Surgical-associated anxiety and postoperative anesthesia recovery among elderly patients subjected to laparoscopic abdominal surgeries: The impact of educational-based intervention

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ABSTRACT

Background: Considerable number of elderly patients still experience preoperative anxiety and poor postoperative anesthesia recovery, despite magnitude advances in laparoscopic management and improved anesthetic techniques, resulted from many improper connotations such as the complexity of anesthesia and surgery, fear of experiencing pain, physiologic response, patient unique characteristics, or being improperly informed. To date, anxiety and recovery in an elderly population undergoing laparoscopic abdominal surgeries have received very little attention and interventional studies with a structured preoperative teaching program addressing such variables are so limited. Teaching elderly patients the appropriate modification of activities and effective use of anxiety-reduction techniques all impact favorably upon their recovery outcome. Thus, the focus of this study is to evaluate the impact of laparoscopic surgery and anesthesia-related educational program on preoperative-associated anxiety and postoperative quality of anesthesia recovery for elderly patients subjected to laparoscopic abdominal surgeries. ***Methodology:*** A randomized pretest-posttest and follow-up control group research design was utilized, in two specialized laparoscopic abdominal surgical departments affiliated to Alexandria Main University Hospital, between the first of January to the end of August 2020. We interviewed 86 elderly patients scheduled for elective laparoscopic abdominal surgeries divided randomly into control and intervention groups, for investigating the following study variables: (1) preoperative anxiety (using State-Trait Anxiety Inventory on primary admission and the 2nd day of admission just before surgery), and (2) postoperative quality of anesthesia recovery (using Quality of Recovery Score-15 in the initial 24-hours post-surgery, before discharge, and on the 7th day follow-up schedule). The proposed Arabic-version instructional program was introduced to the intervention group, then a comparison of the means between the predetermined groups was performed. ***Results:*** Degree of anxiety for the intervention group following the instruction scheme proved to be significantly lowered than those in routine hospital care group. The program conduction confirmed to have a statistically significant effect on the intervention group's recovery outcome than those in the parallel group including an amelioration in pain, physical discomfort, physical independence, as well as emotional dimensions, as evidenced by the marked percent improvement through the whole application periods. ***Conclusion:*** Preoperative engagement in the interventional informative sessions offers benefits to diminish the level of anxiety through gained knowledge and application of anxiety-relief manipulations in the subjected group. Through practiced skills of discharge self-management, quality of anesthesia recovery proved to be better than those in the control group with a statistically significant discrepancy between them. ***Recommendations:*** The pursuit of anxiety and recovery evaluation and management to be established as a routine screening and interventional measures for all elderly patients scheduled electively for laparoscopic surgery to ensure best geriatric patients' outcomes. On top of that, developing of interventional informative sessions with reference to laparoscopic surgery, anesthesia, preparation for surgery, emotional support, and postoperative discharge management should be launched and stepped by all gerontological nurses in the perioperative stage.

Keywords: Elderly patients, Preoperative anxiety, Postoperative quality of anesthesia recovery, Laparoscopic surgery, Intervention program.

Introduction

Laparoscopic-related surgical modality is notified to be the most technological operational proceedings and the treatment of choice recently executed for elderly patients eligible for major surgeries of intra-abdominal pathologies (Yamamoto et al., 2019). This advanced intervention presented because of the need to shift in general surgery from conventional techniques to minimally invasive alternatives. It is feasible as a pioneer in minimizing serious complications mostly presented with miscellaneous atypical presentations affecting disproportionally the geriatric patients making both recovery and early discharge a challenge (Kim et al., 2011).

Likewise, it is more advantageous than the conventional open surgeries in relation to less postoperative pain, lesser inflammatory and neuroendocrine stress responses, reduced post-operative ileus and intraoperative blood loss, shorter convalescence, faster resumption of activities, and limited scarring. Although the safety of this procedure has been well-documented in the medical and nursing literature, it remains a complex surgical interference for elderly patients, involves a removal of an organ and a general anesthesia which place physiologic demands on the body (Kim et al., 2011; Yamamoto et al., 2019). A study of the Netherlands Cancer Registry (2014) on a cohort of 33,000 patients estimated a significant decrease in 1-year mortality rate in older adults aged more than 75 years following laparoscopic procedures (Hamaker et al., 2014).

As the Egyptian population ages, an increasing percent of surgical demands is directed to those 65 years of age more than ever before. It is likely that these numbers will grow in accordance with the expected demographic changes. Elderly patients are often viewed as high-risk anesthesia and surgical candidates as senescence played a constitutive role of decreased functional capacity of the basic body critical organs which resulted in minimal ability to cope with surgical-related stressors (Ali et al., 2014; Kim et al., 2020). Less compensation of age-associated shifts, descending of the physiological and psychological reserve and

the intolerable postsurgical negative – associations, high rate of surgical site infection from altered immune response, high risk for geriatric syndromes as well as highly comorbid status are often the other conventional explanations (Hoshino et al., 2019).

In fact, induction of intravenous and inhaled anesthesia holds serious sort of problems to an elderly patient due to oversensitivity reactions from altered drug metabolism, polypharmacy, the cumulative effect of coexisting morbidities, sensory-perceptual disorders, frailty, and compromised mental abilities (Crucitti, 2018). All previous facets making adjustment of drug selection, awareness of potential interactions, and correct dosing to prevent toxicity resulted from senile decline of liver and kidney functions, a great conflict to manage elderly patients safely and effectively. Consequently, it is more difficult for many older adults to easily recover or regain self-care capability following discharge, and often largely demand post-acute care services (Brioni et al., 2017). The quality of postoperative recovery is deemed as a crucial outcome following surgery and anesthesia. It is described as a multifaceted process of resuming homeostasis following certain situation through returning to normal levels of functioning, compared with pre-morbid state in various dimensions (Ahmed et al., 2019).

Although the biological factors of poor surgical outcomes are lucid and well investigated, psychological factors such as preoperative anxiety must not be ignored due to the dual role it played with elderly reaction to surgical burden and anesthesia stress. In addition, the relation between evoked anxiety and poor recovery among those heterogenous population submitted to laparoscopic surgery is underestimated and still unclear (Ali et al., 2014). Preoperative anxiety is well-known as a body feeling of uncertainty and reaction with undesirable hemodynamics because of multiple stimulations, with prevalence varies across the literature and mostly presents in response to unpredicted surgery outcome, postoperative course, and complications during or after the surgical procedures (Dagona, 2018; Menel et al., 2018; Abate et al., 2020). The ordeal of undergoing surgery disrupts the lives of elderly patients and their families and often brings changes with which many of them are inadequately prepared. Anxiety induced as a

protective behavioral and adaptive response of indirect psychological burden and devastating life events portrayed in laparoscopic surgery, which if not appropriately coped with, delayed short and long-term recovery and impaired whole surgery process is the worrisome trajectory (Ganry et al., 2018).

Holistic preoperative assessment of elderly patients must be initiated upon admission and proactive discharge planning coupled with increased education for elderly patients play a significant role in lessening surgical and anesthesia-related anxiety, length of hospital stays, morbidity, and overall physical and mental deconditioning associated with ineffective recovery (Feldheiser et al., 2016). The gerontological nurse should institute a set of standardized perioperative procedures and practices that is applied to all elderly patients undergoing a given elective laparoscopic surgery (Fortacin et al., 2015). Despite predictions that patient education and proper preoperative preparation with predischarge arrangement can positively influence anxiety and recovery of the geriatric patients undergoing laparoscopic surgeries, there are minute nursing research supporting this assumption (Bates & Divino, 2015). This study further gives gerontological nurses and geriatric physicians opportunities to individualize nursing and medical interventions more deliberately and to provide more intensive interventions for geriatric patients to obtain less adverse outcome which is of extreme importance to improve postoperative results (Lemos et al., 2019). Determining the meaning of recovery to older adults facing laparoscopic surgery, and their expectations following surgery, as well as knowledge of the anxiety-relieving measures are fundamental to the development of targeted interventions to optimize recovery in this growing, high-risk population (Bates & Divino, 2015; Lemos et al., 2019). In such context, the target of this study focused on evaluating the impact of interventional program on preoperative-associated anxiety and postoperative quality of anesthesia recovery for elderly patients underwent laparoscopic abdominal surgeries.

Research hypothesis:

We hypothesized that elderly patients undergo laparoscopic abdominal surgery who receive the proposed anxiety relieving measures, and anesthetic and laparoscopic surgical educational-focused program report lower anxiety degree and better quality of anesthesia recovery level than those who do not.

Subjects and methods

Study design:

Randomized pretest-posttest, follow-up control group design was utilized.

Setting:

The present study was proceeded in two specialized laparoscopic abdominal surgical departments (Hepatic and Pancreatic, and Gastrointestinal surgical departments) affiliated to Alexandria Main University Hospital. Those above- mentioned units had an admission rate of 30-40 elderly patients scheduled for laparoscopic abdominal surgeries over 3 months period, according to statistical records of the admission department in the hospital.

Participants:

All male and female geriatric patients 60 years and above, attending the selected units in the specified days of data collection, and **have the following eligibility criteria were enrolled:**

1. Able to communicate effectively and follow instructions.

2. Scheduled for elective laparoscopic abdominal surgery either diagnostic or therapeutic.

3. Admitted to the hospital at least 48 hours before surgery.

4. Emergencies, gynecological procedures, or surgery turned to be an opened technique were all excluded.

5. Those who either diagnosed with anxiety disorder or received anti-anxiety medications preoperatively were excluded.

The sample size: Assuming that, the interventional program has a medium effect size (0.25) on anxiety degree and better quality of recovery among elderly patients underwent

laparoscopic abdominal surgeries. Using alpha error = 0.05, power of the study= 80%, number of groups=2, and number of repetitions = 3, the minimum required sample size = 86, 43 in each group recruited using a convenience sampling technique. The sample size was calculated using G-Power 3.1 software.

The eighty-six subjects were divided into two groups, each group comprised 43 patients: the interventional group (consisted of 43 patients received the new planned program) and the non-interventional group (consisted of 43 patients received no intervention, other than that which would routinely be provided from the hospital) in 8 months interval. The two surgical wards were selected by simple randomization by picking their names up from a pool. They were ranked according to priority of pulling from the pool, i.e., the first selected ward from the pool would be the starting one for data collection, and then the second would be the next one. The first selected ward was assigned for the non-interventional group and the second one was assigned for the interventional group. This was done to avoid the possibility of contamination by transmission of what has been taught to patients in the interventional group to patients in the other one. The process was repeated till the required number was obtained.

Tools: [3 tools were used]
Tool I: Demographic characteristics, medical profile, anesthesia history, and surgical data for elderly patients structured interview schedule. This tool was developed by the researchers and composed of two parts:

Part I: The demographic characteristics of the elderly patients such as age, sex, marital status, educational level, job before retirement and income.

Part II: The medical profile, anesthesia history, and surgical data of elderly patients included:

- History of chronic diseases such as diabetes mellitus, hypertension, gastrointestinal or hepatic disease and medication schedule.

- Anesthesia history such as previous experience of general anesthesia or its accompanied complication(s), and possible causes of fear and worry - related anesthesia exposure.

- Surgical data such as previous surgery during the last year and current type of surgical intervention

Tool II: State -Trait Anxiety Inventory:

Initially developed by Spielberger et al. (1970), then revised and adapted into a new version in 1983 (Spielberger, 1983). It consists of two subscales, the State Anxiety subscale (S-Anxiety) and the Trait Anxiety subscale (T-Anxiety). For the purpose of this study, S-Anxiety subscale used to measure the existence and severity of present state of preoperative anxiety. It consists of 20 items related to subjective feelings of apprehension, nervousness, tension, worry, and physiological symptoms of anxiety. The study subjects asked to rate how he/she feels in this moment on a 4-point scale, with 1 = not at all, 2 = somewhat, 3 = moderately so, and 4 = very much for anxiety –present items. Reverse scoring used for anxiety-absent items (no.1, 2, 5, 8, 10, 11, 15, 16, 19, and 20). Total score ranged from 20 to 80, with scores ranging from 20-39 indicate mild anxiety, 40-59 moderate anxiety, and 60-80 severe anxiety. The inventory can be easily completed in approximately 10 minutes so accommodated with the attention span of the older adults. It is proved to be a valid and reliable (alpha coefficient= 0.93) tool to assess anxiety-deprived situations in various settings.

Tool III: Quality of Recovery Score-15 (QoR-15)

A patient's self-reported measurement of quality of anesthesia recovery after surgery, which developed by Stark et al., (2013). This short-form 15-item questionnaire derived from the larger Quality of Recovery-40 items of Myles et al., (2000). It measures five dimensions of health: pain, physical comfort, physical independence, psychological support, and emotional state. Each item answered on an 11-point numerical rating scale from 0 to 10 (positive items from 1-10, the score ranged from 0 = "none of the time" to 10 = "all of the time"; while negative items from 11-15 where the scoring was reversed), with a total score extended from 0 to 150. The scale demonstrated good validity, reliability (test–retest reliability $r = 0.99$), feasibility, and clinical acceptability.

Procedures of data collection
I.   Preparatory stage
- Obtaining official permission for data collection and conduction of the

intervention program was proceeded through submission of an official letter from the deans of Faculties of nursing and Medicine, Alexandria University, to the director of the Alexandria Main University Hospital informing him about the purpose of the study, the date and the time of data collection in order to obtain permission to meet the study subjects.

- Tool I was developed by the researcher after an inclusive review of affined and linked literatures related to laparoscopic surgery information guidelines, anxiety-reduction modalities, and practical strategy for better anesthesia recovery. Research concerning the topic of the study were helpful in selecting and designing the intervention program and related tools.

- The preliminary forms of study tools II and III were translated into Arabic language and presented to content validity index, a panel of five experts in Gerontological Nursing, Geriatric Medicine, Psychiatric and Mental Health Nursing, in addition to Anesthesia, Intensive Care and Pain Management specialty.

- The reliability of the tools was tested utilizing Alpha Cronbach's statistical test for internal consistency of tools' items. It reflected 0.839 for tool II, and 0.874 for tool III.

- The clarity, feasibility, and applicability of the tools were tested by conducting a pilot study on 9 newly admitted elderly patients (10% of the sample size), selected from both study surgical departments, satisfying the prescribed criteria (excluded later from the research subjects). Accordingly, all needed modifications and changes were executed.

II. Conduction and evaluation stages

- Based on the weekly schedule of the outpatient clinics, Thursdays scheduled for the Hepatic and Pancreatic surgical department and Sundays for the Gastrointestinal surgical department where cases requiring laparoscopic abdominal surgical interventions were admitted to these departments on the scheduled day of the clinics. In order to meet the newly admitted geriatric patients and to identify those fulfilling the study criteria, the researchers used to go to the study settings the same days of the schedule from 3 Pm to 8 Pm.

- All eligible elderly subjects were randomly divided into two groups (interventional and control groups), admitted to the hospital at least 48 hours before surgery. The baseline information about demographic, health, anesthesia, and surgical-related data of the study subjects was obtained on the 1st day of admission using tool I. Preoperative anxiety was assessed two times: on primary admission and then on the 2nd day of admission just before surgery using tool II. Postoperative quality of recovery outcome was measured using tool III, three times (Initial 24-hours, before discharge, and the 7th day postoperative follow up).

- Study subjects were interviewed individually, and assistance to illiterate patients were provided by researchers through reading and manual filling of their exact answers. The process of sheet completion and fulfillment took between 20 to 25 minutes at maximum, which sounded appropriate for elders' concentration and attention span.

- Both the interventional and control groups received the routine teaching and care from the hospital nursing staff such as avoid eating or drinking 8 hours prior to surgery, removing jewelry, stop smoking after midnight on the day before surgery, shaving the operated region if needed, sign a consent, measuring patient's vital signs, stop anticoagulant drugs, performing routine lab investigations or specific ones for suspicious cases with pre-existing morbidity (as echo or chest x-ray).

- The intervention program was developed by the researchers after revising all relevant literature and conducted into six sessions for the interventional group: four sessions preoperatively (on the 1st and 2nd day of hospital admission), and the other two sessions postoperatively (on the 1st and 2nd day of surgery). Each session took about 35 minutes during which the researchers interviewed the study subjects of interventional group on an individual base to give instructions about the surgery and its preparations. Those three and half hospital

sessions hours covered a variety of related topics. These topics included procedural information, anesthesia and preoperative preparation, operation expectations, incision and drainage care if present, activity and exercising, nutrition and hydration, hygiene, bathing and dressing, pain control, treatment and prevention of postoperative complications, restoration of preoperative daily routine, sleeping, elimination management, and follow-up schedule. Importance of practicing exercises as deep breathing exercise (to prevent pulmonary complications such as lung atelectasis post anesthesia) and lower limb exercise (to promote venous return and prevent deep vein thrombosis) were emphasized by the researchers. Additionally, psychological support and anxiety control measures was demonstrated, and return demonstrated by the researcher mainly deep breathing exercise, guided imagery and progressive muscle relaxation technique. As well, patients provided with illustrative Arabic-version booklet discussing the information and explaining the provided instructions.

- The collection of data and implementation of the program took a period of 8 months from the first of January 2020 to the end of August 2020 as the rate of hospital admission was limited during Covid-19 outbreak. Announcement about and application of precautionary measures against covid-19 outbreak were followed to promote safety and prevent any susceptibility of infection transmission.

- To evaluate the effectiveness of the intervention program on preoperative anxiety and postoperative quality of recovery, comparison was done between the interventional and control groups' scores outcome before and after conduction of the program using proper statistical analysis.

Data analysis

Data entry was done using Epi-info computer software package, using SPSS software package version 20.0 for statistical analysis. The **Kolmogorov-Smirnov test** was used to verify the normality of distribution. Data were represented using descriptive statistics in the form of numbers and percentages for qualitative variables, and with ranges, means and standard deviations for quantitative data. Statistical significance was considered at p-value ≤ 0.05 and highly significance at p-value ≤ 0.01. **The used tests were**: **(1) Chi-square test:** For categorical variables, to compare between different groups. **(2) Fisher's Exact or Monte Carlo correction**: Correction for chi-square when more than 20% of the cells have expected count less than 5. **(3) Student t-test:** For normally distributed quantitative variables, to compare between two studied groups. **(4) Mann Whitney test:** For not normally distributed quantitative variables, to compare between two studied groups. **(5) Wilcoxon signed ranks test:** For abnormally distributed quantitative variables, to compare between two periods. **(6) F test (ANOVA) with repeated measures,** Significance between periods were done using **Post Hoc Test [adjusted Bonferroni]**. **(7) Pearson coefficient (r):** To correlate between two normally distributed quantitative variables. **(8) Cronbach's Alpha:** Reliability statistics was assessed using Cronbach's Alpha test.

Ethical considerations

An ethical approval from the Research Ethical Committee is obtained. Further, the study purpose was explained for each study subject to obtain an informed oral approval or written consent to participate. As well, their opportunity to withdraw from the study at any stage was emphasized. Confidentiality, anonymity, and privacy of the collected information were maintained and protected.

Results

Demographic characteristics

Table (1) showed that the mean age of the control and intervention groups were 68.67 ± 4.10 and 68.40 ± 5.21respectively, and more than half of both groups were females. 74.4% of the control group and 72.1% of the intervention group were married and more than two fifths of both groups were illiterate or just read and write. 46.5% and 51.2% of subjects in the control and intervention groups respectively were housewife and did not have enough income (67.4% and 72.1% respectively). There were not significant statistical differences in demographics between both groups (p ranged from 0.196 to 1.000).

Medical profile, anesthesia history, and surgical data

Table (2) illustrated that majority of the control and intervention groups (69.8% for each) did not have history of surgery in the last year, and the most common type of present surgery was gallbladder surgery (32.6% and 34.9% respectively), followed by colonic (32.6% and 25.6% respectively) and gastric surgery (18.6% and 16.3% respectively). More than two thirds [69.8% for each] did not have previous history of general anesthesia or complications related to it among 90.7% and 86.0% respectively. Postoperative pain (23.3% and 20.9% respectively) followed by delayed postoperative recovery (18.6% and 25.6% respectively), and postoperative complications (18.6% and 23.3% respectively) were the main causes of fear and worry before surgery among the routine care and interventional group. Most of them (95.3% and 76.7% respectively) had mild level of information regarding laparoscopic surgery and anesthesia. There were not significant statistical differences in medical profile, anesthesia history, and surgical data between both groups (p ranged from 0.501 to 1.000).

Program impact on surgical-related anxiety

Table (3) revealed that more than half of both groups (65.1% and 60.5% respectively) had moderate anxiety preoperatively. At the day of surgery, the majority of control group (79.1%) had severe anxiety, while the majority of intervention group (90.7%) had mild anxiety, with a statistically significant improvement in anxiety score between the groups after the intervention program (P= <0.001). Anxiety was increased in the second measurement period of the control group by (13.14 ± 16.53), while decreased by (56.84 ± 9.15) in the predetermined measurement period for the intervention group.

Program impact on postoperative quality of anesthesia recovery

Table (4) showed that there was a statistically significant improvement in the overall postoperative quality of anesthesia recovery in the intervention group at the 3rd and 7th postoperative day (P= <0.001) compared to the control group. Pain, physical independence, and emotional status were the most improved postoperative quality of

recovery's dimensions on the 7th postoperative day (244.06 ± 143.67, 112.61 ± 70.20, and 99.28 ± 41.49 respectively).

Relation between surgery-related anxiety and postoperative quality of anesthesia recovery

Table (5) illustrated a statistically significant negative correlation between preoperative-associated anxiety and postoperative quality of anesthesia recovery in the control group at the periods of initial 24-hours, before discharge, 7th postoperative day (p<0.001 for each), and in the intervention group at the pre-determined periods (0.031, 0.013, and 0.042 respectively).

Table (1): Distribution of the control and intervention groups according to demographic characteristics

Demographic data	Control group (n =43)		Intervention group (n =43)		Test of sig.	p
	No.	%	No.	%		
Age [years]						
60–<65	7	16.3	10	23.3	χ2= 3.053	0.383
65 –<70	19	44.2	16	37.2		
70–<75	14	32.6	10	23.3		
75 and more	3	7.0	7	16.3		
Min. – Max.	68.67 ± 4.10		68.40 ± 5.21		t= 0.276	0.783
Mean ± SD.	61.0 – 78.0		60.0 – 77.0			
Sex						
• Male	18	41.9	19	44.2	χ2= 1.675	0.196
• Female	25	58.1	24	55.8		
Marital status						
• Married	32	74.4	31	72.1	MC= 0.454	1.000
• Divorced	1	2.3	2	4.7		
• Widow	10	23.3	10	23.3		
Educational level						
• Illiterate/ Read and write	21	48.8	18	41.9	MC= 1.771	0.682
• Primary education	12	27.9	14	32.6		
• Secondary education	7	16.3	9	20.9		
• High education	3	7.0	2	4.7		
Job before retirement						
• Skilled worker	15	34.9	13	30.2	χ2= 0.238	0.888
• Housewife	20	46.5	22	51.2		
• Employee	8	18.6	8	18.6		
Income						
• Enough	14	32.6	12	27.9	χ2= 0.221	0.639
• Not enough	29	67.4	31	72.1		

χ2: Chi square test   MC: Monte Carlo   t: Student t-test
p: p value for comparing between the studied groups

Table (2): Distribution of the control and intervention groups according to the medical, anesthesia, and surgical history

Items	Control group (n =43)		Intervention group (n =43)		Test of sig.	p
	No.	%	No.	%		
History of previous surgery in the last year						
No	30	69.8	30	69.8	χ2= 0.000	1.000
Yes	13	30.2	13	30.2		
Type of current surgery						
1- Gall bladder surgery	14	32.6	15	34.9	MC= 1.171	0.917
2- Colonic surgery	14	32.6	11	25.6		
3- Gastric surgery	8	18.6	7	16.3		
4- Esophageal surgery	4	9.3	5	11.6		
5- Liver and splenic surgery	3	6.9	5	11.6		
History of previous general anesthesia						
No	30	69.8	30	69.8	χ2= 0.000	1.000
Yes	13	30.2	13	30.2		
History of previous complication related to anesthesia:						
No	39	90.7	37	86.0	χ2= 0.453	0.501
Yes	4	9.3	6	14.0		
Causes of fear/ worry:						
1- Postoperative pain	11	23.3	12	20.9	MC= 2.826	0.984
2- Delayed recovery after operation	8	18.6	11	25.6		
3- Post-operative complication	8	18.6	10	23.3		
4- Fear of operation itself	8	18.6	5	11.6		
5- Lack of anesthesiologist experience	7	16.3	5	11.6		
6- Operating room environment	7	16.3	5	11.6		
7- Not waking up after anesthesia	5	11.6	6	14.0		
8- Error from surgeons	5	11.6	5	11.6		
9- Permanent physical independence	4	9.3	5	11.6		
Level of information about surgery and anesthesia						
Mild information	41	95.3	39	90.7	χ2= 0.717	0.676
Moderate information	2	4.7	4	9.3		
High information	0	0.0	0	0.0		

χ2: Chi square test   MC: Monte Carlo
p: p value for comparing between the studied group   * More than one answer.

Table (3): Comparison between the control and intervention groups according to surgical-related anxiety level

Anxiety level (20–80)	Control group (n = 43)		Intervention group (n = 43)		Test of Sig.	P
	No.	%	No.	%		
Pre-intervention						
Mild anxiety (20-39)	0	0.0	0	0.0		
Moderate anxiety (40-59)	28	65.1	26	60.5	χ2=	
Severe anxiety (60-80)	15	34.9	17	39.5	0.199	0.655
Total score						
Min. – Max.	44.0 – 80.0		44.0 – 80.0			
Mean ± SD.	57.58±11.08		58.79 ±11.73		U=892.50	0.780
Post-intervention						
Mild anxiety (20-39)	1	2.3	39	90.7		
Moderate anxiety (40-59)	8	18.6	4	9.3	χ2=	
Severe anxiety (60-80)	34	79.1	0	0.0	71.433*	<0.001*
Total score						
Min. – Max.	32.0 – 80.0		16.0 – 44.0			
Mean ± SD.	64.74*±12.47		25.49±7.86		U=17.0*	<0.001*
Z(p0)	4.051*(<0.001*)		5.742*(<0.001*)			
% Improvement	↑13.14 ± 16.53		↓56.84 ± 9.15			

χ2: Chi square test   U: Mann Whitney test   Z: Wilcoxon signed ranks test
p: p value for comparing between the studied groups.
p0: p value for comparing between pre and post program   *: Statistically significant at $p \leq 0.05$.

Table (4): Comparison between the control and intervention groups according to postoperative quality of anesthesia recovery

Items	Control group (n = 43) Mean ± SD.	Intervention group (n = 43) Mean ± SD.	t	P
Pain				
Initial 24-hours	4.95 ± 1.70	4.86 ± 1.97	0.234	0.815
Before discharge	7.00 ± 1.68	12.42 ± 1.52	15.724*	<0.001*
7th day postoperative follow up	7.26 ± 1.60	14.21 ± 1.12	23.267*	<0.001*
% Improvement for Before discharge	47.88 ± 21.72	193.24 ± 102.76		
% Improvement for follow up	54.93 ± 30.29	244.06 ± 143.67		
Physical independence				
Initial 24-hours	7.26 ± 1.98	7.21 ± 1.93	0.110	0.912
Before discharge	8.65 ± 1.60	13.37 ± 1.94	12.305*	<0.001*
7th day postoperative follow up	8.81 ± 1.48	14.21 ± 1.46	17.013*	<0.001*
% Improvement for Before discharge	23.78 ± 21.85	98.28 ± 63.05		
% Improvement for follow up	26.72 ± 24.46	112.61 ± 70.20		
Emotional status				
Initial 24-hours	15.26 ± 2.88	14.84 ± 2.62	0.705	0.483
Before discharge	19.00 ± 2.69	25.53 ± 4.13	8.693*	<0.001*
7th day postoperative follow up	19.42 ± 2.35	28.72 ± 3.61	14.163*	<0.001*
% Improvement for Before discharge	26.17 ± 12.44	76.21 ± 37.55		
% Improvement for follow up	29.64 ± 16.21	99.28 ± 41.49		
Physical support				
Initial 24-hours	8.77 ± 1.57	8.42 ± 1.75	0.973	0.333
Before discharge	9.63 ± 1.40	12.81 ± 1.62	9.757*	<0.001*
7th day postoperative follow up	9.63 ± 1.31	14.05 ± 1.41	15.036*	<0.001*
% Improvement for Before discharge	11.22 ± 13.42	57.02 ± 29.94		
% Improvement for follow up	11.42 ± 13.92	72.87 ± 34.11		
Physical discomfort				
Initial 24-hours	21.44 ± 4.19	21.09 ± 4.14	0.388	0.699
Before discharge	26.07 ± 2.92	34.26 ± 2.33	14.359*	<0.001*
7th day postoperative follow up	26.47 ± 2.59	38.40 ± 1.47	26.323*	<0.001*
% Improvement for Before discharge	24.19 ± 16.10	68.53 ± 34.75		
% Improvement for follow up	26.50 ± 18.24	89.55 ± 41.67		
Overall postoperative quality of anesthesia recovery [0–150]				
Initial 24-hours	**57.67 ± 8.57**	**56.42 ± 8.90**	**0.666**	**0.507**
Before discharge	**70.35 ± 6.78**	**98.40 ± 8.21**	**17.268***	**<0.001***
7th day postoperative follow up	**71.58 ± 6.22**	**109.58 ± 6.30**	**28.150***	**<0.001***
% Improvement for Before discharge	23.19± 10.55	77.84 ± 26.41		
% Improvement for follow up	25.54 ± 11.79	98.52 ± 30.06		

F: F test (ANOVA) with repeated measures, Sig. bet. periods was done using Post Hoc Test (adjusted Bonferroni)
t: Student t-test   p: p value for comparing between the studied groups
*: Statistically significant at $p \leq 0.05$

Table (5): Correlation between preoperative-associated anxiety and postoperative quality of anesthesia recovery among the control and intervention groups.

Preoperative-associated anxiety		Postoperative quality of anesthesia recovery		
		Initial 24-hours	**Before discharge**	**7th day postoperative follow up**
Control group (n = 43)	**r**	-0.603*	-0.555*	-0.530*
	p	<0.001*	<0.001*	<0.001*
Intervention group (n = 43)	**r**	-0.330*	-0.377*	-0.312*
	p	0.031*	0.013*	0.042*

r: Pearson coefficient
*: Statistically significant at p ≤ 0.05
Evans [1996] suggests for the absolute value of r:
0.00-0.19: "very weak"
0.20-0.39: "weak"
0.40-0.59: "moderate"
0.60-0.79: "strong"
0.80-1.0: "very strong"
Evans, J. D. (1996). Straightforward statistics for the behavioral sciences. Pacific Grove, CA: Brooks/Cole Publishing.

Discussion

Abdominal surgery is one of the highly prevalent and most frequent interventions performed for the aged population, backing to the fact that incidence of gastrointestinal disorders that requires this type of management increases with age (Weber, 2003). With today's advanced medical technology and the continuous evolvement of the geriatric perioperative arena, the surgical approach for these disorders has been changed from open to laparoscopic technique as the latter one has many advantages for the elderly including shorter hospital stay, lower postoperative pain, improved wound healing, early mobilization, and increased patient satisfaction (Hindman et al., 2014). In Egypt, the rate of such surgeries is on a staggering rise which exerting a huge burden on health system (Mohammed Ali et al., 2020). Unfortunately, mounting research pay alertness to patient characteristics, health status, or surgery and anesthesia circumstances as predicators of postoperative recovery rather than the other hidden psychological ingredients, importantly the surgical-related anxiety, which prone elderly patients to poor outcome then other conditions did (Rahman et al., 2017).

So, it seemed reasonable to find moderate anxiety level among most subjects in the control and intervention group before the implementation of the educational-based program according to State-trait Anxiety Inventory. The fundamental reported causes for both groups were postoperative pain, delayed recovery, and postoperative complications. Although anxiety is a widely observed emotional response to the laparoscopic surgery in our community; yet it still underestimated psychiatric health issue among the elderly in the acute-care settings, that did not enroll till now in the context of preoperative assessment. The popular concept in our society is that elderly patients once labeled with any surgical interference, any level of anxiety is seemed plausible. This stereotyped thinking makes identification of preoperative anxiety in elderly patients more sophisticated. In addition, the misconception that anxiety is always floating on the surface due to other multifaceted physiological and psychosocial episodes which the life of elderly is full of. Further, no convenient, acceptable, or even sufficient actions could be effective to deal with such events. Because of these regrettable notions, health care professionals pay no attentiveness to the magnificent role the perioperative education played in anxiety relief, with an obvious lack of standardized protocol to be applied with all surgical patients scheduled for laparoscopic surgeries. This insufficient information about the surgery and its consequences evokes sense of uncertainty, worry and fear about the upcoming events in the postoperative period, and consequently contributing to anxiety. The result of the present study agrees with that of Pokharel et al., (2011) who significantly found that 40-60% of surgical patients can be affected with preoperative anxiety. Supporting current research finding, a recently conducted Egyptian study (2019) proved the same

degree of anxiety experienced by elderly patients underwent laparoscopic cholecystectomy in the surgical units at Kasr El-Einy Hospital using Beck Anxiety Inventory as a measurement scale (Abdellatif et al., 2019). In parallel, mild preoperative anxiety level was exhibited in the work of Lim and colleagues (2020), which also represented pain after surgery, a life-threatening situation following surgery and delayed anesthesia recovery as basic worry and concerns.

Of particular interest, our study is from the scarce research that declared a statistically significant reduction in the level of preoperative anxiety for the intervention group post the implementation of the educational-based intervention, in comparison with the control group scheduled for laparoscopic surgery. This may be related to the effect of the implemented interventions on empowering elderly with enough knowledge related to the surgery, its mechanism, anesthesia expectations and self-care management to promote independence in the perioperative period. The teaching program utilized demonstration and return demonstration modalities to provide information regarding skills, and procedures of deep breathing exercise to promote relaxation and progressive muscle relaxation technique to reduce muscle tension. It also encouraged and motivated the elderly to verbalize any fear and to discuss any concern about surgery, as well as, to practice guided imagery which helped in focusing attention on the pleasant images, replacing negative and stressful feelings. It worth mentioned here that higher and less adaptive level of anxiety can block learning of the surgical elderly patients and hinder their participation as noticed during execution of the program. This problem arises when anxious patients become intensely and catastrophically overwhelmed by the probability that surgical conditions become dangerous and pay more attention to probable negative outcome. So, the point of success centered primarily on well control of anxiety-provoking feelings and thoughts. Further, brief teaching, simplicity, repetition, reinforcement, discussion, answering questions of elderly patient and family, and providing illustrated booklet were the prime strategies used to help in improving recalling and following the instructions.

According to this school of thought, Xu et al., (2020) reported that patient who received preoperative nursing visit, a day before surgery, included comprehensive education and announcement regarding the surgical team, the operating room environment, anesthesia process, advantages of laparoscopic surgery, and the postoperative care from recovery room to discharge, experienced lower anxiety levels before laparoscopic cholecystectomy. In this track, Villa et al., (2020) added that relaxation techniques as deep breathing exercises had a positive effect on anxiety among patients undergoing abdominal surgery. Felix et al. (2018) noted that guided imagery was an effective nursing intervention for reducing preoperative anxiety for patients scheduled for laparoscopic bariatric surgery, a result elicited by a Brazilian randomized control trial.

Another distinguished but less studied perioperative-joined factor in elderly patients is the quality of anesthesia recovery, which if inappropriately inspected and managed, act as a double-edged weapon in affecting patient prognosis, treatment, and normal resumption of overall daily livings, or in the incidence of complications. Recovery goes beyond estimating the physical function to include emotional, social, cognitive function and optimum level of well-being, and mostly reflects a patient's perspective about his ability to return to their normal level of performance in various daily roles (Bowyer & Royse, 2016). Based on participants' responses to Quality of Recovery score-15, the present study concluded that both studied groups had poor quality of recovery at the first 24-hours postoperatively. It is an anticipated result, as recovery from surgery is a continuous process with an expected initial reduction in function, followed by progressive resumption of baseline function. The mechanism of laparoscopic surgery that includes insufflation of carbon dioxide into the peritoneal cavity, could lead to pneumoperitoneum and increase the intra-abdominal pressure resulted in physiological changes, especially in the cardiovascular and respiratory systems (Perrin & Fletcher, 2004). Additionally, postoperative pain is a common problem after laparoscopic surgery as a result of the surgical incision or

irritation of the phrenic nerves by insufflated carbon dioxide resulting in shoulder pain (Sao et al., 2019). The time to emerge from anesthesia, to be easily arousal or aware of the surrounding and identity is affected by different factors including patient factors, anesthetic factors, and duration of surgery. In addition, elderly patients have increased sensitivity toward general anesthesia and have a slow return to consciousness due to progressive decline in central nervous system function. There is paucity in the research that examines the quality of postoperative recovery and its dimensions after laparoscopic abdominal surgery in elderly surgical population. A recent study (2020) conducted in France revealed that elderly patients, aged 75 years and above, planned for laparoscopic surgery had poor quality of recovery mainly in the subscales of physical independence, pain and psychological support at 24 hours postoperatively (Matsuzaki et al., 2021). Shida et al., [2015] added that older patients had lower postoperative quality of recovery score compared to younger patients with colorectal cancer.

Beside the above-mentioned results, the current study also yielded an observed statistically significant difference between the control and intervention group in mean score of postoperative quality of recovery post program implementation, with consistent upward trend in the percent improvement of the overall quality of recovery domains before discharge, reached the highest level on the 7th postoperative follow-up day. Pain, physical independence, and emotional status were the most improved dimensions of postoperative recovery in the intervention group. This considerable outcome could be explained by the role played by sufficient preoperative information for ensuring early recovery response with careful consideration of patient participation during the preoperative meeting within this limited time frame. Optimal and personalized information strategies were applied in response to the elderly patient's expectations, requests, and needs to alleviate any heightened anxiety or stress. Elderly patients were supported with different strategies, actions, plans, and knowledge about surgery, anesthesia, and recovery. These

includes non-pharmacological management of postoperative pain, prevention of postoperative respiratory complications through deep breathing exercises, avoidance of deep vein thrombosis through practice of leg exercises, and care of surgical incisions. The intervention group was encouraged and motivated for early mobilization out of bed, consumption of diet as recommended, importance of resumption of daily activities gradually, medication compliance, and scheduled follow-up. These provided skills helped in increasing confidence to deal with the surgery-related problems, maintain roles, manage negative emotions hindering learning as fear and anxiety, and in preparing the elderly to collaborate with health care professionals within the hospital environment. The important point that should be aroused here, is the problems facing nursing profession in Egypt. These problems summarized in low qualified nurses' rate, shortage in numbers in relation to responsibilities, and with insufficient quality of nurse education in general, and core geriatric care in specific. Of utmost significance is the under-education of staff about this process, so they are deficient in developing individualized laparoscopic surgical and anesthesia-related care plans. Furthermore, the teaching provided may not be the specific information patients want or find helpful to their recoveries. On that base, older patients may confront ageist attitudes of ill-educated and unprepared nurses. This may place a serious burden on patients with limited resources such as older adults with inadequate home support and care, or who do not have an adequate perioperative preparation and are then responsible for their own care. In addition to developing surgery specific patient information, there is a need to reeducate the nursing staff regarding patient and family teaching needs within period of hospital admission and discuss importance of preoperative assessment. A randomized controlled trial in China (2020) confirmed that preoperative education about the surgery team, the operating room's environment, anesthesia process, and postoperative care was effective in reducing the complications after laparoscopic cholecystectomy (Jiang et al., 2020). Another study conducted in Menoufia, Egypt, (2018) on patients undergoing open cholecystectomy, reported additional benefits

for preoperative educational intervention including stability of vital signs, decreasing nausea, vomiting, pain, early mobility, and improving functions postoperatively (Elkalashy & Masry, 2018).

Preoperative anxiety has repeatedly documented as the most important predictor of overall post-anesthesia quality of recovery. The current study showed a negative statistically significant correlation between the level of preoperative anxiety and quality of recovery. This means that the lower the level of preoperative anxiety the studied subjects had, the more likely they experienced proper recovery. Providing needs-related education (either detailed or concise according to patient preference) in both verbal and written form, was the key matter. This coincides with several studies which stated that high level of preoperative anxiety was significantly correlated with poor post-anesthesia recovery. Anxiety is strongly linked with postoperative physical pain and dependence, slower recovery (Andersson et al., 2020; Turksal et al., 2020).

To the best of the authors' knowledge, this is the first experimental study on laparoscopy with its associated anesthesia recovery and preoperative anxiety conducted in Egypt among older patients. In sum, this study does lend support for increased information leads to decreasing anxiety and improving elderly surgical patients' recovery. Information from this study provides evidence of the continued importance of preoperative education in the plan of care for those patients in the gerontological and geriatric medical care practices.

Conclusion

The program portrayed in the current study succeeded in increasing perioperative knowledge, anxiety-relieving skills' performance and self - management related practices of recovery among the elderly patients underwent laparoscopic abdominal surgeries as evidenced by statistically significant reduction of preoperative anxiety and improvement in their pain, physical independence, and emotional status of postoperative quality of recovery's dimensions

post program, in intervention group in comparison with their counter partner.

Recommendations

The followings are the main recommendations pertained to this study:

- The pursuit of surgical-related anxiety and postoperative anesthesia recovery to be established as a routine screening and an integral part of the comprehensive evaluation for geriatric patients scheduled electively for laparoscopic surgery through using a valid, reliable, and feasible scales specific to this target age group to ensure best geriatric patients' outcomes.

- On top of that, developing of interventional informative sessions and tutorials with reference to laparoscopic surgery, anesthesia, preparation for surgery, emotional support, and postoperative discharge management should be launched and stepped by all gerontological nurses in the perioperative stage.

- A standardized protocol of written policies and guidelines regarding preoperative education program should be developed and implemented for all geriatric patients undergoing laparoscopic abdominal surgery as a part of routine hospital perioperative care.

- Nurses and doctors specialized in gerontology should be encouraged to participate in continuing operative and anesthetic education opportunities and research as an essential step to assist in better provision of geriatric preoperative preparation and postoperative management in acute care settings.

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