ORIGINAL RESEARCH

A prospective study on prevalence of PCSs after open and laparoscopic cholecystectomy

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ABSTRACT

Aim: To assess the prevalence of PCSs after open and laparoscopic cholecystectomy. **Material and Methods:** Patient's admitted through surgery outpatient department / Emergency / transferred from other departments for gallstone disease was taken for the study after clearance from institutional ethical committee.A correlation matrix was developed to see the postcholecystectomy syndrome in patients who have under gone open cholecystectomy or laparoscopic cholecystectomy. In order to maintain the similarity, all the patients included in the study were catheterized and Ryle's tube drainage was given during the intra operative period and these were removed with in next 48 hours according to the patient's condition. **Results**: Total 154 were recruited during the study period, out of which 38 and 116 underwent open and laparoscopic cholecystectomy respectively.Post- op pain (hours), duration of hospital stay (days) and return to work (days) was significantly more in open as compared to laparoscopic cholecystectomy with statistically significant difference as $p<0.05$. Incidence of PCS was reported among 7.89% of the subjects in open and laparoscopic cholecystectomy while 18.19% of the subjects in laparoscopic cholecystectomy. Hence incidence of PCS was more in laparoscopic as compared to open cholecystectomy with statistically significant difference as $p<0.05$. **Conclusion**: Although incidence of PCS was more in laparoscopic as compared to open cholecystectomy, still it is safe and efficacious in thehands of experienced surgeons. There is a definitive learningcurve for surgeons and complications rate reduces assurgeons become more and more familiar with thisprocedure.

Keywords: Cholecystectomy, Open, Laparoscopic, PCS

INTRODUCTION

The term postcholecystectomy syndrome (PCS) describes the presence of symptoms after cholecystectomy.[1] These symptoms can represent either the continuation of symptoms thought to be caused by gallbladder pathology or the development of new symptoms normally attributed to the gallbladder. PCS also includes the development of symptoms caused by removal of the gallbladder (eg, gastritis and diarrhea).[2]

In general, PCS is a preliminary diagnosis and should be renamed with respect to the disease identified by an adequate workup. It arises from alterations in bile flow due to loss of the reservoir function of the gallbladder. Two types of problems may arise. The first is continuously increased bile flow into the upper gastrointestinal (GI) tract, which may contribute to esophagitis and gastritis. The second is related to the lower GI tract, where diarrhea and colicky lower abdominal pain may result.[3]

PCS has occurred in 14% of patients. Effective communication between patients and their physicians, with specific inquiry directed at eliciting frequently anticipated postoperative problems, may be necessary to reveal the somewhat subtle symptoms of PCS.[3]

In order to study the causes of the PCS we must know the effects of cholecystectomy and how cholecystectomized patients are different from those with intact gallbladders whether these gallbladders contain gallstones or not. Absence of the gallbladder, on its own, i.e., cholecystectomy per se has not been reported to impair intestinal digestion or absorption.

As a matter of fact there is a congenital anomaly known as agenesis of the gallbladder and cystic duct which does occur, although uncommonly , and patients with this anomaly have not been reported to suffer any digestive or absorption problems.[2,3]

Like medical therapy, surgical therapy should be directed at the specific diagnosis.[11,12] Surgery is indicated when an identifiable cause of PCS that is known to respond well to operative intervention has been established. The most commonl performed procedure is endoscopic retrograde cholangiopancreatography (ERCP), which can be both diagnostic and therapeutic. Exploratory surgery is a last resort in the patient who lacks a diagnosis and whose condition proves refractory to medical therapy.[4]

One could look for an increase of PCSs due to the more liberal indication for cholecystectomy performed for functional disorders or for symptoms caused by undiagnosed stenosis of the papilla formerly detected intraoperatively by combined pressure and flow measurements. Few studies have compared the later results of laparoscopic cholecystectomy with those of open cholecystectomy.[5] The goal of present study was to compare the data from a single institution regarding prevalence of PCSs in prospective study after open and laparoscopic cholecystectomy.

MATERIAL AND METHODS

Patient's admitted through surgery outpatient department / Emergency / transferred from other departments for gallstone disease was taken for the study after clearance from institutional ethical committee.

A correlation matrix was developed to see the postcholecystectomy syndrome in patients who have under gone open cholecystectomy or laparoscopic cholecystectomy.

INCLUSION CRITERIA

- Patient giving informed consent for operative intervention
- All manifestations of symptomatic gallstones – biliary colic, history of jaundice, chronic cholecystitis and acute cholecystitis

EXCLUSION CRITERIA

- Age below 10 years.
- Large gallbladder polyps
- Gallstone pancreatitis
- Pregnancy, cirrhosis and portal hypertension.
- The patients not fit for general anaesthesia due to various medical illnesses.
- Bleeding disorders.
- Patient not giving informed consent.
- Patients diagnosed to have Biliary malignancy.

PRE-OPERATIVE SCANNING

The patients were worked up thoroughly and subjected to:

- Detailed history and clinical examination.
- Routine hematological investigation :Hb, TLC ,DLC , RBS
- Viral markers: HCV , HBsAg, HIV 1&2
- Liver function test: S.Bilirubin, SGOT, SGPT, S. Alkaline phosphatase
- CECT Whole Abdomen (Where ever indicated)
- ERCP (where ever indicated)
- MRCP (Where ever indicated)
- Abdominal USG :

– GB distended / contracted
– GB Wall thickness
– USG Murphy's sign
– Pericholecystic fluid
– Stone:

✓ single or multiple
✓ Size of largest stone

➢ ECG
➢ Pre-anaesthetic check-up

PRE-OPERATIVE PREPARATION

Viral marker for HBsAG and HCV was tested prior to surgery and informed consent for HIV testing was taken prior to HIV test. Informed consent for surgery was obtained. On pre-operative night tablet alprazolam 0.25mg and bisacodyl (dulcolax) was given. The patient was kept fasting after mid night with I.V. fluids for maintenance. On next morning, i.v. antibiotic (Cephalosporin) as prophylactic measure was given. Pre-medication was given half an hour before the operative procedure and patient was asked to void urine just before being shifted in operating room. In order to maintain the similarity, all the patients included in the study were catheterized and Ryle's tube drainage was given during the intra operative period and these were removed with in next 48 hours according to the patient's condition.

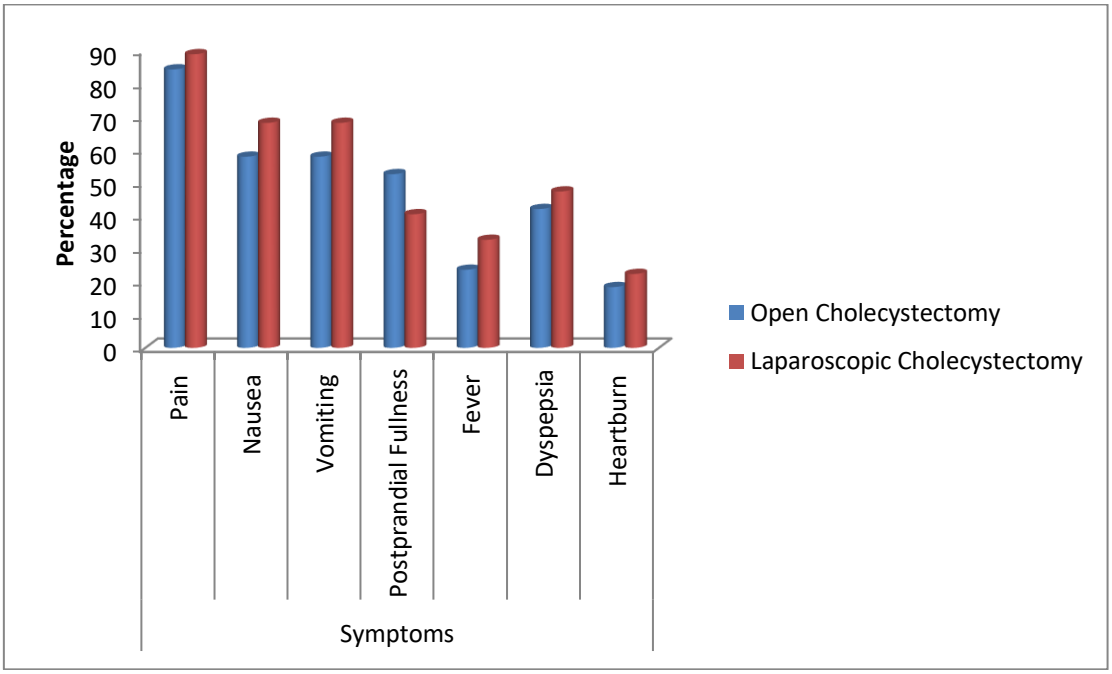
STATISTICAL ANALYSIS

Data so collected was tabulated in an excel sheet, under the guidance of statistician. The means and standard deviations of the measurements per group were used for statistical analysis (SPSS 22.00 for windows; SPSS inc, Chicago, USA). Difference between two groups was determined using student t-test as well as chi square test and the level of significance was set at $p < 0.05$.

RESULTS

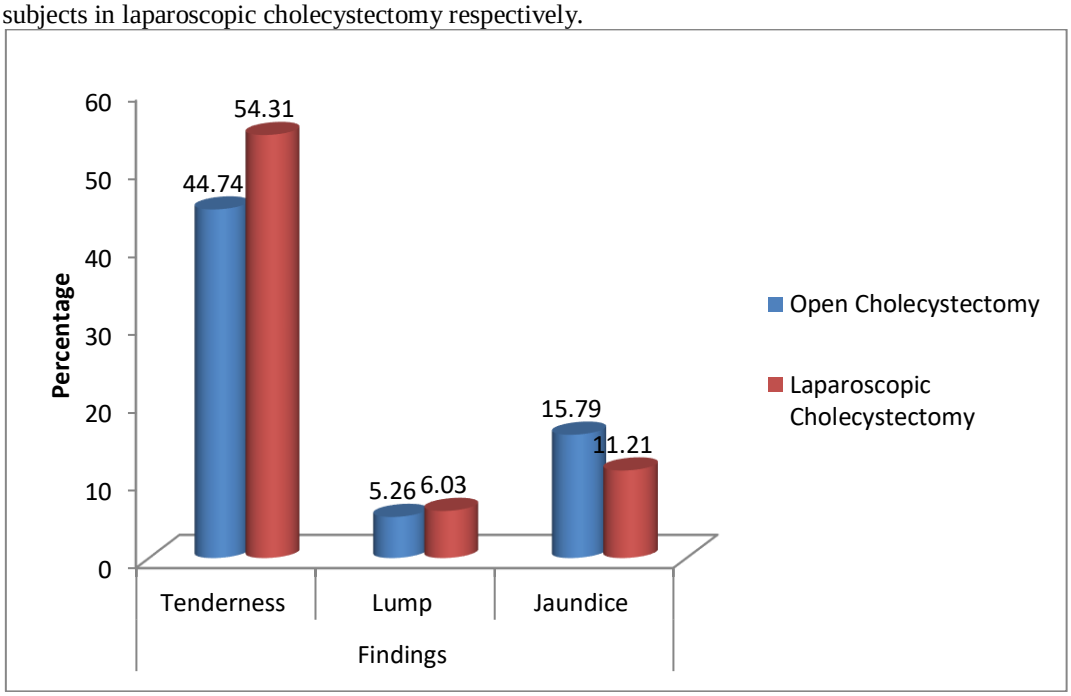
Total 154 were recruited during the study period, out of which 38 and 116 underwent open and laparoscopic cholecystectomy respectively. Females were comparatively more as compared to males in the present study. Maximum subjects were from the age group of 21-40 years.Most common symptom was pain followed by nausea/vomiting and postprandial fullness among the study subjects. Least common

symptom among the study subjects was heartburn followed by fever in this study (graph 1).



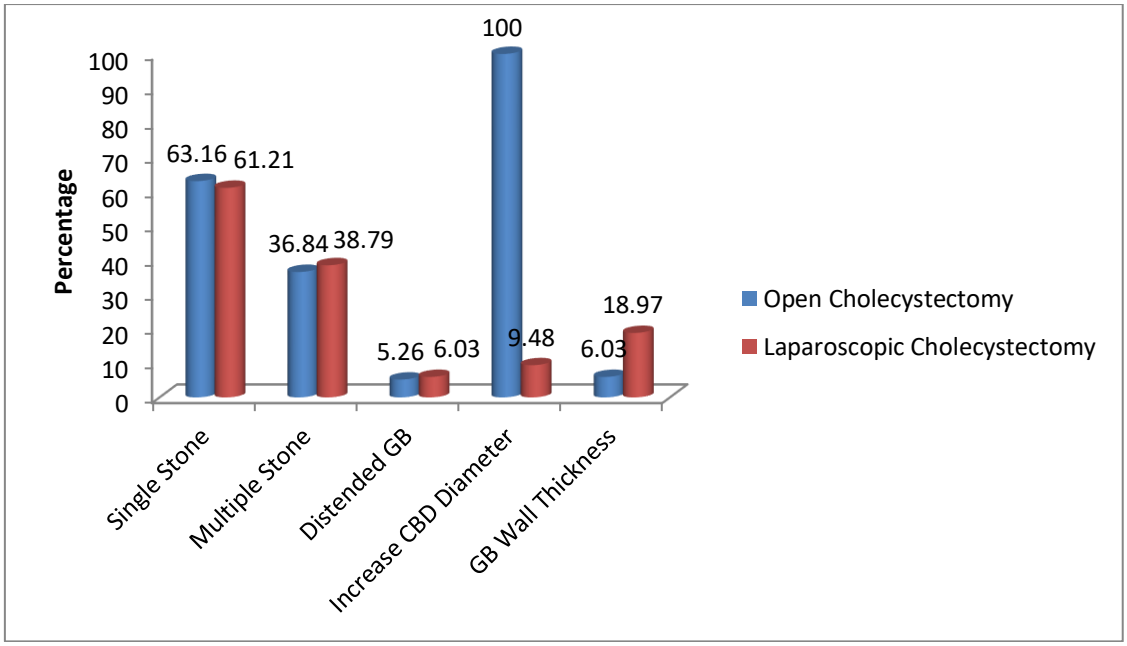
Graph 1: Symptoms among the study groups

Graph 2 shows the clinical findings among the study groups. Most common clinical finding was tenderness (44.74% in open and 54.31% in laparoscopic cholecystectomy). Lump and jaundice was reported among 5.26% and 15.79% of the subjects in open cholecystectomy. Lump and jaundice was reported among 5 6.03%, 11.21% of the subjects in laparoscopic cholecystectomy respectively.



Graph 2: Clinical findings among the study groups

Graph 3 shows the USG findings among the study groups. Single and multiple stone was found in 63.16%, 36.84% of the subjects in open cholecystectomy. Single and multiple stone was found in 61.21%, 38.79% of the subjects in laparoscopic cholecystectomy.Increase CBD diameter was revealed in all the subjects undergoing open cholecystectomy. Distended GB was reported in 5% and 6.03% of the subjects in open and laparoscopic cholecystectomy respectively.



Graph 3: USG findings among the study groups

Table 1 shows the intraoperative findings among the study groups. Adhesion with GB, excessive Fat over Calot's Triangle, bile leakage, bile duct injury and stone spillage was found among 10.53%, 13.16%, 10.53%, 10.53%, 5.26% of the subjects in open cholecystectomy. Adhesion with GB, excessive Fat over Calot's Triangle, bile leakage, bile duct injury and stone spillage was found among 9.48%, 11.21%, 5.17%, 5.17%, 10.34% of the subjects in laparoscopic cholecystectomy respectively.

Table 1: Intraoperative findings among the study groups

Findings	Open Cholecystectomy		Laparoscopic Cholecystectomy	
	N	%	N	%
Adhesion with GB	4	10.53	11	9.48
Excessive Fat over Calot's Triangle	5	13.16	13	11.21
Bile leakage	4	10.53	6	5.17
Bile duct injury	4	10.53	6	5.17
Stone spillage	2	5.26	12	10.34

Mean operation time (in min) was 78.13±7.08 in open cholecystectomy respectively.Mean operation time (in min) was 62.89±6.41 in laparoscopic cholecystectomy respectively. When mean operation time was compared statistically among open and laparoscopic cholecystectomy, it was found to be statistically significant as $p<0.05$ (table 2).

Table 2: Comparison of operation time between two groups

Group	Operation Time (in min)		t test	p value
	Mean	SD		
Open Cholecystectomy	78.13	7.08	6.14	0.007*
Laparoscopic Cholecystectomy	62.89	6.41		

*: statistically significant

Post- op pain (hours), duration of hospital stay (days) and return to work (days) was significantly more in open as compared to laparoscopic cholecystectomy with statistically significant difference as $p<0.05$ (table 3).

Table 3: Comparison of post-operative parameters between two groups

Parameters	Open Cholecystectomy		Laparoscopic Cholecystectomy		p value
	Mean	SD	Mean	SD	
Post- op pain (hours)	29.91	3.19	17.08	3.19	<0.01*
Duration of hospital stay (days)	5.09	0.52	2.01	0.17	<0.01*
Return to work (days)	6.27	0.89	2.98	0.39	<0.01*

*: statistically significant

Table 4 shows the comparison of complications between two groups. Intra operative bleeding, wound infection and postoperative ileuswas found among 10.53%, 15.79%, 13.16% of the subjects in open cholecystectom. Intra

operative bleeding, wound infection and postoperative ileuswas found among 2.59%, 3.45%, 4.31% of the subjects in laparoscopic cholecystectomy. Hence complications were more in open as compared to laparoscopic cholecystectomy with statistically significant difference as p<0.05.

Table 4: Comparison of complications between two groups

Complications	Open Cholecystectomy		Laparoscopic Cholecystectomy		p value
	N	%	N	%	
Intra operative bleeding	4	10.53	3	2.59	0.008*
Wound Infection	6	15.79	4	3.45	<0.01*
Abdominal Infection	2	5.26	2	1.72	0.07
Postoperative Ileus	5	13.16	5	4.31	0.002*
Pulmonary Complication	3	7.89	3	2.59	0.09
Bile Duct Findings	4	10.53	6	5.17	0.08

*: statistically significant

In our study; incidence of PCS was reported among 7.89% of the subjects in open and laparoscopic cholecystectomy while 18.19% of the subjects in laparoscopic cholecystectomy.Hence incidence of PCS was more in laparoscopic as compared to open cholecystectomy with statistically significant difference as p<0.05 (table 5).

Table 5: Incidence of PCS between two groups

Group	PCS		Chi Square test	p value
	N	%		
Open Cholecystectomy	6	7.89	8.71	0.023*
Pain	2	5.26		
Postprandial Fullness	1	2.63		
Fever	1	2.63		
Nausea/Vomiting	2	5.26		
Laparoscopic Cholecystectomy	21	18.10		
Postprandial Fullness	8	5.79		
Dyspepsia	6	4.35		
Pain	3	2.58		
Nausea/Vomiting	2	1.72		
Fever	2	1.72		

*: statistically significant

DISCUSSION

The present study was conducted from to study postcholecystectomy syndrome in patients undergoing OPEN Cholecystectomy Versus Laparoscopic Cholecystectomy. Total 154 were recruited during the study period, out of which 38 and 116 underwent open and laparoscopic cholecystectomy respectively.

Females were comparatively more as compared to males in the present study. The reason for high incidence among females could be that pregnancy and childbirth have a definitive influence on biliary tract disease, acting by causal stasis as well as weight gain and consequent hypercholesterolemia. Another reason may be the effect of female hormones i.e. oestrogen and progesterone, especially progesterone reducing motility of gall bladder to cause stasis leading to gall stone formation. Similar findings were revealed by Dhaigudeet al[6], Parambil SM et al[7], Anmol N et al[8] and AninditaBhar et al[9] in their studies.

Maximum subjects were from the age group of 21-40 years in the present study. AninditaBhar et al[9] in their study revealed that in Group A 49 (61.25%) patients were in age group of (20 to 40) yrs and in Group B 43 cases (53.75%) were in the first group i.e. 20 to 40 yrs. These findings were similar to our study. However Anmol N et al[8] in their study reported that highest age incidence was in the 5th decade.

Single and multiple stone was found in 63.16%, 36.84% of the subjects in open cholecystectomy. Single and multiple stone was found in 61.21%, 38.79% of the subjects in laparoscopic cholecystectomy. Increase CBD diameter was revealed in all the subjects undergoing open cholecystectomy. Distended GB was reported in 5 6.03% of the subjects in laparoscopic cholecystectomy respectively. M Khandayet al[10] in their study showed that gallstones were seen in all patients; stones were multiple in 36 (25.71%) cases and single in 104 (74.28%) cases.

Adhesion with GB, excessive Fat over Calot's Triangle, bile leakage, bile duct injury and stone spillage was found among 10.53%, 13.16%, 10.53%, 10.53%, 5.26% of the subjects in open cholecystectomy. Adhesion with GB, excessive Fat over Calot's Triangle, bile leakage, bile duct injury and stone spillage was found among 9.48%, 11.21%, 5.17%, 5.17%, 10.34% of the subjects in laparoscopic cholecystectomy respectively. Similarly AninditaBhar et al[9] in their study reported that intra-operative complication is more in open cholecystectomy (15%)

compared to laparoscopic cholecystectomy (11.25%), but this is not statistically significant.

Anmol N et al[8] in their study revealed similar findings too.

Mean operation time (in min) was 78.13±7.08 in open cholecystectomy respectively. Mean operation time (in min) was 62.89±6.41 in laparoscopic cholecystectomy respectively. When mean operation time was compared statistically among open and laparoscopic cholecystectomy, it was found to be statistically significant as $p<0.05$ in this study. Study by Waldner H et al[11] revealed that there was no significant difference in duration of surgery in laparoscopic and open cholecystectomy, while studies by several other authors such as Pramod Singh et al[12] (44.7 versus 72.4 min), Pessaux P et al[13] (103.3 min vs. 149.7 min), Doke A et al[14] and Jaswant Jain et al[15] found a shorter duration of surgery in laparoscopiccholecystectomy compared to open cholecystectomy which was in agreement with our study. Similarly AninditaBharet al[9] in their study revealed that mean duration of surgery in laparoscopic cholecystectomy (70.25±15.78) is significantly less than that of open cholecystectomy (107.18 ± 16.18). Contrary in various studies e.g. by Porte RJ et al[16] (75 min vs. 55 min), Lujan JA et al[17] (88 min vs. 77 min) a longer duration for laparoscopic compared to open cholecystectomy has also been encountered.

This was probably due to surgeons being more conversant with laparoscopic operations (by training, retraining and performing more numbers of laparoscopic surgeries on a daily basis) generally require less time for performing such operations.

Post- op pain (hours), duration of hospital stay (days) and return to work (days) was significantly more in open as compared to laparoscopic cholecystectomy with statistically significant difference as $p<0.05$ in our study. Similar to our study Hardy KJ et al[18] in their study revealed a significant longer mean hospital stay of 6.5±0.3 days in open cholecystectomy group compared laparoscopic cholecystectomy group (2 ± 0.2 days). Chan HS et al[19] recorded that laparoscopic cholecystectomy patients require significantly shorter mean post-operative stay (3.5 days vs. 5.9 days). Several other authors e.g. Hendolin HI et al[20], Anmol N et al[8] recorded similar findings. According to AninditaBharet al[9], post-operative complication is more in open cholecystectomy (22.5%) compared to laparoscopic cholecystectomy (6.20%), which is statistically significant. These findings are similar to our study. Similar to our study several authors such as Karim T et al[21], Ajay Gangji et al[22], and Lujan JA et al[17] showed a higher rate of complication in open cholecystectomy group compared to laparoscopic group. Though Lujan et al[17] found that the association of lesser complications in laparoscopic cholecystectomy group was not statistically significant ($p=0.06$).

In our study; incidence of PCS was reported among 7.89% of the subjects in open and laparoscopic cholecystectomy while 18.19% of the subjects in laparoscopic cholecystectomy. Hence incidence of PCS was more in laparoscopic as compared to open cholecystectomy with statistically significant difference as $p<0.05$. AldamaLópezet al[57] in their study found frequency of post-cholecystectomy syndrome among 23.1% of the cases. Anmol N et al[8] in their study revealed PCS among 0 and 2 subjects who underwent open and laparoscopic cholecystectomy respectively. The earlier report of Anandet al[23] who followed up 171 patients prospectively for nearly 3 years had an incidence of 18.13% whereas a more recent study from India reported an incidence of 27%.

There seems to be a large lacuna in the understanding of post-cholecystectomy symptoms, especially from India and there is a need for larger series or multicentric trials to understand in a better way, the physiology of altered bile flow and symptoms after LC and the cause of persistent, long-term symptoms in such patients.

CONCLUSION

Although incidence of PCS was more in laparoscopic as compared to open cholecystectomy, still it is safe and efficacious in thehands of experienced surgeons. There is a definitive learningcurve for surgeons and complications rate reduces assurgeons become more and more familiar with thisprocedure. It offers definitive advantages (e.g. shorterduration of surgery, less intra and post-operativecomplications, less analgesic use, early discharge and mobilisation) over open cholecystectomy and should be anavailable option for all patients requiring electivecholecystectomy.

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