



Impact of Patient's Pain and Fatigue on Decision of Discharge After Laparoscopic Surgery for Colorectal Cancer

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Purpose: Hospital stays after laparoscopic surgery for colorectal cancer tend to be much shorter than those after conventional open surgery. Many factors, including surgical outcomes and complications, are associated with patient discharge planning. However, few studies have analyzed the impact of patient subjective discomfort (including pain and fatigue) on the decision to discharge after surgery. Therefore, the purpose of this study was to determine how patient pain and fatigue play a role in the decision to discharge after laparoscopic surgery for colorectal cancer.

Methods: Between March 2014 and February 2015, we conducted a questionnaire survey of 91 patients who underwent laparoscopic surgery for colorectal cancer to estimate the expectation criteria for discharge and patient subjective discomfort at that time. Patients were divided into the following 2 groups: group A, those who complied with the medical professional's decision to discharge; and group B, those who refused discharge despite the medical professional's decision. The participants' subjective factors were analyzed.

Results: Preoperatively, 78 of 91 patients (85.7%) identified activity level, amount of food (tolerance), and bowel movements as important factors that should be considered in the decision to discharge a patient postoperatively. Postoperatively, 17 patients (18.7%) refused discharge despite a discharge recommendation. Subjective pain and fatigue were significantly different in linear-by-linear association between the group of patients who agreed to be discharge and those who disagreed. Despite this difference, there was no significant difference in mean length of hospital stay between the 2 groups.

Conclusion: A patient's subjective feelings of pain and fatigue can impact their decision regarding hospital discharge.

Keywords: Colonic neoplasm; Pain; Fatigue; Hospital stay; Laparoscopic surgery

INTRODUCTION

Many randomized controlled trials have demonstrated that laparoscopic colorectal surgery produces better short-term outcomes, including less postoperative pain, faster recovery, shorter hospital

stays, and earlier return to social activity, than does conventional open surgery [1-5]. In recent years, in addition to minimally invasive surgery, many efforts have been made to achieve faster recovery and return to society through organized postoperative management programs such as clinical pathway (CP) and enhanced recovery after surgery (ERAS) [6]. CP and ERAS are treatment programs that seek to improve prognosis through treatment standardization that is centered on evidence, while reducing the difference between baseline and actual clinical treatment [7]. Practically, CP or ERAS can decrease the length of hospital stay and overall medical expense through early postoperative oral ingestion, decreased postoperative stress and inflammatory responses, increased recovery rates, and decreased complications [8]. However, if a patient's compliance with this program is low, the expected effect may not be obtained. Many factors influence compliance with this postoperative care program, but surgical factors

Received: August 11, 2018 • Accepted: November 29, 2018

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are the most significant [9-11]. Other factors, including patient education, counseling, and socioeconomic status, which have not been studied extensively, may also affect compliance [12, 13]. In addition to these objective factors, patient subjective symptoms may be related to compliance and decisions regarding discharge.

The purpose of this study was to estimate patients' expectation criteria for discharge after laparoscopic surgery for colorectal cancer. We used a questionnaire to investigate the subjective factors that might affect patient satisfaction and decisions regarding discharge postoperatively.

METHODS

Between March 2014 and February 2015, written informed consent was obtained from all participating patients who underwent laparoscopic colorectal cancer surgery at Incheon St. Mary's Hospital. This study was approved by Institutional Review Board (IRB) of Incheon St. Mary's Hospital (OC14QISI0007).

After consent was obtained, a 3-part questionnaire was completed by these patients. Part 1 of the questionnaire addressed patient demographics of sex, age, educational level, marital status, presence of a cohabitant, religion, occupation, income level, house structure, existence of private insurance, and presence of caregiver after discharge. Part 2 addressed patients' expectation criteria for discharge, as follows: amount of food, number of bowel movements until discharge, degree of pain, degree of activity, and self-efficiency. Part 3 focused on the degree of subjective discomfort at the time of discharge, as follows: amounts of food, nausea, or vomiting; discomfort due to changes in bowel habits; pain; effects on activities of daily living; degree of gait; need for caregiver; and

fatigue. The patients were asked to complete parts 1 and 2 of the questionnaire preoperatively, while part 3 was administered after the decision regarding discharge. Patient satisfaction and discomfort were assessed using a Likert scale of strongly disagree, disagree, neutral, agree, or strongly agree.

Before surgery, medical professionals explained the overall treatment plan and timetable to patients. A diagram of the treatment plan and timetable was attached to the patient's bed to help the patient and their caregivers understand the recovery process after surgery (Fig. 1).

Mechanical bowel preparation was performed using Colyte (Colyte-F powder, Tae Joon Pharm., Seoul, Korea) 2 days before surgery. Water and carbohydrate drinks (No-NPO, Newcare, Daesang Wellife, Seoul, Korea) were allowed until two hours before surgery.

A nasogastric tube was not inserted. A urinary catheter was inserted soon after general anesthesia was induced and was removed one day after surgery. Patients were allowed to drink water and eat a soft diet starting on the first postoperative day after colon surgery and on the third postoperative day after rectal surgery. The drain was removed 3–5 days after surgery depending on medical situation. The Department of Nutrition provided patients with dietary education during hospitalization. If there were no (suspected) surgical complications and the physical examination and laboratory tests were stable postoperatively, discharge was recommended.

The patients were divided into the following 2 groups: (1) group A, those who complied with the medical professional's decision to discharge; and (2) group B, those who refused discharge despite the medical professional's decision. The factors affecting patient

Name : _____ Standard course guide for colorectal cancer surgery patient										
	2 day before surgery	1 day before surgery	OP day	POD 1	POD 2	POD 3	POD 4	POD 5	POD 6	
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	
Diet	water, NO-NPO (carbohydrate drink)		NPO	NPO	NO-NPO	Low residue diet			Please keep low residue diet for 2 weeks	
Bowel preparation	Take Colyte solution		Chew gum (3 times per day)							Dietary Education : Monday
Pain control	Get surgery informed consent/Patient controlled analgesia agreement		 Patient controlled analgesia adverse effect : nausea, vomiting, dizziness (Additional painkillers for severe pain)		 Narcotics fluid or PO painkiller (Additional painkillers for severe pain)				PO painkiller	
Activity	 Exercise when taking Colyte		Bed rest Semi-Fowler's position		 Start with a light workout (sit->walk) Breathing exercises (coughing, deep breathing)				 Apply intermittent pneumatic compression	
Foley Catheter			Keep catheter		Self-urination after catheter removal					
Drainage catheter			Keep catheter		 Keep catheter : check color, amount			catheter removal		
* The above schedule or contents may change depending on the situation										

Fig. 1. Treatment plan and timetable. OP, operation; POD, postoperative day; NPO, none per-oral; PO, per-oral.

discharge were analyzed.

Statistical analysis was performed using independent t-test, chi-square test, and linear by linear association. Statistical significance was considered at a P-value <0.05.

RESULTS

A total of 91 patients completed the questionnaire during the study period. Their mean age was 60.1 years. The male to female ratio was 1.27:1. Fifty-three cases (58.2%) were colon cancer, while 38 (41.7%) were rectal cancer. The mean length of postoperative hospital stay was 6.8 days. Twenty-five patients (27.5%)

Table 1. Baseline patient characteristics

Variable	No. (%)
Sex	
Male	51 (56)
Female	40 (44)
Age (yr)	
<60	36 (39.5)
≥60	55 (60.5)
Education level	
High school graduate or less	74 (81.3)
College or higher	17 (18.7)
Spouse	
Yes	66 (72.5)
No	25 (27.5)
Cohabitant	
Yes	75 (82.4)
No	16 (17.6)
Religion	
Yes	49 (53.8)
No	42 (46.2)
Job	
Yes	49 (53.8)
No	42 (46.2)
Income level/mo	
<3 million KRW	69 (75.8)
≥3 million KRW	22 (24.2)
Private insurance	
Yes	44 (48.4)
No	47 (51.6)
Caregiver	
Yes	70 (76.9)
No	21 (23.1)

KRW, Korean won.

did not have a spouse, and 16 patients (17.6%) lived alone. Twenty-one patients (23.1%) did not have a caregiver after discharge. Although the government medical insurance covers the entire Korean population, 44 patients (48.4%) also had private medical insurance (Table 1).

In part 2 of the preoperative questionnaire, 16 patients (17.6%) answered that expected to be discharged when they could eat more than 2/3 of a meal. In contrast, 35 patients (38.5%) replied that the amount of food would not affect the discharge decision. With regard to bowel activity, 54 patients (59.4%) preferred to have one or more postoperative bowel movements before discharge, while 19 patients (20.9%) did not consider this an important factor for discharge. In terms of pain, 52 patients (57.1%) wanted visual analogue scale (VAS) score <2, while 22 (24.2%) wanted VAS score <4 prior to discharge. Finally, 9 patients (9.9%) answered that degree of pain would not affect their discharge decision. Twenty-seven patients (30%) answered that they expected to be discharged when they assumed full activity, while 46 patients (50.5%) considered partial activity sufficient for discharge (Table 2). Overall, preoperatively, patients considered activity, amount of food intake, and bowel movements to be the most important factors influencing discharge decisions. In contrast, they considered pain, ability to pay, and presence of caregivers to be relatively less important (Fig. 2).

The mean hospital stay after surgery was 6.8 days. When dis-

Table 2. Patient preferences at discharge

Patient preferences	No. (%)
Amount of food intake	
Does not matter	35 (38.5)
One-half of typical food intake	21 (23.1)
Two-thirds of typical food intake	13 (14.3)
Full tolerance of typical food intake	3 (3.3)
Postoperative bowel movements	
>3	13 (14.3)
1–2	41 (45.1)
Flatulence	18 (19.8)
Does not matter	19 (20.9)
Degree of pain (point)	
<VAS 2	52 (57.1)
<VAS 4	22 (24.2)
<VAS 6	8 (8.8)
Does not matter	9 (9.9)
Activity level	
Fully active	27 (29.7)
Partially active	46 (50.5)
Does not matter	18 (19.8)

VAS, visual analogue scale.

charge was recommended by medical professionals, 17 patients (18.7%) refused for the following reasons: subjective abdominal

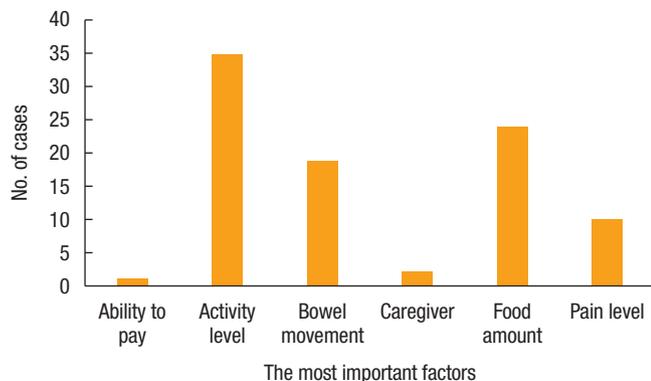


Fig. 2. Important patient factors for discharge.

Table 3. Baseline characteristics by group

Variable	Group A (n = 74)	Group B (n = 17)	P-value
Education level			
<High school	59 (79.7)	15 (88.2)	0.417
≥College	15 (20.3)	2 (11.8)	
Spouse			
Yes	54 (73)	12 (70.6)	0.843
No	20 (27)	5 (29.4)	
Cohabitant			
Yes	61 (82.4)	14 (82.4)	1.000
No	13 (17.6)	3 (17.6)	
Religion			
Yes	41 (55.4)	8 (47.1)	0.534
No	33 (44.6)	9 (52.9)	
Job			
Yes	40 (54.1)	9 (52.9)	0.934
No	34 (45.9)	8 (47.1)	
Income/mo			
<3 million KRW	59 (79.7)	10 (58.8)	0.069
≥3 million KRW	15 (20.3)	7 (41.2)	
Private insurance			
Yes	33 (44.6)	11 (64.7)	0.135
No	41 (55.4)	6 (35.3)	
Caregiver			
Yes	56 (75.7)	14 (82.4)	0.753
No	18 (24.3)	3 (17.6)	

Values are presented as number (%).

Group A, patients who complied with the medical professional's decision to discharge; group B, patients who refused discharge despite the medical professional's decision; KRW, Korean won.

pain or discomfort (9 cases); absence of a caregiver at home (3 cases); a long distance between the hospital and home (4 cases); and voiding discomfort (1 case). We divided patients into 2 groups, which were comparable with regard to baseline characteristics (Table 3). Postoperative complications occurred in 16 patients (17.4%), including 12 cases in group A and 4 cases in group B. There was no significant difference in complication rate be-

Table 4. Characteristics of the groups by decision regarding discharge

Variable	Group A (n = 74)	Group B (n = 17)	P-value
Age (yr)	60.8 ± 11.7	57.6 ± 9.1	0.365
Sex			
Male	45 (60.8)	6 (35.3)	0.056
Female	29 (39.2)	11 (64.7)	
ASA PS classification			
I	33 (44.6)	8 (47.1)	0.962
II	39 (52.7)	8 (47.1)	
III	2 (2.7)	1 (5.9)	
Tumor location			
Colon	41 (55.4)	12 (70.6)	0.252
Rectum	33 (44.6)	5 (29.4)	
Tumor size (cm)	4.3 ± 2.2	3.3 ± 1.6	0.134
No. of harvested lymph nodes	21.9 ± 13.2	23.2 ± 12.2	0.631
Distal resection margin (cm)	7.1 ± 4.4	9.4 ± 8.6	0.103
Proximal resection margin (cm)	16.7 ± 10.6	17.7 ± 12.6	0.440
TNM stage			
1	12 (16.2)	4 (23.5)	0.748
2	26 (35.1)	6 (35.3)	
3	28 (37.8)	4 (23.5)	
4	8 (10.8)	3 (17.6)	
Operative time (min)	135.6 ± 49.7	135.3 ± 43.4	0.454
Intraoperative blood loss (mL)	60.4 ± 58.8	92.1 ± 110.7	0.003
Diet initiation (postoperative day)	2.6 ± 0.6	2.4 ± 0.5	0.394
Postoperative complications			
Yes	12 (16.2)	4 (23.5)	0.489
No	62 (83.8)	13 (76.5)	
Clavien-Dindo classification grade			
I	3 (25)	2 (50)	
II	5 (41.7)	2 (50)	
III	4 (33.3)	0 (0)	
Hospital stay (day)	6.68 (6–23)	7.35 (6–18)	0.316
Readmission	5 (6.8)	2 (11.8)	0.611

Values are presented as mean ± standard deviation, number (%), or mean (range).

Group A, patients who complied with the medical professional's decision to discharge; group B, patients who refused discharge despite the medical professional's decision; ASA PS, American Society of Anesthesiologists physical status.

Table 5. Subjective discomfort by group

Question	Group A (n = 74)	Group B (n = 17)	P-value
I am satisfied with my current diet after surgery.			0.486
1	0 (0)	0 (0)	
2	6 (8.1)	0 (0)	
3	10 (13.5)	3 (17.6)	
4	45 (60.8)	10 (58.6)	
5	13 (17.6)	4 (23.5)	
I currently have nausea or vomiting.			0.115
1	31 (41.9)	10 (58.8)	
2	35 (47.3)	7 (41.2)	
3	7 (9.5)	0 (0)	
4	1 (1.4)	0 (0)	
5	0 (0)	0 (0)	
I am uncomfortable with changes in bowel habits after surgery.			0.614
1	8 (10.8)	3 (17.6)	
2	30 (40.5)	6 (35.3)	
3	15 (20.3)	4 (23.5)	
4	19 (25.7)	4 (23.5)	
5	2 (2.7)	0 (0)	
I am able to tolerate pain after surgery.			0.040
1	1 (1.4)	1 (5.9)	
2	5 (6.8)	1 (5.9)	
3	11 (14.9)	6 (35.3)	
4	44 (59.5)	9 (52.9)	
5	13 (17.6)	0 (0)	

(Continued to the next)

tween the 2 groups. Group A had 1 case of bleeding, 4 cases of ileus, 3 cases of urinary retention, 3 cases of anastomotic leakage, and 1 case of bowel evisceration. The case of bleeding was controlled with endoscopy. The 2 cases of anastomotic leakage and 1 case of bowel evisceration required a second surgery. The other complications were treated conservatively. Group B had 1 case of bleeding, 2 cases of urinary retention, and 1 case of ileus, all of which were treated conservatively. According to the Clavien-Dindo classification, group A had 3 cases of grade I, 5 cases of grade II, and 4 cases of grade III, while group B had 2 cases of grade I and 2 cases of grade II. There were no significant differences between the 2 groups with regard to patient age, sex, cancer location, tumor size, pathologic outcomes, or postoperative diet. Intraoperative blood loss was significantly larger in group B than in group A (60.4 mL vs. 92.1 mL, $P = 0.003$) There was no signifi-

Table 5. Continued

Question	Group A (n = 74)	Group B (n = 17)	P-value
I find it difficult to walk for long distances.			0.005
1	10 (13.5)	2 (11.8)	
2	40 (54.1)	3 (17.6)	
3	13 (17.6)	6 (35.3)	
4	11 (14.9)	5 (29.4)	
5	0 (0)	1 (5.9)	
I need help from someone at home.			0.056
1	10 (13.5)	2 (11.8)	
2	45 (60.8)	6 (35.3)	
3	6 (8.1)	3 (17.6)	
4	13 (17.6)	5 (29.4)	
5	0 (0)	1 (5.9)	
I am easily fatigued.			0.031
1	6 (8.1)	1 (5.9)	
2	26 (35.1)	2 (11.8)	
3	23 (31.1)	4 (23.5)	
4	17 (23)	10 (58.8)	
5	2 (2.7)	0 (0)	

Values are presented as number (%).

Point: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree.

Group A, patients who complied with the medical professional's decision to discharge; group B, patients who refused discharge despite the medical professional's decision.

cant difference in length of hospital stay between the 2 groups (6.68 days vs. 7.35 days, $P = 0.316$). There were also no significant differences in readmission rates between the 2 groups (6.8% vs. 11.8%, $P = 0.611$). The reasons for readmission in group A were 2 cases of poor oral intake, 2 cases of ileus, and 1 case of anastomotic leakage. The reasons for readmission in group B were 1 case of diarrhea and 1 case of anal pain (Table 4).

Postoperatively (based on questionnaire part 3), there were no significant differences between the groups with regard to patient diet satisfaction, subjective gastrointestinal symptoms, or subjective activities of daily living. However, when a linear-versus-linear association was compared, there were significant differences between the group with regard to subjective pain ($P = 0.040$), ability to walk for a prolonged period ($P = 0.005$), and presence of fatigue ($P = 0.031$) (Table 5).

DISCUSSION

The combination of minimally invasive surgery and well-organized postoperative management program is important to reduce hospital stay [3, 4, 14]. Many medical institutions have applied

ERAS or CP in practice to enhance patient recovery and shorten hospital stay after laparoscopic surgery [14, 15]. Good compliance, which may be influenced by subjective patient factors, is essential to obtain excellent clinical outcomes with ERAS or CP. However, there is a little research to substantiate this hypothesis. Therefore, studies that address the effect of subjective patient factors on compliance (with ERAS or CP) are needed to improve patient satisfaction and postoperative management.

In this study, we used the Likert scale in a questionnaire to estimate subjective needs, expectations, and patient satisfaction. The Likert scale has been used in many previous studies and produces comparable results to those of the VAS scale and patient status measurements [16].

We also investigated patient preoperative needs. Although preoperative counseling is thought to reduce hospital length of stay [17], this had never been demonstrated with regard to patient indication for discharge. Therefore, we estimated patients' expectation criteria for discharge, including the amount of food intake, number of bowel movements, pain level, and activity level. We evaluated for a relationship between socioeconomic status and discharge decision. Previous studies suggested that higher income is associated with shorter hospital length of stay and higher patient satisfaction [18, 19]. In contrast, we found that those with higher income tended to have a higher rejection rate, although the difference was not statistically significant. Other socioeconomic status factors were not significantly different between the groups. We found that patients considered amount of food, bowel movements and their degree of activity to be important factors for discharge. In contrast, the presence of a caregiver, their ability to pay, and pain level were not significant factors for discharge.

Seventeen patients (18.7%) in this study refused the medical profession's discharge recommendation. Patients who refused this recommendation had significant differences in subjective pain and fatigue compared to those who accepted the medical profession's discharge recommendation. Practically, there were no objective complications or abnormalities in laboratory findings of patients in group B. Therefore, both objective medical findings and subjective patient symptoms are essential with regard to timing of discharge after surgery. Many studies have not only investigated the relationship between pain control and number of hospital days after surgery, but also have described several methods to reduce postoperative pain [20, 21]. However, the majority of these prior studies only estimated objective values with regard to pain, including amount of analgesics used, VAS score, and inflammatory response [22]. In contrast, medical professionals typically consider both objective and subjective patient findings before making a decision to discharge.

In this study, despite no objective medical abnormalities (including VAS, laboratory findings, and complications), some patients were still uncomfortable or experienced fatigue and therefore declined to be discharged. Postoperative fatigue is considered an important complication after surgery. The risk of postoperative fa-

tigue is higher in patients who are elderly, have low nutritional status, or who have undergone gastrectomy. Laparoscopic surgery may reduce the incidence of postoperative fatigue [23]. Factors that may cause fatigue after surgery should be well estimated and managed. Fatigue is a subjective factor that may be overlooked. Therefore, care should be taken.

There were 17 people in the study who refused to be discharged despite the absence of any postoperative complications. However, discharge was recommended based on objective medical values, without considering subjective patient symptoms. However, this strategy did not meet the patients' expectation criteria for discharge.

In general, factors that influence length of hospital stay after surgery include surgical factors such as surgical complications and objective factors such as age, American Society of Anesthesiologists physical status classification grade, and patient frailty [9, 10, 24, 25]. We found that intraoperative blood loss was lower in group A than it was in group B, but no patient required blood transfusion. We also demonstrated that subjective factors, such as patient pain and fatigue at time of discharge were important. Hospital length of stay was slightly longer in group B than in group A, although the difference was not statistically significant. There was significant difference in intraoperative blood loss between the groups. However, there was no serious bleeding that required blood transfusion, which seemed to prevent an influence on length of hospital stay. This finding may be explained by our typical education of the patient about his/her objective findings so that he/she understands the rationale for discharge. We also delayed discharge if complications occurred or if there was an objective abnormality. There was no significant difference in hospital length of stay between the 2 groups.

This study has several limitations. First, it was a single-center experience with a small sample size. Therefore, the study was unable to accurately measure a patient's subjective symptoms. Therefore, a larger, multicenter study is needed to substantiate our findings.

In conclusion, preoperatively, patients considered presence of a bowel movement, amount of food tolerated, and activity level as the most important factors to determine discharge. Patients who refused discharge were more likely to have subjective pain and fatigue than were those who accepted plans for discharge. Therefore, decisions regarding discharge must not only consider the objective medical factors, but also subjective patient factors.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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