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Original Research Article

# A Retrospective Analysis of Incidence and Contributing Factors in Post-Cholecystectomy Syndrome

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**Conflict of interest: Nil**

**Abstract**

**Background:** The persistence or recurrence of biliary and gastrointestinal symptoms in the follow-up of cholecystectomy is known as post-cholecystectomy syndrome (PCS). PCS has continued to be one of the biggest clinical problems even with the advancement in surgery operation since a good percentage of patients continue to complain of postoperative symptoms.

**Aim:** To examine the rate and identify the demographic, clinical and surgical variables in the post-cholecystectomy syndrome.

**Methodology:** It was a retrospective observational study, and conducted in one year in a tertiary care hospital. It used 150 patients that had undergone cholecystectomies. Hospital record review was done on a pro forma with a structured review that comprised of demographic, clinical presentation, surgical factors and pre-existing conditions. This was done by using SPSS version 25.0 which has a p-value of less than 0.05 as statistically significant.

**Results:** PCS was incidence to be 28.7%. It was also found to be more increased among females (58.7%), and among those that were aged 41-60 years (50.6%). Abdominal pain (65.1%), dyspepsia (52.3%), were the most frequent symptoms. The major contributory factors were bile duct injury (27.9%, p=0.003) and stones that were retained (23.3%, p=0.012). Pre-existing GERD and IBS gastrointestinal diseases had a significant association with PCS.

**Conclusion:** A post-cholecystectomy syndrome phenomenon is a complex phenomenon because it depends on the problems of the surgery, and on some underlying gastrointestinal diseases. In order to decrease the risk factors and enhance patient outcomes, they need to identify the risk factors early, use the appropriate surgical technique, and preoperative assessment.

**Keywords:** Post-cholecystectomy syndrome, Cholecystectomy, Biliary complications, Retrospective study, Risk factors

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## Introduction

Cholecystectomy and especially laparoscopic cholecystectomy are considered to be one of the most conducted surgeries to cure the gallstone disease, as well as other gallbladder diseases [1]. This has been utilized as a major replacement of open surgery as minimally invasive procedures have been developed and this has certain benefits which include reduced pain, reduced hospital stays, faster recovery and reduced complication. The post-cholecystectomy syndrome (PCS) is a recurring or emergent gastrointestinal symptoms, even after surgery in certain patients, which is successful [2]. This is a spectrum of biliary and non-biliary symptoms such as abdominal pain, dyspepsia, bloating, nausea, vomiting, diarrhea and occasionally jaundice and makes it hard to diagnose and treat [3].

PCS etiology is complex, comprising structural, functional, and metabolic factors. Biliary and non-biliary causes are bile duct injury, strictures, bile leakage, biliary retained stones, gastritis, peptic ulcer disease, pancreatitis and irritable bowel syndrome [4]. Persistent symptoms are also caused by functional disorders like the dysfunction of the sphincters. PCS is a major postoperative complication despite the fact that surgical and diagnostic innovations have enhanced surgical outcomes [5]. Surgical complications, failure to clear the stones completely, and lack of proper preoperative assessment may be some of the factors that lead to its occurrence, and thus improved patient selection and management measures are required [6].

**Background of the Study:** Gallstones disease is a widespread health issue worldwide, particularly in

developing nations owing to alterations in lifestyles and increased metabolic illnesses [7]. Cholecystectomy is the normal treatment of symptomatic gallstones and is effective in preventing complications but there are patients who have persistent symptoms which interfere with the quality of life. This brings up issues of perioperative diagnosis and surgery [8]. This is why post-cholecystectomy syndrome is considered to be a significant postoperative syndrome that has both physical and psychological effects [9]. Its etiology can be categorized into biliary (bile duct injury, strictures, and retained stones), and non-biliary (peptic ulcer disease and irritable bowel syndrome) causes, which are usually not diagnosed before surgery [10].

**Contributing Factors of Post-Cholecystectomy Syndrome:** Post-cholecystectomy syndrome is a complex of surgical, patient-related, and functional factors that affect the development of the syndrome [11]. Surgical etiology comprises lacerations of bile ducts, retained common bile duct stones, and postoperative infections, which may cause long-lasting biliary symptoms [12]. There are also patient related factors, where presence of some gastrointestinal conditions like gastritis, peptic ulcer disease and irritable bowel syndrome may persist even after surgery unless properly diagnosed prior to the operation [13]. Moreover, the alterations of microbiota in the gut and bile flow in cholecystectomy can be added as a cause of such symptoms as bloating and diarrhea [14]. Functional abnormalities, especially sphincter dysfunction can also lead to persistent biliary pains even in the absence of structural problems. Besides, insufficient preoperative testing and incorrect patient identification can result in chronic symptoms, making it evident that the assessment of the patient and correct diagnosis should be conducted [15].

**Research Objectives**

The following objectives were taken in the current study:

- The objective of the study was to ascertain the occurrence of post-cholecystectomy syndrome in patients who had cholecystectomy
- In order to examine the demographic features of patients with post-cholecystectomy syndrome
- To determine the clinical and surgical contributory factors of the development of PCS
- To determine the association between postoperative complications and development of post-cholecystectomy syndrome

**Methodology:** The aim of conducting this study was to determine the incidence and the factors that contribute to post-cholecystectomy syndrome through a systematic and structured retrospective study. Hospital records were thoroughly reviewed to extract pertinent clinical, surgical and outcome related variables. The research protocol followed to guarantee accuracy, consistency and reliability of information gathered was the design of the methodology.

**Study Design:** To examine postoperative outcomes among patients during cholecystectomy, a retrospective observational study based on the hospital was performed. This design allowed the evaluation of past documented patient data to determine patterns, incidence rates and risk factors associated with the post cholecystectomy syndrome without affecting clinical management.

**Study Area:** The research was conducted in the Department of General Surgery, ICARE Institute of Medical Sciences and Research, Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India.

**Study Duration:** The research was carried out in the span of one year.

**Study Participants (Inclusion and Exclusion Criteria)**

**Inclusion Criteria:**

- Patients that underwent cholecystectomy either laparoscopic or open
- Complete medical records of the patients
- Adults who are above 18 years old

**Exclusion Criteria:**

- Patients who did not have complete medical records
- Patients who have been diagnosed with malignancy before surgery
- Lost to follow-up: Patients

**Sample Size:** Convenience sampling was used to select 150 patients whose records were available in the hospitals. The sample size was calculated depending on the number of eligible cases during the period of study so that adequate data is obtained to perform a significant statistical analysis.

**Procedure:** The data were gathered through the hospital records, on a structured and pre-designed proforma to have uniformity on data extraction. The following information was picked out:

- Demographic information such as age, gender
- Surgery type
- Preoperative diagnosis
- Postoperative symptoms
- Complications (retained stones, injury to bile duct, infection)
- Results of diagnostics (ultrasound, ERCP)

All the clinical information was thoroughly examined and noted. The diagnosis of PCS was made according to the presence or reoccurrence of the symptoms following cholecystectomy, which was

reported in the follow-up documentation and clinical examinations.

**Statistical Analysis:** The information was entered into the MS Excel and analysed with the help of the SPSS version 25.0. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to summarize data. The association between variables and occurrence of PCS was determined by use of inferential statistics especially the chi-square test. The p-value of below 0.05 would be considered significant i.e. it was found to be significantly correlated with the factors, which were under investigation.

## Results

In this research, 150 patients that underwent cholecystectomy were studied to determine the incidence and other factors that lead to post cholecystectomy syndrome. Out of them, 43 patients (28.7%) developed post-cholecystectomy syndrome which showed that a significant number of patients still had the symptoms despite surgery. The findings are in the tables below and elaborated.

To be able to value demographic characteristics of the study population, the patients have been categorized in terms of the age and gender distribution.

**Table 1: Distribution of Patients According to Age and Gender**

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Age (years) | 18–30 | 28 | 18.7% |
| | 31–40 | 46 | 30.7% |
| | 41–60 | 76 | 50.6% |
| Gender | Male | 62 | 41.3% |
| | Female | 88 | 58.7% |

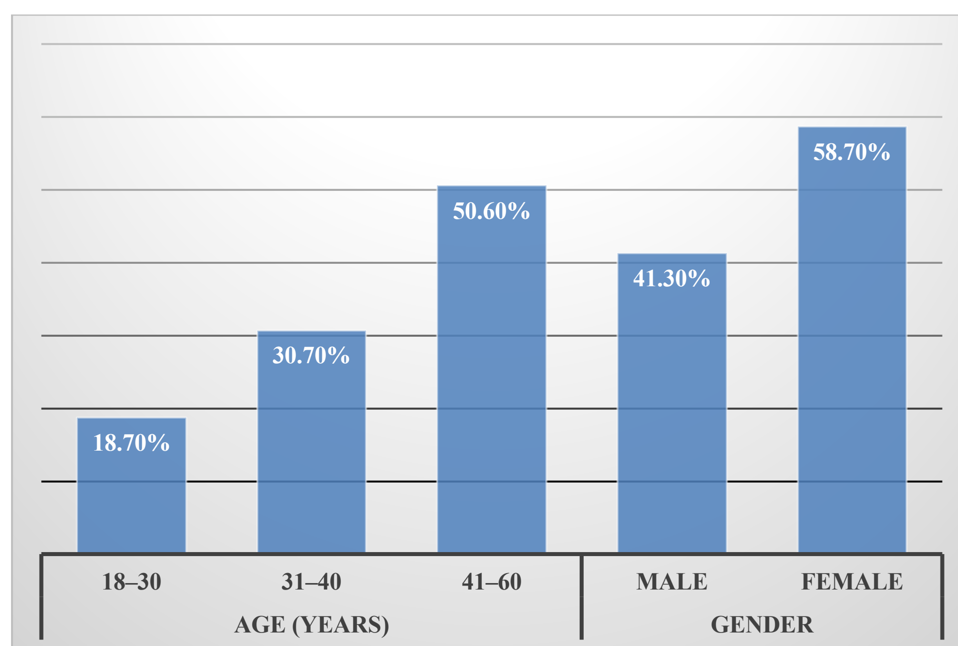


**Figure 1: Visual Representation of Distribution of Patients According to Age and Gender**

The data show that the majority of patients were in the age group of 41–60 years (50.6%, n=76), followed by 31–40 years (30.7%, n=46), while the least number of patients were in the 18–30 years group (18.7%, n=28). Females have higher female's % (58.7% n=88) rather than males who have (41.3% n=62). These results show that middle-aged people, especially females, were more affected and had cholecystectomy.

The incidence of post-cholecystectomy syndrome in the study population was measured in general as indicated below.

**Table 2: Incidence of PCS**

| Condition | Frequency (n) | Percentage (%) |
|---|---|---|
| PCS Present | 43 | 28.7% |
| PCS Absent | 107 | 71.3% |

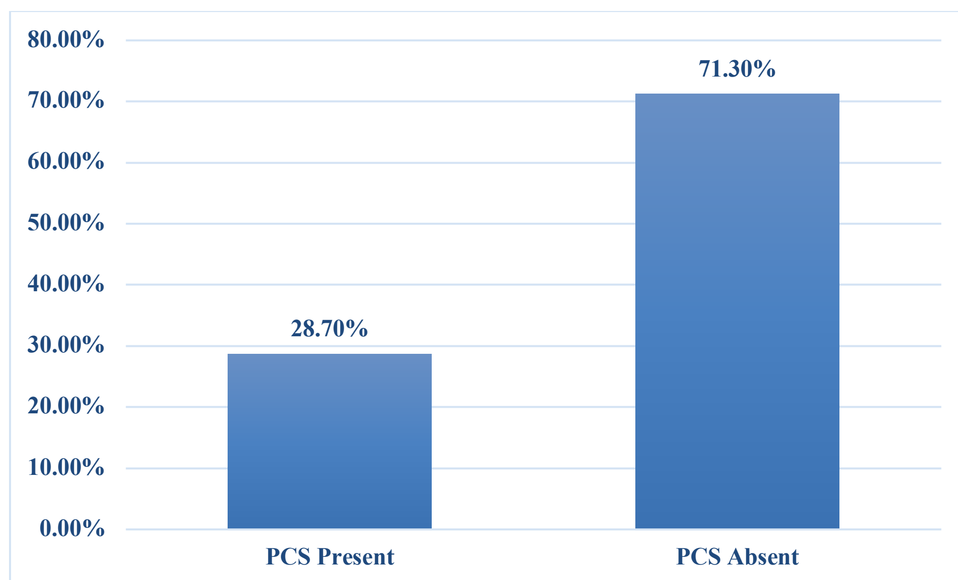


**Figure 2: Visual Representation of Incidence of Post-Cholecystectomy Syndrome**

The findings show that among 150 patients, 43 patients (28.7%) developed PCS, but the biggest proportion of the patients, 107 patients (71.3%), had no postoperative symptoms. This implies that despite the high success rate of cholecystectomy, close to a third of the patients may still have persistent symptoms and hence the clinical significance of PCS.

Clinical presentation of PCS was also examined by the distribution of the symptoms to the affected patients.

**Table 3: Distribution of Symptoms in PCS Patients**

| Symptom | Frequency (n) | Percentage (%) |
| --- | --- | --- |
| Abdominal Pain | 28 | 65.1% |
| Dyspepsia | 22 | 52.3% |
| Diarrhea | 13 | 31.2% |
| Nausea/Vomiting | 10 | 23.3% |

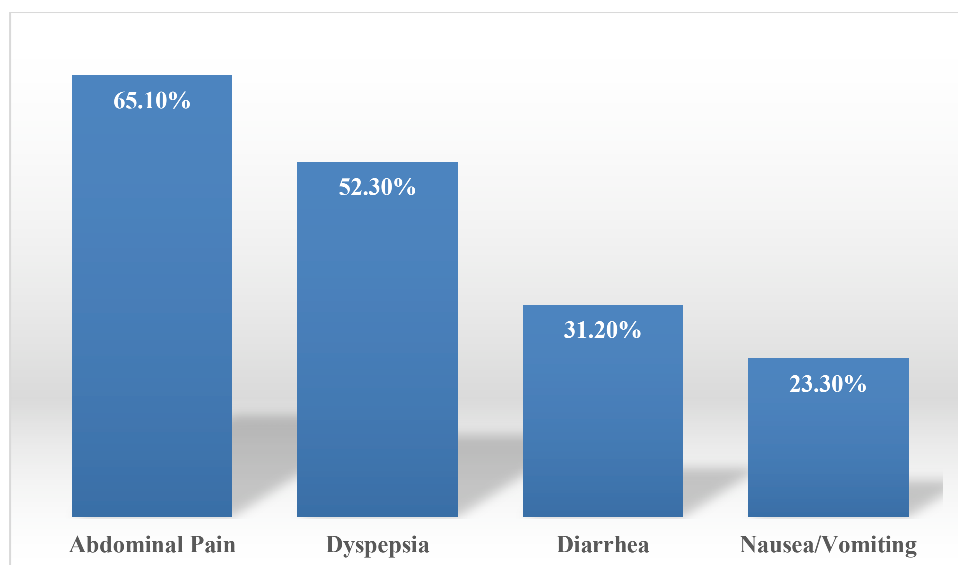


**Figure 3: Visual Representation of Distribution of Symptoms in PCS Patients**

Abdominal pain has been the most common symptom in the 43 patients with PCS with 65.1% (n=28) of the patients having abdominal pain and dyspepsia with 52.3% (n=22) of patients developing dyspepsia. 31.2% (n=13) had diarrhea with 23.3%(n=10) having nausea and vomiting. These results suggest that PCS is mostly manifested in the form of abdominal pain and digestive disorders, as it is both biliary and gastrointestinal.

The relationship between surgical factors and the occurrence of PCS was tested as illustrated below.

**Table 4: Contributing Surgical Factors**

| Factor | Present (n) | Percentage (%) | P-value |
|---|---|---|---|
| Bile Duct Injury | 12 | 27.9% | 0.003 |
| Retained Stones | 10 | 23.3% | 0.012 |
| Infection | 8 | 18.6% | 0.081 |

Among the 43 PCS patients, 27.9% (n=12) reported bile duct injury and was statistically significant (p=0.003). In 23.3% (n=10) of the patients, retained stones were present and also significantly correlated with PCS (p=0.012). Postoperative infection was reported in 18.6% (n=8) of the patients; but statistically it was not found to be significantly related (p=0.081). These findings indicate that surgical complications, especially bile duct injury and retained stones are significant contributors to the occurrence of PCS.

The interrelation between pre-existing gastrointestinal conditions and PCS was as follows analysed.

**Table 5: Association of Pre-existing Conditions with PCS**

| Condition | PCS (n=43) | No PCS (n=107) | P-value |
|---|---|---|---|
| GERD | 18 | 22 | 0.021 |
| IBS | 10 | 14 | 0.034 |

A statistically significant relationship between GERD and PCS were found in 18 patients with PCS compared to 22 patients without PCS (p=0.021). Similarly, the example of irritable bowel syndrome (IBS) was observed between 10 PCS and 14 non-PCS patients providing a significant correlation (p=0.034) as well. These results suggest that prior gastrointestinal diseases are more prevalent in patients who develop PCS and might be a contributing reason to persevering postoperative symptoms.

**Discussion**

The current study revealed that post-cholecystectomy syndrome (PCS) was prevalent among a significant proportion of the patients (28.7%) that has gone through cholecystectomy suggesting that a significant number of patients still experience the symptoms despite having gone through cholecystectomy. Demographic analysis indicated that females (58.7%), 41-60 years old (50.6%), patients had higher chances of having PCS and this demonstrated the existence of a definite demographic factor on the occurrence of the disease. Hormonal, metabolic, and lifestyle factors can be attributed to this trend, as middle-aged individuals (and females, in particular) are prone to the development of gallstone disease and its complications (Tarnasky, 2016) [16]. The findings of the current research highlight the importance of offering demographic profiling as the way of defining high-risk groups and improving clinical outcomes through offering certain interventions.

Abdominal pain (65.1%) and dyspepsia (52.3%) were the main clinical manifestations of PCS in this study followed by diarrhea (31.2%) and nausea/vomiting (23.3%) respectively. This pattern indicates that PCS manifests itself with an amalgamation of biliary and gastrointestinal symptoms, and in the majority of cases, this ailment may be particularly hard to identify due to the failure to differentiate the symptoms with other digestive disorders (van Rensburg, 2018) [17]. Abdominal pain is so prevalent indicating that there is persistent biliary dysfunction or irritation, but dyspeptic symptoms may indicate underlying gastrointestinal involvement. Such a lack of specificity of the symptoms underscores the importance of close clinical assessment and relevant diagnostic studies to distinguish between PCS and other disorders.

It was discovered that surgical factors were significant in the development of PCS with bile duct injury (27.9%) and retained stones (23.3%) having statistically significant associations. These results emphasize the need to exercise great care in surgical practice, proper identification of the biliary anatomy, and total clearance of stones during the operation (Vasavada, 2018) [18]. Bile duct trauma, especially, is a severe complication which can result in long-term morbidity, and may need further surgical or endoscopic treatment. Even though it was found that some of the patients did have postoperative infection (18.6%), it did not correlate significantly with it, indicating that structural complications are more significant in PCS development than temporary postoperative factors (Wang et al., 2017) [19].

In addition to the variables related to surgery, preexisting gastrointestinal conditions such as gastroesophageal reflux disease (GERD) and irritable bowel syndrome (IBS) also had a strong relationship with PCS (Warren et al., 2017) [20]. The risk of persistent symptoms was more likely in patients with GERD (n=18) and IBS (n=10) compared to no risk, suggesting that underlying gastrointestinal

pathology could be an underlying cause of persistent postoperative symptoms. This finding suggests that there are other conditions that may be causing some of the signs and symptoms of gallstone disease preoperative, which are not being corrected after cholecystectomy. This means that preoperative evaluation and an appropriate diagnosis should be carried out to prevent an unnecessary surgical procedure and improve patient satisfaction.

## Conclusion

The present study has established that post-cholecystectomy syndrome is a leading postoperative complication with a considerable percentage of the patients developing the condition following cholecystectomy and that the syndrome has multifactorial etiology with surgical, clinical and patient factors playing a role in its development. The results shows that this surgical complication such as bile duct injury, and retained stones are severe factors that affect the occurrence of PCS, and the existing gastrointestinal diseases like gastroesophageal reflux disease and irritable bowel syndrome are other factors of the postoperative symptoms in the long run. The numerous numbers of the symptoms, which are not specific, is a sign of the complexity of the condition and the need to consider taking clinical precaution. These results demonstrate that it is important to practice surgery carefully, accurately assess during the surgery, and extensively screen the patients prior to surgery to identify underlying conditions and offer appropriate patient selection. The prevention of PCs can be greatly achieved through early detection of risk factors, the use of better clinical awareness and specific management plans, which could potentially decrease the occurrence of PCs and improve general patient outcomes, in turn, diminishing the occurrence of postoperative complications and regardless, the quality of life after cholecystectomy.

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