



Determinaton of eligibility for laparoscopic cholecystectomy of elective patients

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ABSTRACT

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We defined possible complications and difficulty grade of surgery at frequent symptomatic cholelithiasis cases and laparoscopic cholelithiasis surgeries which is accepted exclusive cure technique with evaluating a number of preoperative parameters. Fifty patients who applied to Ataturk University Medical Faculty Department of General Surgery with cholelithiasis diagnosis and planned to undergo laparoscopic cholelithiasis were included in this study. These patient's volume of gallbladder, the extreme dimensions, thickness of wall, count of gallstone and dimensions of the biggest stone, length of cystic canal, measured by magnetic resonance cholangiopancreatography; preoperative ages, genders and preoperative endoscopic retrograde cholangiopancreatography story were recorded. To detect difficulty of patients' surgery, a grading system was established based on surgery time, count surgery port, difficulty of Callot dissection, difficulty of bad dissection, intraoperative injury of bile duct, intraoperative gallbladder perforation, applying drainage and passing to open procedure parameters. The stational relationship of preoperative data and surgery points were analysed. The difficulty of surgery was not statically related with age, gender, thickness of wall of gallbladder, count of gallstone and dimensions of the biggest stone, length of cystic canal, and preoperative endoscopic retrograde cholangiopancreatography story ($p>0.05$). A meaningful relationship was found between surgery difficulty and gallbladder volume over 30 cm³ or extreme dimension over 40 mm ($p<0.05$). In conclusion, it is discovered that surgery difficulty degree increases when gallbladder volume is over 30 cm³ or it's extreme dimension is over 40 mm. We suggest that surgeons must be careful at laparoscopic surgeries on gallbladders which have high volume or extreme dimension to decrease possible complications.

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1. Introduction

Cholecystectomy is the most commonly performed abdominal operation. Open cholecystectomy was the gold standard in treatment of gallbladder stones (Nilsson et al., 2004). Open cholecystectomy left its place to laparoscopic cholecystectomy after the first application of it in France in 1987 (Shea et al., 1996). Laparoscopic cholecystectomy has some advantages like less postoperative pain, early beginning of intestinal movements, short duration of hospital stay, early return to normal activity and better esthetic outcomes (Shea et al., 1996; Sarı et al., 2005; Filho et al., 2006; Schietroma et al., 2006).

In this study, it was aimed to determine the influences of age, gender, gallbladder volume, size and wall thickness measured in preoperative period, number and size of stones

in the gallbladder, length of cystic duct and endoscopic retrograde cholangiopancreatography (ERCP) performed in preoperative period on laparoscopic cholecystectomy in patients who were decided to undergo cholecystectomy and performed laparoscopic cholecystectomy.

2. Material and method

A total of 50 patients who were planned to undergo laparoscopic cholecystectomy due to cholelithiasis at Department of General Surgery, Atatürk University Medical School between September 2010 and October 2011 were included in the study. Patients with acute and chronic cholecystitis were not included in the study.

Age and gender of the patients were recorded. All patients underwent magnetic resonance cholangiopancreatography

(MRCP) and ultrasonography (USG) in order to measure gallbladder volume after ethics committee approval had been obtained. Gallbladder volume, the longest size, wall thickness, number of stones in the gallbladder and diameter of the largest stone, cystic canal length were measured through MRCP. Measurement of gallbladder volume was done with USG correlation using ellipsoid formula recommended by Dodds et al: $v \text{ (cm}^3\text{)}=0.52 \times [(\text{length} \times \text{width} \times \text{depth (cm)})]$ (Dodds et al., 1985). Patients who were performed ERCP were recorded.

Operations were done by a surgical team who were experienced in laparoscopic cholecystectomy for at least 10 years. Operations were performed with two hand method from four trochars placed with American method.

Intraoperative scores were as follows: Patients in whom more than four trochars were used: One point, patients who were inserted drainage tube: One point, patients whose operations took more than 50 min two points, patients whose Callot dissection was difficult two points, patients whose bed dissection was difficult two points, patients who had intrahepatic cystic canal injury three points, patients who had more than 150 cc intraoperative hemorrhage three points, patients who had intraoperative gallbladder perforation three points and patients whose operations could not be completed laparoscopically and switched to open surgery three points. Scoring was done on 20 points and degree of difficulty was tried to be determined.

Table 1. Operative findings and scores of patients are shown

	n	%	
Operation time (minute)	≥50	17	34
	<50	33	66
Trochars (n)	>4	0	0
	≤4	50	100
Callot dissection	easy	32	64
	difficult	18	36
Bed dissection	easy	32	64
	difficult	18	36
Intrahepatic cystic canal injury	yes	0	0
	no	50	100
Intraoperative hemorrhage (cc)	≥150	13	26
	<150	37	74
Intraoperative gallbladder perforation	yes	13	26
	no	37	74
Inserted drainage tube	yes	18	36
	no	32	64
Open cholecystectomy	yes	7	14
	no	43	86
Point	1-5	7	14
	11-16	11	22
	16-20	0	0

Data were loaded to SPSS Statistics 17.0 program. ANOVA, LSD test from post hoc multi tests and independent t test were used for assessment of data. A p level of <0.05 was accepted as statistically significant.

3. Results

Of the patients included in the study, nine (18%) were male and 41 (82%) were female with female/male ratio of 4.55/1 and mean age of 52.04 (24-82). There was the history of preoperative ERCP in 4 (44%) of male patients and 15 (36%) of female patients. Operative findings and scores of patients are shown in Table 1. Parameters of gallbladder detected with MRCP are shown in Table 2.

Difficulty degree of the operation was seen to significantly increase in patients whose gallbladder volume was above 30 cm³ and the longest dimension is above 40 mm (p<0.05). Gallbladder perforation, spread of bile or gallbladder stone into abdomen occurred in seven patients whose gallbladder volume was above 30 cm³ and 12 patients whose the longest gallbladder dimension is above 40 mm. Bleeding from liver bed and controlled with a simple intervention occurred in 5 patients whose gallbladder volume was 30 cm³ and 13 patients whose the longest gallbladder dimension was above 40 mm. In addition, the longest gallbladder dimension was above 40 mm in all of seven patients in whom operation was switched to open cholecystectomy and gallbladder volume was above 30 cm³ in four.

Table 2. Parameters of gallbladder detected with MRCP are shown

	Mean	Range
Gallbladder volume	27.45	5-45
The longest dimension	53.72	25-95
Wall thickness	3.928	3.5-7.5
Number of stones	4.32	0-20
Size of the largest stone	8.87	0-25
Cystic duct length	28.6	12-49

Although mean operation score was seen to be greater in male patients and patients above 50 years, a statistically significant difference was not found (p>0.05). In other words, although laparoscopic cholecystectomy is not significant in male patients and in patients above 50 years, it was seen to be difficult and developed complications.

Gallbladder wall thickness, number of gallbladder stones, size of the gallbladder stone and cystic duct length were seen not to increase the degree of difficulty of the operation (p>0.05). Preoperative ERCP was seen not to increase degree of difficulty of the operation (p>0.05).

Minor complications like bile leakage from gallbladder or stone spread into abdomen due to perforation, small hemorrhages from liver bed were seen. Major complications like uncontrollable hemorrhages from liver bed, bile duct injuries, major vessel injuries, luminal organ injuries were not seen.

4. Discussion

Laparoscopic cholecystectomy has become the gold standard in surgical treatment of cholelithiasis a few years after it had been first performed in France in 1987. Its superiority to open surgery is accepted to be due to early return to normal daily activity and good cosmetic results, less postoperative pain and shorter duration of hospital stay (Schietroma et al., 2006; Dodds et al., 1985). Today, more than 80% of cholecystectomies are done with laparoscopic method (Dodds

et al., 1985). A rapid development occurred in laparoscopic cholecystectomy due to developments in videoscopic devices and manual devices and easy adaptation of surgeons to these new systems. Trochars with automatic safety system, automatically charged clip applicators, less traumatic and sensitive forceps and dissectors and advancements in imaging technologies have increased safety of this method (Cuschieri et al., 1991). Although laparoscopic cholecystectomies are safe through advancements in this technology, various complications may be encountered during operations. Minor intraoperative complication rate was reported as 15.6% and major complication rate was found as 1.6-3.1% in previous studies (Soper et al., 1992; Akin et al., 1998). Minor intraoperative complications were detected in 26 out of 50 patients in our study. While gallbladder perforation and bile and gallbladder stone spread into peritoneal space were seen in 13 patients, bleeding coming from liver bed and controlled with a simple intervention was detected in remaining 13. Major complications were seen in no patients. Our minor complication rate was seen to be greater and major complication rate was seen to be less than reported in literature.

Ratio of switching to open surgery, morbidity and mortality are reported to be high in some series. Recurrent acute cholecystitis episodes, comorbidities are reported to increase difficulty level of the operation and caused switching to open surgery particularly in patients above 65 years (Keskin et al., 1996; Akin et al., 1998; Akat et al., 2002). It was reported that male gender was an important factor for switching to open surgery, dissection was more difficult and operative time was longer, gallbladder perforation was more frequent in male patients (Akin et al., 1998; Keskin et al., 1996; Fried et al., 1994; Mohiuddin et al., 2006). Obesity and previous abdominal operations were seen to be effective in switching to open surgery in some studies. Ratio of switching to open surgery is reported as 6.3-8.1% in various series (Soper et al., 1992; Akin et al., 1998; Akat et al., 2002). This ratio was found as 14% in our study. We considered that the cause for switching to open surgery is advanced age, male gender and Callot dissection's being difficult although this ratio is statistically insignificant ($p>0.05$). In our clinic, the dominant opinion is that insiting on laparoscopic surgery is not favorable in cases in which Callot dissection is difficult and anatomy is not clear. We consider that this opinion is effective on high ratio of switching to open surgery and no

major complications. In addition, mean operative score was found greater in advanced age and male patients and we consider that this condition is effective on switching to open surgery.

It was seen that increased gall bladder wall thickness and gallbladder's being sclerotic and atrophic increased difficulty of the operation, led to complications and increased ratio of switching to open surgery (Schrenk et al., 1995; Keskin et al., 1996; Akin et al., 1998; Yol et al., 2006; Akoğlu et al., 2010; Alponat et al., 1997; Lal et al., 2002; Majeski, 2007). On the contrary to literature data, increased gallbladder wall thickness and gallbladder's being sclerotic and atrophic were not found statistically significant in terms of difficulty of operation in our study ($p>0.05$). However difficulty of operation was found high in patients whose gallbladder volume is above 30 cm³ and the longest gallbladder dimension is above 40 mm in our study ($p<0.05$).

A significant relationship was reported between number of gallbladder stones and difficulty of operation and switching to open surgery through infundibular effect of stone size. Gallbladder stone's placing on cystic duct and being large was reported to make the operation difficult and thereby lead to major complications (Akoğlu et al., 2010; Alponat et al., 1997). In our study, a significant relationship was not found between switching to open surgery and number of gallbladder stones and increased size of stones ($p>0.05$). We did not encounter any data about the relationship between difficulty of the operation and switching to open surgery. A statistically significant difference was not found between cystic canal length and difficulty of operation in our study ($p>0.05$).

In literature, elevated liver function tests and need of ERCP were reported not to be seen as effective risk factors for open surgery and also not to be effective on complications (Akin et al., 1998). In our study, patients were divided in to two groups as the ones who underwent ERCP or the ones who did not undergo ERCP. A statistically significant difference could not be found between groups in terms of degree of difficulty of the operation, consistently with literature ($p>0.05$).

In conclusion, difficulty of operation was found to increase as volume or the longest dimension increased of gallbladders above 30 cm³ or above 40 mm, respectively. We concluded that performing laparoscopic surgery more carefully would be effective to decrease complications in gallbladders above these sizes.

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