The Relationship Between Waiting Time for Elective Cholecystectomy and Emergency Admission in KFMMC: Single Centre Experience

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Introduction: Patients with symptomatic cholelithiasis may undergo cholecystectomy, as an emergency or elective, in the outpatient clinic after discharge from the emergency department (ED). Increasing waiting times for elective cholecystectomy may lead to multiple ED visits for pain management or admission for emergency cholecystectomy. The aim of our study was to determine the relationship between waiting time for elective cholecystectomy and emergency admission.

Methods: This retrospective, observational study was designed and conducted at a single institution. The medical records of 239 patients with gallstone diseases who underwent emergency or elective cholecystectomy between January 2013 to November 2017 were obtained from the clinic.

Result: Approximately 76% (182/239) of the study participants underwent elective cholecystectomy and ~24% (57/239) visited the ED during their waiting period, of which 42% (24/57) proceeded with emergency cholecystectomy during the waiting time for elective cholecystectomy and the remaining 58% (33/57) were managed in the ED and...
eventually underwent elective cholecystectomy. A waiting period of 60 days or more increased the risk of emergency cholecystectomy 5.21 times compared to a waiting period of less than 60 days. A waiting period of 31 to 180 days and above increased the chances of emergency cholecystectomy 4.13 (risk ratio) times and 25.5 (risk ratio) times, respectively, compared to a waiting period of 30 days or less.

Conclusion: Waiting time for elective cholecystectomy should be less than 30 days to reduce the risk of emergency cholecystectomy and multiple ED visits.

Key words: Elective – Emergency – Cholecystectomy – Waiting list – Complications

Background

Waiting lists are created and the patients’ access elective surgeries according to their turn.1 Delaying the treatment of the patients on the basis of the waiting lists leads to increased emergency admission; this in turn disturbs the routine operation room schedule.2 Delayed surgery for patients with biliary colic, which is caused by choledolithiasis, may lead to complications such as acute cholecystitis, biliary pancreatitis, obstructive jaundice, and cholangitis. Those complications leads to multiple emergency visits and admission for emergency surgery.3 Few studies have been conducted on the relationship between time spent on the waiting list for elective cholecystectomy and risk of emergency visit and admission during the waiting time.

Objectives

The study objectives were as follows:

1. To determine the proportion of study participants who underwent: (a) elective cholecystectomy; (b) emergency cholecystectomy, or (c) emergency visit, discharge, and elective cholecystectomy.
2. To determine the mean waiting time for elective cholecystectomy.
3. To determine the mean time between last follow-up and emergency visit.
4. To determine the proportion of study participants who were diagnosed with: (a) biliary colic; (b) acute cholecystitis; (c) pancreatitis; (d) common bile duct stone; and (e) polyp.
5. To determine if there is an association between ER visit during waiting time and sex.
6. To determine the proportion of study participants who were diagnosed with biliary colic and its complications.
7. To determine the association between waiting time and emergency cholecystectomy.

Materials and Methods

Patients

A retrospective, observational study was designed and conducted with 239 patients from a single institution. The medical records of all the patients with gallstone diseases who underwent emergency or elective cholecystectomy between January 2013 to November 2017 were obtained from the clinic. Patients who underwent emergency surgery without a prior clinic appointment were excluded.

Data collection

The data were collected from the electronic medical records after obtaining ethical approval of the patients. Parameters such as demographics, diagnosis, waiting time (days), and outcomes were recorded.

Outcomes

The outcomes were elective cholecystectomy, emergency cholecystectomy, ER visit, discharge, and admission for elective cholecystectomy were also recorded.

Statistical analysis

The data were analyzed using SPSS version 22. The data are represented as mean ± standard deviation (SD) and $\chi^2$ test was used to analyze the data. Values of $P < 0.05$ were considered statistically significant.

Results

The specific objective of this study was to determine the proportion of study participants who underwent
elective cholecystectomy; emergency cholecystectomy; or emergency visit, discharge, and elective cholecystectomy.

About 76% (182/239) of the study participants underwent elective cholecystectomy. Roughly 24% (57/239) visited the ER during their waiting period. Out of this number, 42% (24/57) proceeded with emergency cholecystectomy during waiting time for elective cholecystectomy and the remaining 58% (33/56) were managed in the emergency department and eventually underwent elective cholecystectomy.

Specific objective 2
To determine the mean waiting time for elective cholecystectomy. The mean waiting time for elective cholecystectomy is 56.7 days (SD = 50.03 days). The shortest waiting time is 3 days while the longest waiting time is 360 days. The median waiting time is 42 days (IQR = 56 days).

Specific objective 3
To determine the mean time between last follow-up and emergency visit. The mean time interval time between last follow-up and emergency visit is 47.5 days (SD = 66 days) with the shortest being 1 day and the longest being 304 days. The median time interval is 16 days (IQR = 47 days).

Specific objective 4
To determine the proportion of study participants who were diagnosed with biliary colic, acute

Table 1  Distribution of study participants based on the type of surgery

| Type of surgery                  | Count (n = 239) | Proportion, % |
|----------------------------------|-----------------|---------------|
| Elective cholecystectomy         | 182             | 76.15         |
| Emergency cholecystectomy        | 24              | 10.04         |
| ER + discharge + elective        | 33              | 13.81         |
| cholecystectomy                  |                 |               |

Fig. 1  Distribution of study participants based on the type of surgery.

Fig. 2  Waiting time (in days) for elective cholecystectomy. The mean waiting time for elective cholecystectomy is 56.7 days (SD = 50.03 days). The shortest waiting time is 3 days while the longest waiting time is 360 days. The median waiting time is 42 days (IQR = 56 days).

Fig. 3  Time (in days) between last follow-up and emergency visit. The mean time interval time between last follow-up and emergency visit is 47.5 days (SD = 66 days) with the shortest being 1 day and the longest being 304 days. The median time interval is 16 days (IQR = 47 days).
Specific objective 5
To determine if there is an association between ER visit during waiting time and sex.

Specific objective 6
To determine the proportion of study participants who were diagnosed with biliary colic, acute cholecystitis, pancreatitis, common bile duct stone, and polyp among those who underwent emergency cholecystectomy.

Most of the patients who underwent emergency cholecystectomy were diagnosed with biliary colic (70.83%). The remainder being cholecystitis (4/24), common bile duct stone (1/24), and pancreatitis (2/24).

Specific objective 7
To determine the association between waiting time and having emergency cholecystectomy. Those who were waiting for 60 days or over are 5.21 times at risk of emergency cholecystectomy compared to those who waited for 60 days or less.

Those who were waiting for 31 to 180 days are 4.13 (risk ratio) times more likely to undergo emergency cholecystectomy compare to those who waited for 30 days or less.

Those who were waiting for over 180 days are 25.5 (risk ratio) times more likely to undergo emergency cholecystectomy compared to those who waited for 30 days or less.

Discussion
Cholecystectomy is the treatment of choice for any patient with symptomatic cholelithiasis according to the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES).4

Most of the patients with gallstones came to ED with biliary colic, cholecystitis, common bile duct stone, or gallstone pancreatitis. Some patients were discharged from the ED with outpatient clinic appointment for booking for elective cholecystectomy. Increased waiting time for elective cholecystectomy may increase the risk for recurrent biliary colic or gallstone-related complications, which involves

Table 2 Distribution of study participants based on diagnosis

| Diagnosis            | Count (n = 239) | Proportion, (%) |
|----------------------|-----------------|-----------------|
| Cholecystitis        | 16              | 6.69            |
| Common Bile Duct Stone | 6              | 2.51            |
| Pancreatitis         | 4               | 1.67            |
| Biliary colic        | 205             | 85.77           |
| Polyp                | 8               | 3.35            |

Table 3 Cross-tabulation of sex and ER visit of study participants

| ER visit | Female | Male | Total |
|----------|--------|------|-------|
| No       | 134    | 48   | 182   |
| Yes      | 48     | 9    | 57    |
| Total    | 182    | 57   | 239   |

Person $\chi^2 = 2.6774$; $P$ value $= 0.102$.

There is no sufficient evidence to conclude that gender is associated with ER visit during waiting time ($P = 0.102$).

Table 4 Distribution of diagnosis for study participants who underwent emergency cholecystectomy

| Diagnosis            | Count (n = 24) | Proportion, % |
|----------------------|----------------|---------------|
| Cholecystitis        | 4              | 16.67         |
| Common bile duct stone | 1              | 4.17          |
| Pancreatitis         | 2              | 8.33          |
| Biliary colic        | 17             | 70.83         |

Most of the patients who underwent emergency cholecystectomy were diagnosed with biliary colic (70.83%). The remainder being cholecystitis (4/24), common bile duct stone (1/24), and pancreatitis (2/24).
multiple ED visits and hospital admission, as shown in previous nonrandomized studies.

The time of performing cholecystectomy (early or late) is still a controversial issue. Two randomized, controlled trials were conducted to evaluate the outcome of delayed cholecystectomy in cholelithiasis patients.5,6 Salman et al5 conducted a randomized, controlled study in 71 patients with biliary colic to study the consequences of undergoing cholecystectomy within 24 hours versus delayed cholecystectomy. It was found that 35% of the delayed cholecystectomy group had one or more gallstone-related hospital admissions during the waiting time for elective cholecystectomy. The rate of emergency admission was 11 per 100 patients per month. In these patients the operative times and hospital stays were increased, compared to the early cholecystectomy group.5

Bingener and colleagues7 conducted a retrospective cohort study with the patients who came to the ED with complaints of cholecystitis and determined the outcomes of patients who did cholecystectomy versus those who did not. Most of the patients discharged from the ED were young, with low leukocyte count and 20% of them came to ED within 30 days and underwent emergency cholecystectomy.

Medicare beneficiaries did a study recently and found that 11% of the beneficiaries who did not opt for elective cholecystectomy after initial evaluation in ED required hospital admission later. Previous studies demonstrated that complicated gallstone diseases were associated with increased hospital stay, high expenses, high mortality and morbidity rates, and long operative time. Multiple emergency visits due to gallstone diseases required imaging, such as x-ray, which is less sensitive and patients are exposed to radiation.8

Our study demonstrated that ~76% of the participants underwent elective cholecystectomy. Approximately 24% of the patients visited the ED during their waiting period; out of them, 42% proceeded with emergency cholecystectomy during the waiting time for elective cholecystectomy and the remaining 58% were managed in the emergency department and eventually underwent elective cholecystectomy. Most of the patients who underwent emergency cholecystectomy were diagnosed with biliary colic, while the remainder had gallbladder-related complications. The waiting period for elective cholecystectomy was critical because the patients with a waiting period of 31 to 180 days were 4 times more likely to undergo emergency cholecystectomy compared to those who waited for 30 days or less. Those who waited for over 180 days were 25.5 (risk ratio) times more likely to undergo emergency cholecystectomy compared to those who waited for 30 days or less.

**Limitations**

This study was a retrospective observational study in a single center with a small number of participants, there was no information about the number of patients taking medical advice outside our institute, and the laboratory data of the patients were not included.
Conclusion

The waiting time for elective cholecystectomy should be less than 30 days to avoid the risk of development of recurrent biliary colic, gallbladder stone-related complications, unnecessary investigations, emergency cholecystectomy, and multiple emergency department visits.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on reasonable request.

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