The effect of postoperative early mobilization on healing process and quality of life following radical cystectomy and ileal conduit: A randomized prospective controlled trial

Abstract

Aim: This study was conducted to evaluate the effect of postoperative early mobilization in patients who underwent radical cystectomy (RC) and ileal conduit in terms of healing process and QOL.

Methods: This multicenter prospective randomized controlled study was conducted with 40 patients who were randomly divided into two groups. The intervention group was mobilized within the first 16 hours postoperatively in accordance with the mobilization procedure which determined according to literature. Data were collected using the case report form, HADS and SF-36 QoL scale.

Results: Postoperative hospitalization, duration of narcotic analgesic administration, first oral food intake, flatus, defecation and NG tube termination time were shorter in the intervention group. In the control group blood glucose and pulse values were higher after mobilization. SF-36 physical function, physical role difficulty and general perception of health were higher in intervention group at the postoperative first and third month (p <0.05).

Conclusion: Our study showed that early mobilization contributed to the healing process positively and improved the quality of life in the patients who underwent radical cystectomy (RC) and ileal conduit surgery.

Keywords: Early Mobilization, Radical Cystectomy, Ileal conduit, Quality of Life, Convalescence

What's already known about this topic?

There are studies evaluating the components of the ERAS protocol in patients with radical cystectomy, but there are no studies examining the safety and efficacy of a specified time frame for early mobilization. The feasibility of early mobilization, an important but neglected ERAS protocol, is discussed in detail in patients undergoing radical cystectomy.

What does this article add?

This study will draw attention to this gap in the literature and will be a guide for new studies. We believe that it will be among the publications cited.

Introduction

Radical cystectomy (RC) is considered to be standard treatment option for invasive and high-risk recurrent non-invasive bladder cancer (1). RC is one of the most traumatic cancer surgeries in terms of psychological stress and lifestyle change (2).

Today, there is a growing interest in Quality of Life (QoL) studies evaluating the symptomatic effects of oncological surgical modalities taking into consideration the patients' subjective statements (1). Negative changes are observed regarding urinary, rectal and sexual functions and in the perception of body image in patients undergoing RC and urinary diversion (3). Minimizing the loss of function as a result of surgical intervention is possible with evidence-based treatments (4)

Most of the Enhanced Recovery After Surgery (ERAS) protocols are physiologically based preoperative, operative and postoperative procedures that can be adapted to a specific problem (5). Early and organized mobilization after surgery is in the context of ERAS interventions (6).

Materials & Methods

Aim

The purpose of this study is to investigate the effects of early mobilization on the postoperative healing process and QoL in the patients who underwent radical cystectomy (RC) and ileal conduit surgery due to bladder cancer.

Desing

Prospective randomised controlled study

Research Model

This study was conducted between March 2015 and April 2017 as a multicenter research within the body of the Urooncology Association at an educational research hospital and two university hospitals serving in the Aegean region of Turkey. The sampling that was determined in accordance with the study conducted by Porserud et al. (2014) which was conducted with two groups consisting of 20 individuals by block randomization (7). The sample size of the study was determined by power analysis in accordance with Porserud et al. (2014). According to the power analysis results, 40 patients included in the study were divided into two groups of 20 patient by block randomization (intervention and control group).The patients who were hospitalized to receive RC and ileal loop treatments were included in the study; the individuals were aged between 50-75, literate, and open to communicate and cooperate, had no sensory loss or comorbidity that could hinder mobilization, without history of radiotherapy and chemotherapy, were in ASA I-II risk groups, and did not have any mental and psychiatric disorders. Those who signed the informed consent form were included in the study. During the study, two patients could not be followed due to communication problems, three patients developed intolerance symptoms during mobilization and twelve patients underwent additional surgical procedures; a total of 17 patients were excluded from the study. Patient recruitment went on until the number of sampling was reached. After exclusion of 17 patients, the study was ended when a total of 40 patients (intervention:20, control group:20) were reached.

Surgical Procedure

Surgical operations were performed by three surgeons, one in each center. A vertical midline incision without extending above the umbilicus was performed. The ileal conduit was preferred as the diversion technique and extended lymph node dissection was also performed. Apart from early mobilization, ERAS protocols as applied in clinical practice were performed in all patients included in the study in all three centers (intervention and control groups):

Preoperative counseling and training, preoperative medical optimization, oral mechanical bowel preparation, preoperative diet, epidural analgesia, antimicrobial prophylaxis and skin preparation, standard anesthesia protocol, preoperative liquid diet 8 hours before surgery, urinary drainage, postoperative multimodal analgesia practices (patient-controlled analgesia was not performed in postoperative pain control). There were no postoperative complications that might necessitate the patients to have additional operation and no surgical mortality was observed.

Mobilization Procedure

The patients were mobilized under the supervision of researchers in accordance with the mobilization procedure in Figure 2; following the assessment of their suitability for mobilization as shown in Figure 1; analgesic treatments were applied before the mobilization as prescribed by clinicians. No previously suggested time period was reported for early mobilization after RC with ileal diversion in the literature. Therefore, the most appropriate time for mobilization was determined as the beginning of the next workday (on the first day after surgery) taking into consideration the factors such as the time and length of operation and the fact that postoperative process coincided with the time of shift change, and the number of health personnel working in the clinic at night shift sufficient for safe mobilization. This period included the first 16 hours after surgery assuming a normal operating procedure, and the period after 17 hours was considered as late mobilization. The patients in the intervention group were mobilized within the 16 hours postoperatively, whereas the mobilization of the control group was carried out after 17 hours postoperatively.

Data Collection Method

One day before surgery; the case report form (CRF) and Hospital Anxiety and Depression Scale (HADS) were completed by the researchers using face-to-face interview method, and

SF-36 QoL scale was filled by patients. Vital signs and peripheral blood glucose levels of the patients before and after mobilization were recorded. HADS and SF-36 scales were applied after mobilization at the first and third months after surgery.

Data Collection Tools

CRF: This form consists of 14 questions related to sociodemographic and clinical features of patients, information about the operation process and postoperative healing process, and data on vital signs of the patient before and after mobilization.

HADS: The validity and reliability of the Turkish version of the HADS scale which is developed in 1983 and tested by Aydemir et al. (1997) The scale is used to measure the level and severity of anxiety and depression and to determine the risk of anxiety and depression. There are, in total, 14 questions in the 4-point Likert scale; the odd numbers measure anxiety and the even numbers measure depression. The cut-off point of the scale is considered as 10/11 for anxiety subscale and 7/8 for depression subscale; those having higher scores are considered at risk (8).

SF- 36 Quality of Life Scale: The SF-36 scale consists of 36 items and eight dimensions: physical function, social functioning, role limitations due to physical problems, role limitations due to emotional problems, mental health, energy/vitality, pain, and general perception of health. Zero point from the sub-dimensions represents the worst health status, while 100 points show the best health status. Turkish validity and reliability test of the The SF-36 scale was made by Kocyigit et al. (1999) (9).

Ethical considerations

Written permission was obtained from the research centers before the research. The local ethics committee approval was obtained. Written and verbal approval of the patients were also obtained by using informed volunteer consent form.

Data Analysis

Statistical Package for Social Sciences (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) package program was used to evaluate the research data. Shapiro-Wilk test was used to determine whether the data is normally distributed. Descriptive statistics, Student t-test, and Mann-Whitney U test were used to analyze the data. The accepted level of significance was considered as $p<0.05$.

Results

Mean age of the patients was 64.8±10.3 (min-max:48.0-80.0) years in the intervention group and 65.8±7.2 (min-max:52-80) years in the control group. No significant difference was found between the groups in terms of sociodemographic characteristics such as age, gender, smoking, and chronic disease ($p>0.05$). Previous surgical history was present 75% (n=15) of the intervention group while 40% (n=8) of the control group had previous surgery (p=0.027). Postoperatif complications were recorded according to the Clavien-Dindo classification system, and were similar in frequency and incidence between two groups. Complications which were seen in both group participants were limited to requiring medical interventions such as antiemetics analgesics or antibiotics acccording to Clavien-Dindo classification system. (Table 1).

The mean length of total hospital stay was 15.6±3.9 (min:10.0-max:25.0) days and 19.7±5.9 (min:10.0-max:31.0) days in intervention and control groups, respectively (p=0.013). In the intervention group, the mean duration of postoperative narcotic analgesic administration time was 4.3±3.8 (min:1.0-max:18.0) days, and it was shorter than in the control group also the

difference was found statistically significant (p<0.05). In the intervention group, the mean of first oral food intake, flatus, defecation and nasogastric (NG) tube termination times were 3.2±1.1 (min:1.0-max:6.0)/ days, 3.4±1.4 (min:2.0- max:6.0) days, 4.4±1.5 (min:3.0-max:8.0) days and 2.7±1.3 (min:1.0-max:5.0) days respectively and they were earlier than in the control group; the difference was found statistically significant (p<0.05). In the intervention group the mean of the mobilization time in the first 24 hours after surgery was 70.5±20.1 (min:40.0-max:105.0) minutes; the difference was statistically significant (p<0.01) (Table 2).

The mean of pulse rate after mobilization was 101.3±15.3 (min:76.0-max:137.0) minute in the control group and the mean value of SPO2 without oxygen support was 96,1±2,3 (min-max: 92.0-100.0) % in the intervention group, and they were statistically significantly higher (p<0.05). The mean of blood glucose value after mobilization was 109.8±24.3 (min:90.0-max:176.0) mg/dl in the intervention group, 139.3±41.7 (min:92.0-max:234.0) mg/dl in the control group and it was statistically significantly lower in the intervention group as shown in Table 3 (p=0.009).

There was no significant difference between the groups in terms of SF-36 Quality of Life and HADS scale scores in preoperative (p>0.05) (Table 4). The SF36 sub-scale scores of physical function, physical role difficulty, and general perception of health were significantly higher in the intervention group in the first postoperative month (p<0.05). The mean of SF-36 vitality, mental health, social functioning and general perception of health sub-scale scores were statistically significantly higher in the third postoperative month (p<0.05) (Table 5).

Discussion

ERAS protocols not only increases patient satisfaction and QoL but also improves clinical outcomes (10). The results related to sociodemographic variables such as age, gender of the patients included in the study were consistent with the literature (11–15). Considering the ef-

fects of sociodemographic and clinical characteristics on QoL and postoperative healing process, homogeneity of the research sample is of importance in order not to affect the results biasedly.

Preoperative anxiety which negatively affect the QoL is more common in patients with previous surgical experience (3). Patients' expectations for the healing process also affect QoL (6,16). In our study, although the status of having previous any surgical experience was higher in the intervention group, the expectations for recovery time, SF-36 and HADS scores were similar in both groups.

ERAS components have been reported to decrease the length of postoperative hospital stay (12,14,17). Similar to literature, in our study the length of postoperative and total hospital stay was found significantly shorter in the intervention group. However, total hospital stay in our study was longer than the literature (13,14,17). In Turkey, government health payments cover the entire treatment process without being affected by the length of hospital stay. For this reason, most physicians prefer to follow the recovery process in the hospital. In addition, as the sample of the study was 60 years and older, anesthesia preparation process was carried out in hospital. Therefore, preoperative hospital stay was higher in both groups compared to the literature (11,15,18). Early mobilization may play significant role in decreasing postoperative and total hospital stay.

Djaladat et al. (2017) reported that the complication incidence decreased in parallel with the length of hospital stay in patients undergoing ERAS (5). Moreover, Rivas et al. (2017) stated that the length of hospital stay was shortened without the risk of postoperative complications (18). In the current study, no significant difference was found between the groups in terms of complication incidence rate. ERAS components that are jointly applied in research groups are thought to cause similarity between groups.

It was reported in a study examining mobilization efficiency in the intensive care unit after organ transplantation that the pulse rate was reduced to the normal limits after mobilization (19). In our study, the pulse rate and blood glucose levels after mobilization were more lower in the intervention group ($p<0.05$). Blood glucose levels may be higher in patients remained inactive for a long time due to metabolic stress that may occur after the surgery. In our study, before the surgery, glucose levels of all patients were stable. It is thought that blood glucose value is decreased in the intervention group due to the increase in energy requirement of muscle tissue during mobilization, the increased use of glucose and an increase in insulin sensitivity along with mobilization. We are of the opinion that early mobilization can be effective in terms of early control of hyperglycemia induced by metabolic stress and regulation of hepatic glucose metabolism.

Mobilization is of great importance in terms of increasing muscle strength and function, decreasing the level of dependence and providing cardiorespiratory healing and gravitational stimulation after major surgery without complication (2,3). Postoperative early mobilization was reported to increase oxygen transport and reduce the incidence of pulmonary complications (20). In our study, the values of SPO2 with and without oxygen support measured after mobilization were significantly higher in the intervention group in parallel with the literature and no early-stage pulmonary complications were observed in both groups.

Semerjian et al. (2018) reported that the patients were mobilized at night after surgery, and Persson et al. (2015) and Arumainayagam et al. (2008) reported that the patients were mobilized within the first 24 hours (17,21,22). Guan et al. (2014) reported that the patients were encouraged to get out of bed at least four times a day 24 hours after surgery (12). Dutton et al. (2014) reported that the patients were sit up on the bed in the first 48 hours after surgery and the walking exercises were started after 48 hours (13). Mukhtar et al. (2013)

reported that the patients were mobilized at least 6 hours a day after the first mobilization (15). Retrospective studies (13,15,18,22) and prospective studies (11,14,17,23) on ERAS protocols in RC treatment were analyzed; though early mobilization procedure was reported to be applied, no information was given with respect to the mobilization process in terms of its time, duration and method. In our study, the patients in the intervention group were mobilized within the first 16 hours following a standard mobilization procedure differently from the literature. Factors such as the length of surgery, and the presence of adequate medical staff for safe mobilization after surgery were taken into consideration.

In literature it's reported that regaining regular intestinal functions took a shorter time in patients who underwent ERAS protocol (4,17). NG tube was reported to be removed in 2.0±0.3 days by Mukhtar et al. (2013), at the first day after the surgery by Arumainayagam et al. (2008), and immediately after the surgery by Saar et al. (2013) (11,15,22). The first defecation time in the literature was reported as 6.1±0.3/days by Mukhtar et al. (15) and 2.6 ±0.9/days by Saar et al. (2013). Persson et al. (2015) reported that the time of the first bowel movement was 2 days earlier in the ERAS group (21). Moreover, Frees et al. (2018) pointed out that the first defecation time was shorter in enterally fed patients (14). In our study, the first defecation time was 4.4±1.5 days (intervention group) similar to the results of Frees et al. (2018) and Mukhtar et al. (2013) and it was 1.5 days shorter in the intervention group (5.7±2.1 days/control group) as in Persson et al. (2015). Our findings suggest that early mobilization contributes to early motility of bowel and removal of the nasogastric tube.

Karl et al. (2014) stated that QoL was better on the third and seventh days after surgery in the patients who underwent ERAS protocols (23). Porserud et al. (2014) reported that patients who were included in the exercise program had higher scores at functional capacity and physical area dimensions of QoL (7). In our study, QoL was significantly better in the intervention group in terms of physical function, physical role difficulty and general

perception of health in the first month. In the third month after surgery, the scores of physical and emotional role difficulty, vitality, mental health and general perception of health subdimensions were significantly better in the intervention group. RC treatment could be said to have a significant effect on QoL in RC patients in the early postoperative period. The disappearance of the difference that was observed in the physical function subdimension of QoL in the first month could be explained by the healing effect of the ERAS components jointly applied in both groups. Standardized ERAS protocols improve patient satisfaction and QoL in addition to improved clinical patient outcomes (6). In addition, it is pointed out that the inclusion of patients' relatives in the care planning will have positive effects on the healing process (24).

Rivas et al. (2017) reported that ERAS may have a positive effect on the RC patients and patient if only with the multidisciplinary team working. In our multicenter study, great importance was attached to the multidisciplinary teamwork for the surgeons performing the surgery and the nurses responsible for clinical care to cooperate with the dieticians, physiotherapists and all other health professionals.

Limitations of the Research

The limited number of patients over a period of 3 years due to patients who had to be excluded from the study can be considered as the limitation of the current study. Additionally it has been observed that the fact that the intervention group was encouraged for early mobilization by the research team created a sense of exclusiveness and worthiness in the patients and their relatives, and thus they were more actively involved in the process. It could be thought that more frequent communication with the researcher upon the request of the patients in the intervention group might have positively affected the responses to the surveys in the long run.

Conclusion

It has been found that early mobilization could be performed safely in the patients who underwent RC and ileal loop in accordance with the standard procedure and it has contributed to the healing process positively and improved their QoL.

Standardized ERAS protocols are needed to provide optimal supportive care in patients undergoing RC; it is thought that more multicenter prospective randomized controlled studies are needed in order to evaluate different components of ERAS protocol with larger samplings in different countries.

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Table 1. Sociodemographic characteristics

Variable		Intervention (n=20)		Control (n=20)		Test Statistics		Variable		Intervention (n=20)		Control (n=20)		Test Statistics	
		(n)	(%)	(n)	(%)	z	p			(n)	(%)	(n)	(%)	z	p
Age Groups	18-65 Years	9	45.0	11	55.0	-0.624	0.532[b]	Gender	Male	19	95.0	19	95.0	0.000	1.000[b]
	66-80 Years	11	55.0	9	45.0				Female	1	5.0	1	5.0		
Marital Status	Married	17	85.0	16	80.0	-0.411	0.681[b]	Previous Any Surgical Experience	Yes	15	75.0	8	40.0	-2.211	0.027[b]
	Single	3	15.0	4	20.0				No	5	25.0	12	60.0		
Educational Background	Literate	4	20.0	7	35.0	-0.452	0.651[b]	Preoperative Training	Yes	11	55.0	10	50.0	-0.313	0.755[b]
	Primary Education	9	45.0	6	30.0				No	9	45.0	10	50.0		
	High School	4	20.0	3	15.0			Postoperative Complication	Yes	4	20.0	3	15.0	-0.411	0.681[b]
	Graduate and Postgraduate	3	15.0	4	20.0				No	16	80.0	17	85.0		
Body Mass Index	Normal Weight	9	45.0	6	30.0	-0.805	0.421[b]	Intensive Care Monitoring	Yes	4	20.0	7	35.0	-1.049	0.294[b]
	Overweight	6	30.0	6	40.0				No	16	80.0	13	65.0		
	Obese	5	25.0	6	30.0										
Smoking	Smokes	7	35.0	4	20.0	-1.049	0.294[b]			Intervention (n=20)		Control (n=20)		Test Statistics	
	Gave up	13	60.0	16	80.0										
HT	Yes	7	35.0	8	40.0	-0.322	0.747[b]			Mean±SD (min-max)		Mean±SD (min-max)		t	p
	No	13	65.0	12	60.0										
Diabetes	Yes	5	25.0	4	20.0	-0.374	0.708[b]	Age / Year		64.8±10.3 (48.0-80.0)		65.8±7.2 (52.0-80.0)		-0.375	0.710[a]
	No	15	75.0	16	80.0										

[a]Student t-test . [b] Mann Witney U Test

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Table 2. Clinical features and data on postoperative healing process

Variables	Intervention (n=20) Mean±SD (min-max)	Control (n=20) Mean±SD (min-max)	Test Statistics	
			z	p
Length of operation/hour	5.6±1.7 (3.0-8.0)	6.4±1.8 (3.0-9.0)	-1.346	0.178[a]
Preoperative hospital stay/day	5.2±3.6 (2.0-16.0)	7.3±5.1 (1.0-18.0)	*-1.906*	0.057[a]
Postoperative hospital stay/day	10.4±2.8 (6.0-16.0)	12.4±3.3 (6.0-19.0)	-2.199	0.046[a]
Total hospital stay/day	15.6±3.9 (10.0-25.0)	19.7±5.9 (10.0-31.0)	-2.904	0.013[a]
History of bladder problems/month	11.4±10.6 (1.0-36.5)	9.3±8.7 (2.0-36.5)	-0.628	0.530[a]
Intensive care monitoring period/day	0.7±1.7 (0.0-7.0)	0.7±1.1 (0.0-4.0)	-0.793	0.428[a]
Narcotic analgesic administration/day	4.3±3.8 (1.0-18.0)	5.6±2.5 (1.0-11.0)	-2.221	0.026[a]
Parenteral nutrition / hour	72.8±25.6 (28.0-120.0)	90.5±41.0 (48.0-168.0)	-1.040	0.298[a]
Oral food intake / day	3.2±1.1 (1.0-6.0)	4.3±1.7 (2.0-7.0)	-2.292	0.026[a]
First flatus time/ day	3.4±1.4 (2.0-6.0)	4.4±1.2 (2.0-7.0)	-2.495	0.013[a]
First defecation time/day	4.4±1.5 (3.0-8.0)	5.7±2.1 (2.0-8.0)	-2.276	0.023[a]
Nasogastric tube termination/ day	2.7±1.3 (1.0-5.0)	4.2±2.0 (2.0-8.0)	-2.496	0.013[a]
Drain removal/ day	9.6±2.8 (7.0-19.0)	9.8±3.7 (6.0-23.0)	-0.056	0.956[a]
First mobilization time /hour	13.1±3.2 (6.0-16.0)	26.4±6.3 (18.0-40.0)	-5.431	0.000[a]
Mobilization in the first 24 hours after surgery/times	5.9±2.3 (4.0-8.0)	1.0±1.4 (0.0-5.0)	-5.294	0.000[a]
Mobilization time in the first 24 hours after surgery /minutes	70.5±20.1 (40.0-105.0)	11.8±20.9 (0.0-90.0)	-5.039	0.000[a]

[a] Mann Witney U Test

Table 3. Vital signs and peripheral blood glucose values before and after mobilization

Parameter	Before/After Mobilization	Intervention (n=20) Mean±SD (min-max)	Control (n=20) Mean±SD (min-max)	Test Statistics z/t	p
Systolic Blood Pressure/ mmHg	Before	128.7±16.9 (90.0-152.0)	126.7±17.8 (95.0-160.0)	-0.298	0.766[a]
	After	117.7±15.12 (90.0-140.0)	120.6±22.6 (90.0-170.0)	-0.477	0.636[b]
Diastolic Blood Pressure / mmHg	Before	77.7±14.2 (40.0-94.0)	72.7±9.2 (60.0-91.0)	1.334	0.190[b]
	After	69.5±6.4 (58.0-80.0)	71.1±10.6 (50.0-97.0)	-0.577	0.568[b]
Pulse/ min.	Before	85.9±12.6 (68.0-109.0)	83.5±16.0 (60.0-116.0)	0.515	0.609[b]
	After	92.0±11.5 (72.0-118.0)	101.3±15.3 (76.0-137.0)	-2.174	**0.036[b]**
Fever /°C	Before	36.6±0.3 (36.0-37.6)	36.6±0.4 (36.0-37.7)	-0.399	0.690[a]
	After	36.5±0.2 (36.2-36.8)	36.6±0.4 (36.2-37.6)	-0.302	0.763[a]
SPO2/with O2 support (%)	Before	97.1±1.8 (94.0-100.0)	96.8±1.6 (94.0-99.0)	-0.422	0.673[a]
	After	98.9±1.8 (92.0-100.0)	96.8±1.6 (94.0-99.0)	-4.005	**0.000[a]**
SPO2/without O2 support (%)	Before	92.6±2.9 (88.0-100.0)	92.6±2.7 (88.0-97.0)	-0.096	0.923[a]
	After	96.1±2.3 (92.0-100.0)	93.3±2.5 (89.0-98.0)	3.733	**0.001[b]**
Blood Glucose (mg/dl)	Before	131.4±27.0 (107.0-212.0)	148.5±42.7 (98.0-248.0)	-1.382	0.167[a]
	After	109.8±24.3 (90.0-176.0)	139.3±41.7 (92.0-234.0)	-2.441	**0.015[a]**

[a] Mann Witney U Test   [b] Student t-test

Table 4. Preoperative SF-36 Quality of Life and HADS scale score distributions

Score Distributions	Intervention (n=20)	Control (n=20)	Test Statistics	
	Mean±SD (min-max)	Mean±SD (min-max)	*t/z*	*p*
SF-36 Physical Function	74.3±21.8 (25.0-100.0)	61.5±32.9 (0.0-100.0)	-0.992	0.321[b]
SF-36 Physical Role Difficulty	35.0±38.4 (0.0-100.0)	22.5±38.0 (0.0-100.0)	-1.190	0.234[b]
SF-36 Emotional Role Difficulty	31.7±43.9 (0.0-100.0)	40.0±42.7 (0.0-100.0)	-0.710	0.478[b]
SF-36 Vitality	47.8±22.7 (5.0-80.0)	44.3±22.5 (10.0-80.0)	0.489	0.627[a]
SF-36 Mental Health	55.0±19.6 (20.0-92.0)	52.0±18.2 (20.0-88.0)	0.502	0.618[a]
SF-36 Social Functioning	60.0±25.8 (12.5-100.0)	42.5±26.8 (0.0-100.0)	1.502	0.141[a]
SF-36 Pain	48.5±25.4 (10.0-100.0)	56.5±38.2 (0.0-100.0)	-0.746	0.445[b]
SF-36 General Perception of Health	57.8±15.9 (35.0-90.0)	46.8±21.9 (10.0-80.0)	1.816	0.777[a]
HADS-Anxiety	19.9±2.9 (11.0-23.0)	20.3±2.4 (15.0-24.0)	-0.270	0.978[b]
HADS-Depression	18.2±2.4 (15.0-24.0)	18.4±2.1 (14.0-22.0)	-0.285	0.777[a]
HADS-Total	38.0±4.2 (27.0-46.0)	38.6±3.0 (33.0-45.0)	-0.552	0.605[a]

[a]Student t-test . [b] Mann Witney U Test

Table 5. Postoperative SF-36 Quality of Life and HADS scale score distributions

	Score Distribution	Intervention Mean±SD (min-max)	Control Mean±SD (min-max)	Test Statistics z	p
First Month	SF-36 Physical Functioning	41.0±19.4 (15.0-70.0)	26.8±16.2 (0.0-55.0)	-2.409	**0.016ᵃ**
	SF-36 Physical Role Difficulty	11.3±12.8 (0.0-25.0)	3.8±9.2 (0.0-25.0)	-2.044	**0.041ᵃ**
	SF-36 Emotional Role Difficulty	31.7±39.7 (0.0-100.0)	13.3±22.7 (0.0-66.7)	-1.406	0.160ᵃ
	SF-36 Vitality	32.5±21.2 (10.0-85.00)	23.8±22.4 (0.0-60.0)	-1.813	0.070ᵃ
	SF-36 Mental Health	53.4±20.4 (28.0-96.0)	41.6±17.8 (20.-68.0)	-1.820	0.069ᵃ
	SF-36 Social Functioning	21.3±12.2 (0.0-50.0)	15.0±12.6 (0.0-37.5)	-1.501	0.133ᵃ
	SF-36 Pain	53.0±13.7 (32.5-62.5)	54.6±13.1 (32.5-77.5)	-0.260	0.795ᵃ
	SF-36 General Perception of Health	38.8±11.7 (20.8-60.6)	21.9±16.1 (1.0-46.0)	-3.243	**0.001ᵃ**
	HADS-Anxiety	21.4±2.1 (16.0-23.0)	20.4±3.1 (14.0-24.0)	-0.575	0.565ᵃ
	HADS-Depression	20.1±2.1 (17.0-24.0)	20.3±2.3 (18.0-24.0)	-0.151	0.880ᵃ
	HADS-Total	41.4±2.9 (35.0-45.0)	40.7±2.6 (35.0-45.0)	-0.589	0.556ᵃ
Third Month	SF-36 Physical Functioning	74.3±15.9 (40.0-90.0)	66.0±16.0 (40.0-100.0)	-1.922	0.055ᵃ
	SF-36 Physical Role Difficulty	70.1±31.0 (0.0-100.0)	42.5±28.2 (0.0-100.0)	-2.838	**0.005ᵃ**
	SF-36 Emotional Role Difficulty	73.9±40.8 (0.0-100.0)	45.0±39.4 (0.0-100.0)	-2.765	**0.006ᵃ**
	SF-36 Vitality	66.3±16.1 (20.0-85.0)	41.0±21.1 (5.0-70.0)	-3.931	**0.000ᵃ**
	SF-36 Mental Health	83.4±11.8 (40.0-100.0)	60.8±20.5 (36.0-92.0)	-3.699	**0.000ᵃ**
	SF-36 Social Functioning	65.0±20.5 (12.5-87.5)	48.8±18.1 (25.0-87.5)	-2.486	**0.013ᵃ**
	SF-36 Pain	49.3±2.4 (40.0-50.0)	53.6±9.7 (45.0-77.5)	-1.633	0.112ᵃ
	SF-36 General Perception of Health	64.3±15.5 (20.0-80.0)	38.0±15.9 (20.0-80.0)	-4.073	**0.000ᵃ**
	HADS-Anxiety	22.3±1.7 (17.0-25.0)	20.6±2.9 (15.0-25.0)	-1.588	0.112ᵃ
	HADS-Depression	18.0±1.8 (14.0-23.0)	18.0±1.4 (16.0-23.0)	-0.086	0.932ᵃ
	HADS-Total	40.3±2.4 (34.0-46.0)	38.6±3.4 (33.0-45.0)	-1.282	0.200ᵃ

ᵃ Mann Witney U Test

Figure 1. Mobilization Suitability Assessment Guide

Figure 2. Mobilization Application Procedure