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Original Article

Factors Impacting Readiness to Discharge Time from Recovery Room after Laparoscopic Cholecystectomy

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Abstract

Aim: **To evaluate the relationships between preoperative anxiety, preoperative information need, body mass index, operative time, abdominal distension and discharge readiness from the recovery room in the patient underwent laparoscopic cholecystectomy.**

Methods: **The study involved 126 patients who underwent laparoscopic cholecystectomy. The data collected were the Amsterdam Preoperative Anxiety and Information Scale, abdominal distension level record form and White's fast-track recovery score. Descriptive statistics and Pearson product-moment correlations were employed for data analysis.**

Results: **Most of the subjects were female (68.3%) with an average age of 55.5 ± 15.3 years. Twenty seven percent of the subjects were anxious. The average level of subjects' preoperative information need was 35%. Forty nine percent of the subjects had a normal body mass index. The mean operative time was 60.7 ± 23.6 minutes. Fifty six percent of the subjects had abdominal distension in recovery period. Both preoperative anxiety and abdominal distension had moderate significant correlations with readiness time to discharge from the recovery room ($r = 0.64$, $p < 0.01$ and $r = 0.63$, $p < 0.01$, respectively). Similarly, preoperative information need and body mass index had significant positive correlations with readiness time to discharge from the recovery room ($r = 0.32$, $p < 0.01$ and $r = 0.20$, $p < 0.05$, respectively). However, the operative time was not correlated with the time to discharge from the recovery room.**

Conclusion: **Healthcare providers should pay more attention to reducing preoperative anxiety by providing more information to reduce anxiety and information about cause of abdominal distension that may occur. They should also relieve postoperative anxiety in order to promote faster and better postoperative recovery period.**

Key words: **Anxiety, abdominal distension, information need, laparoscopic cholecystectomy, postoperative recovery**

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Introduction

Gallstone diseases are common. The incidence is 12% in the population of the United States and approximately one million people throughout the rest of world being diagnosed with gallstones each year.[1,2] At Siriraj Hospital, the numbers of patients undergoing gallbladder surgery are likely to increase.[3] Today, laparoscopic cholecystectomy (LC) is the gold standard treatment for symptomatic gallstones and an alternative way to treat gallstones with complications such as acute cholecystitis. This procedure is preferable to open gallbladder surgery and allows patients to return to activities of daily living quicker than usual.[4]

Although LC supports faster patient recovery than open surgery, the patients' readiness time to discharge from the recovery room ranges from 15 to 195 minutes with 24% of patients requiring more than 120 minutes which is a delayed recovery resulting in increased cost of care.[5] Pain is one of the indicators of readiness to discharge from the recovery room. Postoperative pain within the first two hours after laparoscopic surgery will be approximately at the level of 3-7 points.[6,7] Analgesic usage can reduce pain but side effects such as dizziness, nausea and vomiting not only cause patients to suffer but also result in delayed discharge from the recovery room.[8]

Normally carbon dioxide gas is released through the surgical wound after LC but some gas remains in the peritoneal cavity causing patients to have a feeling of distention. Only 24% of patients can absorb the remaining gas within 24-48 hours after the surgery.[9] Abdominal distension causes patients to have shallow breathing and decreased ability to expel carbon dioxide via breathing.[10]

In addition to the physical factors involved in recovery after open surgery, preoperative anxiety was associated with postoperative pain and analgesia demand.[11,12] Anxiety stimulates the automatic nervous system and reduces a patient's tolerance for pain.[13] Anxiety is related to a patient's need for information before surgery.[14] Before surgery 94% of patients should receive information about the surgical procedure, postoperative complications and ways to prevent complications that may occur.[15,16]

The aim of this prospective correlational study was to examine the relationships between the factors such as preoperative anxiety and information need, body mass index, operative time, abdominal distension and discharge readiness from the recovery room. The results of this study might be useful in developing guidelines for the improvement of quality of patient care after LC. In addition, findings from the study might reduce negative factors that had impact on readiness to discharge from the recovery room and promote patient recovery in an appropriate period.

Materials and Methods

Ethics

This study has been approved by the Institutional Research Board Committee of the Faculty of Medicine Siriraj Hospital, Mahidol University (Si 164/2010). All subjects provided written informed consent.

Sample of the Study

The population consisted of male and female patients diagnosed with symptomatic gallstones who underwent LC. These patients were 18 years of age or older and were admitted at Siriraj Hospital during April to July, 2010. The sample size was calculated using power analysis. The power analysis determined the level of significance = 0.05, power test = 0.80 and small effect size = 0.25. The sample size for this study was 126.

Research Instruments

In the preoperative period, the researcher collected data on anxiety and information need using the Amsterdam Preoperative Anxiety and Information Scale (APAIS),[14] which consisted of six items, four of which represented anxiety about anesthesia and surgical procedure. The remaining two items represented the need for information about anesthesia and surgical procedure. In the current study, APAIS cronbach's alpha coefficient was 0.84 and 0.79 respectively.

During the postoperative period the researcher assessed the patient's physical recovery in the recovery room by recording vital signs and assessing pain level using White's fast-track recovery score[17] criteria every 15 minutes. In the current study, White's fast-track recovery score inter-rater reliability was 0.95. The researcher assessed the level of postoperative abdominal distension in the recovery room using the Numeric Rating Scale every 30 minutes. Whenever the overall score of physical recovery was equal to or

greater than 12 of 14 points, indicating the patient was ready to be discharged from the recovery room, the assessment was complete.

Statistic analysis

Statistical analyses were performed using SPSS 17.0 for Windows. Demographic and sickness data were presented as frequency, parentage, mean, standard deviation and statistical significance was calculated using Pearson product-moment correlation coefficient to determine the relationships between preoperative anxiety, preoperative information need, body mass index, operative time, abdominal distension and discharge readiness from the recovery room. In this study the significance was accepted at p-value < 0.05.

Results

In this study, 126 patients who underwent LC participated. There were more female (68.3 %). The mean age was 55 years old (SD = 15.3). About 53.2% of the subjects had a Bachelor's degree or higher. Thirty nine percent of the subjects used the average amount of carbon dioxide during surgery less than 30 liters. Spillage of bile during surgery occurred in 24.6%. All of the subjects received an analgesic drug (morphine or fentanyl) at least one time during surgery with fentanyl being used 88.9% of the time. During the recovery period, 58 subjects (46.0%) received an analgesic drug with morphine being used most often at 62.1% of the time. Postoperative nausea and vomiting in recovery occurred 3.2% of the subjects, and the average readiness time to discharge from the recovery room was 52.1 minutes (SD = 18.9).

Preoperative anxiety in the patients

Anxious subjects accounted for 27.8% of the sample, and most of these (74.1%) were female. The average readiness time to discharge from the recovery room among anxious subjects was 68.4 minutes whereas subjects who were not anxious had average readiness time to discharge from the recovery room of 45 minutes.

Preoperative information needs in the patients

Level of preoperative information need of subjects was moderate (35%) to high (32.5%). The average readiness time to discharge from the recovery room among subjects who had preoperative information needs at the high level was 58.8 minutes whereas the average readiness time to discharge from the recovery room among subjects who had preoperative information needs at the low level was 46 minutes.

Body mass index in the patients

The number of subjects with body mass index in the normal weight range and overweight range were 49.2% and 37.3% respectively, and 8% of the subjects were at obesity class I. Research results showed that subjects at obesity class I had the longest readiness time to discharge from the recovery room of 72 minutes, compared to subjects with lower body mass index.

Operative time of the procedure

In this study, the mean of operative time was 60.7 minutes (SD = 23.6). Most subjects (49.2%) had operative time within 31-60 minutes.

Abdominal distension in the patients

Fifty seven percent of the subjects had abdominal distension in recovery period. The majority (35.7%) had a moderate to high level of abdominal distension. Classified by time in the recovery room, the highest level of abdominal distension was 60 minutes after surgery with an average score of 4.7 points.

Readiness to discharge from the recovery room of the patients

The mean of readiness time to discharge from the recovery room was 52.1 minutes (SD = 18.9). Most of subject's readiness times were in range of 31-60 minutes after surgery (59.5%).

The correlations between factors and readiness time to discharge from recovery room

The correlation matrix between preoperative anxiety and abdominal distension had significantly moderate positive correlations with readiness time to discharge from the recovery room ($r = 0.638$, $p < 0.01$ and $r = 0.630$, $p < 0.01$, respectively). Similarly, preoperative information needs and body mass index had significantly low positive correlations with readiness time to discharge from the recovery room ($r = 0.322$, $p < 0.01$ and $r = 0.204$, $p < 0.05$, respectively). However, the operative time was not correlated with readiness time to discharge from the recovery room (Table 2).

Table 1. Readiness time to discharge from the recovery room

	Readiness time to discharge from the recovery room (minutes)
Sex	
Male	46.0
Female	54.8
Age (year)	
18-20	53.0
21-40	52.5
41-60	51.3
More than 60	53.8
Body mass index (kg/m^2)	
Less than 18.5 (less than normal)	52.8
18.5-24.99 (normal weight)	49.8
25-29.99 (over weight)	50.1
30-34.99 (obesity class I)	72.0
Pre-operative anxiety level	
Normal	45.0
Anxious	68.4
Pre-operative information need level	
No/little	46.0
Medium	51.5
High	58.5
Operative time (minutes)	
Less than 30	54.2
31-60	53.7
61-90	46.0
More than 90	51.8
Abdominal distension level	
No	39.6
Little	51.2
Medium	65.3
High	66.2

Discussion

In this study, most of the patients were female (68.3%). The mean age was 55 years (range = 41-60). According to Bellows et al[1], the gallstones were found greater in people over 40 years of age and three times greater in females than males.

Recovery period data showed that four subjects had postoperative nausea and vomiting during the recovery period. Although 1 of the 4 subjects (1.1%) received an antiemetic drug during surgery, the subjects still had postoperative nausea and vomiting during the recovery period. This was similar to the findings of Bestas et al,[18] in which patients who received an antiemetic drug during surgery had the chance of postoperative nausea and vomiting during the recovery period of 0.6-30%. This study found that 46% of subjects received an analgesic during the recovery period with morphine and fentanyl being used most often at 45.2%. According to Jensen et al,[5] 46% of patients receive an analgesic during the recovery period, with morphine and fentanyl being used most often at 45.2%.

This study showed the patients' average time to discharge from the recovery room was 52.1 minutes (SD = 18.9). Fifty nine percent were in the range of 31 to 60 minutes after surgery. According to Jensen et al using the White's fast-track recovery score to assess the readiness for discharge from the recovery room, the average time to discharge from the recovery room was 46 minutes.[5] In contrast, Bisgaard et al[19] found the average time to discharge from the recovery room of 72 minutes which was longer than this study. This may be due to the fact that patients in the study of Bisgaard et al. had female of 78.8% but this study had 68.3%. Female recovered after surgery slower than male.[5]

Table 2: The correlation matrix between preoperative anxiety, preoperative information needs, body mass index, operative time, abdominal distension and readiness time to discharge from the recovery room in laparoscopic cholecytectomy patients.

Variable	1	2	3	4	5	6
1. Preoperative anxiety	1					
2. Preoperative information needs	.483**	1				
3. Body mass index	.166	-.001	1			
4. Operative time	-.079	-.031	.050	1		
5. Abdominal distension	.454**	.193*	.019	-.070	1	
6. Readiness to discharge from the recovery room	.638**	.322**	.204*	-.084	.630*	1

*p <.05,**p <.01

Anxious subjects were 27.8% of total subjects. This is similar to the findings of Nikumb et al,[20] in which 26.5% of patients undergoing general surgery had anxiety definitely present. However, Sirinan et al found only 12% of patients were more anxious.[21] This may be due to the fact that the APAIS cut off point used by Sirinan and colleagues was 13 points whereas this study used 11 points as the cut off following the standard for the tool.[14] In this study, most of the anxious subjects were female (68.3%) who had fluctuations in the levels of estrogen and progesterone in relation to emotions and anxiety.[22] Similar to the studies of Rosen et al[23] and Caumo et al[24], female patients were most anxious than male. Preoperative anxiety not only affected mental condition but also produced physical changes in the physiology of the endocrine system by secreting adrenaline into the bloodstream causing vasoconstriction resulting in increased blood pressure.[25] Blood pressure changing during the recovery period resulted in decreased scores on the physical recovery assessment which resulted in delayed discharge from the recovery room.

Subjects with preoperative information needs about surgery and anesthesia in the average to high range were 67.5% similar to the study of Sirinan et al,[21] 61% of whom had preoperative information needs about surgery and anesthesia in the average to high range. In addition, Sirinan and colleagues found that high level of education correlated with need for information. It is possible that most of the subjects in this study (53.2%) who earned a bachelor's degree or higher had greater awareness of the risks arisen from anesthesia and surgery and expected that information would be helpful for promoting faster postoperative recovery.[26] On the other hand, 32.5% of subjects had preoperative information needs about surgery and anesthesia in low level which might be due to data collecting time in range of 1 to 4 hours before surgery, difference of routine ward works to provide information or some patients had not received information. In the study of Mordiffi et al,[26] 66.7% of patients received insufficient information about the anesthesia and surgery from their healthcare providers. Insufficient preoperative information failed to adequately prepare patients for postoperative conditions such as pain or to prevent postoperative complications resulting in delayed discharge from the recovery room.

The results of this study indicated that the readiness time to discharge from the recovery room was longest at 72 minutes in subjects with a body mass index (BMI) greater than 30 kg/m^2. This is explained by changes in drug volume distribution in patients with high BMI which resulted from adipose tissue accumulation in the body in greater proportion than in patients in the normal weight range. This factor allows lipophilicity drugs such as propofol, the widely used anesthetic induction drug, to distribute well in obese patients. However, larger quantities of drugs usually are used in obese patients, resulting in the drug's effects remaining in the body for longer periods than in patients with normal BMI.[27-29] This was due to the reduction of drug elimination in obese patients by the accumulation of fat in the liver which might alter blood flow to the liver. In turn, these pathological changes might have an impact on hepatic drug clearance, resulting in the elimination of drugs from the body more slowly than in patients with normal BMI.30 Readiness time to discharge from the recovery room in obese subjects was delayed. This was similar to the study of Jensen et al,[5] which 41% of patients with a BMI greater than 30 kg/m^2 had the readiness time to discharge from the recovery room greater than 120 minutes.

In this study, the mean operative time was 60.7 minutes and most subjects (49.2%) had operative time within 31-60 minutes. This is not supported by the study of Jensen et al and De Cosmo et al,[5,11] in which mean operative times were 83 and 91 minutes. The shorter operative times in this study might be due to the fact that most subjects in this study (49.2%) had a normal BMI and subjects with BMI greater than 30 kg/m^2 accounted for only 8%. This was contrast to Jensen et al in which 21.1% of patients had BMI greater than 30 kg/m^2.[5] The longer operative time for obese patients undergoing LC could be explained by the accumulation of fat in the abdominal wall and intra abdomen created a barrier to operative field exposure. Operative time had a significantly low negative correlation with the readiness time to discharge from the recovery room ($r = 0.20$, $p = 0.05$). This may be due to the fact that the subjects in this study were only gallstone patients without cholecystitis. In addition, most LCs in this study (80%) were performed by expert surgeons with few postoperative complications. Therefore, subjects' readiness time to discharge from the recovery room was indifferent.

In the present study, postoperative abdominal distension might be caused by various factors such as increased lung ventilation before inserting the endotracheal tube. This is similar to the findings of Chakraborty et al[31] that 30% of patients who underwent LC had gastric distension caused by increasing lung ventilation. Patients' feeling of abdominal distension may also be caused by uncomfortable feeling from pneumoperitoneum during surgery. Ure et al showed that 38.7% of patients had abdominal distention and the highest level of postoperative pain score in the first two hours after surgery was 4 points.[32] Abdominal distension may also increase postoperative pain. This study showed that subjects with high levels of abdominal distension had high levels of postoperative pain during the recovery period averaging 5.4 points, as compared to subjects with no abdominal distension who had lower levels of postoperative pain during the recovery period averaging 2.6 points. High levels of postoperative pain cause decreased physical recovery assessment scores that result in delayed readiness to discharge from the recovery room.

Implementation

Health care teams should provide information to patients about how to prepare themselves for surgery to reduce anxiety and as a way of deciding upon appropriate nursing intervention and provide information about the causes of postoperative abdominal distension and methods to relieve it such as adjusting the patient's position to decrease abdominal pressure, body movement and turning to the side in order to increase abdominal gas absorption and promote a better recovery in patients underwent LC.

Research limitation

This study had limitation with reference to the population because it comprised eligible patients of 126 cases who underwent LC only at Siriraj Hospital.

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