

Research Article

Effect of General Anesthesia on Subjective Assessment of Cognition

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Abstract

Background: Postoperative early subjective cognition has been reported after cardiac and non-cardiac surgery. The method of surgery and anesthetic are believed to be associated with the incidence, but there are few prospective evidence comparing the incidence after various procedures and on long term³. **Patients and Methods:** A total of 60 adult patients of both sex, ASA I-III aged between 40 to 60 years, scheduled for surgery under general anesthesia were included in the study. Patients were randomly allocated into 2 equal groups each containing 30 patient. Group (B) surgery group and group (C) control group of the patients' relatives. **Results:** There was no significant decrease in instrumental activity of daily living (IADL) and subjective cognitive function questionnaire after 3 months between the two groups. **Conclusion:** we concluded that general anesthesia can cause early postoperative and no significant effect on delayed subjective cognition after major non cardiac surgeries.

Key words: cognition, general anesthesia

Introduction

Postoperative subjective cognitive disorder is characterized as a new disability resulting from surgery. The diagnosis includes both pre-and post-operative psychometric assessment⁶.

It can be assessed by subjective scores which was in the form of:

a- Subjective Cognitive Functioning questionnaire (SCFQ)

The Subjective Cognitive Functioning Questionnaire (SCF) was administered 7 days and 3 months after surgery to all patients and informants (usually spouses). The questionnaire was primarily developed to diagnose changes in the perceived neurological effects of action. It consists of four questions that measure memory, attention, health and the capacity to withstand a mental load. The score is from 0 to 7 for each part, with 4 reflecting no improvement. A cumulative score of 0 to 28 was measured, with high scores reflecting degradation. We also assessed mood and degree of independence in everyday life tasks using questionnaires preoperatively and respectively 7 days and 3 months after surgery¹.

b-The Instrumental Activity of Daily Living (IADL)

The Instrumental Activity of Daily Living (IADL) score is used for assessing of cognitive dysfunction. Assessment of Instrumental

Activities of Daily Living through performance-based measures is especially useful for the early detection of dysfunctions or preclinical disability. Difficulties in performing instrumental activities of daily living are closely associated with deficits in executive functions and prospective memory. Activities of Daily Living can be understood as multitasks. The use of virtual reality-based tests was shown to be sensitive to the detection of cognitive deficits in Activities of Daily Living. An advantage of using virtual reality in assessments is that it can help to predict the level of personal autonomy in patients who are in an institutional environment and could be a first approximation to the real environment⁷. This measure comprises seven questions related to shopping, domestic work, preparing meals, walking, handling money, handling medicine, and using a telephone.

The IADL score is administrated to patients and relatives preoperatively, 7 days postoperatively and 3 months postoperatively. For each of the seven questions, a score of 0 was given for no need of help, 1 was given for some need, and 2 was given in the case of inability to perform this activity. A summarized measures was calculated. A total score was calculated, ranging from 0 to 14, with a high score indicating greater dependence⁷.

Aim of the work

The effect of general anesthesia on postoperative subjective cognition.

Patients and methods

After obtaining approval of Faculty of Medicine-Minia University ethical committee and written informed consents from all patients, this prospective randomized double blind clinical study was performed on 60 cognitively normal middle aged population (40 – 60 y) of both sex of American Society of Anesthesiology (ASA) physical status I - III, at

El-Minia University Hospital in the period from (February 2019 to Feb.2020), to evaluate postoperative subjective cognition. The participants included in this study were randomly allocated into two groups one surgical group (undergoing major non cardiac under general anesthesia) and one non-surgical age matched control group.

Exclusion criteria:

1. Severe head trauma and alcoholism.
2. Patients who receive antipsychotic, major tranquilizers or antidepressant drugs.

Patients' groups

Patients were randomly allocated into 2 equal groups each containing 30 patients. Group (B) surgical group and group (C) control group of the patients' relatives.

Results

The two groups were comparable regarding age, sex, ASA score, as shown in table (1).

Table (1): Demographic data in the studied groups (data presented as mean \pm SD or number and percentage)

		Group B	Group C	P value
		N=30	N=30	
Age	Range Mean \pm SD	(40-58) 47.8 \pm 6.7	(40-56) 44.6 \pm 5.8	B vs C 0.146
Sex	Male Female	16(48%) 14(52%)	15(40%) 15(50%)	B vs C 0.871
ASA	ASA I ASA II ASA III	11(52.4%) 7(33.3 %) 3(14.3 %)	11(52.4%) 7(33.3 %) 3(14.3 %)	B vs C 0.91
SPO ₂	Range Mean \pm SD	(98-100) 99 \pm 0.7	(98-100) 99 \pm 0.7	B vs C 0.891

Table (2) shows the changes in oxygen saturation (SPO₂) and no significance difference was recorded between the two groups. Intergroup comparison showing significantly lower HR in comparison to the basal HR in both groups.

Table (2): Oxygen saturation in the two studied groups (data presented as mean \pm SD)

SPO₂ Range Mean \pm SD	Group B N=30	Group C N=30	P value
Before induction (Basal) Range Mean \pm SD	(99-100) 99 \pm 0.7	(98-99) 99 \pm 0.7	B vs C 0.990
5 min Range Mean \pm SD	(98-100) 99 \pm 0.7	(98-100) 99 \pm 0.7	B vs C 0.882
15 min Range Mean \pm SD	(98-100) 99 \pm 0.7	(97-100) 99 \pm 0.7	B vs C 0.891
1 hr. Range Mean \pm SD	(99-100) 99 \pm 0.7	(98-100) 99 \pm 0.7	B vs C 0.892
2 hr. Range Mean \pm SD	(98-99) 99 \pm 0.7	(98-100) 99 \pm 0.7	B vs C 0.991
End of surgery Range Mean \pm SD	(98-99) 99 \pm 0.7	(98-99) 99 \pm 0.7	B vs C 0.891
After Extubation Range Mean \pm SD	(99-100) 99 \pm 0.7	(98-99) 99 \pm 0.7	B vs C 0.971

Table (3) & (4) show that there was no significant difference between the two studied groups either in IADL of subjective cognitive functioning questionnaire.

Table (3): Instrumental activity of daily living among the studied groups (data presented as mean \pm SD)

Instrumental activity of daily living	Group B N=30	Group C N=30	P value
Preoperative Range Mean \pm SD	(0-7) 2.9 \pm 2.2	(1-6) 3.3 \pm 1.7	B vs C 0.774
After 3 months Range Mean \pm SD	(0-6) 2.3 \pm 1.9	(1-6) 2.9 \pm 2.1	B vs C 0.316

Table (4): Subjective cognitive functioning questionnaire among the studied groups.

Subjective cognitive functioning questionnaire	Group B N=30	Group C N=30	P value
Preoperative Range Mean \pm SD	(23-28) 25.3 \pm 1.9	(22-28) 24.9 \pm 1.3	B vs C 0.16
After 3 months Range Mean \pm SD	(25-28) 23.9 \pm 1.5	(23-28) 25.6 \pm 1.4	B vs C 0.091

Discussion

Cognition is characterized as the mental processes of vision, memory, and information processing that helps the person to gain knowledge, solve problems, and prepare for the future. It covers the mental processes needed for daily life and should not be confused with intelligence⁴.

General anesthesia affects brain function at all levels, including neuronal membranes, receptors, ion channels, neurotransmitters, brain blood flow and metabolism. Mental correlates to these impairments entail behavioral changes in mood, memory, and muscle control. Such dysfunctions are even more apparent in the event of stress-regulating delivery and in the modification of intracellular signal transduction systems. In addition, more basic cellular mechanisms that play a significant role in the production and release of neurotransmitters, such as intra-neuronal signal transduction and the second messenger mechanism may be disrupted. The roles of the central muscarinic cholinergic system and its various associations with anesthesia medications tend to indicate that modulation of muscarinic cholinergic receptors may play a crucial role in the pathogenesis not only of post-operative delirium but also of the more common post-operative cognitive dysfunction syndrome⁵.

Some reports found that subjective cognitive assessment after heart surgery do not reflect actual changes in cognition but rather appear to be related to mood. Also increased the emotional arousal in surgical patients has no direct relation on test performance².

This agree with our results where no significant cognitive complaint was recorded in surgical patients after three months of surgery.

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