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ARAŞTIRMA / RESEARCH

Effect of a mobilization program administered after open cholecystectomy on sleep duration and several other clinical variables

Açık kolesistektomi sonrası hastalara uygulanan bir mobilizasyon programının uyku süresi ve diğer klinik değişkenlere etkisi

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Abstract

Purpose: The purpose of this study was to determine the effect on sleep duration, pain level, first flatus and defecation time, and discharge of a mobilization program administered under nurse supervision and monitoring following open cholecystectomy.

Materials and Methods: This experimental study was performed in February-August 2019 in the general surgery clinic of a public hospital. Considering the possibility of data loss, 68 patients meeting the research criteria were included. Two patients from the experimental group and two from the control group subsequently dropped out, and the study was finally completed with 64 patients. Data were collected using a patient description form, a Visual Analogue Scale, and a walking chart on which pedometer output was recorded.

Results: Length of hospitalization was shorter, first flatus and defecation time occurred earlier, and walking distances were longer in the experimental group compared to the control group. No difference was determined between the groups in terms of amount of drainage, or times to spontaneous urination. It was determined that the pain levels in the control were lower than those in the experimental group on postoperative day 1, and sleep durations on postoperative days 2 and 3 were significantly longer.

Conclusion: Earlier first flatus, defecation time, and discharge, and significantly longer walking distances, were determined in the experimental group compared to the control group. However, the mobilization program had no effect on sleep duration or pain levels.

Keywords: Cholecystectomy, postop mobilization, nursing care

Öz

Amaç: Bu çalışma açık kolesistektomi sonrası hastalara hemşire gözetimi ve denetiminde uygulanan mobilizasyon programının uyku süresi, ağrı düzeyi, ilk flatus, gayta çıkışı ve taburculuk üzerine etkisinin belirlenmesi amacıyla yapıldı.

Gereç Yöntem: Deneysel tipteki çalışma bir devlet hastanesinin genel cerrahi kliniğinde Şubat-Ağustos 2019 tarihleri arasında yapıldı. Veri kaybı olasılığı göz önüne alındığında, araştırma kriterlerini karşılayan 68 hasta çalışmaya dahil edildi. Çalışma süresince iki hasta deney grubundan iki hasta kontrol grubundan çıkarıldı ve çalışma 64 hastayla tamamlandı. Veriler hasta tanıtım formu, postoperatif izlem çizelgesi, Görsel kıyaslama ölçeği, pedometre çıktılarının kaydedildiği yürüme çizelgesi ile toplandı.

Bulgular: Deney grubu hastaların, kontrol grubuna göre hastanede yatış sürelerinin kısa, gaz ve gaita çıkış saatlerinin daha erken, yürüme mesafelerinin ise uzun olduğu, dren geleni ve spontan idrara çıkış zamanları açısından iki grup arasında fark olmadığı saptandı. Kontrol grubunun postop 1. gün ağrı düzeylerinin anlamlı düzeyde daha düşük, postop 2 ve 3. günde ise fark olmadığı, uyku süreleri ise, postop 1. ve 2. günde kontrol grubunun deney grubundan daha yüksek olduğu belirlendi.

Sonuç: Deney grubu hastaların ilk gaz ve gayta çıkışlarının, taburculukların kontrol gruba göre erken olduğu, yürüme mesafelerinin anlamlı şekilde uzun olduğu saptandı. Buna rağmen mobilizasyon programının uyku süreleri ve ağrı düzeylerine etkisi olmadığı belirlendi.

Anahtar kelimeler: Kolesistektomi, postop mobilizasyon, hemşirelik bakımı

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INTRODUCTION

The current approach to treatment and care in surgery, and evidence-based procedures, are known to be capable of accelerating healing and reducing surgery-related mortality. One evidence-based application emerging in that context is the Enhanced Recovery After Surgery (ERAS) pathway developed by the ERAS Society, also known as the Fast Track Surgery (FTS) protocol[1]. The ERAS protocol may be defined as facilitating discharge in the shortest time possible by preventing surgery-related trauma, psychological problems and organ function disorders emerging during the surgical process, standardizing the process, and providing optimal treatment and care[2]. The basic aim of the protocol is to reduce patients' surgical stress reactions, postoperative morbidity and mortality, and length of hospital stay, and to positively impact on patients' surgery-related perceptions. Approximately 20 care components affecting duration of care and postoperative complications have been shown in the ERAS protocol[3-6]. One of these 20 care components is early mobilization. This is defined as encouraging the patient to stand as soon as possible after surgery, and out-of-bed activities. Early mobilization is important in terms of preventing respiratory system complications such as pneumonia and atelectasis, vascular complications such as thrombophlebitis, gastrointestinal complications such as distension, and urinary system complications such as urine retention[7,8]. Various different early mobilization protocols have been used in studies employing the ERAS pathway. However, some are very short (mobilization in the 15th min postoperatively), while others are deficient or not specific to postoperative status (6 h a day 2 h after bed on postoperative 0)[9-11].

Postoperative mobilization is an independent, non-invasive intervention requiring knowledge and skill on the part of nurses[7]. The timing of postoperative mobilization, depending on the type and the distance to be walked depending on the number of days since the operation, can both be standardized. The purpose of this study was therefore to determine the effect on sleep duration, pain levels, and time to first flatus, defecation time, and discharge of a mobilization program applied to patients undergoing cholecystectomy surgery. Research hypothesis for the study was as follows;

H1: Patients scheduled for the mobilization program will have longer sleep durations than those not enrolled in the program.
H2: Patients scheduled for the mobilization program will have lower pain levels than those not enrolled in the program.
H3: First flatus will be earlier in patients scheduled for the mobilization program than those not enrolled in the program.
H4: Defecation times will be earlier in patients scheduled for the mobilization program than those not enrolled in the program.
H5: Time to mobilization will be shorter in patients scheduled for the mobilization program than those not enrolled in the program.

MATERIALS AND METHODS

This experimental-type research was carried out in February-August 2019 in a public hospital, Turkey. The general surgery clinic where the study was performed has a 24-bed capacity, with eight nurses and four surgeons. Tuesday and thursday are the day of surgery. Open cholecystectomy patients are started on oral nutrition 6 h after surgery, and are discharged on postoperative day 2 or 3, depending on their general condition.

The population of the study consisted of 102 patients who underwent open cholecystectomy during the data collection process. Power analysis was applied to determine the minimum sample size within the population. This was calculated as 62 patients, 31 experimental and 31 control. Considering the possibility of data loss, 68 patients (34 experimental, 34 control) were included. Two patients from the experimental group and two from the control group subsequently dropped out, and the study was finally completed with 64 patients. In order to avoid any bias, the first 34 reached were enrolled as the experimental group and the second 34 as the control group.

Inclusion criteria were to be aged 18 and over, willingness to participate, absence of cardiopulmonary problems, absence of communication problems, absence of psychiatric problems, and absence of movement dysfunction/restriction in the postoperative period and giving written informed consent to participate in the study. Exclusion criteria from the study; were to have articular or connective tissue disease affecting normal activities, with cognitive or psychological problems restricting collaboration, with blood loss exceeding 500 ml in the first 24 h after surgery and

with severe cardiopulmonary dysfunction.

Ethical approval for the study was granted by the Kırklareli University ethical committee (Decision Date: 03.01.2019; Issue: 2018-SBEK-09) and institutional permission was obtained from the hospital where the research was conducted. Enrolment in the research was based on the principle of voluntary participation. Before data collection began, patients were informed about the type and aim of the research, the application procedure, and their rights within the scope of that procedure, and were asked to sign voluntary consent forms. During the study, the Helsinki Declaration 2008 principles were followed.

Table 1. Comparison of patients' descriptive characteristics (n=64)

Descriptive characteristics		**Experimental group (n=32) n (%)**	**Control group (n=32) n (%)**	**χ^2**	**p**
Sex	Female	19 (59.4)	15 (46.9)	1.004	0.316
	Male	13 (40.6)	17 (53.1)		
Age group (years)	≤ 40 years	7 (21.9)	6 (18.8)	1.172	0.557
	41-65 years	22 (68.8)	20 (62.5)		
	Over 65 years	3 (9.4)	6 (18.8)		
BMI (kg/m^2)	Underweight	1 (3.1)	0	2.737	0.434
	Normal	21 (65.6)	17 (53.1)		
	Overweight	7 (21.9)	12 (37.5)		
	Obese	3 (9.4)	3 (9.4)		
Marital status	Married	29 (90.6)	31 (96.9)	1.067	0.306
	Single	3 (9.4)	1 (3.1)		
Education level	Literate	2 (6.3)	6 (18.8)	2.667	0.446
	Primary school	5 (15.6)	10 (31.3)		
	Middle school	4(12.5)	6 (18.8)		
	High school	15 (46.9)	5 (15.6)		
	University	6(18.8)	5 (15.6)		
ASA classification	1	24 (75.0)	21 (65.6)	0.729	0.694
	2	7 (21.9)	10 (31.3)		
	3	1 (3.1)	1 (3.1)		
Smoking status	Smoker	18 (56.3)	19 (59.4)	0.104	0.949
	Ex-smoker	7 (21.9)	7 (21.9)		
	Never smoked	7 (21.9)	6 (18.8)		
Previous history of surgery	Yes	6 (18.8)	8 (25)	0.366	0.763
	None	26 (81.3)	24(75)		
Vomiting	Yes	3 (9.4)	2 (6.3)	0.217	1
	No	29 (90.6)	30 (93.8)		
Abdominal distension	Yes	6 (18.8)	7 (21.9)	0.097	1
	No	26 (81.3)	25 (78.1)		

BMI (Body mass index), ASA (American Society of Anesthesiologists) P = P values; χ^2 = Pearson Chi-square test

Table 2. Preoperative night-time sleep, and urination and defecation frequencies

	Experimental	Control	Test	Significance
			t	P
Duration of night-time sleep	5.03	5.28	-774	0.442
Frequency of urination	6.71	6.75	-090	0.929
Frequency of defecation	2.84	2.5	1.707	0.093

P = P values; t = Independent groups t test

Study groups

Experimental Group

Patients enrolled in the experimental group, and their relatives, were informed in person, the day prior to surgery, over approximately 30-45 min, about the importance of postoperative mobilization, daily walking times, and pedometer use. Patients left their beds at the 7th hour postoperatively on average, and were mobilized in their rooms. A walking program was applied under the supervision of a researcher

nurse, from the first postoperative day onward. In this program, the distance to be walked was a total 250-500 meters on postoperative day 1, 500-1500 meters on day 2, and 1500-3500 meters on day 3[12,13]. A distance between the given daily values was specified, together with the patient, taking individual and functional differences into account. The specified distance was divided into five periods over the day in question, and patients were asked to walk with a pedometer.

Pedometer outputs were recorded onto walking charts by a nurse every day at 22:00 hours. Level of consciousness, vital findings, and the amount of fluid emerging from the drain were checked 5 min before mobilization. If no problems were encountered, patients were caused to stand erect for 1-3 min. Depending on their ability to stand, and also considering dizziness, respiratory difficulty, and other symptoms, patients were asked to start walking once they felt well enough.

Control group

Patients enrolled in the control group, and their relatives, were informed in person, the day prior to surgery, over approximately 30-45 min, about the importance of postoperative mobilization, and pedometer use. Patients left their beds at the 7th hour postoperatively on average, and were mobilized in their rooms. They were informed of the need to carry a pedometer on postoperative days 1, 2, and 3. This reminder was issued every day, and pedometer outputs were recorded onto walking charts by a nurse at 22:00 hours. Level of consciousness, vital findings, and the amount of fluid emerging from the drain were checked 5 min before mobilization. If no problems were encountered, patients were made to stand erect for 1-3 min. Depending on their ability to stand, and also considering dizziness, respiratory difficulty, and other symptoms, patients were asked to start walking once they felt well enough. However, in contrast to the experimental group, no walking distances or periods were determined by the researcher nurse.

Table 3. Differences between postoperative pain levels, drain output, times to first urine, flatus and defecation time, lengths of hospitalization, and times to discharge

	Experimental	Control	t	p
Pain postoperative 0	6.5313±1.58591	6.2813 ±1.83574	.583	0.431
Postoperative 1	5.5313±1.58	5.3125±1.17604	.547	0.019
Postoperative 2	2.8438±1.08	3.0313±1.14960	-.672	0.504
Postoperative 3	2.4375±071	2.5000±.80322	-.329	0.744
Night-time sleep			z	p
Postoperative 0	4.0625±1.162	3.875±1.362	-649	0.516
Postoperative 1	4.906±1.328	5.625±1.070	-1.966	0.049
Postoperative 2	5.750±0.803	6.531±0. 803	-4.110	0.000
Postoperative 3	6.094±.734	6.219±0. 879	-.720	0.471
Total length of hospital stay	5.469±.507	5.875±.336	-3.434	0.001
Length of stay after surgery	2.375± .491	2.781±.420	-3.265	0.001
Drain output	249.375±93.392	303.125 ±91.526	-.308	0.758
Time to first urine	80.781±18.756	82.812± 20.671	-.338	0.736
Time to first flatus	22.937±8.084	27.781±5.779	-2.757	0.008
Time to first defecation	25.937±11.033	39.906±10.196	-4.356	0.000

P = P values; t = Independent groups t test; Z= Mann Whitney U test *p < 0.05; †p < 0.01

Table 4. Walking distances in the experimental and control groups

Walking Distances	Experimental	Control	Z	p
Postoperative 0	21.312±8.61	17.875±5.67	-1.602	0.109
Postoperative 1	327.6250±72.57	164.5313±48.74	-6.849	0.000
Postoperative 2	1377.28±256.91	465.8125±193.52	-6.876	0.000
Postoperative 3	3391.59±330.40	629.3438±236.45	-6.875	0.000

P = P values; Z= Mann Whitney U test, †p < 0.01

Data collection tools

Patient description form

This form recorded sociodemographic variables such as patients' age, sex, education level, BMI (Body mass index) and American Society of Anesthesiologists (ASA) classification, and pre-operative sleep duration and urine and defecation production.

Postoperative monitoring chart

This form, produced by the researchers based on the previous literature, evaluated postoperative nausea-vomiting, abdominal distension, time to first flatus, oral intake time, time of spontaneous urination, night-time sleep, and pain. The form also contained total and postoperative hospital stays [14,15].

Visual Analogue Scale (VAS)

Preoperative pain was measured using the VAS. Patients indicated the point on a 10-cm line that most closely corresponded to their own pain, with one end indicating no pain and the other end indicating the worst possible pain. Measurement of severity of pain using the VAS is reported to be more sensitive and reliable than other one-dimensional scales[16,17].

Pedometer

Experimental group patients used a pedometer provided by the researchers in order to measure daily walking distances. Pedometers are small and easy to operate, and are capable of measuring the number of steps taken, distance walked, and time taken. They are generally attached to the waist, and contain a lever attached to a horizontal spring that bounces with the vertical acceleration of the hips during walking. Pedometers designed to determine vertical motion logically also determine the number of steps taken. The device output can be easily established as the number of motions representing one pace[18].

Walking chart

This is the chart on which the walking distance, measured in meters and read on the pedometer, was recorded at the end of each day (22:00 hours). The chart was drawn up and pedometer outputs were recorded onto the chart by the researchers.

Statistical analysis

All analyses were performed using the IBM SPSS Statistics Version 22.0 statistical software package. In addition to descriptive statistical methods, Chi-Square test statistic was used to compare categorical data between the two groups. Independent samples t test was used with normal distributed continous data and MannWhitney U test was used with not normal distributed continous data

RESULTS

Sixty-four patients were enrolled in this study of the effects on sleep duration, pain levels, time to first flatus and first defecation, and discharge of a mobilization program applied following open cholecystectomy, 32 in the experimental group and 32 in the control group. Women constituted 59.4% of the experimental group and 46.9% of the control group. More than half the patients were in the 41-65 age range and were normal weight, and the majority were educated to high school level. Analysis revealed that 90.6% of the experimental group and 96.9% of the control group were married, more than half the sample smoked, and 75% were ASA class 1. A large proportion of our patients reported undergoing surgery for the first time. Vomiting occurred in 9.4% and 6.3% of the experimental and control groups, respectively, following surgery, and abdominal distension in 18.8% and 21.9%. No significant differences were determined between the two groups in terms of these variables (Table 1). No significant differences were determined between the two groups in terms of sleep duration or frequency of urination and defecation (Table 2).

Postoperative day 1 pain levels were significantly lower in the control group, but no difference was observed between the groups on days 2 and 3. However, duration of sleep was significantly higher in the control group on postoperative days 1 and 2 compared to the experimental group. Total lengths of hospital stay were 5.469±0.507 days in the experimental group and 5.875±0.336 days in the control group. Lengths of stay after surgery were 2.375±0.491 in the experimental group and 2.781±0.420 days in the control group. Both total length of hospital stay and postoperative lengths of stay were significantly shorter in the experimental group than in the control group. In the experimental group, mean time to first flatus 22.937±8.084 h, and time to first defecation was 25.937±11.033 h, compared to 27.781±5.779 h and 39.906±10.196 h, respectively, in the control group, and the differences were statistically significant. No difference was observed between the experimental and control groups in terms of drain outputs and times to

spontaneous urination following Foley catheter removal (Table 3).

Mean postoperative walking distances in the experimental group were 21.312±8.61 meters on postoperative day 0, 327.6250±72.57 meters on postoperative day 1, 1377.28±256.91 on postoperative day 2, and 3391.59±330.40 on postoperative day 3. The comparable distances in the control group were 17.875±5.67, 164.5313±48.74, 465.8125±193.52, and 629.3438±236.45 meters, respectively. Differences were determined between the two groups on postoperative days 1, 2, and 3, with the experimental group patients walking significantly greater distances on these days (Table 4).

DISCUSSION

Although early postoperative mobilization is one of the most important components of the ERAS protocol, the traditional belief was that abdominal surgery leads to greater trauma, and that patients require bed rest after surgery[14]. However, this belief has been altered by new evidence showing that early postoperative mobilization and exercise[19] has a positive effect on healing[15]. No difference was determined in the present study, performed to determine the effect of a mobilization program applied following open cholecystectomy, between the experimental and control group patients in terms of variables capable of affecting mobilization, such as age, sex, education level, ASA classification, and BMI. This is an important point in terms of the reliability of this study. Early ambulation and continuing to walk in the subsequent period have been reported to significantly reduce the incidence of gastrointestinal system (GIS) disturbance[15]. In the present study, postoperative first flatus and defecation occurred earlier in the experimental group than in the control group. Similarly, Ni et al. reported that first flatus occurred earlier in an early ambulation group compared to the control group[14], while Kibler et al. reported that early ambulation reduced postoperative ileus by 37%[15]. Similar findings have been reported in various studies focusing on the benefits on the GIS of early activity following GIS surgery[12,19,20]. We think that the greater distances walked by the experimental group in this study resulted in earlier flatus and defecation through acceleration of intestinal motility.

Interestingly, pain levels in the control were lower than those in the experimental group on postoperative day 1, and sleep durations on postoperative days 2 and 3 were significantly longer. In contrast to our findings, Ni et al. reported that early postoperative mobilization can significantly prolong sleep duration, improve quality of sleep, and reduce the patient's pain and anxiety symptoms[14]. Pain, disease-related conditions, and environmental factors such as room conditions (such as the numbers of patients and relatives) can all affect sleep duration. The higher pain levels in the experimental group on postoperative day 1 may have been due to room condition-associated factors.

Mean length of hospital stay among the experimental group patients was 5.4688 days, and mean length of postoperative stay was 2.3750 days, compared to 5.8750 days and 2.7813 days in the control group. Total hospital stays and postoperative stays were both shorter in the experimental group, and these patients were also discharged earlier. In similar studies, Ahn et al. reported a mean hospital stay of 7.82 days in a group performing exercise following colectomy, compared to 9.86 in the control group, length of stay being significantly shorter among the experimental group patients[19]. Liebermann et al. reported mean hospital stays of 1.54 days in an early mobilization group following abdominal surgery and of 1.71 days in the control group[21]. Ni et al. reported that early mobilization accelerated healing and significantly shortened postoperative hospital stay[14], while Wolk et al. reported that early mobilization had no effect on length of hospital stay[22]. Another study reported that early mobilization did not by itself shorten length of hospital stay[23], while similar research performed at the Vanderbilt University Medical Center also observed no significant difference between experimental and control groups in terms of length of hospital stays[15].

Pedometers are devices that provide practical measurement of activity data and that thus yield objective finding parameters in clinical tests[22]. They can also be used as motivational tools. Pedometers have been found to be useful in encouraging early mobilization following laparoscopic cholecystectomy[24]. Mean distances walked by the patients in our experimental group were 21.312 meters on postoperative day 0, 327.6250 meters on day 1, 1377.28 on day 2, and 3391.59 meters on day 3, compared to 17.875, 164.5313, 465,8125, and 629.3438 meters, respectively, in the control group. Analysis revealed no significant difference between the two groups on day 0, but significant improvements in favor of the experimental group on

postoperative days 1, 2, and 3. In their study focusing on the effect of exercise following colectomy. Ahn et al. reported no difference in distances walked between the experimental and control groups in the first five days, although patients in the experimental group increased their distances even though no targets were set[19]. Although both groups were given pedometers in the present study, the fact that distances walked were greater in the experimental group, with specified targets and nurse monitoring, shows that pedometers are not by themselves a motivational tool, and that walking is more effective under nurse observation and supervision.

There are a number of limitations to this study, including the fact that the results reflect only a single center and cannot therefore be generalized, and that only one surgical procedure was investigated. The walking program was also applied only during the discharge process, and further studies involving subsequent period are now needed.

In the light of our findings, first flatus and defecation time, and discharge all occurred earlier in our experimental group patients implementing a postoperative mobilization program, while distances walked were significantly longer. However, the mobilization program applied had no effect on sleep duration or pain levels. We therefore recommend that rather than being applied simply in the form of early mobilization, postoperative mobilization should be based on a protocol involving the period up to discharge, and should be planned depending on the surgical procedure performed.

Yazar Katkıları: Çalışma konsepti/Tasarımı: KA; Veri toplama: AAS; Veri analizi ve yorumlama: KA; Yazı taslağı: KA; İçeriğin eleştirel incelenmesi: KA, AAS; Son onay ve sorumluluk: KA, AAS; Teknik ve malzeme desteği: AAS; Süpervizyon: AAS; Fon sağlama (mevcut ise): yok.
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REFERENCES

1. Abdikarim I, Cao XY, Li SZ, Zhao YQ, Taupyk Y, Wang Q. Enhanced recovery after surgery with laparoscopic radical gastrectomy for stomach carcinomas. World J Gastroenterol. 2015;21:1339-44.
2. Jimenez RS, Alvarez AB, Lopez JT, Jimenez AS, Conde FG, Saez JAC. ERAS (Enhanced Recovery after Surgery) in colorectal surgery. In Colorectal Cancer - Surgery, Diagnostics and Treatment (Ed JS Khan). Rijeka, Croatia, InTech, 2014.
3. Bayar ÖÖ, Bademci R, Sözener U, Tüzüner A, Karayalçın K. Major karaciğer rezeksiyonunda ERAS protokolü. Okmeydanı Tıp Dergisi. 2013;29:135-42.
4. Cerantola Y, Valerio M, Persson B, Jichlinski P, Ljungqvist O, Hubner M et al. Guidelines for perioperative care after radical cystectomy for bladder cancer: Enhanced Recovery After Surgery (ERASR) society recommendations. Clin Nutr. 2013;32:879-87.
5. Yamada T, Hayashi T, Aoyama T, Shirai J, Fujikawa H, Cho H. et al. Feasibility of enhanced recovery after surgery in gastric surgery: a retrospective study. BMC Surg. 2014;14:41.
6. Kabataş MS, Özbayır T. Enhanced recovery after surgery (ERAS) protocols after colorectal surgery: a systematic review. Gümüşhane University Journal of Health Sciences. 2016;5:120-32.
7. Kaneda H, Saito Y, Okamoto M, Maniwa T, Minami K, Imamura H. Early postoperative mobilization with walking at 4 hours after lobectomy in lung cancer patients. Gen Thorac Cardiovasc Surg. 2007;55:493-8.
8. Litwack K. Postoperative patient. in Medical Surgical Nursing (Eds SM Lewis, MM Heitkemper, SR Dirksen):390-412. St Louis, Mosby, 2000.
9. Anderson AD, McNaught CE, MacFie J, Tring I, Barker P, Mitchell CJ. Randomized clinical trial of multimodal optimization and standard perioperative surgical care. Br J Surg. 2003;90:1497–504.
10. Gatt M, Anderson AD, Reddy BS, Hayward-Sampson P, Tring IC, MacFie J. Randomized clinical trial of multimodal optimization of surgical care in patients undergoing major colonic resection. Br J Surg. 2005;92:1354–62.
11. Wind J, Hofland J, Preckel B, Hollmann MW, Bossuyt PM, Gouma DJ et al. Perioperative strategy in colonic surgery; laparoscopy and/or fast track multimodal management versus standard care (LAFA trial). BMC Surg. 2006;6:16.
12. Delaney CP, Zutshi M, Senagore AJ, Remzi FM, Hammel J, Fazio VW. Prospective, randomized, controlled trial between a pathway of controlled rehabilitation with early ambulation and diet and traditional postoperative care after laparotomy and intestinal resection, Dis Colon Rectum. 2003;46:851–9.
13. Lin JH, Whelan RL, Sakellarios NE, Cekic V, Forde KA, Bank J et al. Prospective study of ambulation after open and laparoscopic colorectal resection Surg Innov. 2009;16:16-20.
14. Ni C, Wang Z, Huang Z, Zhou H, Fu L, Cai H et al. Early enforced mobilization after liver resection: A prospective randomized controlled trial. Int J Surg.

2018;54:254–258.
15. Kibler VA, Hayes RM, Johnson DE, Anderson LW, Just SL, Wells NL. Early postoperative ambulation: Back to basics. Am J Nurs. 2012;112:63–69.
16. Cline ME, Herman J, Show F, Marton RD. Standardization of the visual analoque scale, Nurs Res.1992;41:378-9.
17. Collins SL, Moore AR, McQuay HJ. The visual analoque pain intensity scale: what is moderate pain in milimetres? Pain. 1997;72:95-97.
18. Pitta F, Troosters T, Probst VS, Spruit MA, Decramer M, Gosselink R. Quantifying physical activity in daily life with questionnaires and motion sensors in COPD. Eur Respir J. 2006;27:1040-55.
19. Ahn KY, Hur H, Kim DH, Min J, Jeong DH, Chu SH et al. The effects of inpatient exercise therapy on the length of hospital stay in stages I-III colon cancer patients: randomized controlled trial. Int J Colorectal Dis. 2013;28:643-51.
20. Dubljanin-Raspopovic E, Markovic-Denic L, Ivkovic K, Nedeljkovic U, Tomanovic, S, Kadija M et al. The impact of postoperative pain on early ambulation after hip fracture, Acta Chir. 2013;60:61–4.
21. Liebermann M, Awad M, Dejong M, Rivard C, Sinacore J, Brubaker L. Ambulation of hospitalized gynecologic surgical patients: a randomized controlled trial. Obstet Gynecol. 2013;121:533-7.
22. Wolk S, Linke S, Bogner A, Sturm D, Meißner T, Müssle B et al. Use of activity tracking in major visceral surgery—the enhanced perioperative mobilization trial: a randomized controlled trial. J Gastroint Surg. 2019;23:1218–26.
23. Le H, Khankhanian P, Joshi N, Maa J, Crevensten H. Patients recovering from abdominal surgery who walked with volunteers had improved postoperative recovery profiles during their hospitalization. World J Surg. 2014;38:1961-5.
24. Wasowicz-Kemps DK, Slootmaker SM, Kemps HM, Borel- Rinkes IH, Biesma DH., van Ramshorst B. Resumption of daily physical activity after day-case laparoscopic cholecystectomy. Surg Endosc. 2009;23:2034–40.