sola differenza chiara tra le due procedure è un minore durata dell'intervento nella MC. In conclusione la MC è una alternativa attraente nei pazienti anziani con la loro alta incidenza di colecistite acuta. La colecistectomia mininvasiva è una ottima procedura operatoria efficace, sicura. Particolarmente importante per i paesi con minori capacità economiche:

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