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Anesthesia and the Mental Status of Elderly Patients Following Major Non-Cardiac Surgery

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Abstract: ***In this paper we present the results of a prospective study that examined the effects of anesthesia as a factor in the occurrence of cognitive changes in the elderly after a major non-cardiac surgery. The objective of this paper is to analyze the impact of the type of anesthesia (general or regional) and the outcome of cognitive (mental) status in patients over 60 years of age. Method: A prospective (pilot) study was performed on 30 patients over 60 years of age in a three-month time period. In order to evaluate cognitive (mental) status, psychological tests were performed on all 30 patients at the time of admission and three times after anesthesia. General health status, mental status, accompanying diseases, regular ASA status, age, type of surgery and anesthesia and level of education were also evaluated following the application of the respective type of anesthesia (general or regional). A statistical analysis of the results was then performed. Results: The results are according to the assessment of the physical and mental health of patients at the time of admission, while the results and assessment of mental status (cognition) correspondto the day of operation, the second day, and the seventh day following the operation. Conclusion: The proper assessment of physical and mental health of patients led to the correct treatment approach and determination of the type of anesthesia in non-cardiac surgery. While POCD (postoperative cognitive dysfunction) depends on several factors, it can be directly considered as a possible complication of surgery and can be a strong predictor of morbidity and mortality in non-cardiac surgery patients.***

Keywords: Anesthesia, cognition, non-cardiac surgery, postoperative dysfunction

1. Introduction

Major advances in modern anesthesiology have marked the first years of the 21st century. While the field has seen new methods, medicines and drugs, and safer interventions, there has been increased interest in detecting cognitive changes in the postoperative period, especially after non-cardiac surgery [1]. Although new research is still in theearly stages, results demonstrate how anesthesia affects specific brain regions responsible for cognitive functions and the changes that occur as a result. The World Health Organization and contemporary literature describe the occurrence of postoperative cognitive (mental) dysfunction (POCD) as the "nightmare" of surgical anesthesiology [2]. Due to increased life expectancies, research has focused on elderly patients over 60 years undergoing minor and major operations [3].

There are numerous anecdotesof patients and their families reporting problems with cognitive function after surgery. One such anecdote goes, "After the operation grandfather was never the same." Such statements speak to the definition of postoperative cognitive dysfunction (POCD) in people [4]. Since research in the US suggests an increased length in life expectancy, the field of anesthesiology has set new standards for patients over 60 years undergoing surgery. Research of this kind will help give insights into changes in morbidity and mortality among elderly people in the first year after operation [5].

According to Dr. Silbert and colleagues,the anesthesiologist plays an important role in monitoring patients during the pre-, peri-, and post-operative stages,which may contribute to further research and clinical management of patients with MIC (minimal cognitive impairment) and Alzheimer's disease [6].

2. Research Purpose

The purpose of this paper is to analyze the impact of the type of anesthesia (general or regional) on the outcome of cognitive (mental) status of patients over 60 years of age. Promising new clinical research is investigating if POCD,asreaction of the brain during anesthesia, surgery and sedation contributes to the occurrence of mild, persistent and lengthy blurring (fogginess) that occurs after anesthesia and surgery. At the same time, anesthesia and surgery only speak to the existing path of intellectual dysfunction, which is recognized as a possible complication of surgery in the early postoperative period.

3. Methods

This clinical study examined 30 patients over a period of three months, from May to July 2013. Upon reception, all patients were treated to determine their general health status, comorbidities, ASA status, age, type of surgery, type of anesthesia, level of education and mental status. The questionnaire was then designed based on these demographic and clinical data. The Blessed Test was used to determine the mental status of the patients [7], specifically their memory, orientation and concentration.All questions were scored on the basis of the points to determine cognitive condition. Using this methodprovided a quick and simple way of testing patients.Changes in the mental status of patients were examined before surgery (to), a few hours after surgery (t1), and on the second (t2) and seventh day after surgery (t3). Once finished, all results were summarized.

4. Results

The complete survey contains a sample of 30 patients, of whom 20 were men and 10 were women, including 2 patients over 80 years of age. Sixteen patients were given

general endotracheal anesthesia (GEA), while 14 patients were given regional anesthesia. Of those, 8 had orthopedic surgery,5 had urologic surgery, and 17 had digestive surgery.

The cognitive status of all patients was assessed preoperatively and then compared with cognitive results from the first, second, and seventh postoperative days.The points for each of the six criteriawere added together, thus providing a total number of points. Every wrong answer was worth one point, and more than tenpoints were taken as sign of dementia. According to the results, five patients deviated from the norm; three from the GEA group and twofrom the RA group.

On the first day, one of the patients received 12 points during the memory phase of counting backwards, but the condition improved on the second and seventh days.A second patient from the RA group scored 25 points on the second day, but improved by the seventh day. A third patient from the RA group had zero points preoperatively, but had postoperative changes in all six criteria of the BOMC (Blessed Orientation-Memory-Concentration Test).Slight improvement was noted on the seventh day during a scheduled psychiatric consultation. Changes started to appear on the second day for a fourth patient from the GEA group, with an upward trend towards improvement on the seventh day. Changes were evident for a fifth patient from the GEA group in the memory phase on the second day. By the seventh day cognitive status was normal despite the complication of hematuria.

Table 1 shows the distribution of socio-demographic and clinical characteristics of the 30 patients who participated in the study.

Table 1: Socio-demographic and clinical characteristics of the sample

Variable	N (%)	Variable	N (%)	Variable	N (%)
Gender		Age	min=57 max=89 mean±SD (71±7,25)	ASA Score	
Male	18(60%)	57- 64	7 (23.33%)	2	23 (76.67%)
Female	12(40%)	65 - 74	15(50%)	3	6(20%)
		75 – 89	8 (26.67%)	4	3 (3.33%)
Variable	N (%)	Variable	N (%)	Variable	N (%)
Type of Operation		Type of Anesthesia		Education	
Digestive	17 (56.67%)	GEA	16 (53.33%)	4th Grade	3(10%)
Orthopedic	8(25%)	RA	14(46.67%)	8th Grade	8 (26.67%)
Urologic	5 (16.67%)			High School	17 (56.67%)
				College	2 (6.67%)

The gender structure consists of 60% of patients were male and 40% female, with an average age of 71 ± 7.25 years. Half of the respondents were between the ages of 65 and 74, while more than half (56.7%) had a vocational level of education. Over three quarters (76.7%) of the respondents had an ASA score of 2.

Digestive pathology appeared in 56.7% of patients as a result of the operation. Slightly more than half(53.3%) of the patients were operated on with general anesthesia, while 46.67% were operated on with regional anesthesia.

The cognitive status of the participants was analyzed on the Blessed scale, according to which the criterion for dementia is a score greater than ten. The Blessed scale indicated a postoperative cognitive disorder for five (16.67%) of the patients.

The average values of Blessed scale scores were 5.4 ± 4.5 after the first day of operation, 6.8 ± 10.9 after two days and 1.2 ± 1.8 after one week (Table 2, Figure 1).

Table 2: Results of the Blessed scale analysis

Score	Mean±SD
Day 1	5.4 ± 4.5
Day 2	6.8 ± 10.9
Day 7	1.2 ± 1.8

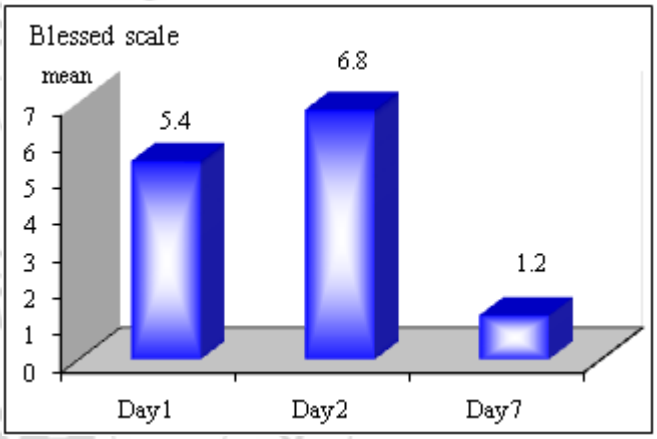

Figure 1: Results of the Blessed scale analysis

Table 3: Friedman ANOVA scale - distribution of symptoms

Result	Day 1	Day 2	Day 7
0	1(3.33%)	3(10%)	3(10%)
2			1(3,33%)
4	2 (6.67%)		1 (3.33%)
7	1 (3.33%)		
9		1 (3.33%)	
12	1 (3.33%)		
25		1 (3.33%)	
Total	5 (16.67%)	5 (16.67%)	5 (16.67%)

Friedman ANOVAChi Sqr. (N = 5, df = 2) = 2.94 p =0 .23

The distribution in Table 3 (Figure 1) shows that signs of dementia as a result of the operation developed in only one patient, and that was on the second day after surgery.

Table 4: Results of the Blessed scale analysis

Score	Day 1	Day 2	Day 7
0 - 10	4 (13.33%)	4 (13.33%)	5 (16.67%)
> 10	1 (3.33%)	1 (3.33%)	0
Total	5 (16.67%)	5 (16.67%)	5 (16.67%)

A score of greater than ten indicates dementia.

Table 5: Organized by Type of Anesthesia

Score	Day 1		Day 2		Day 7	
	General Anesthesia	Spinal Anesthesia	General Anesthesia	Spinal Anesthesia	General Anesthesia	Spinal Anesthesia
0	13 (43.33%)	13 (43.33%)	16 (53.33%)	12(40%)	15(50%)	13 (43.33%)
2					1 (3.33%)	
4	2					1 (3.33%)
7		1(3,33%)				
9				1 (3.33%)		
12	1 (3.33%)					
25				1 (3/33%)		
Total	16(53.33%)	14 (46.67%)	16 (53.33%)	14(46.67%)	16 (53.33%)	14 (46.67%)

Significant variation in one patient from the general anesthesia group on the second day

In the structure of surgery-related cognitive disorders there are two fractured hip operations, two TUR surgeries and one surgery of malignancyon the recto sigmoidal part of the colon (Chart 3, Table 6)

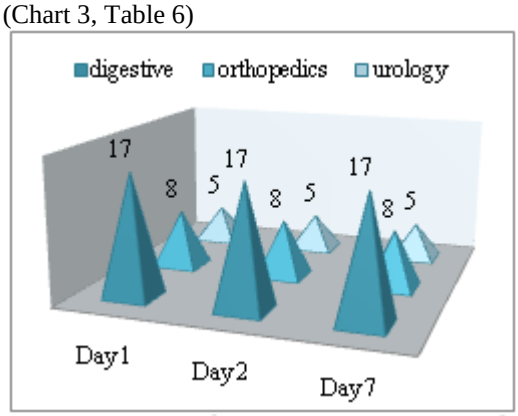

Figure 2: Organized by Type of Operation

Tabel 6: Organized by Type of Operation

Score	Day 1			Day 2			Day 7		
	Dig	Orth	Uro	Dig	Orth	Uro	Dig	Orth	Uro
0	16 53.33	7 23.33	3 10	17 56.67	6 20	5 16.67	17 56.67	7 23.33	4 13.33
2									1 3.33
4	1 3.33		1 3.33					1 3.33	
7		1 3.33							
9					1 3.33				
12			1 3.33						
25					1 3.33				
Total	17 56.67	8 26.67	5 16.67	17 56.67	8 26.67	5 16.67	17 56.67	8 26.67	5 16.67

5. Discussion

Research interest in these initial studies directed towards finding POCD in adult patients over 60 years of age who have an operable disease and require non-cardiac surgery [8]. The study aims to find cause and effect relationships between the emergence of POCD and age, gender, educational attainment, type of anesthesia, and type of surgery.

Considering the existing research in major centers, we could expect to find POCD in older and less education patients, in patients with major operations as opposed to minor ones, and in patients with accompanying diseases [9]. The affect of the type of surgery (general and regional) is still subject to research.There are studies that suggest a greater likelihood of POCD in GEA (general endotracheal anesthesia) than in regional anesthesia, but there are also results suggesting that the type of anesthesia is not very important for the emergence of POCD [10]. POCD patients in non-cardiac surgery are the focus of research from 2000 onwards, so the process of memory, attention, concentration, and speed of mental and motor responses were examined with a range of tests in order to obtain more concrete evidence.A number of comparative studies show the occurrence of POCD after major non-cardiac surgery within the first three months, but the results are not strong enough to claim that most cognitive disorders occur as a result of GEA.

The available results show that, indeed, during the first week following regional anesthesia the incidence of cognitive disorders is lower relative to that of GEA, but these results equal outafter three months.The results of ISPO-CD, a large new prospective study conducted at the international level, showed that the incidence of POCD in non-cardiac surgery is much lower than in cardiac surgery.Transient POCD, which dissipates after one week, has been observed in 25.8% of patients. From that percentage, symptoms persisted for three months in 9.9% of elderly patients, and up to two years in one percent of the patients [11].

The results of our study speak to results observed in similar studies done in other centers. Transient dysfunction in the form of POCD appeared in five patients (17%) in the first week after an operation, and one patient (3.33%) who left the hospital with lingering symptoms will be the subject of further research in the coming months.

6. Conclusions

This study showed that GEA and RA could cause POCD, but that the number of occurrences is relatively small and has no statistical significance. This is primarily due to the small number of subjects that would normally be required to come to a definite conclusion. The recognition of the existence of POCD after surgery, especially in older patients, placesimportance on early perioperative care of patients and raises awareness about the significance of surgery's cognitive outcomes. While explaining the importance of POCD to patients, anesthesiologists should consider the benefits of the proposed operation.On the other hand, through getting to know the patients anesthesiologists

can be in a better position to notice POCD and any differences that occur before and after surgery in a timely fashion. They will also be able to actively participate in the patient's complete physical, mental, and social recovery. Reducing the number of days in the hospital also reduces the economic cost of care.

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