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EVALUATION OF DIFFERENCE IN PRESENTATION, SURGICAL IMPLICATIONS AND COMPLICATIONS BETWEEN PATIENTS OF SOLITARY AND MULTIPLE GALL STONE DISEASE AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Introduction

Gall stones are currently classified based mainly on their composition. Though some studies have suggested differences in patients with multiple and solitary gallstones, there is sparse data regarding this, leaving a lacuna for research work which could help expand our understanding of the disease.

Aim & Objectives

Evaluation of difference in presentation, surgical implications and complications between patients of solitary and multiple gall stone disease.

Methods

100 patients admitted with and undergoing surgery for cholelithiasis and its complications at Muzaffarnagar Medical College & Hospital, Muzaffarnagar (UP, India) were divided into two groups- those with single gall stones, and those with multiple gall stones.

Results

In our study, 63 cases had multiple gallstones, while 37 had a single gallstone. No significant difference was found between the two groups with respect to the studied symptoms. However, a significantly higher percentage of patients with multiple stones suffered from acute cholecystitis (p value 0.014), and choledocholithiasis (p value 0.015), as compared to those with single stones. Mucocele was found to be significantly more common in single stone patients (p-value = 0.001). The comparison of the duration of cholecystectomy, prevalence of dense

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adhesions, and rate of lap to open conversions revealed no statistically significant difference between the two groups.

Conclusion

While differential rates of some complications were observed between patients with single and multiple gall stones, the symptom profile was similar and no significant difference between the two groups regarding operative difficulties could be illustrated.

Keywords

Cholelithiasis; Gallstone; Single; Solitary; Multiple; Symptoms; Complications; Operative

INTRODUCTION

Cholelithiasis ranks among the most prevalent diseases worldwide and stands as a significant contributor to abdominal morbidity. Its incidence has been steadily increasing on a global scale, attributed in large part to shifts in dietary habits, lifestyle choices characterized by high consumption of junk food, and a rise in sedentary lifestyles. [1]

The disease affects women more than men, and the incidence increases with age.The prevalence of gall stone is 6.12% in the Indian population.[2]

Most patients with gall bladder stones typically do not have any symptoms and can simply be observed.When symptomatic, patients usually report pain or discomfort in the upper right quadrant or epigastric region, which could radiate to the back. Some changes in stool frequency, dyspepsia, flatulence, and dietary intolerance (especially to lipids) are additional symptoms. The most typical complaint is biliary colic which occurswhen the gallstone intermittently blocks the cystic duct.Occasionally, cholecystitis, pyocele, mucocele, pancreatitis, choledocholithiasis, cholangitis, and rarely cholangiocarcinoma can develop as complications caused by cholelithiasis. [3]

Approximately 10% of individuals start to experience biliary colicand other symptoms within 5 years, and 20% within 20 years of getting diagnosed.The first-line diagnostic tool for gallstone disease is abdominal ultrasonography.When symptomatic, laparoscopic cholecystectomy is the preferential modality of treatment. It ranks high among the procedures done surgically on a global scale. [4]

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Gallstones may be single or multiple. The molecular mechanisms behind formation of multiple and single gallstones have been studied extensively.[5] Despite observed differences in the severity and progression of clinical disease between the two groups, current clinical practice does not distinguish between cholelithiasis caused by single and multiple stones.Existing studies comparing the 2 groups are scarce and often present conflicting findings, highlighting the need for further research to elucidate the distinctions between the single and multiple gallstone groups.

This study was aim to evaluate the differences in presentation, complications, and operative implications between patients with single and multiple gallstones, which can be helpful for informing clinical guidelines and optimizing management strategies for gallstone disease based on number of gallstones.

MATERIAL & METHODS

Study Design

This was a hospital based prospective observational study conducted in Department of General Surgery, Muzaffarnagar Medical College & Hospital, Muzaffarnagar, U.P, India for a period of 18 months, from July 2022. The study included patients of cholelithiasis and its complications who were admitted in Department of General Surgery, and underwent laparoscopic cholecystectomy.Verbal and written consent was taken from all the participants of this research. Approval from Institutional Ethics Committee was obtained.

Inclusion criteria & Exclusion Criteria

Patients of both sexes, above the age of 18 years diagnosed as having cholelithiasis and its complications (acute cholecystitis, choledocholithiasis, pancreatitis, mucocele, pyocele, GB perforation), that were admitted in our institute, underwent laparoscopic cholecystectomy, and gave consent for participation in our study were included in the study. Patients who did not undergo surgery at our institute; who opted for open cholecystectomy; who were detected as having gall bladder carcinoma; and who did not give consent for the study were excluded from the study.

Method

100 indoor patients admitted to the General Surgery department were recruited based on predefined inclusion and exclusion criteria. Upon enrollment, patients underwent comprehensive history-taking, general physical examination, and relevant clinical examinations. Laboratory investigations were also conducted, and the results were interpreted. Two study groups were established: one comprising patients diagnosed with single gallstone disease, and the other consisting of patients diagnosed with multiple gallstone disease, on the basis of

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abdominal ultrasonography. Data was collected on the patients and a thorough comparison between the two study groups was conducted, focusing mainly on symptoms, complications and operative implications and challenges.

Statistical analysis & Software

We used SPSS version 20.0 to examine the data that we collected. The standard deviation, mode, median, and mean were computed for ratio and interval data types. Probabilities, percentages, and proportions were determined for ordinal and nominal data. The two groups were compared using a student's t-test for variables with interval and ratio data. The chi-square ($\chi 2$) tests were used for the analysis of categorical variables. Statistical significance was determined by a p-value less than 0.05.

RESULTS

In our study, 63 out of 100 cases (63.0%) had multiple gallbladder stones, while 37 cases out of 100 (37.0%) had a single gallbladder stone, i.e. multiple gallstones were much more common. The highest prevalence was observed in the age group of 31-40 years (32% of patients), followed by 51-60 years (24%), and then 41-50years (19%). No variation was observed between the two sets of patients with regards to age distribution of patients (p-values>0.05).Females were the more commonly affected demographic (72% of patients). No difference was found between the single and multiple gallstone group on the basis of sex distribution (p-values> 0.05).

Table 1 Distribution of cases based on the presence or absence of various symptoms and the number of gallbladder stones

SYMPTOMS		Multiple		Single		Total		Chi-square value	p-value
		No. of cases	Percentage	No. of cases	Percentage	No. of cases	Percentage		
RUQ Pain	YES	56	88.9%	33	89.2%	89	89.0%	0.002	0.963
	NO	7	11.1%	4	10.8%	11	11.0%		
Nausea/ Vomiting	YES	34	54.0%	24	64.9%	58	58.0%	1.136	0.304
	NO	29	46.0%	13	35.1%	42	42.0%		
Fever	YES	9	14.3%	6	16.2%	15	15.0%	0.068	0.794

	NO	54	85.7%	31	83.8%	85	85.0%		
Dyspepsia	YES	15	23.8%	11	29.7%	26	26.0%	0.425	0.515
	NO	48	76.2%	26	70.3%	74	74.0%		
Total		63	100.0%	37	100.0%	100	100.0%		

Right upper quadrant pain was the most common complaint in both the groups, followed by nausea/vomiting. Across all symptoms, the p-values are greater than 0.05, indicating no statistically significant association between the presence of each symptom and the occurrence of multiple or single gallbladder stones. These results suggest that the patients of single or multiple gallbladder stones do not differ significantly with respect to symptoms, in the studied population.

Figure 1 Distribution of cases based on the presence or absence of various symptoms and the number of gallbladder stones

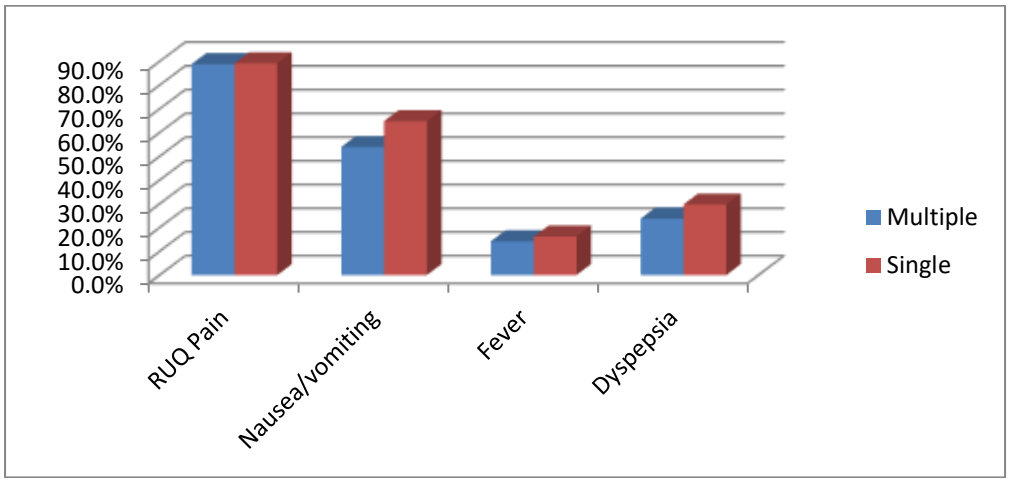

Table 2Distribution of cases based on operative findings and the number of gallbladder stones.

OPERATIVE FINDINGS		Multiple		Single		Total		Chi-square value	p-value
		No. of cases	Percentage	No. of cases	Percentage	No. of cases	Percentage		
Gall bladder distension	YES	53	84.1%	20	54.1%	73	73.0%	10.696	0.001
	NO	10	15.9%	17	45.9%	27	27.0%		
Gallbladder contraction	YES	5	7.9%	2	5.4%	7	7.0%	0.229	0.632
	NO	58	92.1%	35	94.6%	93	93.0%		
Gangrenous	YES	4	6.3%	0	0.0%	4	4.0%	2.447	0.294

gall bladder	NO	59	93.7%	37	100.0%	96	96.0%		
Dense Adhesions	YES	9	14.3%	5	13.5%	14	14.0%	0.012	0.914
	NO	54	85.7%	32	86.5%	86	86.0%		
Calot's triangle dissection to GB removal from fossa (>45 min)	YES	11	17.5%	2	5.4%	13	13.0%	2.995	0.124
	NO	52	82.5%	35	94.6%	87	87.0%		
Laparoscopic to open cholecystectomy conversion	YES	1	1.6%	1	2.7%	2	2.0%	0.148	0.700
	NO	62	98.4%	36	97.3%	98	98.0%		
Total time (>1 hour)	YES	47	74.6%	31	83.8%	78	78.0%	1.145	0.285
	NO	16	25.4%	6	16.2%	22	22.0%		
Total		63	100.0%	37	100.0%	100	100.0%		

Intraoperatively, Gall Bladder distension was seen significantly more in multiple gall stone group(p-value 0.001). No significant difference in the presence of gallbladder contraction, gangrenous gall bladder, or the presence of dense adhesions was seen between multiple and single stone cases (all p-values>0.05).

The number of cases where time for calot's triangle dissection to GB removal from fossa was more than 45 minutes or total time of surgery was more than 1 hour showed no significant difference between the 2 groups (p-values > 0.05).

Also, no significant difference was observed in conversion rates (laparoscopic to open cholecystectomy) as p-value = 0.7.

Figure 2 Distribution of cases based on operative findings and the number of gallbladder stones.

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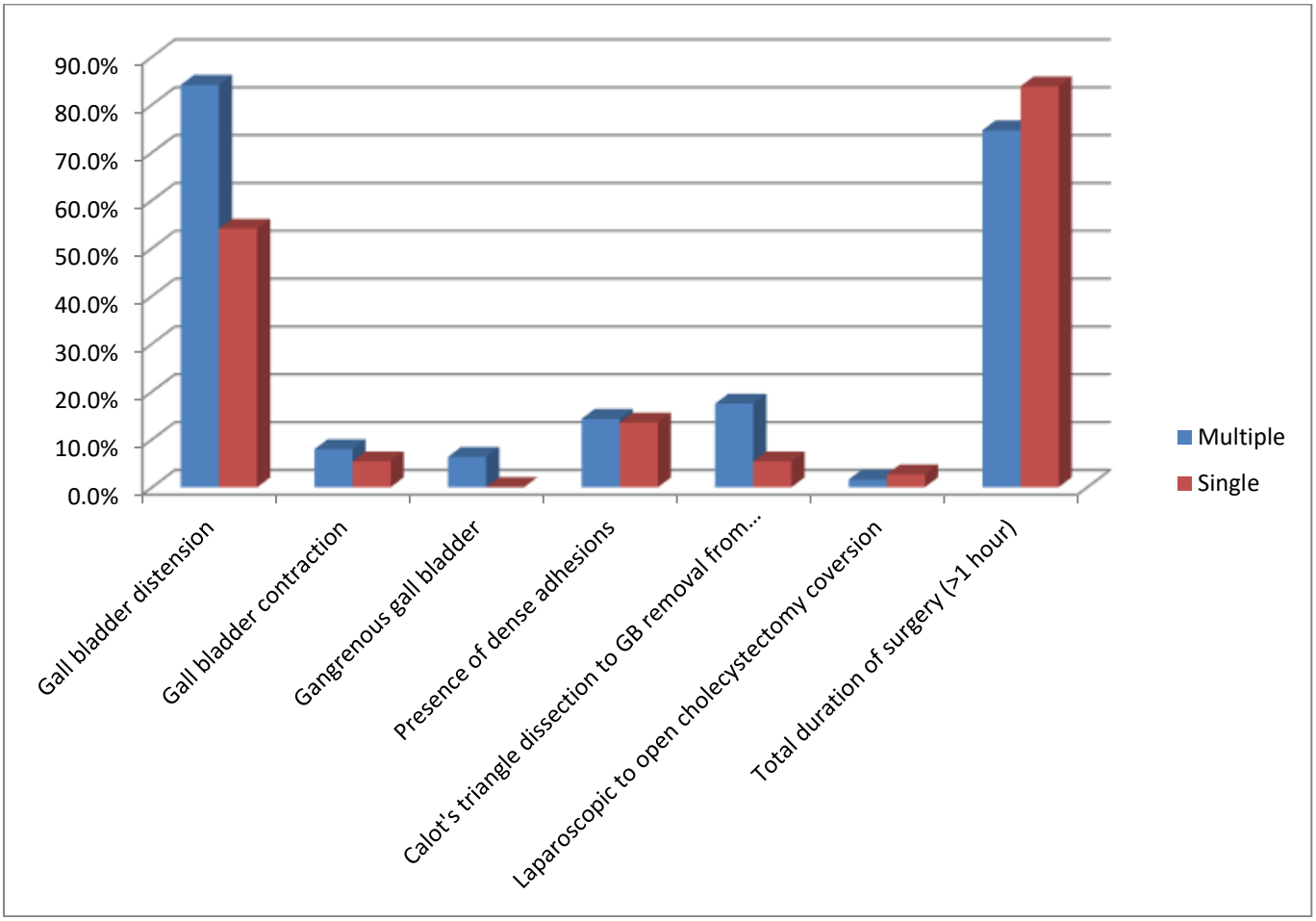


Table 3 Distribution of cases based on the presence or absence of complications and number of gall stones

COMPLICATIONS		Multiple		Single		Total		Chi-square value	p-value
		No. of cases	Percentage	No. of cases	Percentage	No. of cases	Percentage		
Acute cholecystitis	YES	16	25.4%	2	5.4%	18	18.0%	6.312	0.014

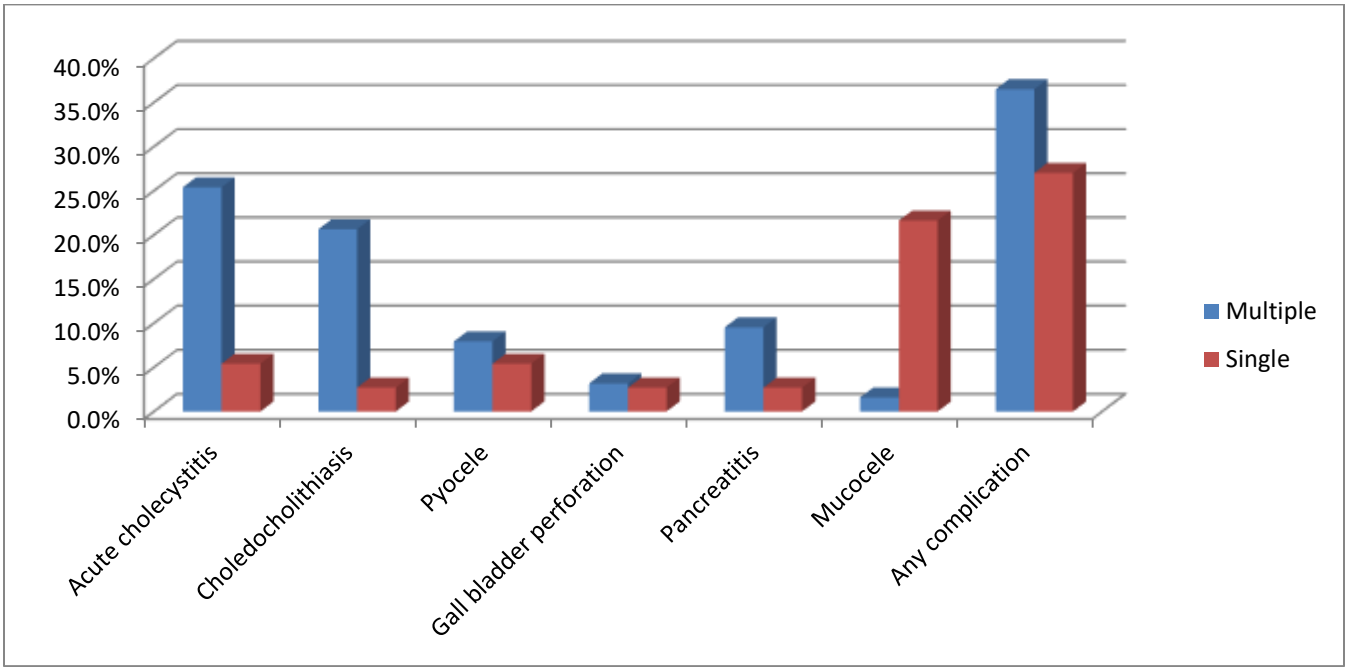
	NO	47	74.6%	35	94.6%	82	82.0%		
Choledocholithiasis	YES	13	20.6%	1	2.7%	14	14.0%	6.226	0.015
	NO	50	79.4%	36	97.3%	86	86.0%		
Pyocele	YES	5	7.9%	2	5.4%	7	7.0%	0.229	0.632
	NO	58	92.1%	35	94.6%	93	93.0%		
Gall bladder perforation	YES	2	3.2%	1	2.7%	3	3.0%	0.018	0.894
	NO	60	95.2%	34	91.9%	97	97.0%		
Pancreatitis	YES	6	9.5%	1	2.7%	7	7.0%	1.666	0.255
	NO	57	90.5%	36	97.3%	93	93.0%		
Mucocele	YES	1	1.6%	8	21.6%	9	9.0%	11.424	0.001
	NO	62	98.4%	29	78.4%	91	91.0%		
Any complication	YES	23	36.5%	10	27%	33	33.0%	0.948	0.33
	NO	40	63.5%	27	73%	67	67.0%		
Total		63	100.0%	37	100.0%	100	100.0%		

In the study, multiple gallstones were significantly associated with acute cholecystitis (p-value = 0.014) and choledocholithiasis (p-value = 0.015).Mucocele was significantly less common in cases with multiple stones(p-value = 0.001).

No significant associations were found between the presence of single or multiple stones and the occurrence of pyocele, gall bladder perforation, or pancreatitis (all p-values > 0.05).

Interestingly, there was no significant difference when comparing the number of patients with at least one complication between the multiple and single stone group (p-value = 0.33), suggesting that the presence of multiple stones does not significantly impact the overall occurrence of complications in patients of cholelithiasis.

Figure 3 Distribution of cases based on the presence or absence of complications and number of GB stones



DISCUSSION

Symptoms

In our study, it was seen that the two groups did not exhibit any of the studied symptoms to a significantly different degree.

This was similar to the findings by Misrani et al [6], Aditya Singh Baghel et al [7]and GR Verma et al [8]who reported that the patients with single or multiple stones did not differ significantly regarding any of the clinical signs and symptoms.

Pain in the right upper quadrant was the most often reported symptom in this study. For the multiple gallstone group, there were 56 instances of RUQ pain (88.9%), and for single gallstone case, there were 33 instances (89.2%) with no discernible difference between the twogroups. The most prevalent symptom in the study was RUQ pain, which was also reported by 20/23 in the multiple stone group and 21/23 in the single stone group with no significant difference between the two groups, according to Keerthi KV et al. [9]

For multiple gallstone, nausea or vomiting was seen in 54.0% cases, and for single gallstone, in 64.9%. In their research, Keerthi KV et al. [9]reported no significant variation on the frequency of nausea and vomiting, since it occurred in 3 out of 23 patients in the group with a single stone and 2 out of 23 patients in the group with several stones

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9 cases (14.3%) of fever were noted in multiple gallstone cases and 6 cases (16.2%) in single gallstone cases. No significant difference was present between the two groups. In a study conducted by Singh H et al [10] comparing single versus multiple gall stone disease in patients undergoing laparoscopic cholecystectomy, most common clinical symptom was found to be fever in both groups, but it was distributed similarly in both the groups (87%- group 1, 90%- group 2).

Complications:

In our study, multiple stones produced slightly more number of pyocele, G.B. perforations and pancreatitis, but no statistically significant associations were found between the presence of single or multiple stones and the occurrence of these complications, as all p-values were more than 0.05.

Acute cholecystitis was substantially more common in patients with multiple gallstones; 25.4% of patients with multiple stones while only 5.4% of patients with a single stone experienced this complication (p-value = 0.014).Similarly, choledocholithiasis was substantially more common in cases with numerous gallstones (20.6% vs2.7%), and the association was statistically significant (p = 0.015).

Multiple stones were more commonly linked with cholecystitis symptoms, according to SK Mathur et al. [11] This was proven by inspecting the excised gall bladders of 330 patients who had cholecystectomy procedures.Similarly, the study carried out by C. Dharma Kishore Raja et al. 2020 [12] found that patients with many gall stones were more likely to get acute cholecystitis, gangrenous cholecystitis, gall bladder perforation, and empyema gall bladder.

Cholangitis and pancreatitis were more common in the group with several gallstones than in the one with a single gallstone, according to research by T. Juvonen et al. [13]

Multiple gallstones are associated with an increased risk of acute cholecystitis and other gallstone complications, including gallbladder gangrene, perforation, and frozen Calot's triangle, according to a 2014 study of 71 patients by A. Siva Rama Krishna et al.[14]

It is worth noting that the prevalence of mucocele was substantially higher in single stone group (21.6% vs 1.6% ; p-value = 0.001). This was in line with findings of Adnan Bakr Mofti et al.[15] who discovered in 1994 that the solitary gallstone group had a higher prevalence of certain cholelithiasis sequelae, such as mucocele and empyema gall bladder.

It was however seen in our study that the presence of multiple stones does not significantly increase the overall complications.

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Surgical Implications

While the mean cholecystectomy length was longer in the multiple stone group (78.16 min) compared to the single stone group (74.80 min), the high p-value (0.501) indicates that the difference was not statistically significant. Patients with more than one stone had more thick adhesions, however this difference was not considered statistically significant (p= 0.914).

The conversion rate (laparoscopic to open cholecystectomy) was also not significantly different for cases with multiple stones from those with a single stone (p-value = 0.7).

Pericholecystic adhesions were more common in patients with multiple gall stones, according to the study by Aditya Singh Baghel et al. [7] Patients with more than one gallstone required longer surgeries on average, suggesting that these procedures were more challenging, and they also had higher rates of conversion to open surgery. Both Raja et al. [12] and A Siva Rama et al. [14] found results that were similar.

Statistical analysis of our study however revealed that the number of challenging surgeries performed in the multiple gall stone group was not significantly greater than the single stone group across variables such as operative time, conversion of laparoscopic surgery to open surgery, and prevalence of dense adhesions. The small number of patients likely contributed to this deviation from other studies.

CONCLUSION

The results of our study indicated that females, especially those in the age group 31-40 were more likely to be afflicted with gall stone disease, be it single or multiple, with multiple stones far more common. The patients of single and multiple gall stones were mostly demographically similar and displayed similar symptom profile. While multiple stones resulted in higher rates of complications such as acute cholecystitis and choledocholithiasis, and single stones resulted in higher rates of mucocele formation, our study did not demonstrate a statistically significant enough difference in terms of operative difficulties, between the two groups. Hence, this study can not recommend a change in management protocols of cholelithiasis patients based on number of gallstones alone, but highlight the need for further research.

Conflict of Interest: None

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