

Factors affecting the Post-Anesthetic Recovery Score and Length of Stay in the Recovery Room in Elderly Patients with Hypertension

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Abstract

Background/Objectives: As the elderly experience a decline in physical and mental function, their memory decreases, their dependence increases, and their adaptability is reduced, resulting in a reduction in their ability to adapt to surgical operations. To improve the elderly patients' resilience to surgery and anesthesia, it is necessary to identify factors that affected them.

Methods/Statistical analysis: The subjects of this study were 104 elderly patients with hypertension, who underwent elective surgery under general anesthesia, understood the purpose of this study, and voluntarily agreed to participate in the study. In this study, data on the general characteristics of patients, disease-related factors, and related postoperative factors were collected. Data collected were analyzed using IBM SPSS 25.0 program. The significance level was set to .05.

Findings: The factors significantly affecting the post-anesthetic recovery score included education level, experience of surgical operation, anesthesia length, operative site, GCS, body temperature, and cerebrovascular complications, and their explanatory power was 68.9% ($p < .001$). The factors significantly affecting the length of stay in the recovery room included the frequency of surgical operations, cardiac disease, operative site, pain, body temperature, airway obstruction, and the amount of bleeding, and their explanatory power was 54.9% ($p < .001$).

Improvements/Applications: To increase the post-anesthetic recovery score and reduce the length of stay in the recovery room in elderly surgical patients, it is necessary to identify the influencing factors and provide appropriate interventions. We suggest that further studies be conducted in the future to investigate factors related to surgical operations and anesthesia in the elderly.

Keywords: Hypertension, Elderly, Post-anesthetic recovery, Length of stay, psychotic factors

Introduction

In South Korea, the elderly population aged 65 or over was approximately 7.4 million in 2018, accounting for 14.3% of the total population of 51 million^[1]. In 2016, South Korea's life expectancy was 82.36 years old; however, its healthy life expectancy was 64.9 years old, and the duration of disease or injury in individuals is approximately 17 years^[2].

Of the elderly in South Korea, 98.5% have one or more chronic diseases, and 73.0% are patients with multi morbidity, that is, they have two or more chronic diseases. To control disease, the elderly constantly make use of medical institutions, of which 77.4% of the elderly have used health centers in the past one month, and the average number of their visits to medical institutions was 2.4 times^[3]. In addition, out of the total 491,926 operations in 2015 in South Korea, 346,811 were performed on elderly patients aged 65 or older, accounting for 70.5%^[4]. However, the perioperative mortality rate for elderly patients is 3-5 times higher than for non-elderly patients, and much attention is,

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thus, required from anesthesia induction to recovery in elderly patients^[5].

The prevalence of hypertension, which is the most prevalent among chronic diseases, is over 60.0% in individuals over the age of 65, and it increases with age, causes various diseases, and worsens symptoms^[6].

In particular, the risk of surgical operation for the elderly with hypertension increases, and such patients may often face difficulty in recovering from anesthesia^[7,8]. Therefore, surgical operations and anesthesia for elderly patients with hypertension require a careful approach, considering related influencing factors.

The post-anesthesia recovery score is used to assess the extent of recovery of patients in the recovery room, and provides reasonable information in determining discharge from the recovery room by assessing reflexes, breathing, consciousness, circulation, and skin color in patients^[9]. As elderly patients have a high prevalence of various diseases, more attention is needed for appropriate recovery management and post-anesthetic recovery management in the recovery room.

The recovery room is a place where postoperative intensive care takes place, and it has the greatest impact on patients' recovery, and is also the place where nursing care for maintaining the patients' respiratory functions, cardiopulmonary functions, and electrolyte levels is provided^[10].

The length of stay in the recovery room reflects a patient's condition, and an extended length of stay in this room indicates that a patient's recovery is poor^[11]. Therefore, a lot of effort has been made to reduce the length of stay in the recovery room. The results of previous studies have shown that factors affecting the length of stay in the recovery room among elderly patients included age, number of diseases, albumin level, chills, pain, arrhythmia amount of bleeding, cardiovascular side effects, hypertension, delirium, and anesthetic drugs^[11-12]. Regarding nursing care for elderly patients in the recovery room, there is a need for ongoing attention and techniques for effective nursing interventions that take into account the patients' physical and psychological factors.

This study attempted to determine the factors affecting the post-anesthetic recovery score and length of stay in the recovery room in elderly patients with

hypertension.

Method

The subjects of this study were 104 elderly patients with hypertension, who underwent elective surgery under general anesthesia, understood the purpose of this study, and voluntarily agreed to participate in the study.

Data collection was conducted at a university hospital from January 2, 2016 for 6 months using face-to-face questions, which were asked 10 minutes prior to the beginning of surgery after individual patients had entered the operating room area, patient charts, anesthesia records, recovery room records, and direct recording in the instruments of observations in the operating and recovery rooms

The general characteristics of the subjects included gender, age, marital status, education level, drinking status, smoking status, the experience and frequency of surgical operations, the presence or absence of past general anesthesia, and body mass index (BMI).

Disease-related factors included lung disease, thyroid disease, kidney disease, metabolic disease, cardiac disease, diabetes, cerebral disease, cancer, depression, arrhythmia, osteoporosis, dementia, and ASA class.

Postoperative factors included pain, Glasgow Coma Scale (GCS), body temperature, shivering, cardiovascular, pulmonary, and cerebrovascular complications, delirium, endotracheal extubation, airway obstruction, amount of bleeding, nausea and vomiting, the post-anesthetic recovery score, length of stay in the recovery room.

Data collected were analyzed using IBM SPSS 25.0 program:t-test or ANOVA, Scheffe test, Pearson's correlation coefficients, Stepwise multiple regression analysis.

Results

1. Differences in the post-anesthetic recovery score and length of stay in the recovery room according to the general characteristics of the subjects

As shown Table 1, among the subjects, 44 (42.3%) were female, the number of those aged 65-70 years old was 56 (53.8%), and the number of those living with

their spouse was 56 (53.8%). In terms of education level, 44 (42.3%) were elementary school graduates or below, and middle school graduates. There were 68 (65.4%) non-drinkers and 88 (84.6%) non-smokers. The number of those who had experienced surgical operations was 84 (80.8%), the number of those undergoing one operation was 56 (53.8%), and the number of those with experience of general anesthesia was 80 (76.9%). The number of

those with a BMI of 22.9kg/m² was high at 52 (50.0%).

The post-anesthetic recovery score differed according to age, education level, drinking and smoking status, the experience and frequency of surgical operations, and BMI $p < .05$. The length of stay in the recovery room differed according to education level, the experience of surgical operations, and the frequency of operation $p < .05$.

Table 1. Differences in the post-anesthetic recovery score and length of stay in the recovery room according to general characteristics (n=104)

Factors	Classification	n (%)	Post-anesthetic recovery score		Length of stay in the recovery room	
			M(SD)	X ² (p)/Scheffe	M(SD)	X ² (p)/Scheffe
Gender	Male	40(57.7)	2.20(0.65)	1.75 (.082)	67.33(17.74)	-1.84 (.068)
	Female	44(42.3)	2.0(0.43)		78.18(40.65)	
Age	65-70	56(53.8)	2.28(0.59)	3.39 (.001)	68.57(17.31)	-1.23 (.220)
	≥71	48(46.2)	1.91(0.49)		75.83(39.88)	
Marital status	With spouse	56(53.8)	2.07(0.70)	-0.83 (.406)	68.21(17.22)	-1.36 (.174)
	Others	48(46.2)	2.16(0.37)		76.25(39.84)	
Education	≤Elementary ^a	44(42.3)	1.90(0.52)	5.23 (.007)	61.81(12.80)	8.97 ($<.001$) a,c<b
	Middle ^b	44(42.3)	2.27(0.62)		85.45(40.48)	
	≥High ^c	16(15.4)	2.25(0.44)		62.50(8.56)	
Drinking	Yes	36(34.6)	2.44(0.50)	-4.60 ($<.001$)	71.11(20.39)	0.20 (.842)
	No	68(65.4)	1.94(0.54)		72.35(34.12)	
Smoking	Yes	16(15.4)	2.50(0.51)	-2.99 (.003)	78.75(12.84)	-0.99 (.325)
	No	88(84.6)	2.04(0.56)		70.68(32.03)	
Experience of surgical operation	Yes	84(80.8)	2.0(0.53)	4.53 ($<.001$)	74.76(32.46)	-2.0 (.047)
	No	20(19.2)	2.60(0.50)		60.0(9.17)	
Frequency of operation	1 ^a	56(53.8)	2.35(0.61)	14.05 ($<.001$) a>b,c	66.42(18.82)	4.29 (.016)
	2 ^b	36(34.6)	1.88(0.31)		83.33(43.29)	
	≥3 ^c	12(11.5)	1.66(0.49)		63.33(4.92)	
Experience of general anesthesia	Yes	80(76.9)	1.95(0.50)	6.20 ($<.001$)	73.0(32.27)	-0.66 (.506)
	No	24(23.1)	2.66(0.48)		68.33(20.78)	
Body Mass Index (kg/m ²)	≤22.9 ^a	52(50.0)	2.0(0.56)	3.59 (.031) a<b	76.15(39.71)	1.25 (.290)
	23-24.9 ^b	20(19.2)	2.4(0.82)		64.0(15.35)	
	≥25 ^c	31(29.8)	2.12(0.34)		72.03(30.10)	

2. Differences in the post-anesthetic recovery score and length of stay in the recovery room according to disease-related factors

As shown Table 2, in terms of disease-related characteristics, there were 16 subjects (15.4%) with kidney disease, 16 (15.4%) with metabolic disease, 16 (15.4%) with cardiac disease, 28 (26.9%) with diabetes, 24 (23.1%) with cancer, and 28 (26.9%) with dementia.

The post-anesthetic recovery score differed according to the presence or absence of cerebral disease and dementia ($p < .05$). The length of stay in the recovery room differed according to the presence or absence of kidney disease, cardiac disease, and arrhythmia ($p < .05$).

3. Factors affecting the post-anesthetic recovery score and length of stay in the recovery room

As shown Table 3, the factors significantly affecting the post-anesthetic recovery score included education level, experience of surgical operation, anesthesia length, operative site, GCS, body temperature, and cerebrovascular complications, and their explanatory power was 68.9% ($F = 13.55, p < .001$).

The factors significantly affecting the length of stay in the recovery room included education level, kidney disease, metabolic disease, diabetes, depression, operative site, cerebrovascular complication, delirium, and airway obstruction, and their explanatory power was 84.4% ($F = 44.01, p < .001$).

Table 2. Differences of the post-anesthetic recovery score and length of stay in the recovery room according to disease-related factors (n=104)

Factors	Classification	n (%)/ M(SD)	Post-anesthetic recovery score		Length of stay in the recovery room	
			M(SD)	F/t(p) Scheffe	M(SD)	F/t(p) Scheffe
Lung disease	Yes	4(3.8)	2.0(0.01)	0.40 (.687)	70.0(0.01)	0.13 (.897)
	No	100(96.2)	2.12(0.59)		72.0(30.58)	
Thyroid disease	Yes	4(3.8)	2.0(0.01)	0.40 (.687)	55.0(0.01)	1.15 (.252)
	No	100(96.2)	2.12(0.59)		72.60(30.38)	
Kidney disease	Yes	16(15.4)	2.0(0.01)	0.86 (.389)	102.50(58.13)	-4.90 ($<.001$)
	No	88(84.6)	2.13(0.62)		66.36(16.69)	
Metabolic disease	Yes	16(15.4)	2.0(0.73)	0.86 (.389)	63.75(6.70)	1.18 (.238)
	No	88(84.6)	2.13(0.55)		73.40(32.28)	
Cardiac disease	Yes	16(15.4)	2.0(0.01)	0.86 (.389)	106.25(56.02)	-5.68 ($<.001$)
	No	88(84.6)	2.13(0.62)		65.68(16.35)	
Diabetes	Yes	28(26.9)	2.14(0.35)	-0.29 (.771)	67.14(8.96)	0.98 (.326)
	No	76(73.1)	2.10(0.64)		73.68(34.55)	
Cerebral disease	Yes	8(7.7)	1.5(0.53)	3.26 (.001)	70.0(0.01)	0.18 (.851)
	No	96(92.3)	2.16(0.55)		72.08(31.21)	
ASA class	1a	8(7.7)	2.0(0.01)	2.47 (.090)	62.50(13.36)	1.27 (.285)
	2b	48(46.2)	2.25(0.60)		68.75(20.22)	
	3c	48(46.2)	2.0(0.58)		76.66(38.55)	
Cancer	Yes	24(23.1)	2.16(0.38)	-0.49 (.624)	79.16(16.78)	-1.35 (.178)
	No	80(76.9)	2.1(0.62)		69.75(32.70)	
Depression	Yes	4(3.8)	2.0(0.01)	0.40 (.687)	55.0(0.01)	1.15 (.252)
	No	100(96.2)	2.12(0.59)		72.60(30.38)	

Cont... Table 2. Differences of the post-anesthetic recovery score and length of stay in the recovery room according to disease-related factors (n=104)

Arrhythmia	Yes	16(15.4)	2.25(0.44)	-1.01	102.5(58.59)	-4.90
	No	88(84.6)	2.06(0.59)	(.315)	66.36(16.41)	(<.001)
Osteoporosis	Yes	4(3.8)	2.0(0.01)	0.40	90.0(0.01)	-1.23
	No	100(96.2)	2.12(0.59)	(.687)	71.2(30.36)	(.221)
Dementia	Yes	28(26.9)	1.85(0.65)	2.85	62.85(8.96)	1.89
	No	76(73.1)	2.21(0.52)	(.005)	75.26(34.11)	(.061)

Table 3. Factors affecting the post-anesthetic recovery score and length of stay in the recovery room

	Variables		B	SE	β	t	p	
Post-anesthetic recovery score	General characteristics	Education	-.229	.076	-.281	-3.01	.003	
		Experience of surgical operation	-.669	.298	-.456	-2.24	.027	
	Pre and Intra-operative factors	Anesthesia length	-.189	.049	-.417	-3.89	<.001	
		Operative site	.081	.026	.315	3.13	.002	
	Post-operative factors	Glasgow coma scale	.767	.184	.653	4.17	<.001	
		Body temperature	.369	.100	.443	3.67	<.001	
		Cerebrovascular complication	.605	.149	.515	4.07	<.001	
	R ² = .689, F=13.55, p<.001, Durbin Watson=2.59, Tolerance: .120-.444, Variance Inflation Factor: 2.25-8.35							
	Length of stay in the recovery room	General characteristics	Frequency of surgical operation	8.466	4.095	.195	2.06	.042
Disease-related factors		Cardiac disease	58.362	10.164	.706	5.74	.000	
Pre and Intra-operative factors		Operative site	7.926	1.431	.603	5.53	.000	
Post-operative factors		Pain	-23.080	5.391	-.540	-4.28	.000	
		Body temperature	17.970	5.011	.419	3.58	.001	
		Airway obstruction	26.360	11.195	.430	2.35	.021	
		Amount of bleeding	12.437	5.243	.230	2.37	.020	
R ² = .549 F=9.35, p<.001, Durbin Watson=1.91, Tolerance: .132-.616, Variance Inflation Factor: 1.76-7.60								

Discussion

There were differences in the post-anesthetic recovery score depending on age, education level, drinking and smoking status, the experience and frequency of surgical operations, and BMI among the general characteristics of the subjects. In particular, drinking, smoking, and BMI, which are risk factors for hypertension, had similar effects with the results of this study involving elderly patients with hypertension.

There was a difference in the anesthesia recovery score depending on cerebrovascular disease and dementia among disease-related factors. The post-anesthetic recovery score was lower in those with cerebrovascular disease than in those without this disease, and was lower in those with dementia than in those without dementia. There was a difference in the length of stay in the recovery room depending on the presence or absence of kidney disease, cardiac disease, and arrhythmia, and the length of stay in the recovery room was longer in those with diseases than in those without any disease, which is consistent with the results of a previous study^[13] regarding the length of stay in the recovery room according to the past history of disease in elderly patients. Therefore, these results could confirm that the elderly patients with hypertension also suffer from other chronic diseases.

The results of the multiple regression analysis to determine the factors affecting the post-anesthetic recovery score and length of stay in the recovery room revealed that GCS is the most influential factor in the post-anesthetic score, cardiac disease for the length of stay in the recovery room. In the case of general anesthesia, its main target of action is the central nervous system, and neurologic assessments such as GCS are, thus, needed for patients during awakening from anesthesia^[14]. As neurological injury can affect recovery from anesthesia, related careful nursing care is needed^[15].

According to the results of a study by Kim et al.^[16], cardiac disease was a factor significantly affecting the length of stay in the recovery room, and its impact was greater in elderly patients with chronic diseases such as hypertension. In the case of the increasing elderly surgical patients, the severity of the operation is high and the patients' resilience is often reduced. Therefore, adequate nursing care for elderly patients in the recovery room is, thus, important in reducing complications and mortality^[16-18]. Adequate post-anesthesia care for elderly patients is required, accordingly.

Conclusion

This study was conducted to investigate the factors affecting the post-anesthetic recovery score and length of stay in the recovery room. The results of this study established that the post-anesthetic recovery score was higher in those with higher GCS scores, the length of stay in the recovery room was longer in those with cardiac disease.

To increase the post-anesthetic recovery score and reduce the length of stay in the recovery room in elderly surgical patients, it is necessary to identify the influencing factors and provide appropriate interventions. We suggest that further studies be conducted in the future to investigate factors related to surgical operations and anesthesia in the elderly.

Ethical Clearance: Not required

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Conflict of Interest: Nil

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