

Original article:

A clinical study of gall stone disease and its surgical management with factors predicting difficult laparoscopic cholecystectomy and post-cholecystectomy complications

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Abstract

Introduction: Gallstone disease remains one of the major causes of abdominal morbidity and mortality through the world, representing a major health problem. Calculi are formed due to impaired metabolism of cholesterol, bilirubin and bile acids. Gallstone disease and cardiovascular disease, common diseases worldwide, are strongly associated and have considerable economical impact.

Methodology: All patients presenting with symptoms suggestive of gallstone disease were screened with ultrasonography (USG). Those confirmed as having cholelithiasis on ultrasound, was subjected to routine hemogram, liver and kidney function tests, coagulation profile, and biochemical investigations. Patients were assessed for surgical management of gallstone disease. Laparoscopic cholecystectomy was offered to patients with no contradiction to surgery/ laparoscopic surgery.

Results: It has been found that patient who have difficult lap cholecystectomy or who have underwent conversion to open cholecystectomy have complications like tachycardia, hypertension or SSI in the postop or followup period. Patient who have difficult lap cholecystectomy are comparatively more prone for complications like SSI, one patient have developed incisional hernia and another 02 patients have hypertrophic scar on follow up at 06 months.

Conclusion : It can be concluded that LC is the gold standard for the management of gall stone disease. With the advancement in equipment and gaining experiences in laparoscopy, most of the difficult gallbladder can be dealt laparoscopically.

INTRODUCTION:

Gallstone disease remains one of the major causes of abdominal morbidity and mortality through the world, representing a major health problem. Calculi are formed due to impaired metabolism of cholesterol, bilirubin and bile acids. Gallstone disease and cardiovascular disease, common diseases worldwide, are strongly associated and have considerable economical impact¹. The lowest frequencies are in Black Africans (<5%) the best studied being the Masi tribe and the Bantu, in whom the entity is virtually non-existent². Prevalence of cholelithiasis in India is more in females than men. The prevalence is more common in Northern Indians than Southern Indians followed by Maharashtra particularly from coastal region³.

The adage 'fair, fat, fertile, female and forty' is only part of the story. Other risk factors include: Increasing age, Positive family history, Sudden weight loss - eg, after obesity surgery, Loss of bile salts - eg, ileal resection,

terminal ileitis, Diabetes - as part of the metabolic syndrome, Oral contraception - particularly in young women. There are many researches on etiology, clinical presentation, management specifically evaluating the modalities of treatment. Increase in incidence in India partially attributed to widespread use of ultrasonography (USG) in the last two decades but changing socio-economic structure and changes in various other epidemiological factors including diet may also be responsible.

Non-vegetarians were found to be more commonly involved with cholelithiasis than vegetarians. The ratio of incidence of cholelithiasis in non-vegetarians and vegetarians was found to be 8:2. The cause could be due to the consumption of high protein and fat. The findings were similar in a study done by Maskey et al. in 1990 AD in Nepal where incidence of cholelithiasis was found more frequently among the people who consumed more fat and protein⁴.

With the advent of better diagnostic aids there has been an increase identification of patients suffering from gall bladder disease. Laparoscopic cholecystectomy is the preferred procedure. A Cochrane review found that there was no difference in mortality, postoperative complications, or operative time compared with open cholecystectomy. However, hospital stay was shorter and recovery time was quicker. An American study subsequently found that open cholecystectomy is associated with a higher mortality burden.

Also, a high predicted risk of conversion may allow the surgeon to take an early decision to convert to OC when difficulty is encountered during dissection; this may shorten the duration of surgery and decrease the associated morbidity.

This study aims at identifying factors which can predict difficult laparoscopic cholecystectomy and correlate with postoperative complications.

MATERIALS AND METHODS

- Patients with symptomatic Gall stone disease at a tertiary care centre in India (241 patients).
- Prospective type study.

Inclusion criteria: All patients undergoing Laparoscopic cholecystectomy will be included in study.

Exclusion criteria: Nil

The study was approved by the local ethical committee. Written informed consent was obtained from all the patients or their guardians/legal representatives.

METHODOLOGY

All patients presenting with symptoms suggestive of gallstone disease were screened with ultrasonography (USG). Those confirmed as having cholelithiasis on ultrasound, was subjected to routine hemogram, liver and kidney function tests, coagulation profile, and biochemical investigations. Patients were assessed for surgical management of gallstone disease. Laparoscopic cholecystectomy was offered to patients with no contradiction to surgery/ laparoscopic surgery.

The selected patients were evaluated for the following risk factors: age, sex, history of duration of symptoms, previous hospitalization, body mass index (BMI), presence of any supraumbilical or infraumbilical abdominal scar, palpable gallbladder, gallbladder wall thickness, pericholecystic collection, and impacted stone. Following workup and evaluation the patient were subjected to laparoscopic cholecystectomy. Time

taken, biliary/stone spillage, bleeding during surgery, Calot's triangle dissection, gall bladder bed dissection, anatomical variation, injury to duct / artery, difficult extraction of gall bladder, extension of incision, need for conversion were noted and operating surgeon grading it as easy or difficult, duration of hospital stay, necessity for interventional procedure were recorded.

RESULTS

A total of 241 patients had laparoscopic cholecystectomy during the study period. Average age was 44.07 years \pm 14.232. 25.7% were males and remaining were females. Most patients were in age group 41-60 years age group (44.8%). Similar number of patients has been in age group 21-40 yrs constituting 41.1%.

Most of the patients presented with Right upper quadrant pain, Biliary colic and Dyspepsia. Some patients had history of jaundice also (5.8%). Most patients have found to be symptomatic for less than a year (177). Around 21 patients were asymptomatic but underwent Lap cholecystectomy for other indications.

Most of the patients belong to north and north east region constituting nearly 72% that too mainly belong to 03 states i.e. Uttar Pradesh (69), Bihar (55) and Maharashtra (41). Most patients have no comorbidity (61.4%). Hypertension and DM II are the most prevalent comorbidities among the patients.

Previous abdominal surgeries were absent in 73.40% of cases. But lower segment caesarian section (8.30%) and total abdominal hysterectomy (4.60%) were the most common procedures previously done in cases.

Most patients have TLC within normal range. Around 53 patients have found to have >9000 TLC Count. 17 patients have found to have deranged liver function test, around 27 patients have hyperglycemia at the time of surgery. On USG most of the patients have multiple calculi (64.3%). 82 patients have single calculi, 21 patients have impacted stone and 02 of them have suspected to have mucocele on imaging.

Most patients found to have GB wall thickness less than 3 mm. Most patients were accepted in ASA I and ASA II. One patient has multiple comorbidity and was accepted in ASA IV.

There have been nearly equal distribution of patients operated by General and GI surgeon. There have been no difficulty during port entry in most of the patients except in 06 patients who were obese.

Distended gallbladder was seen in 19.90% of cases, mucocele of gall bladder seen in 10% of cases and normal gall bladder seen in around 60.60% of cases. Normal gall bladder wall thickness was seen in 67.60% of cases, thickened gall bladder wall seen in 32% of cases.

Gall Bladder	Number	Percent
Contracted	20	8.30%
Distended	48	19.90%
Emphyema	3	1.20%
Mucocele	24	10.00%
Normal	146	60.60%
Wall thickness	Number	Percent
GB polyp	1	0.40%
Normal	163	67.60%
Thickened	77	32.00%

Cystic duct	Number	Percent
Normal	192	79.70%
Short/ wide	49	20.30%
Mucosa	Number	Percent
Cholesterosis	6	2.50%
Fibrotic	10	4.10%
GB polyp	1	0.40%
Unremarkable	224	92.90%
Calculi	Number	Percent
Absent	6	2.5%
Multiple	155	64.3%
Single	82	34.0%
Sludge	2	0.80%
Calculi mobility	Number	Percent
Absent	6	2.5%
Impacted	35	14.50%
Mobile	201	83.40%
Calculi type	Number	Percent
Absent	5	2.50%
Cholesterol	58	24.1%
Mixed	105	43.6%
Pigmented	72	29.9%
CBD	Number	Percent
Dilated	21	8.7%
Normal	220	91.3%

Cystic duct was short and wide in 20.30% cases while in 79.70% of patients' cystic duct was normal in caliber. 92.90% of patients had an unremarkable gall bladder mucosa whereas only around 4.10 % cases had a fibrotic mucosa.

Multiple calculi were seen in 64.30% cases, while single calculi were 34.0%. Most of the calculi were mobile (83.40%). Mixed type of calculi were more in number (43.6%). Common bile duct was seen dilated in only 8.70% cases. In 21 patients there was dilatation of CBD. In 65 patients there was spillage of bile either at the time of surgery or during extraction. In most patients liver was normal in appearance, but in 14 patients liver was cirrhotic or fatty liver, or shrunken.

Drain was put in around 28 patients postoperatively, most of them were those which were converted to open i.e 24. In 04 patient the incision at epigastric port was to extended to deliver the GB. In 80 patients GB was easily extracted by using port dilator. Most surgeries were performed within 90 minutes, however in 74 cases the time taken extend more than 90 minutes most of which were either converted or were difficult, in some cases the initial step of port entry and initial dissection was done by residents also.

Postoperatively most patients have uneventful postoperative period except in one patients who have soakage at epigastric port. 34 patients have shoulder tip pain and 13 patients have developed ecchymoses of abdominal wall. 05 patients have developed SSI at operated site all of them were who underwent lap converted to open cholecystectomy. out of these 05 patients 02 patients have developed hypertrophic scar and one patients have incisional hernia at follow up.

Out of 62 male patients 22 have difficult cholecystectomy which constitute 34.9% of total male patients where as only 41 female patients have difficult cholecystectomy out of 179 patients. Statistically no significant difference was found based on sex about difficulty lap cholecystectomy. But it was found that age of the patient have impact on the difficulty level. It was found that mean age >48.29 years was associated with difficulty during lap cholecystectomy.

Difficulty level	Difficult (n=63)			Easy (n=178)			t	df	p value
	Mean	Median	SD	Mean	Median	SD			
AGE	48.29	50.00	13.97	42.54	43.00	13.86	2.82	239.00	0.005

Obesity and Hypertension have significant association with difficult laparoscopic cholecystectomy, but No significant association was found with patient with comorbidity like DM, Hypothyroidism. But association between difficulty level was found to be significant if the patient have both HTN as well as DM in the same patient.

Difficulty level		OBESITY		Total
		ABSENT	PRESENT	
Difficult	n	57	6	63
	%	90.5%	9.5%	100.0%
Easy	n	173	5	178
	%	97.2%	2.8%	100.0%
Total	n	230	11	241
	%	95.4%	4.6%	100.0%
	Value	df	p value	
Pearson Chi-Square	4.816a	1	.028	
Likelihood Ratio	4.194	1	.041	

Difficulty level		HTN		Total
		No	Yes	
Difficult	n	46	17	63
	%	73.0%	27.0%	100.0%
Easy	n	151	27	178
	%	84.8%	15.2%	100.0%
Total	n	197	44	241
	%	81.7%	18.3%	100.0%
	Value	df	p value	
Pearson Chi-Square	4.353a	1	.037	
Likelihood Ratio	4.089	1	.043	

Difficulty level		DM WITH HTN		Total
		No	Yes	
Difficult	n	54	9	63
	%	85.7%	14.3%	100.0%
Easy	n	167	11	178
	%	93.8%	6.2%	100.0%
Total	n	221	20	241
	%	91.7%	8.3%	100.0%
	Value	df	p value	
Pearson Chi-Square	4.018a	1	.045	
Likelihood Ratio	3.629	1	.057	

The mean TLC count in difficult cases was 8065 /cu mm. As all our cases have undergone interval cholecystectomy we have taken normal but higher TLC count i.e. 9000/cu mm as cut off and we found that TLC more than 9000 have significant association with difficult lap cholecystectomy. It was seen that 68.3% of difficult lap cholecystectomy has TLC count more than 9000.

Difficulty level		TLC		Total
		>9000	<9000	
Difficult	n	20	43	63
	%	31.7%	68.3%	100.0%
Easy	n	33	145	178
	%	18.5%	81.5%	100.0%
Total	n	53	188	241
	%	22%	78%	100.0%
	Value	df	p value	
Pearson Chi-Square	4.731a	1	.030	
Likelihood Ratio	4.484	1	.034	

USG factors and association with difficult lap cholecystectomy

Number of calculus: No significant association of number of stones and difficulty level was found in the study. But strong association between impacted stone and GB wall thickness (>3.94 mm) was found. Also association was seen between the size of calculus and the difficulty level. Mean stone size of more than 14.65 mm have been found to be associated with difficult lap cholecystectomy.

Difficulty level		IMPACTED STONE		Total
		No	Yes	
Difficult	n	45	18	63
	%	71.4%	28.6%	100.0%
Easy	n	175	3	178
	%	98.3%	1.7%	100.0%
Total	n	220	21	241
	%	91.3%	8.7%	100.0%
	Value	df	P value	
Pearson Chi-Square()	42.285a	1	.000	
Continuity Correctionb	38.973	1	.000	
Likelihood Ratio	36.776	1	.000	

Difficulty level	Difficult (n=63)			Easy (n=178)			t	df	p value
LARGEST CALCULUS	14.65	14.30	6.02	10.67	11.00	5.35	4.89	234.00	0.000
GB WALL THICKNESS	3.94	3.00	1.56	3.07	3.00	1.11	4.42	197.00	0.000

Preanaesthetic check up(ASA grade) :

It was found that ASA level of the patient has association with the difficulty level. It was found that 74.6% of difficult Lap chole was associated with ASA II and higher ASA level. Strong association found between the abnormal i.e. dilated CBD and difficult lap cholecystectomy. There has been more incidence of Bile and stone spillage in difficult cases as compared to easy one.

Difficulty level		CBD		Total
		NORMAL	ABNORMAL	
Difficult	n	53	10	63
	%	84.1%	15.9%	100.0%
Easy	n	167	11	178
	%	93.8%	6.2%	100.0%
Total	n	220	21	241
	%	91.3%	8.7%	100.0%
	Value	df	p value	
Pearson Chi-Square	5.496a	1	.019	
Likelihood Ratio	4.922	1	.027	

Difficulty level		BILE/STONE SPILLAGE		Total
		DIFFICULTY	NORMAL	
Difficult	n	36	27	63
	%	57.1%	42.9%	100.0%
Easy	n	140	38	178
	%	78.7%	21.3%	100.0%
Total	n	176	65	241
	%	73.0%	27.0%	100.0%
	Value	df	p value	
Pearson Chi-Square	10.929a	1	.001	
Likelihood Ratio	10.346	1	.001	

Adhesions at calots triangle has strong association with the difficulty level. Around 70 % of the cases with adhesions have difficulty during surgery and some of them have been converted also. It has been observed that nearly 24 cases out of 63 difficult cases were converted to open cholecystectomy. also significant association has been seen with the use of port dilater and the difficult level, i.e most difficult cases GB have to be delivered via port dilater. It has been found that mean time taken in difficult cases was 02 hours , where as in easy cases time taken for surgery was around 67 minutes.

Difficulty level		ADHESIONS			Total
		NO	MINIMAL	YES	
Difficult	n	10	9	44	63
	%	15.9%	14.3%	69.8%	100.0%
Easy	n	104	55	19	178
	%	58.4%	30.9%	10.7%	100.0%
Total	n	114	64	63	241
	%	47.3%	26.6%	26.1%	100.0%
	Value	df	p value		
Pearson Chi-Square	84.962a	2	0.0001		
Yates Continuity Correction	80.036	2	0.0001		
Likelihood Ratio	78.817		0.0001		

Difficulty level		GB EXTRACTION			
		CONVERTED	EXTENSION OF INCISION	NO	PORT DILATOR
Difficult	n	24	3	12	24
	%	38.1%	4.8%	19.0%	38.1%
Easy	n	0	1	121	56
	%	0.0%	0.6%	68.0%	31.5%
Total	n	24	4	133	80
	%	10.0%	1.7%	55.2%	33.2%
		Value	df	p value	
Pearson Chi-Square		93.559a	3	.000	
Continuity Correction		94.071	3	.000	

Surgeon Opinion	Difficult (n=63)			Easy (n=178)			t	df	p value
	Mean	Median	SD	Mean	Median	SD			
TIME TAKEN	120.48	120.00	22.64	67.89	70.00	16.89	-19.33	239.00	0.000

Postop complications

It has been found that patient who have difficult lap cholecystectomy or who have underwent conversion to open cholecystectomy have complications like tachycardia, hypertension or SSI in the postop or followup period. Patient who have difficult lap cholecystectomy are comparatively more prone for complications like SSI, one patient have developed incisional hernia and another 02 patients have hypertrophic scar on follow up at 06 months.

Difficulty level		POSTOP SCAR			Total
		HEALED	HYPERTROPHIED SCAR	INCISIONAL HERNIA	
Difficult	n	60	2	1	63
	%	95.2%	3.2%	1.6%	100.0%
Easy	n	178	0	0	178
	%	100.0%	0.0%	0.0%	100.0%
Total	n	238	2	1	241
	%	98.8%	0.8%	0.4%	100.0%
		Value	df	p value	

Pearson Chi-Square	8.583a	2	0.014
Likelihood Ratio	8.158	2	0.017
Yates Continuity Correction	7.054		0.017

Hospital stay:

The mean days of hospital stay in easy cases was 2.08 days as compared to 4.06 days in patients who have difficult laparoscopic cholecystectomy which is statistically significant. Although now a days Lap cholecystectomy done as a day care surgery in most part of world, in our hospital setting, the patient were kept for observation on POD-1, the discharge process gets completed by next day evening ie on POD-2. In patients who have difficult lap cholecystectomy patient were discharged on POD-2 or POD-3, but patients who underwent conversion were discharged on POD-5 or later depending upon complications, so the mean hospital stay in case of these patients have come up as 4.06 days.

Surgeon Opinion	Difficult (n=63)			Easy (n=178)			t	df	p value
	Mean	Median	SD	Mean	Median	SD			
DISCHARGE	4.06	2.00	2.96	2.08	2.00	0.64	8.44	239.00	0.000

HPE correlation:

Out of 241 patients, their HPE report shows chronic cholecystitis in 207 cases; in 26 patients it shows chronic cholecystitis with cholesterosis. 04 GB sent for HPE shows acute on chronic cholecystitis. One of them have spongoid hyperplasia, 02 shows follicular cholecystitis and 01 patient have xanthogranulomatous cholecystitis.

DISCUSSION

Some series like Fried, et al⁵ in 1994 and Brodsky A et al⁶ in 2000 suggest that male gender is a risk factor of difficult cholecystectomy. In our study, male sex was not found to be statistically significant predictor of difficult LC (p 0.052). This finding was in conformity with that of Schrenk, R. Woisetschlager, et al⁷.

Age: Several series had reported that advanced age was associated with difficult LC and increased rate of conversion. Fried et al⁵ and Brodsky et al⁶ noted that increasing age was associated with difficult LC and increased conversion rate. Similar association found in our study series (p-0.005). We found that age more than >48 years is associated with increased difficulty, Randhawa et al⁸ have found age more than 50 years associated with

difficulties. Duration of disease: Most studies have found significant association between duration of symptoms in the form of dull aching pain in Rt hypochondrium, biliary colic and dyspepsia, as shown in recent series by Dhiraj Agarwal et al⁹ in 2015. But in our studies we are failed to find any correlation between duration of symptoms and difficult LC, it is in conformity with the results of Alponat et al¹⁰ and SK Mohanty et al¹¹ (2017).

Obesity: Obesity is known to be associated with difficult surgery and increased risk for conversion as seen in many studies like one by Liu, et al¹² in 1996, Fried et al⁵ in 1994, also shown in Nachnani J et al¹³ in 2005 and Ibrahim S et al¹⁴ in 2006. Our study have also found significant association with Obesity and difficulty in Cholecystectomy (p=0.028). However Partha Bhar et al¹⁵ in their study on 112 patients have found that there is no significant risk associated with high BMI.

Hypertension: Some literatures had studied Hypertension as predictor of difficult LC. Partha Bhar et al¹⁵ in their study found hypertension to be a statistically significant (p<0.001) predictor of difficult laparoscopic cholecystectomy. In our study we also find significant association (p=0.037)

Diabetes –Mellitus: Few studies had found diabetes as a predictor of difficult laparoscopic cholecystectomy. Samer A. Kanaan, Kenric M. Murayama et al¹⁶ in 2002 did not find any increased risk of conversion in diabetic patients similarly we also do not find any significant association between DM and difficult LC. However Partha Bhar et al¹⁵ found to have significant association between presence of DM and increased difficulty. We did not find any literature which has compared including both DM and HTN together, as impact on difficulty level. We found in our study that although DM alone has insignificant impact on difficulty but in a patient with both DM and HTN there is significant increase in difficulty level while LC (p=0.045). Hypothyroidism: Although no literature exist defining difficult LC with Hypothyroidism in patient, I did not find any association with thyroid disorder and difficult LC. Also we could not find any association of difficult LC with number of comorbidity.

Laboratory parameters: Abnormal LFT and elevated amylase signify ongoing hepatitis, cholangitis and pancreatitis that pose difficulty in dissection due to oedema. Alphonat et al¹⁰, and Kama et al¹⁷, have demonstrated a similar association in their study. They have also obtained elevated total count as a predictor for difficulty. Ravindra Nindoni et al¹⁸ in their study found that patients with TLC >11000/cu mm had significant high rates of difficulty and conversion, compared to patients with TLC <11000/cu mm. In our study we also find significant association with TLC count of >9000/cu mm (p=0.030). Other factors like deranged LFT, blood sugar level, blood group and INR were insignificant in my study.

In our study, we found ASA class to be a statistically significant predictor (p=0.009) of difficult laparoscopic cholecystectomy. When ASA II was compared with ASA I the former was found to have a greater probability of difficult cholecystectomy. Similar results was noted by P Bhar et al¹⁵ in their study Operative factors and association with difficulty

Difficult umbilical port entry was associated pre-operatively with previous history of upper abdominal surgeries, obesity and presence of upper abdominal scars/hernias. In our study we have only 06 patients in whom we faced difficulty during port entry. Shannon et al¹⁹, have found that the presence of upper abdominal surgeries and presence of upper abdominal scars or hernias as being significantly associated with difficulty in umbilical port

placement. In our study we could not find any association with difficult LC, it may be because we have few patients with upper midline scars.

Dilated CBD: In our study we noted that Dilated CBD results in difficulty in operating and is associated with increased risk of conversion. In our study we noted Dilated CBD in 21 cases (8.7%) out of which 10 patients have difficult lap chole, which was statistically significant (0.019). Common bile duct size also has a good correlation with conversion to the open procedure and difficulty in surgery, in accordance with findings from previous studies (Daradkeh SS et al²⁰, Corr P et al²¹)

Bile spillage: In 65 cases we noted spillage either of bile, stone or both, which constitute 27% of total. But we found that most of them are seen in difficult cases and is statistically significant (p=0.001). Spillage of stones as a cause of conversion had been observed by Frazee R.C. et al²². But in our study none of the cases were converted due to this reason. Bile spillage was present in 65 cases in our study, but these cases have been categorized as difficult due to bile spillage. None of these cases were converted and all were managed by irrigation and suction.

Adhesions at calots: Partha Bhar et al¹⁵ in their study found adhesion has one of the most common reasons for difficulties encountered during laparoscopic attempt of the patients had to be converted because of frozen Calot's triangle making visualization of duct and vessels impossible. In our study we found that adhesions at calots have difficulty in operating and also most have to undergo conversion.

GB extraction: Difficulty in gallbladder extraction was associated with distended gallbladder and presence of large stones. A distended gallbladder or the presence of large stones leads to difficulty in the extraction of the specimen through the small incision thus leading to the need to aspirate the gallbladder, extend the epigastric port and the increased probability of gallbladder perforation during these maneuvers. Singh et al²³, also have supported the same in their study. In our study out of 63 difficult cases 24 undergo conversion for various reasons mentioned in result. In 3 cases we have to extend the epigastric incision to deliver the GB, while 24 GB were easily extracted using port dilator.

Time taken for surgery: Lal et al²⁴ and colleagues suggest that a difficult cholecystectomy is one taking longer than 90 minutes, tearing the gallbladder, spending more than 20 minutes dissecting the gallbladder adhesions, or more than 20 minutes dissecting Calot's triangle. While time to dissection of Calot's triangle will vary on surgical skills and level of experience, it will generally be longer in patients with increasing access difficulty, inflammation and adhesion. In our study the mean time taken by surgeon in difficult cases was 120 minutes, as compared to 67 minutes taken for easy cases, clearly defining increased time required in difficult cases.

Postop complications: Serious complications of LC occur in fewer than 2% of all cases (Gauma DJ et al²⁵). In our study the postoperative complication rate was within the range of published reports (0-8.6%) (Ghnam W et al²⁶, Singh R et al²⁷, Kaushik R²⁸). Few patients developed Right shoulder tip pain in immediate postop period most of them in the converted group (14.1%). Ecchymoses of the abdominal skin developed in 5.4% of patients mainly in obese group. More than 90% patients have uneventful immediate postop period. Tachycardia and high blood pressure observed in 18 patients that settled by POD-1. Only one patient has soakage of dressing at epigastric port, rest have minimal insignificant or no soakage at optd site. Wound infection of epigastric port through which

gallbladder is extracted occurs in 0.3 to 1% of cases (Vagenas K et al²⁹). In our study it occurred in five cases (2.1%), all were treated with antibiotics and dressing.

Several studies have shown that low-pressure pneumoperitoneum is feasible and safe and results in reduced postoperative pain compared with standard-pressure pneumoperitoneum [W.Ko-Iam et al³⁰, J.Hua et al³¹].

PONV(postoperative nausea and vomiting) is known to be a frequent and distressing source of discomfort during the postoperative period, especially after laparoscopic procedures, with an incidence rate as high as 70%. The use of proper antiemetic drugs during the operation might also reduce the incidence of PONV [W Ko Iam et al³³]. Based on the evidence, ondansetron is more effective than metoclopramide in preventing PONV after LC. Our patient too has PONV and managed significantly with ondansetron.

One of our patient developed port site hernia at umbilicus after 6 months of follow up. Other complications, such as those related to pneumoperitoneum or thermocoagulation, were not seen in our study. 02 of the converted group developed hypertrophic scar at Kocher incision site.

Hospital stay:

Improvement in LC and anesthetic techniques, together with increased familiarity with the procedure, has led to progressively shorter hospital stays [F keus et al³²]. However, two studies have reported that LC patients fulfilling the following criteria had a significant association with longer hospital stays: patients aged more than 60 years, patients with ASA class 3, patients with complicated gallstones, patients with increased operative time, patients with intraoperative findings of thickened gallbladder wall, and patients with adhesions and perforations of the gallbladder [Y-Y Tsang et al³³, J U Chong et al³⁴]. In our study we noted that hospital stay have increased by 02 days in difficult group as compared to easy group, similar findings with that of J U Chong et al³⁷.

CONCLUSION

It can be concluded that LC is the gold standard for the management of gall stone disease. With the advancement in equipment and gaining experiences in laparoscopy, most of the difficult gallbladder can be dealt laparoscopically. Preoperative risk factors can help to predict difficult gallbladder and conversion to OC. These factors can predict difficulty to be encountered during surgery and help in making a decision for conversion thus shortening the duration of surgery and preventing unnecessary complications.

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