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# Ongoing Impact of COVID in Gall Stone Disease on Patients and Surgeons. Is This Just The Tip of The Iceberg? A Snapshot From An Upper GI Unit

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## ORIGINAL

### Abstract

**Introduction:** Covid-19 resulted in a delay to provide cholecystectomy services. We looked at the effects of the delay on patient morbidity, operative difficulty, and training at our upper GI unit.

**Materials And Methods:** Data were collected from patients who had cholecystectomy at the resumption of elective operating services at our DGH. We used Medisec, ICE, and Blue Spire software to collect data regarding previous admissions, investigations, and operative details. A proforma was completed after every operation to record the operative findings and difficulty as per Nassar grades. 101 patients who had cholecystectomy when services resumed from September 2020 after a 5-month pause were included in the study. We looked at the initial presentation, number of hospital visits, inpatient admissions, diagnoses, operative difficulty, post-operative complications, hospital stay, 30-day readmissions, and mortality. Results were compared with Chole S study.

**Results:** We found a 50% rise in acute cholecystitis, nearly double the number of pancreatitis and an almost 3 times rise in complications due to choledocholithiasis. Readmissions whilst waiting had increased by nearly 50%. Nassar grade 4 operations were 50% more, with a significant increase ( $p < 0.0001$ , 95% CI) in the operating time. Complications including bile leak were significantly higher, ( $p < 0.0001$ , 95% CI). Two-thirds of the operations were done by consultants.

**Conclusion:** This study from an upper GI unit is a testimony to the adverse effects of delay caused by covid in terms of morbidity, hospital resources, and training.

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**Keywords :** Covid-19, Cholecystectomy, Common Bile Duct stones, Acute Pancreatitis.

## Introduction

Covid-19 appears to have introduced a cohort of long waiters for gall stone disease, some of who had recurrent acute presentations whilst waiting. Our DGH started elective laparoscopic cholecystectomies in September 2020, and we looked at a host of issues including the degree of operative difficulty because of the prolonged wait. Studies have shown that the waiting period increases morbidity and chances of recurrent admissions, especially after the initial acute presentation (1). Nassar scale could be used to grade operative difficulty in cholecystectomy and could be a tool in assessing the effect of prolonged waiting time on cholecystectomy (2).

## Aims

To look at the effect of cancellation of acute and elective cholecystectomies during covid on patients who presented acutely or electively in the covid period, who then went on to have cholecystectomies when services resumed. We looked at the impact of the waiting period enforced by covid on clinical presentation, the number of recurrent admissions, operative difficulty, duration of surgery, complications, hospital stay, 30-day readmissions, and 30-day mortality. Results were compared with the Chole S study, one of the largest studies done in the UK on cholecystectomy.

## Materials And methods

101 consecutive patients who had cholecystectomies done when the operations resumed from Sept 2020 were included in the study. Data were collected prospectively on the day of surgery and follow-up data from online hospital records, namely Bluespire, Medisec, and ICE. Data collection was anonymous, and all patients who had cholecystectomy when the service resumed in September 2020 were included in the study. Relative risk was calculated for the main outcomes in comparison with Chole S study (3). We excluded any patients who had the previous cholecystectomy but presented with biliary symptoms, and those with pancreatic or bile duct cancer. The statistical significance of the outcomes of the present study about the waiting time was calculated using Excel software. Numerical data has been expressed as Median with an interquartile range. ANOVA and Students T-test were used as appropriate. P values were calculated with 95% C.I.

## Results

All elective and acute cholecystectomies were put off at our DGH from April 2020 to August 2020, during the first wave of Covid-19. Operations resumed by mid-September 2020 after a five-month pause. 101 cases were included in the study, of which females were 71%, (72/101). The median age was 54, range of 20-84 years. Majority of the patients were ASA 2, 48.5% (49/101), others being ASA 1, 26.7% (27/101), ASA 3, 23.8% (24/101), and ASA 4, 1% (1/101). The median BMI was 30, range of 19-50 Kg/m<sup>2</sup> The acute initial presentation was noted in 64% (64/101), as opposed to 36% (37/101) outpatient presentation. Acute cholecystitis and Biliary Colic were the commonest initial presentations, 40.6% (41/101) each, followed by pancreatitis 17.8% (18/101). GB dyskinesia, 1% (1/101). ( [Table 1](#) )

Altogether, 25% (25/101) of patients had at least one repeat admission whilst waiting for surgery. 20% (8/37) of those presented to outpatients, and 26% (18/64) who presented initially with an acute episode had recurrent admissions whilst waiting. Amongst those who presented initially with acute pancreatitis, 33% (6/18) had recurrent admissions with the same. The median waiting time was 196 days (1-1185days). The median operating time was 75 minutes, (32 -394 min). [Table 2.](#) shows the frequency and category of operations and surgeons who performed them.

Approximately 80% of the planned IP, Hot Gall Bladders, and 65% of day case surgeries were done by consultants. Nearly 2/3rd of the operation was in Nassar Grades 1 or 2. 19.8% (20/101) were Nassar 3, and 13.9% (14/101) Nassar 4. ( [Figure 1](#) )

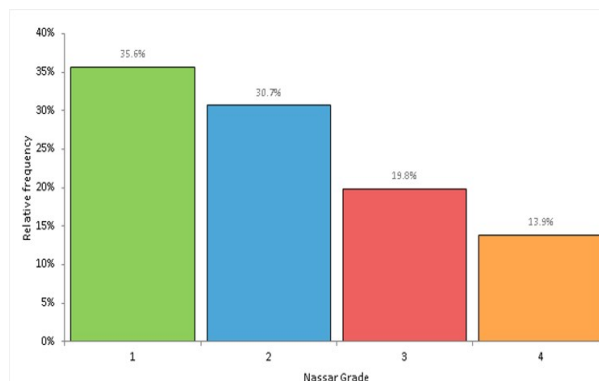
The majority had no postoperative complications, 91% (92/101), 9% (9/101), had complications, including two bile duct injuries and four minor bile leaks, and 3 intraoperative bleeding. Only three patients (3%) had an open conversation, and two of them were for the above complications. The median length of stay was 1 day, range 0-17 days. The 30-day readmission rate was 3% (3/101). No mortality was reported. The results were compared with Choles S study. ( [Table 3](#) ).

**Table 1.** Patient characteristics and pre-operative findings, comparing Chole S and Present Study.

	Chole S (n=8909)	Present study (n=101)
N	8909	101
Age	51(38-64)	54 (20-84)
F:M	74:26:00	71:29:00
BMI		30
ASA 1 and 2	789(89.4%)	76(75.2%)
ASA >/=>3	7937 (10.6%)	25(24.8)
<b>Indications</b>		
Biliary colic	4683 (52.6%)	41(40.6%)
Cholecystitis	2581 (29%)	41(40.6%)
Pancreatitis	851 (9.6%)	18(17.8%)
CBD stone	589 (6.6%)	24(23.8%)
GB Dyskinesia	31 (0.3%)	1 (1%)
Polyps etc	174 (1.9%)	0
<b>Admissions before surgery</b>		
0	5196 (58.3%)	40 (39.6%)
1	2859 (32.1%)	41(40.6%)
2	623 (7.0%)	16 (15.8%)
3 or more	231 (2.6%)	4 (4%)
Waiting time		196 (1-1185)
<b>Thickness of GB</b>		
Thickwalled	2835 (32.8%)	56 (55.5%)
<b>CBD diameter</b>		
Dilated CBD	1398 (16%)	29 (28.7%)
pre-op ERCP's	960 (10.9%)	24 (23.8%) includes 4 pts with 2 ercp's

**Table 2.** Distribution of operation category and surgeon category.

Operation	surgeon			Total
	Cons	St7-8	St3-6	
Day case	47	21	4	72
Planned inpatient	11	3	0	14
Hot GB	11	1	3	15
<b>Total</b>	<b>69</b>	<b>25</b>	<b>7</b>	<b>101</b>



**Figure 1.** Nassar operating grades of cases. N=101.

**Table 3.** Morbidity, operative difficulty, and post operative complications. Comparison with Chole S study. \* Median time calculated separately for day cases, delayed and elective cholecystectomy.

	Chole S (%)	Present study (%)	relative risk	Relative Risk Increase	p value 95% CI
<b>Indications for surgery</b>					
Biliary colic	4863 (52.6)	41 (40.6)	0.7		
Cholecystitis	2581 (29)	41 (40.6)	1.4	40%	
pancreatitis	851 (9.6)	18 (17.8)	1.9	90%	
CBD stone	589 (6.6)	24 (23.8)	3.6	260%	
GB dyskinesia	31 (0.3)	1 (1)			
Polyps etc	174 (1.9)	0			
<b>Admissions before surgery</b>					p=0.0338
1 acute admission	2859 (32.1)	41 (40.6)	1.3		
2 acute admissions	623 (7)	16 (15.8)	2.3	130%	
3 or more ac admissions	231 (2.6)	4 (4)	1.5	50%	
<b>Operative difficulty grades</b>					p=0.6726
Nassar 1	3554 (40.2)	36 (35.6)	0.9		
Nassar 2	2644 (29.9)	31 (30.7)	1		
Nassar 3	1814 (20.5)	20 (19.8)	0.97		
Nassar 4	821 (9.3)	14 (13.9)	1.5	50%	p=0.6726
Operating time	60-80 min* (50-110)	75 min (32-394 min)			p<0.0001
All complications	962 (10.8)	9 (9)	0.8		p<0.0001
Bile leak	121 (1.3)	4 (4)	3.1	210%	
Bile duct injury	24 (0.9)	2 (2)	2.2	120%	
Bleeding	754 (8.4)	3 (3)	0.36		
open conversion	297 (3.3)	3 (3)	0.9		
intraabdominal collection	189 (2.1)	3 (3)	1.4	40%	
SSI	192 (2.1)	1 (1)	0.5		
CVS/ pulmonary	127 (1.4)	1 (1)	0.7		
CBD stone	89 (0.9)	1 (1)	1		
Length of hospital stay		1 day (0-17 days)			p=0.0006
30-day readmissions	633 (7.1)	3 (3)	0.4		p=0.9161
30-day mortality	11 (0.1)	0	0		

## Discussion

Most hospitals in the UK, paused all elective work during the first wave, with some exceptions. All elective gall bladder operations were paused, which resulted in a bulging waiting list for laparoscopic cholecystectomies when the operation lists were reinstated. Covid free elective pathways allowed to catch up with the waiting lists (4). Previous studies have shown that the average waiting time for cholecystectomy could be around 80 to 170 days (1; 5). In the present study the median waiting time was 196 days. Various studies done in the UK have shown that readmissions with acute complications of gall stone disease could be around 10% (1). In the

present study the readmission rates were twice reported in the literature, 25%, and a third of acute pancreatitis represented the same whilst waiting for surgery. This does keep in line with other studies reporting reduced quality of life with prolonged waiting times (6).

There are several grading systems to assess the operative difficulty of cholecystectomy. Nassar grading has been found to be simple and easy to use by all grades of surgeons. The operative difficulty is graded into four.( Table 4) (2).

**Table 4.** Nassar Grading of operative difficulty. Adopted from Griffiths, E.A., Hodson, J., Vohra, R.S. et al. Utilisation of an operative difficulty grading scale for laparoscopic cholecystectomy. Surg Endosc 33, 110–121 (2019). <http://creativecommons.org/licenses/by/4.0/>

Grade 1 Gallbladder—floppy, non-adherent Cystic pedicle—thin and clear Adhesions—Simple up to the neck/Hartmann’s pouch
Grade 2 Gallbladder—Mucocele, Packed with stones Cystic pedicle—Fat laden Adhesions—Simple up to the body
Grade 3 Gallbladder—Deep fossa, Acute cholecystitis, Contracted, Fibrosis, Hartman’s adherent to CBD, Impaction Cystic pedicle—Abnormal anatomy or cystic duct—short, dilated or obscured Adhesions—Dense up to fundus; Involving hepatic flexure or duodenum
Grade 4 Gallbladder—Completely obscured, Empyema, Gangrene, Mass Cystic pedicle—Impossible to clarify Adhesions—Dense, fibrosis, wrapping the gallbladder, Duodenum, or hepatic flexure difficult to separate

We used this grading as Chole S study also used the same, and hence useful in comparison. A third of all cholecystectomies in the present study were Grades 3 or 4, 33.7% (34/101). This increase in Grade 3 and 4 cholecystectomies in the present study was marginal compared to the CholeS study but could be clinically significant. It should be borne in mind that the CholeS study had specialist and non-specialist operating surgeons, whilst in the present study, all cholecystectomies were done or led by specialist (UGI) surgeons. This would make the results of operative difficulty more relevant in the present study. Consultants did 70% of all operations and 80% of Grade 3 and 4 cholecystectomies. The median operating time was 75minutes, range (of 32-394min). The reported incidence of complications like bile duct injury, and major bleeding, in the literature is less than 1%. Conversion to open varied from 1-5%. The complications could be lower when operations are done in specialist units (7). The present study showed an increased incidence of complications like bile duct injury, 2%. This was statistically significant, p,0.0001, (95% C.I). Operating time, p<0.0001and length of hospital stay, p=0.0006, were also statistically significant at 95% C.I.

The study benefits in being a prospective one, done at the reinstating of operating lists which adds to its relevance. However, the sample is relatively small compared to the enormity of gall stone disease load in the population. This however represents a snapshot of the bigger picture, highlighting the potential impact of increased waiting times on patients, surgeons, and health care management. The fact that this study has been done in a specialist upper GI unit adds to the significance of the results. It is quite possible that the small sample size would have resulted in an exaggeration of complication rates. Nevertheless, the study highlights the importance of getting the waiting list down and implementing hot gall bladder pathways to reduce the negative impact of increased waiting times. We haven’t calculated the increased financial burden from this, but that should be obvious. The training was also affected because the consultant had to take over cases due to increased difficulty, with less than a third done by trainees.

## Conclusion

The delay caused by covid-19 from April to August 2020, has significantly increased the operating time, complication rates, and hospital stay in gall stone disease. It has also increased the number of acute admissions with gall stone complications and had a negative impact on training. This is likely to have influenced all NHS trusts, and even in units with specialist Upper GI input as shown

in this study. A larger study or a multicenter study should throw more light on the impact caused by Covid-19 delays in cholecystectomy. Measures should be taken urgently to reduce waiting lists and encourage hot gall bladder pathways.

## Conflict Of Interest

All authors declare no conflict of interest of any kind.

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