ORIGINAL RESEARCH PAPER

General Surgery

SINGLE VERSUS MULTIPLE GALL STONE DISEASE – OPERATIVE CHALLENGES ENCOUNTERED

KEY WORDS: Gall stones, Cholecystitis, Laparoscopic cholecystectomy,

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ABSTRACT

Aim : The aim of the study is to evaluate the differences in the operative implications of single stone vs. multiple gall stone disease.
Materials and methods : After approval from the ethical committee a written informed consent was obtained from 71 patients. This is a prospective study conducted between August 2014 to July2016. Patients were divided into two groups:
Group I - 30 patients with single gall stone disease were included in the group.
Group II - 41 patients with multiple gall stone diseases were included in the group
All the patients admitted under single unit who presented with multiple gall stones were included in Group II. However patients with single gall stone disease was also taken from other unit in order to reach the minimum criteria of 30 patients in Group I. The p value was calculated by student paired t test and chi square test. p value< 0.05 was taken as significant.
Results : In the present study while taking all the 71 patients into consideration 33/71 patients had features of normal / chronic cholecystitis and 38/71 patients had features of acute cholecystitis/ gangrenous cholecystitis s/o gangrenous gall bladder or perforated gall bladder with frozen Calot'striangle. In two patients laparoscopy converted into open procedure. It appeared that intraoperatively almost same number of patients had normal/ chronic cholecystitis and acute cholecystitis. Comparing the total time of surgery between Group I and Group II the two tailedP value 0.0267 was significant. In two cases in group II we had to convert to open procedure which was not included in calculating the total time of surgery. In present study 10/71 patients had difficult laparoscopic cholecystectomy. In Group I 2/30 patients had difficult laparoscopic cholecystectomy where as in Group II 8/39patients had difficult laparoscopic cholecystectomy.
Conclusion : The features of acute cholecystitis was more in the group of patients with multiple gall stones and the complications of gall stones like gangrene of gall bladder, perforation of gall bladder and frozen Calot's triangle was also more in the group of patients with multiple gall stones. The number of difficult laparoscopic cholecystectomy was also more in patients with multiple stones

INTRODUCTION

Gallstone disease is one of the most common gastrointestinal illness that frequently requires hospitalization and it can occur in any healthy persons. They represent an inability to maintain certain biliary solutes, primarily cholesterol and calcium in a solubilized state resulting in stone formation[1].

Most patients with symptomatic GB stones are treated by cholecystectomy. Cholecystectomy is the definitive treatment of patients with gall stones.

In case of acute presentation early cholecystectomy performed within 2 to 3 days of presentation is preferred over interval or delayed cholecystectomy that is performed 6 to 10 weeks after initial medical therapy[2,3]. Laparoscopic cholecystectomy is the preferred approach to patients with acute cholecystitis.

Conversion to an open procedure should be made if the inflammation prevents adequate visualization of important structures especially in the Calot's triangle. The conversion rate to an open cholecystectomy is higher (4%-35%) in the setting of acute cholecystitis than with chronic cholecystitis.

Numerous studies have shown that the morbidity rate, hospital stay and time to return to work are lower in patients undergoing laparoscopic cholecystectomy than open cholecystectomy[4].

Patients with gall stone disease can have either a single gall stone or multiple gall stones. However, these two subsets of gall stones differ in their size, incidence, their clinical presentation, operative and post-operative complications, they also show varying rates of conversion to open procedures.

Multiple stones are more common compared to single stones[5]. Laparoscopic cholecystectomy is the definitive treatment of patients with gall stones. However the intra operative difficulties like dense adhesions and difficult dissection of Calot's triangle, spillage of gall stones, spillage of bile and gall bladder perforation[6] leads to conversion to open procedure. The conversion rates to the open procedure are also more often associated with multiple stones filled in gall bladder when compared to single stone. However a single stone of >1 cm or a single large stone impacted at the neck increases the conversion rate[7]. Some studies also quote that single stone disease are equally problematic.

AIM OF THE STUDY

The aim of the study is to evaluate the differences in the operative implications of single stone vs. multiple gall stone disease.

MATERIALS AND METHODS

After approval from the ethical committee a written informed consent was obtained from 71 patients. This is a prospective study conducted between August 2014 to July2016. All the patients admitted under single unit who presented with multiple gall stones were included in Group II. However patients with single gall stone disease was also taken from other unit in order to reach the minimum criteria of 30 patients in Group I. Patients with symptomatic gall stones diagnosed preoperatively by ultrasonography are included in the study. Patients were divided into two groups:

GROUP I -30 patients with single gall stone disease were included in the group

GROUP II- 41 patients with multiple gall stone diseases were included in the group

The p value was calculated by student paired t test and chi square test. p value< 0.05 was taken as significant.

RESULTS

Operative challenges :

In the present study while taking all the 71 patients into consideration 33/71 patients had features of normal / chronic cholecystitis and 38/71 patients had features of acute cholecystitis/ gangrenous cholecystitis s/o gangrenous gall bladder or

perforated gall bladder with frozen Calot'striangle. In two patients laparoscopy converted into open procedure. It appeared that intraoperatively almost same number of patients had normal/ chronic cholecystitis and acute cholecystitis.

In Group I normal/chronic cholecystitis was seen in 17/30(56.66%) while in Group II it was seen in 16/39(63.41%).

Acute cholecystitis was seen in 13/30(43.33%) patients in Group I while in Group II it was seen in 23/39(58.97%). Thus it appeared that in both the groups most of the patients presented with normal/chronic cholecystitis. However comparatively in more proportion of patients in Group II had acute cholecystitis intra operatively.

Fig 1 : Showing comparison of operative findings in Group I and Group II patients.

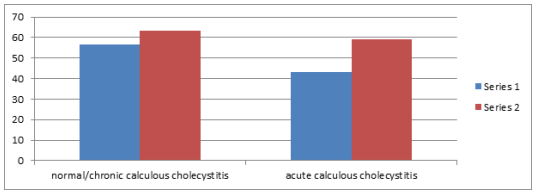

TABLE 1 : Operative findings in Group I and Group II patients

	Parameters	Total (group I +group II)	Group I (n=30)	Group II (n=41)	p value	Significance
Features of normal/ chronic cholecystitis	Normal gall bladder only	7	5	2		
	Only gall bladder distension	25	12	13		
	Only contracted gall bladder	1	0	1		
Total		33	17	16	0.136	Not significant
Features of acute cholecystitis	Gall bladder distension +edematousgall bladder and/or adhesions	26	11	17		
	gangrenous gall bladder and /or adhesions	10+2	2			
Total		36+2	13	23+2	0.136	Not significant

*Note – 2 patients were converted into open procedure.

In present study normal / chronic cholecystitis was detected in 43/71 patients by ultrasonography while intra-operatively it was seen in 33/69 patients only while acutecholecystitis was detected in 28/71 patients by ultrasonography while intra-operatively it was seen in 36/69 patients.

Difficult Laparoscopic Cholecystectomy:

Timings : Two timings were noted in present study, first is the total time of surgery which is the time from skin incision for insertion of the umbilical port to removal of gall bladder from the abdomen with adequate hemostasis of the liver bed. The second time is the time interval between Calot's triangle dissection to gall bladder removal from the fossa. Based on these timings difficult laparoscopic cholecystectomy was predicted in Group I and Group II patients.

For present study purposegall bladder dissection time > 45 minutes and the total time of surgery >90 minutes was considerd as the predicting time for difficult laparoscopic cholecystectomy.

I) Gall bladder dissection time:

In our study the mean of timings of Calot's triangle dissection to gall bladder removal from the fossa in Group I was 27.17 minutes and that in Group II was 32.18 minutes. This suggest that in present study the mean of timings of Calot's triangle dissection to gall bladder removal from the fossa in Group II was more than in GroupI.

Table – 2: Timings of Calot's triangle dissection to gall bladder removal from the fossa.

	Group I(n=30)	Group II(n=39 *)	p VALUE
SAMPLE SIZE	30	39	0.055
RANGE	15-50 minutes	10-50 minutes	Not significant
MEAN	27.17 minutes	32.18 minutes	
SD	9.45	11.08	

In comparison between Group I and Group II the two tailed P value 0.055 wasnotsignificant. Two patients in Group II conversion to open procedure was done, because of dense adhesionsat the porta-hepatis, gangrenous gall bladder which was friable and difficult to hold and was adherent to duodenum also. The other patients had acute cholecystitis with perforated gall bladder with frozen Calot's triangle.

II)Totaltime of surgery:

The mean of total time of surgery in Group I was 56.56 minutes and that in Group II was 65.00 minutes. This suggest that study the mean total time of surgery in Group II was more than in Group I.

Table-3: Comparisonof total time of surgery.

	Group I (n=30)	Group II (n=39*)	p VALUE
SAMPLE SIZE	30	39	0.0267
RANGE	40-75	45-150	Significant
MEAN	56.56	65.00	
SD	9.34	24.75	

* Note: 2 patients were converted into open procedure.(excluded in calculating the timing).

Comparing the total time of surgery between Group I and Group II the two tailedP value 0.0267 was significant. In two cases in group II we had to convert to open procedure which was not included in calculating the total time of surgery.

Table 4 : Comparing the number of patients with difficult cholecystectomy

	Group I(n=30)	Group II (n=39*)	Pvalue
Time	No. of patients	No. of patients	(SIGNIFICANCE)
Calot's triangle dissection to gall bladder removal from the fossa(>45minutes)	2/30	8/39	
Totaltime of surgery (>90 minutes)	0	6/39	0.125(Not significant)

*Note- 2 patients were converted into open procedure.

In present study 10/71 patients had difficult laparoscopic cholecystectomy. In Group I 2/30 patients had difficult laparoscopic cholecystectomy where as in Group II 8/39patients had difficult laparoscopic cholecystectomy. As the time for Calot's dissection was also more in Group II, the total time of surgery taken was also more. In these patients achieving hemostasis of the liver bed following removal of gall bladder also contributed to the total time of surgery. This suggest that in comparison to Group I the number of difficult laparoscopic cholecystectomy were more in Group II.

In Group I the difficult laparoscopic cholecystectomy was due to difficult in gall bladder dissection where as in Group II the difficult laparoscopic cholecystectomy was due to both difficult in gall bladder dissection and increased calot's triangle adhesions.

DISCUSSION

Gallstone disease is a leading cause for hospital admissions related to gastrointestinal problems. Their manifestation vary from being asymptomatic to symptomatic and complications which increases in presence of the various risk factors associated with them.

Open cholecystectomy was the gold standard treatment of gall stone disease more than half a century before. This was rapidly taken over by laparoscopic cholecystectomy. The advantage of laparoscopic cholecystectomy was earlier return of bowel function, lesspostoperativepain, better cosmesis, early recovery and early return to work & decreased overall cost.

Ultrasound accurately detects gall stones as small as 2mm in diameter. However, it is not very useful for identifying acalculus cholecystitis in patients who have symptoms and identifying common bile duct stones or imaging the cystic duct.

CT and magnetic resonance cholangiography or cholangio-pancreatographyare other useful imaging modalities used to diagnose gall stones especially CBD stones.

In the present study while taking all the 71 patients into consideration the common ultrasonographic findings was normal /chronic cholecystitis, seen in 43(60.56%) patients and only 28(39.43%) patients had features suggestive of acute cholecystitis. Normal/chronic cholecystitis was less common.In Group I 17(56.66%) compared to Group II 26(63.41%).But acute cholecystitiswas comparatively more 13 (43.33%) in Group I than in Group II 15(36.58%).However, it was not statistically significant.

PawanLal, et al[8].studied the role of ultrasonography in predicting difficult laparoscopic cholecystectomy that requires conversion to open procedure. They performed preoperative ultrasound just prior to surgery, and 4 ultrasonographicparameters were analyzed, namely GB wall thickness, contracted GB, impaction of gallstones at the neck of the GB, and common bile duct stones. The surgical findings were objectively graded as difficult or easy laparoscopic cholecystectomy according to 5 operative parameters, namely total time taken for the surgery, time taken to dissect GB bed, spillage of stones, tear of GB during dissection, and conversion to the open procedure. Of the 73 cases, 21 (28.76%) cases predicted to be difficult on ultrasonography, 17 (23.3%) were technically difficult, of which 13 (17.8%) were converted to the open procedure. Of the 52 (71.23%) cases predicted to be easy on ultrasonography, only 7 (9.38%) were found to be difficult on surgery, of which only 4 (5.48%) had to be converted to the openprocedure. They concluded that preoperative ultrasonography is of great value in selecting patients preoperatively for laparoscopic cholecystectomy and minimizing complications and conversion to the open procedure.

In the present study out of the 71 patients into 33(46.47%) patients had intraoperative features suggestive of normal / chronic cholecystitis and 36(50.70%) patients had intraoperativefeatures suggestive of acute cholecystitis or its complications while in 2 patients we had to convert into open procedure.

On analysis of Group I and Group II more patients presented with features of acute cholecystitis or its complications in Group II (58.97% vs. 43.33 %). However it was not statistically significant.
In the present study ultrasonography had shown acute calculuscholecystitis in 39.43% patients while intra-operatively it was found in in 52.17% patients.

In the present study the number of difficult laparoscopic cholecystectomy were more in Group II. Overall 10(14.08%) patients had difficult laparoscopic cholecystectomy. In Group I 2(6.66%) patients had difficult laparoscopic cholecystectomies where as in Group II 8(20.51%) patients had difficult laparoscopic cholecystectomies.

In Group I it was due to difficulty in gall bladder dissection from the liver bed where as in Group II the difficult laparoscopic cholecystectomy was due to both difficulty in gall bladder dissection and increased Calot's triangle adhesions. As the time taken for Calot's dissection was more in Group II, the total time of surgery taken was also more. In these patients to achieve the hemostasis of the liver bed also contributed to the increase in total time for surgery. In two patients in Group I there was difficulty in gall bladder dissection adherence to the liver bed. In 8 patients in Group II there was adhesionsin the region of Calot's triangle. It was noticed that the thickened cystic duct at times makes the dissection difficult.

Dense adhesions and fibrosis in the Calot s triangle make the dissection very difficult and anatomy unclear, causing a high level of difficulty & 2 patients wereconverted to open surgery who are male as they had dense adhesions at Calot's triangle and gangrenous gall bladder with perforation in this study.

Five prospective randomized trials have evaluated the outcome of patients with acute cholecystitis undergoing early versus late laparoscopic cholecystectomy. Although a significant increase in operation time was experienced for those undergoing early compared with delayed cholecystectomy (p=002), the results of these trails uniformly showed no significant difference in postoperative morbidity or mortality, including common bile duct injury [9]. Additionally, no significant difference was found in the conversion rate to open cholecystectomy, although it was clearly higher (20 – 30%) in patients with cholecystitis compared withprior studies evaluating patients undergoing elective laparoscopic cholecystectomy in the non-acute setting. Perhaps the most important finding was that in all but one study , patients randomized to late cholecystectomy failed conservative management in 15 -30 % of cases. Although patients in early group experienced a longer postoperative hospitalization. Most of these trails demonstrated adecreaseinoverall length of hospital stay in the early versus delayed group. Earlylaparoscopicchole cystectomy is therefore preferred approach for patients with acute cholecystitis[10].

Gangrenous GB is a grave pathology that makes tissues so friable that GB may perforate even with cautious handling, making the operation difficult. Many authors have reported a conversion rate varying from 16% (by Kiviluoto et al) to 40% (by Elder)[11,12]. Unlikely, in the present study it was only 2.81 %. Out of 6 patients with gangrenous gall bladder in 2 patients conversion into open procedure was doneso with a conversion rate of 2.81%.

Table 5 : Results of large series of laparoscopic cholecystectomy

Study	No of patients	Conversion(%)	Mortality Rate (%)	Complications* (%)	Bile duct Injuries (%)
Deziel et al,1993	77,604	0	0.04	2	0.6
Scott et al,1992	12,397	4.3	0.08	4	0.4
Deveny,1993	9597	0	0.042.5	0.4	
Croce et al,1993	6865	3.1	0.06	2.5	0.3
Orlando et al 1993	4640	6.9	0.13	8.6	0.3
Schulmpf et al, 1994	3722	7	0.08	4.8	0.6
Collet et al,1993	2955	4.8	0.20	3.4	0.6
Airan et al,1992	2671	4.6	0.15	0	0.2
Kane et al,1995	2490	7.8	0	0	0
Litwin et al,1992	2201	4.3	0	_	0.1
Kimura et al,1993	1989	2.7	0	1.8	0.6
Cuschieri et al,1991	1236	3.6	0	1.6	0.3
Brune et al,1994	800	1.2	0	2.8	0.2
wu, et al 1998	1200	2.1	0.1	2.7	0.2
Present study	71	2.81	0	5.63	0

CONCLUSION

In the present study the features of acute cholecystitis was more in the group of patients with multiple gall stones and the complications of gall stones like gangrene of gall bladder, perforation of gall bladder and frozen Calot's triangle was also

more in the group of patients with multiple gall stones. The number of difficult laparoscopic cholecystectomy was also more in patients with multiple stones.However all these were not statistically significant. Probably it requires more number of patients for study. This is the limitation of the study.

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