ResearchArticle

Complications of early cholecystectomy in patients with acute biliary pancreatitis: a descriptive case series

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Abstract

Background: Laparoscopic cholecystectomy is one of the most commonly performed surgical procedures and is associated with a significant reduction in morbidity and mortality. The timing of cholecystectomy in acute biliary pancreatitis remains debated. This study determined the frequency of complications of early cholecystectomy in patients with acute biliary pancreatitis. Methods: A descriptive case series was conducted at the Department of General Surgery, SKBZ / CMH Muzaffarabad, from 15 August 2022 to 15 February 2023. Consecutive patients aged 25–70 years with mild acute biliary pancreatitis who underwent early laparoscopic cholecystectomy (within 72 hours) were followed until discharge. Complications were defined as sepsis with positive bacterial growth, re-hospitalisation or biliary leakage. Data were analysed in SPSS 23; the chi-square test was applied after stratification ($p \leq 0.05$). Results: Of 125 patients, 78 (62.4%) were female and 47 (37.6%) male; mean age was 37.86 ± 8.62 years. Diabetes was present in 33 (26.4%), hypertension in 55 (44.0%) and obesity in 32 (25.6%) patients. Mean duration of surgery was 64.53 ± 12.48 minutes and mean hospital stay 4.23 ± 2.11 days. Complications occurred in 24 patients (19.2%). They were significantly associated with male gender ($p = 0.001$), age above 50 years ($p = 0.001$), diabetes ($p = 0.001$) and hypertension ($p = 0.001$), but not with residence ($p = 0.192$), obesity ($p = 0.940$) or socioeconomic status ($p = 0.130$). Conclusion: The frequency of complications of early laparoscopic cholecystectomy in acute biliary pancreatitis was low (19.2%), and the procedure was safe, reliable and effective in this series.

Keywords:complication; acute pancreatitis; cholecystectomy; laparoscopic; gallstones; early surgery

1. Introduction

Acute pancreatitis is a common gastrointestinal disorder, and in the majority of patients the aetiology is either alcohol-associated or biliary, that is, caused by gallstones or sludge (Yadav and Lowenfels, 2013). The incidence of acute biliary pancreatitis is increasing worldwide, possibly because of an increased risk of gallstone disease due to nutritional and lifestyle factors and obesity (Torgerson et al., 2003). The economic burden is high; in the United States alone the annual costs of acute pancreatitis exceed $2.2 billion (Fagenholz et al., 2007). Most patients (80%) have a mild course, but 20% develop severe pancreatitis, which is associated with high morbidity and mortality (Tenner et al., 2013). Once biliary pancreatitis has resolved, cholecystectomy is indicated to reduce the risk of recurrent gallstone-related complications such as acute pancreatitis, cholecystitis, cholangitis or gallstone colic (IAP/APA Working Group, 2013).

A much-discussed question is when during the course ofpancreatitis the gallbladder should be removed. Gallstones and biliary sludge account for 30–55% of acute pancreatitis in the West, whereas in Saudi Arabia they account for 68.5% of all cases. The risk of subsequent attacks in patients recovering from a first attack of acute gallstone pancreatitis is 30-fold higher than in the general population, and further attacks can be prevented by cholecystectomy and bile duct stone clearance once the acute stage has settled (Al-Qahtani, 2014).

Early cholecystectomy raises the risk of a second general anaesthetic or of a second interventional procedure to manage persistent fluid collections. Jan et al. (2014) reported an 11.1% complication rate after early cholecystectomy

in acute pancreatitis, whereas Nealon et al. (2004) from the USA reported 44%. High complication and mortality rates after early cholecystectomy in severe pancreatitis have prompted guidelines recommending that cholecystectomy be delayed until all signs of inflammation have resolved (interval cholecystectomy). After mild biliary pancreatitis, early cholecystectomy is advised by current guidelines, yet no consensus exists on the exact definition of "early": the British Society of Gastroenterology recommends cholecystectomy within two weeks after discharge, whereas the International Association of Pancreatology and the American Gastroenterological Association recommend that all patients with mild biliary pancreatitis undergo cholecystectomy as soon as they have recovered from the attack (Tenner et al., 2013).

Local data on the complication rate of early cholecystectomy in acute pancreatitis would indicate the magnitude of the related morbidity and help in drawing up guidelines for the proper management of these patients. This study therefore aimed to determine the frequency of complications of early cholecystectomy in patients with acute biliary pancreatitis.

2. Materials and methods

2.1. Study design, setting and sample

This descriptive case series was conducted in the Department of General Surgery, SKBZ / CMH Muzaffarabad, over six months, from 15 August 2022 to 15 February 2023. The sample size was calculated with the formula $n = Z^2pq/d^2$, taking the hypothesised (lowest) complication rate of 11.1% (Jan et al., 2014), $q = 100 - p$, and a margin of error (d) of 5.5%, which gave n = 125 patients undergoing early cholecystectomy for acute biliary pancreatitis. Patients were enrolled by non-probability consecutive sampling.

2.2. Inclusion and exclusion criteria

Male and female patients aged 25–70 years with acute biliary pancreatitis who underwent early cholecystectomy were included. Patients with moderate to severe pancreatitis (confirmed on the medical record), pancreatic necrosis or chronic pancreatitis (on history and clinical record), alcohol abuse (on history) and pregnant women (confirmed by urine pregnancy test) were excluded.

2.3. Operational definitions

Early cholecystectomy was defined as laparoscopic cholecystectomy carried out within 72 hours of acute biliary pancreatitis. **Acute pancreatitis** was defined by all of the following: duration of symptoms less than three days, upper abdominal pain, serum amylase > 500 U/l, Ranson score less than 3, and transabdominal ultrasonography showing gallstones (movable echogenic structures within the gallbladder lumen causing a posterior acoustic shadow). **Complications** were considered present when any one of sepsis (with positive bacterial growth on the laboratory report), re-hospitalisation or biliary leakage (confirmed from the patient's record) was noted.

2.4. Data collection

All indoor patients meeting the inclusion criteria were enrolled from the Department of General Surgery, SKBZ / CMH Muzaffarabad. Prior permission was obtained from the institutional ethical committee [approval number to be added]. Informed consent was taken from each patient after explaining the objectives of the study, assuring confidentiality of the information and the absence of risk from participation. Baseline investigations, including serum amylase and ultrasonography, were performed at the hospital free of cost. Surgery was performed by a senior surgeon with five years of post-fellowship experience. Patients were followed until discharge to document complications, and all relevant information was recorded by the researcher on a specially designed proforma (age, gender, duration of surgery, hospital stay, residence, BMI, diabetes, hypertension and complications).

2.5. Statistical analysis

Data were entered and analysed in SPSS version 23. Mean and standard deviation were calculated for age, duration of surgery, BMI and hospital stay. Frequencies and percentages were calculated for categorical variables: gender, age group, diabetes, hypertension, complications (yes/no), obesity and residential status. Effect modifiers (age, diabetes, hypertension, residential status, gender and obesity) were controlled by stratification, and the chi-square test was applied after stratification to examine their effect on complications. A p-value ≤ 0.05 was considered significant.

3. Results and discussion

3.1. Characteristics of the patients

The study included 125 patients: 47 (37.6%) males and 78 (62.4%) females. Mean age was 37.86 ± 8.62 years (range 28–67 years); males were older than females (43.09 ± 11.31 vs 34.71 ± 4.08 years; p = 0.001), and 110 patients (88.0%) were aged up to 50 years. Fifty-eight patients (46.4%) lived in rural and 67 (53.6%) in urban areas; 59 (47.2%) were of poor and 66 (52.8%) of middle-income socioeconomic status. Diabetes was present in 33 (26.4%), hypertension in 55 (44.0%) and obesity in 32 (25.6%) patients (**Table 1**). Mean BMI was 24.53 ± 2.11 kg/m², mean duration of surgery 64.53 ± 12.48 minutes and mean hospital stay 4.23 ± 2.11 days (**Table 2**).

Table 1. Baseline characteristics of the study patients (n = 125).

Variable	Category	Frequency	%
Gender	Male	47	37.6
	Female	78	62.4
Age group	Up to 50 years	110	88.0
	More than 50 years	15	12.0
Residence	Rural	58	46.4
	Urban	67	53.6
Socioeconomic status	Poor	59	47.2
	Middle income	66	52.8
Diabetes	Yes	33	26.4
	No	92	73.6
Hypertension	Yes	55	44.0
	No	70	56.0
Obesity	Yes	32	25.6
	No	93	74.4

Table 2. Continuous variables of the study patients (mean ± SD).

Variable	Mean ± SD	Range
Age, all patients (years)	37.86 ± 8.62	28–67
Age, males (years)	43.09 ± 11.31	–
Age, females (years)	34.71 ± 4.08	–
BMI (kg/m²)	24.53 ± 2.11	–
Duration of surgery (minutes)	64.53 ± 12.48	–
Hospital stay (days)	4.23 ± 2.11	–

Difference in age between males and females: p = 0.001.

3.2. Frequency of complications

Complications (sepsis, re-hospitalisation or biliary leakage) were noted in 24 of the 125 patients (19.2%), while 101 patients (80.8%) had none (**Table 3**).

Table 3. Frequency of complications of early cholecystectomy (n = 125).

Complications	Frequency	%
Yes	24	19.2
No	101	80.8
Total	**125**	**100**

3.3. Complications by patient characteristics

Stratified results are shown in **Table 4** and **Figure 1**. Complications were significantly more frequent in males than in females (20/47 vs 4/78; p = 0.001), in patients older than 50 years than in those aged up to 50 years (9/15 vs 15/110; p = 0.001), in diabetic than in non-diabetic patients (20/33 vs 4/92; p = 0.001) and in hypertensive than in normotensive patients (24/55 vs 0/70; p = 0.001). All 24 patients with complications were hypertensive. Residence (p = 0.192), obesity (p = 0.940) and socioeconomic status (p = 0.130) were not significantly associated with complications.

Table 4. Stratification of complications by patient characteristics (n = 125).

Variable	Group	Complications: yes, n (%)	No, n	p-value
Gender	Male (n=47)	20 (42.6)	27	**0.001**
	Female (n=78)	4 (5.1)	74	
Age	Up to 50 years (n=110)	15 (13.6)	95	**0.001**
	More than 50 years (n=15)	9 (60.0)	6	
Residence	Rural (n=58)	14 (24.1)	44	0.192
	Urban (n=67)	10 (14.9)	57	
Diabetes	Yes (n=33)	20 (60.6)	13	**0.001**
	No (n=92)	4 (4.3)	88	
Hypertension	Yes (n=55)	24 (43.6)	31	**0.001**
	No (n=70)	0 (0.0)	70	
Obesity	Yes (n=32)	6 (18.8)	26	0.940
	No (n=93)	18 (19.4)	75	
Socioeconomic status	Poor (n=59)	8 (13.6)	51	0.130
	Middle income (n=66)	16 (24.2)	50	

Percentages are the proportion of each group with complications. Chi-square test; significant p-values (≤ 0.05) in bold.

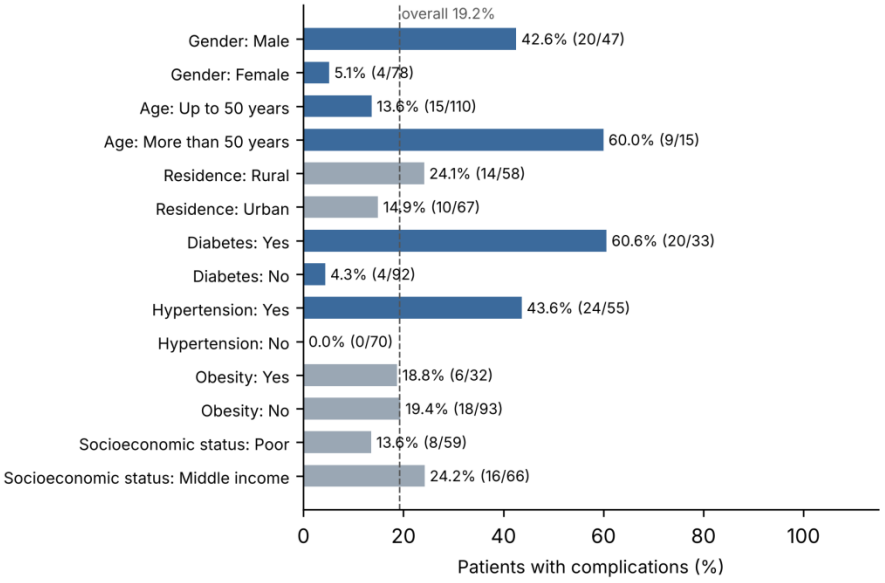


Figure 1. Proportion of patients with complications in each subgroup (n/N shown). Dark bars mark characteristics significantly associated with complications; the dashed line shows the overall rate.

3.4. Discussion

Acute pancreatitis is a common disease in the emergency room, with an annual incidence ranging from 4.9 to 35 per 100,000 population. According to the Atlanta classification, 80% of patients have mild acute pancreatitis, and acute biliary pancreatitis accounts for up to 40–70% of cases. Cholecystectomy is effective in reducing the recurrence of acute gallstone pancreatitis, which without cholecystectomy may be as high as 33%. The main concern in mild acute biliary pancreatitis is the optimal timing of laparoscopic cholecystectomy: delayed cholecystectomy can increase readmission, whereas most guidelines advise early surgery, which can reduce the risk of recurrent biliary events. However, many previous studies were of low methodological quality, and one source of heterogeneity is the use of different criteria for the severity of pancreatitis (Lyu et al., 2018).

In our series complications occurred in 19.2% of patients. Egin et al. (2017) reported a complication rate of 2%, which is much lower than ours. Jan et al. (2014) reported 11.1% after early cholecystectomy in acute pancreatitis, which is similar to our result, whereas Nealon et al. (2004) reported 44%, which is much higher. We therefore regard the frequency in this series as low, consistent with the conclusion that early laparoscopic cholecystectomy in mild acute biliary pancreatitis is safe, reliable and effective.

There was a female predominance in our series (62.4%). Egin et al. (2017) reported a high female predominance of 79%, Rai et al. (2016) 80%, Ahmed et al. (2016) 53.81% and Alshahrani et al. (2015) 79%, all in keeping with our result, whereas Farooq et al. (2017) reported 65% males. Our mean age of 37.86 years, with 88.0% of patients aged up to 50 years, is similar to the pattern reported by Egin et al. (2017) and close to the means of 43.79 years (Farooq et al., 2017), 36 years (Rai et al., 2016), 43.25 years (Ahmed et al., 2016) and 46 years (Alshahrani et al., 2015). Rai et al. (2016) also reported baseline characteristics (residence, socioeconomic status, comorbidity and BMI) similar to ours.

The mean duration of surgery in our patients was 64.53 ± 12.48 minutes, similar to the 77.4 ± 34.8 minutes reported by Egin et al. (2017), and the mean hospital stay of 4.23 ± 2.11 days is similar to that reported by Rai et al. (2016).

Complications were significantly associated with male gender, older age, diabetes and hypertension in our patients. Males in our series were older than females (mean 43.09 vs 34.71 years), so the association with gender may partly reflect the age difference. Every patient with a complication was hypertensive, and 20 of the 24 were diabetic, which suggests that comorbid disease identifies a higher-risk group within an otherwise low-complication population. Obesity, residence and socioeconomic status showed no significant association. These findings come from stratified comparisons within a single series, and several subgroups are small (for example only 15 patients were older than 50 years), so they should be interpreted with caution.

The limitations of this study are its single-centre, descriptive design without a comparison group (such as interval cholecystectomy), the non-probability consecutive sampling, and the follow-up of patients only until discharge. The study reports complications as a single combined outcome (sepsis, re-hospitalisation or biliary leakage), so the frequency of each individual complication cannot be described.

4. Conclusion

Early laparoscopic cholecystectomy in patients with acute biliary pancreatitis is a safe, reliable and effective procedure, as the frequency of complications was low (19.2%) in this series. Complications were significantly associated with gender, increasing age, diabetes and hypertension. Surgeons treating such patients should consider early cholecystectomy to achieve the desired outcomes, with particular attention to older, diabetic and hypertensive patients.

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