

The evolution of concepts in laparoscopic cholecystectomy in a general surgical clinic from Timișoara, Romania



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Sorin Olariu

University of Medicine and Pharmacy "Victor Babes", Timisoara, Romania
Surgical Clinic I, Emergency County Hospital, Timisoara, Romania

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AIM: *The analysis of the progress in the gallbladder laparoscopic surgery by comparing the cases operated after the implementation of this procedure in General Surgery Clinic I of Emergency County Hospital Timisoara, Romania to the current period.*

MATERIAL AND METHODS: *Two groups of 1000 patients undergoing laparoscopic cholecystectomies have been studied. The first group has been operated between 1994 and 1998, the second group between 2008 and 2011. Analyzed data: surgical indications, the rate of conversions to conventional surgery, intraoperative accidents, postoperative complications and the death rate.*

RESULTS: *The indications for a laparoscopic approach have been extended from 53 % (530 cases) of the total number of cholecystectomies to 78% (780 cases). The rate of conversions has decreased from 4.9% (26 cases) to 3% (23 cases). The number of patients with acute cholecystitis operated with laparoscopic approach has risen from 48.30 % (256 cases) to 73.07 % (570 cases). The intraoperative accidents and the postoperative complications rate remained unchanged. There were no registered deaths*

CONCLUSIONS: *The comparative study has demonstrated the positive evolution of the laparoscopic method due to surgical technique improvement and technological progress. The laparoscopic cholecystectomy is "the gold standard" as an ablation procedure of the gallbladder.*

KEY WORDS: Cholecystectomy, Complications, Conversion, Laparoscopic approach

Introduction

Cholelithiasis is a common disease in adult patients, with a reported frequency ranging between 11% and 36%¹.

Often evolving with little or no symptoms, this disease, although diagnosed, is ignored by the patient or treated inappropriately for years. It is symptomatic in more than 50% of the patients, being the cause of more than 3 million cholecystectomies every year all over the world. This represents less than 30% of all the patients, while the rest are either asymptomatic, or refuse surgical treatment². The first laparoscopic cholecystectomy was performed experimentally in 1985 and applied to humans that same year. By the year 1990 it have spread worldwide, becoming the gold standard for gallbladder ablation¹, initially in chronic cholecystitis, later in acute cholecystitis and today even in gallbladder cancer or complications secondary to gallstones.

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Correspondence to: Assoc. Prof. Sorin Olariu, University of Medicine and Pharmacy "Victor Babes" Timisoara. Surgical Clinic I, Emergency Clinical County Hospital, Bd I. Bulbuca Nr. 10, 300736 Timisoara, Romania (e-mail: srnolariu@gmail.com, olariu.sorin@umft.ro)

Material and Methods

The purpose of this paper is to analyze the progress in indicating laparoscopic cholecystectomy, the strategy in handling gallstones and the assessment of the technical standard in gallbladder ablation, by comparing cases operated at the beginning of laparoscopic surgery to cases operated recently in the General Surgery Clinic Ist of the University of Medicine and Pharmacy "Victor Babeș", County Clinical Emergency Hospital Timișoara. This retrospective study was made on two groups of patients, each comprising 1000 laparoscopic cholecystectomies out of a total of approximately 5000 such procedures performed in the clinic between 1994-2012. The time between the interventions in the first and second group was 10 years. The procedures were performed between 1994 and 1998 for the first group, respectively between 2008 and 2011 for the second group. The

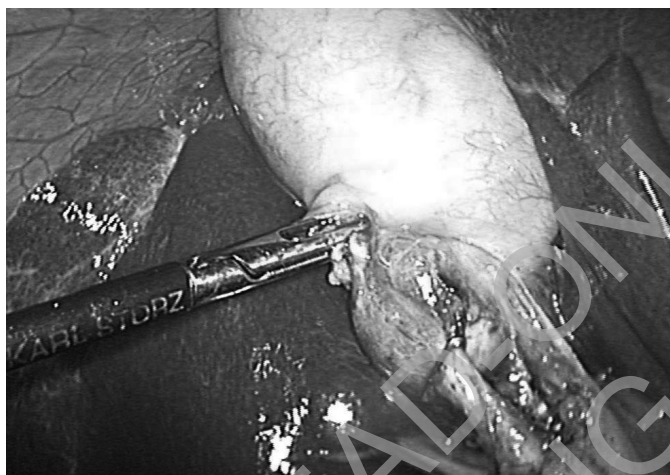


Fig. 1: laparoscopic intraoperative cholangiography - cystic duct isolated.



Fig. 2: laparoscopic intraoperative cholangiography - incomplete section of the cystic duct.

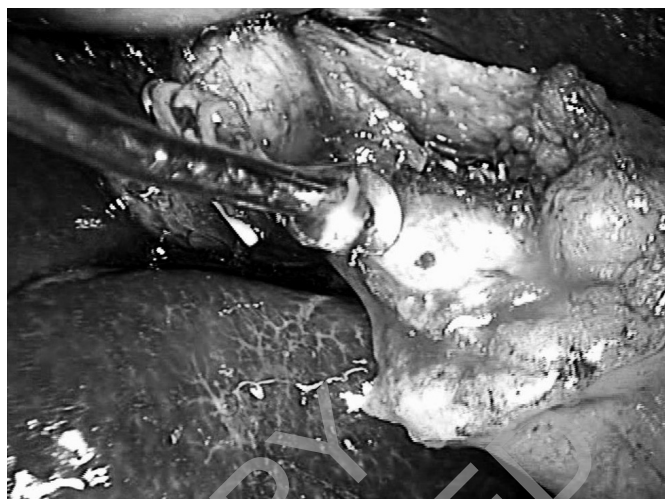


Fig. 3: laparoscopic intraoperative cholangiography - catheter inserted in the cystic duct.

total number of patients hospitalized in the clinic in both these periods of time was 20795 patients, of which 11371 in the first period and 9424 in the second. All cholecystectomies performed for cholelithiasis, through laparoscopic approach were included; the diagnosis was made preoperatively using ultrasonography, regardless of age, sex, acute or chronic form of the illness, there were no exclusion criteria. In cases which ultrasound measured diameter of the CBD (common bile duct) was above 6 mm, an ERCP (endoscopic retrograde cholangiopancreatography) was performed. Furthermore, when the patient had episodes of cholangitis or jaundice, with a history of elevated values of serum bilirubin, alkaline phosphatase, an ERCP was performed. Selectively, IOC (intraoperative cholangiography) was performed only in the situations described above, for detecting asymptomatic CBD lithiasis, when ERCP was not possible to conduct or when the gallstones were small-sized and the cystic duct's caliber increased.

MRCP (magnetic resonance cholangiopancreatography) was used more frequently for the second group, as a detection method of the CBD lithiasis in cases with risk factors present.

The following data were analyzed: surgical indications, the rate of conversions to conventional surgery, intraoperative accidents, the rate of postoperative complications and the death rate.

Results

The indications for a laparoscopic approach have been extended from 53% (530 cases) of the total number of cholecystectomies in the first period, to 78% (780 cases) in the second period, $p < 0.001$. The number of acute cholecystitis operated by laparoscopic approach has risen from 25.6% (256 cases) to 57% (570 cases) $p < 0.001$.

TABLE I - Comparative analysis of the two groups studied and literature data

	Group 1 (1994-1998) 1000 cases	Group 2 (2008-2011) 1000 cases	p-value	Literature data
Laparoscopic approach	53% 530 cases	78% 780 cases	p<0.001 ES	75-90% ^{4,5}
Acute cases, treated using laparoscopic approach	25.6% 256 cases	57% 570 cases	p<0.001 ES	84-95% ^{6,7}
Acute/total laparoscopic	48.30% 256 cases	73.07% 570 cases	p<0.001 ES	—
Global rate of conversions	4.9% 26 cases	3% 23 cases	p = 0.6617 NS	5-10% ^{4,5,6}
Rate of conversion in acute cholecistitis	11.8% 30	5.8% 33	p = 0.0029 VS	9,5% ^{4,5,6}
Intraoperative accidents	1.2% 6 cases	1% 8 cases	p = 0.6680 NS	0,2-0,8% ⁴
Postoperative complications	0,8% 4 cases	0,8% 6 cases	—	0,2-0,5% ⁸
Mortality	0%	0%	—	0,22-0,4% ^{6,7}

Legend: ES: extremely significant; VS: very significant; NS: non significant; Chi square test used

The global rate of conversions to classic surgery has decreased from 4.9% (26 cases) to 3% (23 cases), $p = 0.6617$. The rate of conversions decreased from 11.8% (30 cases) to 5.8% (33 cases) in acute cholecystitis, $p = 0.0029$. The intraoperative accidents decreased from 1.2% (6 cases) to 1% (8 cases), $p = 0.6680$. Hemorrhagic accidents were minor, not requiring conversion.

The conversion and IOC (intraoperative cholangiography) was performed in biliary lesions. Suture was done in minor injuries and reconstruction or biliary-digestive anastomosis in case of major lesions. In both cases with lesions of the main biliary duct, with its partial excision under the confluence of the hepatics on a length of 4 cm (type 3,c, LS + in accordance to EAES classification)³ was practiced a hepatic – jejunum anastomosis "à la Roux" on an excluded loop. In one of the cases, after 12 months a reintervention due to an anastomotic stenosis was performed, which required the restoring of the anastomosis, with good further progress. In the second group, the minor lesions of the main biliary duct were stented (4 cases), detected by ERCP (endoscopic retrograde cholangiopancreatography). This was performed postoperative, due to the presence of the bile leak on the drain tube. For those revealed intraoperative, the conversion and suture or reconstruction (biliary-digestive anastomosis) was performed. In the first studied period,

the postoperative complications rate was 0.8% (4 cases) and it remained unchanged in the second period (0.8%=6 cases). The mortality was 0% in both groups. Performing IOC helped the conversion rate to decrease, while in some cases, where ultrasound exploration raised the suspicion of common bile duct (CBD) lithiasis, were also treated using laparoscopic approach. Intraoperative confirmation of CBD lithiasis made it possible the removal of calculi during the same session by endolaparoscopic approach^{9,10,11,12} or using a choledoscope and a Dormia catheter. If intraoperative cholangiography excluded common bile duct lithiasis, the intervention was simpler, reduced just to a laparoscopic cholecystectomy.

Discussion

By comparison, if in the first period the 1000 cholecystectomies were performed in 5 years (1994-1998), in the second period the same number of surgeries were performed in 4 years (2008-2011). The number has increased although the period was shorter and the number of hospitalizations was reduced. The results achieved show significant improvement for the second group, in all the parameters taken into consideration. This is due to a multitude of factors, out of which the standardization of the operating technique towards the end of the

learning curve¹³ played a decisive role. Another factor was the change in strategy in treating common bile duct lithiasis: first operative ERCP and then laparoscopic cholecystectomy in known cases of common bile duct lithiasis, or laparoscopic cholecystectomy and only afterwards operative ERCP in residual lithiasis. The simultaneous execution of both procedures - endolaparoscopic treatment of cholecysto-choledochal lithiasis or rendezvous technique has proven itself superior to the aforementioned sequential approach^{9-12;14-17}.

Intraoperative cholangiography (IOC) it's a feasible and safe technique with a success rate greater than 90%. IOC can discover a common unknown bile duct lithiasis and can reduce incidence of unnecessary ERCP with subsequent complication¹⁸. If a bile duct injury is going to occur because of misidentification, cholangiography will not prevent the injury, but a properly performed cholangiogram will minimize the extent of the injury¹⁸. Technical factors were also involved in the improvement of the parameters that were taken into consideration. Thus, the laparoscopic procedures were more accurate and easier to perform, due to the enhanced technology in the new High Definition (HD) monitors, HD laparoscopes, insufflators that maintain the intrabdominal pressure at a constant level (10-20 mmHg) by compensating for any possible pressure leakages, and last but not least the enhanced quality and performance of various instruments (such as rotating loops).

The conversion rates are relative in specialized medical literature as well as in our clinic, owing to the fact that during the operations on the first lot, the patients had undergone careful selection before laparoscopy, whereas on the second lot, as specialists had gained experience, laparoscopy was performed almost in all patients.

The conversion rates in both lots is comparable to those in various studies, which show that the incidence varies between 2%-18% in all cholecystectomies, as well as cases of acute cholecystitis^{19,20}. This parameter has reached a new low level (3%, respectively 5,8% in acute cases), taking into consideration that in acute cholecystitis the conversion rate is highest among all gallbladder laparoscopic interventions^{21,22}. After a pathological analysis of all cases of converted acute cholecystitis, it has been shown that majority of them occurred in case of acute gangrenous cholecystitis, with or without a bladder plastron (72%)²³. Laparoscopic cholecystectomy in acute cholecystitis is the recommended surgical procedure. The operation is easier, faster and safer when performed in first 3-5 days of the onset of symptoms, due to easier dissection of the inflamed and oedematous tissue²⁴⁻²⁶. With greater experience and new technology, laparoscopic cholecystectomy is today the gold standard in the treatment of empyema and gangrenous cholecystitis²⁵.

In gallbladder neoplasms laparoscopic cholecystectomy was a good option because it was proven to be effective approach in less advanced forms. The diagnosis was usu-

ally macroscopically intraoperative, confirmed by the pathologist. Electro-dissection was beneficial because it blocks the tendency to extension of the neoplastic process and the evolution of cases found in early stages was favorable.

The literature mentioned intraoperative accidents, requiring the conversion: lesions of the transverse colon while introducing the Veress needle (2,6%) or during the dissection of the pedicle (5,7%), lesions of the duodenum (14,9%), of the hepatic artery (7,2%), of the main bile duct (25,3%), of the liver (2,1%) and most frequently the hemorrhage of the cystic artery (42,2%)^{27,28}. Our study revealed 6 accidents in the first group (1,2%) and 8 (1%) in the second one. Usually the hemorrhage during laparoscopic surgery is minor, however the actual visualization during this procedure may create the impression of substantial bleeding. It must be noted that most of the hemorrhages that occurred in the studied groups did not comprise an indication for conversion to classic surgery due to their severity, but rather due to the difficulty faced when trying to identify the exact source of the bleeding (the retraction of the arterial vessel). Although conversion is not preferable, in some cases it is necessary and must be performed in order to avoid further decrease in the quality of the operation. A very early diagnosis and the close cooperation of an endoscopist make possible to treat the majority of complications arising after laparoscopic cholecystectomy with minimally invasive methods²⁹. The certain indications of conversion are: uncertain anatomical relations in the triangle of Calot, the flowing of bile outside its ducts with uncertain or unknown origin, hemorrhage that cannot be controlled using laparoscopy or the inability to dissect while suspecting a secondary lesion and associated malignancy that has not been previously diagnosed³⁰. In biliary lesions detected intraoperatively, their conversions and repair was practiced (suture for the minor ones, reconstruction or biliary-digestive anastomosis on excluded intestinal loop in the major ones). Postoperative bile leak on the drain train was verified by ERCP, applying stents if minor injuries at the level of CBP were detected. This was adopted lately as routine procedure. The prevention of major bile duct injuries remains the main target during cholecystectomy but when a major lesion of CBD occurs, bile reconstruction is best achieved by Roux-en-Y hepaticojejunostomy³¹.

Far from meaning to undermine the enthusiasm of those who consider laparoscopic cholecystectomy the solution of the future, it must be pointed out that it lays a hidden trap: regardless of the surgeon's will, a certain number of interventions shall require conversion. Therefore, the surgeon must undoubtedly master the open cholecystectomy^{32,33}. In quite a few cases, laparoscopy cannot offer a solution to intraoperative accidents, postoperative complications or lesions of the bile ducts. The risk of laparoscopic bile duct injury is twice higher than it was in the open cholecystectomy era⁸. This is why

all those who remove the gallbladder through laparoscopy must know the surgical techniques used in conventional gallbladder surgery and biliary- digestive anastomoses. Regarding the asymptomatic CBD lithiasis, when it was detected preoperatively by ERCP, the solution was endoscopic during detection, or by surgery in case of failure of endoscopic procedure. When detected by MRCP, the ablation of the gallstones was performed preoperative, endoscopic, or during the surgery. The data in the literature also recommend this strategy^{34,9-12}. The residual CBD lithiasis was treated postoperative, either endoscopic or by reintervention, if the endoscopic method was inefficient. Only in the residual lithiasis of CBP, the ablation of the gallstones was performed after the colecystectomy.

Conclusions

Laparoscopic cholecystectomy is not a procedure to be taken lightly. This comparative study has shown the positive evolution of the indications of a laparoscopic approach, due to the operating technique that has been perfected, as well as the technologies that have progressed. The standardized and optimized operating procedure has determined a decrease in the number of conversions and intraoperative accidents. Laparoscopic cholecystectomy is and will remain the gold standard as far as gallbladder ablation is concerned.

Riassunto

Lo studio riguarda l'analisi dei progressi nella chirurgia laparoscopica della colecisti paragonando i casi operati dall'adozione di questa procedura nella General Surgery Clinic I of Emergency County Hospital Timisoara, Romania, fino all'attualità. Per questo sono stati studiati due gruppi di 1000 pazienti ciascuno, sottoposti a colecistectomia laparoscopica. Il primo gruppo è quello degli operati tra il 1994 e il 1998, ed il secondo degli operati tra il 2008 e il 2011, analizzando i seguenti dati: indicazione chirurgica, tasso di conversione a chirurgia laparotomica, incidenti operatori, complicanze postoperatorie e numero di decessi. L'indicazione per l'approccio laparoscopico si è ampliato dal 53 % (530 casi) del numero totale di colecistectomia al 78%(780 casi). Il tasso di conversione è diminuito dal 4.9% (26 casi) al 3% (23 casi). Il numero di pazienti affetti da colecistite acuta operati con la procedura laparoscopica si è accresciuto dal 48.30 % (256 casi) al 73.07 % (570 casi). Gli incidenti intraoperatori ed il tasso di complicanze postoperatorie è rimasto invariato, e non sono state registrati decessi. In conclusione lo studio comparative ha dimostrato l'evoluzione positiva del metodo laparoscopico grazie ai miglioramenti della tecnica chirurgica ed ai progressi dei

mezzi tecnologici, e la colecistectomia laparoscopica si è dimostrata essere il "gold standard" per l'asportazione della colecisti.

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