Original Article

Comparative Study of Clinical Profile in Patients with Solitary Versus Multiple Gallstones

Manzer Mehmood, Muhammad Arslan, Fahad Akhtar, Kanza Farrukh, Fahim Sakhizada, S H Waqar

Abstract

Objective: To compare the clinical profile of patients with solitary gallstones versus those with multiple gallstones.

Methodology: This cross-sectional comparative study was conducted at the Department of General Surgery, Pakistan Institute of Medical Sciences (PIMS), Islamabad, from March 2023 to February 2024 and evaluated 127 patients diagnosed with gallstones via convenience sampling. Demographic information, clinical presentations, including detailed pain characteristics and preoperative ultrasound findings, were recorded. The patients were categorized into two groups based on the number of stones in the gallbladder: Group A (solitary stone) and Group B (multiple stones). Descriptive analysis was done using SPSS version 25.

Results: The mean age was 47.10±14.11 years, with a female predominance (79.5% females vs 20.5% males). Gallstones were more common in patients aged 30 to 45 years. Preoperative ultrasound showed a solitary stone in 29 patients (22.8%) and multiple stones in 98 (77.2%). Group A demonstrated a higher proportion of thick-walled gallbladders and stone impactions. Group A patients predominantly reported colicky pain localized to the right hypochondrium, whereas Group B patients experienced dull or constant pain in the epigastrium. Secondary symptoms, like dyspepsia, vomiting, and fever, showed no significant differences.

Conclusion: The clinical profiles are similar between groups except for the site and nature of pain. Distinct variations exist in preoperative ultrasound findings, with solitary stones showing a higher proportion of thick-walled gallbladders and neck impactions.

KEYWORDS: Colicky Pain, Dyspepsia, Gallstones, Vomiting

INTRODUCTION

Gallstones are solid stones that form in the gallbladder, commonly composed of cholesterol, bilirubin, or a combination of both. They are one of the most prevalent gastrointestinal disorders, affecting a significant proportion of the adult population worldwide, with a reported prevalence ranging from 10% to 20% in Western countries.[1] Its prevalence in Pakistan is around 15 to 20%.[2] The clinical presentation of gallstones can vary depending on their size, number, and location within the gallbladder.[3] In some cases, patients may remain asymptomatic, while others experience debilitating symptoms, such as biliary colic, jaundice, and acute or chronic cholecystitis.[1] Patients with gallstones typically present with pain in the right upper quadrant or epigastric region, which may radiate to the back. This pain is described as colicky, but is more often dull and

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constant. Other symptoms include dyspepsia, flatulence, food intolerance, particularly to fats, and some alteration in bowel frequency.

Gallstones can be classified by number, as solitary or multiple, with the majority of cases involving multiple stones. The clinical implications of solitary versus multiple gallstones are an area of ongoing research, as some studies suggest that the number of stones may influence symptom severity, the likelihood of complications, and the need for surgical intervention.[4] Solitary gallstones tend to be larger in size compared to multiple stones, which are typically smaller and more likely to form in clusters. However, both types can lead to the same range of complications, such as biliary obstruction, pancreatitis, and cholangitis.[5]

The presence of common symptoms, such as right upper quadrant pain, nausea, vomiting, and dyspepsia, can complicate the clinical presentation of both single and multiple gallstones, influenced by demographic patterns, presenting symptoms, and associated comorbidities. For this reason, it is necessary to perform clinical profiling of gallstones to diagnose and improve the clinical management of gallstone disease properly. There is a wealth of information in the literature about the etiology, epidemiology, clinical presentation, and management of gallstones; however, little is known about their frequency, severity, and related complications, and relatively few studies have focused on comparative, frequency-based clinical profiling of gallstone disease.[6,7]

The creation of evidence-based clinical protocols to improve patient outcomes through more customized treatment approaches would be made possible by the age-specific clinical profiling data. Understanding the differences in the clinical profiles of patients with solitary versus multiple gallstones is crucial for improving diagnostic accuracy, treatment strategies, and predicting potential outcomes. This study aims to compare the clinical features, management, and outcomes of patients with solitary gallstones versus those with multiple gallstones. By analyzing factors such as symptom presentation, laboratory findings, imaging results, and post-surgical recovery, this study seeks to offer insights into the optimal clinical approach for each group.

METHODOLOGY

This comparative study was conducted at the Department of General Surgery, PIMS, Islamabad. Ethical approval was taken from the Hospital Ethical Research Review Board before the start of the study (FMTI ERRB/06/08, dated 15th March 2022). Patients diagnosed with gallstones who consented to the study were included and meticulously analysed. Patients who were positive for Hepatitis B or C, with severe comorbidities like chronic renal disease, hypertension, diabetes, psychiatric illness, and on immunosuppressive drugs were excluded from the study. Patients were recruited after taking informed consent and selected through convenient sampling. By using the WHO calculator, a sample size of 127 cases is calculated with 80% power of the study,[2] 5% significance level, and percentage of pain, i.e., 75% with the solitary stone group and 62.5% with the multiple stone group. A detailed clinical assessment of all patients was done and recorded in the proforma. Demographic information like age, gender, and symptoms was also recorded. Clinical presentations, including detailed pain characteristics and preoperative ultrasound findings, were recorded on a predesigned proforma for each patient. The patients were categorized into two groups based on the number of stones in the gallbladder: Group A (solitary stone) and Group B (multiple stones). Data was collected on a prescribed proforma. Descriptive analysis was performed using SPSS version 25. Advanced statistical analyses, including t-tests and chi-square tests, were employed to assess the significance of observed differences.

RESULTS

The study cohort consisted of 127 patients with a mean age of 47.10 ± 14.11 years.

Table I: Baseline Characteristics of Study Groups (n=127)			
Characteristics	**Solitary stone Group A (n=29)**	**Multiple stone Group B (n=98)**	***P* value**
Age (years)	46.60±11.26	47.60±13.04	0.684
Gender Male Female	 05 24	 21 77	0.793
BMI (kg/m^2)	26.67±4.56	25.09±4.47	0.074

¥ Significant at 5% level of significance

There was a marked female predominance, with 101 females (79.5%) and 26 males (20.5%). Gallstones were more common in patients aged 30 to 45 years (Table I). Solitary stone was found in 29 (22.8%) patients, while the remaining 98 (77.2%) had multiple stones. Patients in Group A predominantly reported colicky pain in 18 (62%) patients, localized to the right hypochondrium, whereas those in Group B experienced dull or constant pain in 56 (57%) patients involving the right hypochondrium and epigastrium. Other symptoms, including dyspepsia, vomiting, and fever, showed no significant differences between the groups (Table II). Distinct variations were noted in preoperative ultrasound findings, with Group A exhibiting a higher proportion of thick-walled gallbladders in 27.6% and stone impactions at the neck in 17.2% (Table III).

Table II: Clinical Presentation				
	Group A: n (%)	**Group B: n (%)**	**Total**	**P-value ***
Site of pain RHC Epigastrium RHC + Epigastrium	 18 (62) 04 (14) 07 (24)	 24 (24.5) 18 (18.4) 56 (57.1)	 42 22 63	0.001¥
Nature of pain Colicky Dull / constant	22 (75.8) 07 (24.1)	27 (27.6) 71 (72.4)	49 78	0.000 ¥
Nausea + vomiting Dyspepsia Fever	12 (41.4) 15 (51.7) 02 (6.8)	43 (43.8) 49 (50) 06 (6.1)	55 64 08	0.967

* Chi-square test was applied to calculate the p-value
¥ Significant at 5% level of significance

Table III: Ultrasound Findings				
	Group A: n (%)	**Group B: n (%)**	**Total**	**P-value ***
Stones impacted at the neck of the GB	05 (17.2)	19 (19.4)	24	0.795
Thick wall GB	08 (27.6)	36 (36.7)	44	0.363
Empyema	03 (10.3)	06 (6.1)	09	0.436
Mucocele	03 (10.3)	05 (5.1)	08	0.307
Contracted GB	07 (24.1)	18 (18.4)	25	0.492

* Chi-square test was applied to calculate the p-value

DISCUSSION

This study showed that gallstones were more prevalent in the 30–45 age group, with a mean age of 44 years, and a notable female predominance (79.5%). These findings are aligned with previous studies conducted by Amjad et al and Anam Ghaffar et al., which reported a similar age distribution and a mean age of approximately 42.5–45.5 years.[2,8] The predominance of gallstones in females is well-documented in the literature, with hormonal influences, pregnancy, and oestrogen therapy contributing to the increased risk in women.[9,10]

Comparing our results with those of Misrani JK et al., we observed a similar trend regarding the age distribution and gender predisposition.[11] Misrani et al. found that single stones (Group A) were more common in younger patients (mean age: 30.6 years), whereas multiple stones (Group B) were more common in older patients (mean age: 47.8 years). Our study also supports this observation, as almost 80% of our cohort had multiple stones, predominantly in older patients. Furthermore, their findings on the male-to-female ratio (1:5 for solitary stones and 1:4.3 for multiple stones) closely match our study's female predominance in both groups.

The study by Shafique MS et al. reported a lower mean age (26.2 years), and 85.2% of patients were female, reinforcing the well-known female predominance of gallstone disease.[12] Similarly, Raja Kumar et al. found that gallstones were three

times more prevalent in females, with the highest incidence observed in the 40–50-year age group, findings that are comparable with those of the present study.[13] Mofti et al. reported a median age of 38–39 years for gallstone patients, which is in line with our study's age distribution.[14]

Regarding socioeconomic status, Shafique et al. found that gallstones were more prevalent in middle (64.8%) and upper (19.7%) socioeconomic classes, which aligns with our findings that gallstone disease was more common in middle-class individuals.[12] This may be attributed to dietary habits, obesity, and other lifestyle factors prevalent in these groups.[15]

Symptomatology varied across studies.[16,17] Our study found that Group A (solitary stones) patients mainly reported colicky pain localized to the right hypochondrium, whereas Group B (multiple stones) experienced dull or constant epigastric pain. This aligns with the findings of Jalali SA et al., who also observed that 20% of patients had solitary stones.[18] The study by Shafique et al. also highlighted pain and tenderness in the right hypochondrium as the most common presenting complaint, consistent with our findings.[12]

Ultrasound (US) is an affordable and preferred diagnostic modality with high accuracy (greater than 95% sensitivity) for identifying both single and multiple gallstones, which appear as highly reflective (hyperechoic) objects within the gallbladder lumen, usually associated with posterior acoustic shadowing.[19,20] Preoperative ultrasound findings in our study showed significant differences between the two groups. Group A had a higher prevalence of thick-walled gallbladders and stone impactions at the gallbladder neck. Our findings are further supported by Raja CDK et al., who reported that multiple gallstones were associated with difficult intraoperative management due to gallbladder adhesions, altered Calot's triangle anatomy, and cases of gangrenous gallbladders.[21] These factors resulted in longer operative times and increased conversion rates from laparoscopic to open cholecystectomy. Our findings contrast with those of Mofti et al., who reported that complications such as mucocele, empyema, and perforation were more common in single stone cases, requiring more emergency surgical interventions.[14]

CONCLUSION

The study highlighted that the clinical profile is the same in both groups, except for the site and nature of pain. Differences in symptomatology and ultrasound findings between solitary and multiple stone groups highlight the need for further studies to explore the pathophysiological mechanisms underlying these variations. Future research should also investigate the long-term outcomes and optimal management strategies for different gallstone presentations.

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