

## Effect of COVID-19 Pandemic on Presentation and Outcomes of Gallstone Disease

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### Abstract

**Objective:** To determine the effect of Covid-19 pandemic on presentation and outcomes of gallstone disease and to compare them with the pre-covid time.

**Methods:** it is a retrospective observational study conducted in surgical emergency department of holy family hospital, Rawalpindi. Data of all the patients presented to emergency department (ED) from April to August 2020 (Group I) and in the same months of 2019 (Group II) was collected retrospectively. More patients presented with complicated gallstone disease in emergency department during COVID'19 than in pre-covid time. Covid'19 is an independent risk factor for presentation of patients in emergency department with complications.

**Results:** There were 108 (53%) patients in Group I and 95 (47%) patients in Group II retained in emergency department (ED) of General surgery, holy family hospital, Rawalpindi. There were more patients admitted through ED in Group I than in Group II (63[58%] vs 40[42%] p-value 0.003). In Group I patients, duration of symptoms was prolonged before reaching ED than Group II (3.55+1.45 vs 2.86+1.32 days, p-value 0.001). Moreover, patients presented with more severe disease assessed by Tokyo criteria and number of patients with complicated gallstone disease in Group I were also higher (p-value 0.01).

**Conclusion:** During covid-19 pandemic, patients were reluctant to attend hospitals for elective surgeries as a result of fear of the COVID'19. Moreover, due to cancellation of elective procedures during lockdown, there were more patients admitted through Emergency Department with severe and complicated gallstone disease. Hence COVID19 is an independent risk factor for presentation of patients in ED with complications.

**Keywords:** Covid-19, gallstone disease, complicated gallstone, surgical emergency.

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### Introduction

All community members have been affected by the Corona virus Disease 2019 (COVID-19) outbreak, which has caused significant disruption in all spheres of life.<sup>1</sup> On January 7, 2020, Chinese authorities identified this viral strain.<sup>2</sup> The healthcare system had to expand its capacity to handle the influx of patients,

preserve the maximum amount of hospital resources, and reduce infection risk as much as possible during the COVID-19 pandemic. In this regard, the healthcare system agreed to reduce elective surgical treatments globally in March 2020.<sup>3,4</sup>

To stop the spread of the corona virus infection, the nations enacted preventative measures like lockdown and movement restrictions. This had an effect on the population's mental health and, as a result, made many reluctant to seek medical treatment for their problems.<sup>5</sup> This led to increase the morbidity in even manageable diseases. By June 30, 2020, an estimated 41% of U.S. people had postponed or avoided medical care, including urgent or emergency care (12%) and routine care (10%), due to worries about COVID-19 (32 percent). Unpaid caregivers for adults as well as people with underlying

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medical conditions were more likely to avoid urgent or emergency care.<sup>6</sup>

One of the most common medical problems that necessitates surgery is still gallstone disease. About 20% of people over the age of 40 and 30% of people over the age of 70 have biliary calculi. The ratio of women to men in reproductive years is around 4:1, with the gender disparity narrowing to almost equality in the proportion of senior persons.<sup>7</sup> The symptoms of gallstone disease range from being asymptomatic to being symptomatic, the latter of which includes both acute pain bouts and severe disease. There is a high likelihood that symptomatic sickness may return and require cholecystectomy. Although sex, age, BMI, and the characteristics of gallstones detected by ultrasonography are all factors that affect the progression of disease from an asymptomatic to a symptomatic state, pandemic conditions and patients' reluctance to visit hospitals for follow-up also contributed to progression and complications.<sup>8</sup> The 30-day overall mortality, length of hospital stay, conversion rates to open surgery, and medical costs were all substantially correlated with the TG13 severity grading for acute cholecystitis, which is frequently used to grade the severity of gall stone illness.<sup>9</sup>

The most effective method of treating benign gallbladder diseases is laparoscopic cholecystectomy. To finish the process securely in some situations, the protocol must be changed to open cholecystectomy. The three most frequent intra-operative findings resulting in conversion were inflamed gall bladder, adhesion, and anatomic difficulties. Endoscopic retrograde cholangiopancreatography (ERCP) with endoscopic biliary sphincterotomy and stone extraction is the gold standard for the treatment of common bile duct (CBD) stones as part of complication<sup>11</sup>.

The objective of our research is to see how COVID-19 affects the presentation or severity of presentation and outcomes of gall stone disease, which is a prevalent reason for patients to wind up in the surgical emergency department. The goal of the study is to document the impact so that public awareness campaigns can be launched to reduce the number of emergency room visits.

## Materials and Methods

A retrospective observational study was conducted at surgical emergency department, Holy family hospital, Rawalpindi. After endorsement from the ethical committee, data of all the patients with diagnosed gall stone

disease, presented to emergency department (ED) from April to August 2020 (Group I) and in the same months of 2019 (Group II) was collected retrospectively. Data of all the patients including their demographics, clinical findings and duration of symptoms was retrieved and filled out on the form. Outcomes noted were number of admissions, severity of disease, number of complicated gallstones and total length of hospital stay were all reviewed and entered into the respective form. Data entry and analysis were all done using SPSS vs 26. Descriptive analysis was performed. The relative risk of complicated gall stone disease presentation among patients in COVID'19 durations was calculated.

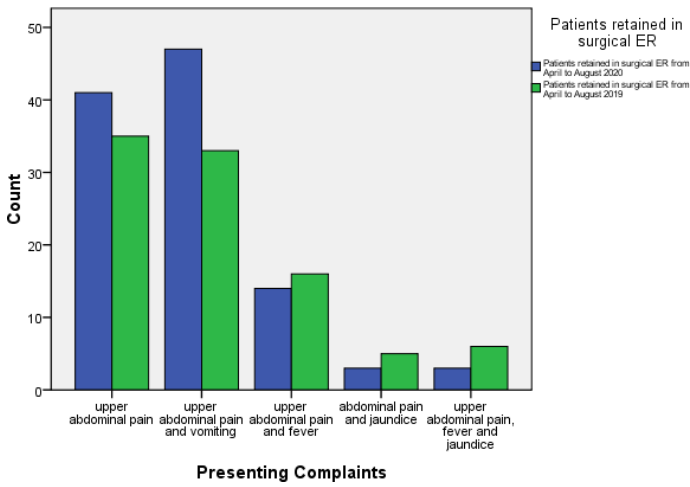
## Results

There were 203 patients retained overall in surgical emergency department (ED) of holy family hospital, Rawalpindi. There were 108 (53%) patients in Group I (between April – July 2020) and 95 (47%) patients in Group II (between April – July 2019). Median age was 48 (18 – 66) years with a female predominance of 63%. There was no difference with respect to age, gender, BMI, co-morbid and presenting symptoms between two groups as shown in **table I**.

Group II patients presented earlier in ED while Group I patients presented late (2.86+1.32 vs 3.55+1.45 days; p-value 0.001). There were higher number of admissions through ED in Group I as compared to Group II (63 [58.3%] vs 40[42.1%]; p-value 0.003). Moreover, patients presented with more severe and complicated gallstone disease assessed by Tokyo criteria (p-value 0.01) as shown in **table II**.

Out of 203 patients, 137 (67.5%) patients were managed conservatively by giving iv antibiotics and analgesics; 19(9.4%) patients underwent ERCP for cholangitis and choledocholithiasis; 33 (16.2%) patients were admitted for laparoscopic cholecystectomy due to empyema gallbladder and acute cholecystitis; 14(6.9%) patients were admitted for laparoscopic cholecystectomy but later converted to open cholecystectomy due to dense adhesions with surrounding structures and intraoperative bleed. Seven (3.5%) patients developed complications postoperatively; 5 patients had wound infection and 2 patients had intraabdominal collection which were managed conservatively by iv antibiotics and ultrasound guided aspiration of the collection. There was no statistically significant difference in terms of management and length of hospital stay as shown in table II.

Bar Chart



**Table 1:** Groups Comparison on the Basis of Demographics, Comorbids And Symptom Complex:

Patients retained inER	Group I (n= 108)	Group II (n= 95)	P-value
<b>Age (yrs)</b>	41.08±11.37	40.73±11.09	0.82
<b>Gender</b>			
Female	69	59	0.79
Male	39	36	
<b>BMI (kg/m<sup>2</sup>)</b>			
18.5-24.9	11	13	0.82
25-29.9	68	60	
30-34.9	27	21	
35-39.9	2	1	
<b>ASA</b>			
I	66	62	0.7
II	31	26	
III	11	7	
<b>Diabetes mellitus</b>	30	25	0.81
<b>Hypertension</b>	41	34	0.75
<b>IHD</b>	13	8	0.49
<b>COPD</b>	2	1	0.64
<b>Symptoms of Disease</b>			
Upper abdominal pain	41	35	0.4
Upper abdominal pain and vomiting	47	33	
Upper abdominal pain and fever	14	16	
Upper abdominal pain and jaundice	3	5	
Acute cholangitis	3	6	
<b>Duration of Symptoms before ER consultation (days)</b>	3.55±1.45	2.86±1.32	0.001

**Discussion**

The dynamics of practically every area of our civilization have been dramatically altered by the corona virus

pandemic, let alone the healthcare industry. Surgery has an impact on both acute and elective surgical care, affecting benign, slowly developing, and readily curable illnesses like cholelithiasis as well as urgent pathologies. Our retrospective cohort analysis shows how the severity

**Table 2:** Comparison of Different Parameters Between

Parameters		Group I (n= 108)	Group II (n= 95)	P-value
<b>Outcomes</b>	Admitted cases	63 (58%)	40 (42%)	0.003
<b>Preoperative diagnosis</b>	Complicated gallstones	63	40	0.01
<b>Severity of disease</b>	Grade 1	47	60	0.01
	Grade 2	61	35	
	Grade 3	8	2	
<b>Management</b>	i.v antibiotics and fluids	71	66	0.8
	Underwent ERCP	11	8	
	Lap cholecystectomy	17	16	
	Lap converted to open cholecystectomy	9	5	
<b>Inpatient complications</b>		5	2	0.32
<b>Total length of hospital stay (days)</b>		7.15±4.6	7.01±4.5	0.83

and side effects of gallstone disease varied between Covid-19 and before. During the pandemic, patients with gallstone disease had more severe symptoms. The patients who presented to the surgical ER during the times of COVID-19 had disease severity of grades 2 and 3, in contrast to those who presented at the same time a year before to COVID-19. This was obvious using the Tokyo criteria. The delay and interruption of surgical procedures at surgery departments as well as a lack of presentation to surgical outpatient departments due to a preventative fear of contracting Covid-19 could be the plausible explanation for this striking difference in the severity of the disease between the two groups. Additionally, since the patient influx was on the rise, the majority of resources, including ICU and other healthcare institutions, were devoted to fighting Covid-19. In a related study, the department of surgery at Stanford University School of Medicine discovered that, as measured by higher Tokyo criterion scores, more patients presented with severe cholecystitis during Covid-19 as compared to pre-covid periods. (mean SD = 1.39(0.56) vs 1.16 (0.44); p=0.02)1.

As evidenced by the higher number of patients kept in

the ER during COVID-19 than during 2019, the surgical ER was overrun with patients with serious gallstone disease during 2020. Furthermore, Group I had a higher prevalence of the complex condition than did Group II. As noted by Harnett and Wong, we believe that this is likely the result of a delay in presentation brought on by worry about getting the pandemic and the use of painkillers and over-the-counter treatments to ease gallstone-related abdominal pain.<sup>12,13</sup>

Our work has also emphasized and contrasted the surgical methods necessary for the main treatment of gall stones in the two research groups, as demonstrated by Gabriel Sandblom's work, which was published in the Scandinavian journal of surgery. It was discovered that Group I performed more laparoscopic cholecystectomies than Group II. In order to combat the pandemic, resources were reallocated and planned surgeries were postponed, which led to an increase in the number of acute procedures.<sup>14</sup>

It's interesting to note that Group I required more open cholecystectomies than Group II did (9.3% vs. 5.3%), perhaps as a result of the higher incidence of complications in that group. During COVID'19, a notably greater number of patients had their laparoscopic cholecystectomy procedures converted to open cholecystectomy procedures. This result also invalidates a related study by Franziska Koch, Sven Hohenstein, and Jorg-Peter Ritz in Germany, which showed that the number of cholecystectomies decreased significantly during the first lockdown but increased during the second lockdown due to a rise in patients presenting with complicated disease, necessitating open surgery to remove the gallbladder.<sup>15</sup>

Hospital discharge rates were yet another important factor that supported the results of our study. Similar studies were out at the Department of Surgical Sciences, University of Rome Tor Vergata, Italy, revealed that treatment delays were unavoidable for benign hepatobiliary illnesses like gallstones. It was observed that cohort 1 had a discharge rate from ER of 29% while cohort 2 had a discharge rate of 52%. Surprisingly, during the months of April through December 2020, 14 out of 63 patients who were admitted through the emergency room were discharged with a follow-up procedure, as opposed to 6 out of 40 patients during the previous year.<sup>16</sup>

Recommendations are that “Mass campaigns and Tele-medicine” to be made more common and information to be disseminated regarding risk factors and complications to masses associated with gall stone diseases around the clock so that worse case scenarios can be avoided. More and more patients to be registered via online ways and to be approached on regular basis to analyze the disease progression so that timely decisions can be made. This also is the lesson to combat future pandemics and targeted steps to be taken in time for the benefit of patients. National and international policies to be made to overcome such scenarios where patient suffers from partial closure of health system as we saw in case of Covid.<sup>19</sup>

### Conclusion

Patients were hesitant to go to hospitals for elective surgery during the COVID-19 pandemic out of dread of the pandemic. Furthermore, more patients with severe and difficult gallstone disease were admitted through the ED as a result of the cancellation of elective treatments during the lockdown.

**Conflict of Interest:**

*None*

**Funding Source:**

*None*

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#### Authors Contribution

**SMD:** Conceptualization of Project

**HZ:** Data Collection

**MKB:** Literature Search

**SMD:** Statistical Analysis

**UQ, GR:** Drafting, Revision

**JSK:** Writing of Manuscript