RESEARCH ARTICLE

Studying Recent Memory in Patients Before and After Regional Anesthesia

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Background: Memory has an important role in our social life. General anesthesia has long been known to negatively affect the recent memory. It is also necessary to study the recent memory changes upon regional anesthesia.
Methods: This study is cohort, before-after type, which was accomplished at Imam Khomeini hospital. The recent memory was evaluated before and after regional anesthesia using Wechsler memory scale-revised V. The obtained data were analyzed using SPSS 25 software to calculate median, mean, standard deviation and p-value.
Results: 220 women and 180 men with an average age of 42.7 years old were interviewed, among which 248 patients had accompanied diseases and/or history of former surgeries. It was found that recent memory function reduces upon regional anesthesia. Moreover, different aspects of memory do not exhibit similar extent of sensitivity to anesthesia; logical memory and number repeat reduced pronouncedly.
Conclusion: Regional Anesthesia causes recent memory loss and cognitive disorders.
Keywords: Regional anesthesia; Recent memory; Wechsler memory scale-revised V

Anesthesia is an induced situation in which the patient does not have any voluntary or involuntary control on his body as well as the surrounding. Anesthesia can temporarily cause analgesia, regional paralysis and amnesia. This procedure causes reversible CNS suppression and disappearing response to external stimulants [1]. Amnesia and unconsciousness are two important aspects of anesthesia; it activates amnestic receptors in brain (hippocampus) such that the patient does not remember the surgery process and its trauma. Alpha-5 GABA type A is the main target for anesthetic drugs, and is responsible for amnesia [2].

The regional anesthesia is a common technique that is widely employed for many surgeries. However, it might cause complications such as delirium and cognitive disorder that can result in various socioeconomic difficulties among which the loss of personal independency, decrease in life quality and death are the most prominent [3-4].

It was reported [5] that the general anesthesia is usually accompanied with higher POCD (Post-Operative Cognitive disorder) risk compared to the regional anesthesia; therefore, the high risk patients were strongly recommended to undergo regional anesthesia. POCD risk factors include old age, low education, alcohol abuse, previous cognitive disorder, long-acting anesthetic drugs and severe hemodynamic disorders during surgery [6]. Moreover, it is believed [6] that conservative treatments such as adequate oxygenation and ventilation, precise control of pain and hemodynamic changes can reduce the side effects of the regional anesthesia. The more pain is relieved; the more negative effects are reduced.

Regional anesthesia has drawn many attentions in medical society over past decades [7]. Nevertheless, there is a serious lack of comprehensive researches concerning its effects on the recent memory. Hence, this research aims to study different aspects of the recent memory before and after the regional anesthesia.

Methods

The current paper is based on a Cohort (before-after) study. It was accomplished at surgery ward ONE at Imam Khomeini Hospital, Tehran. The study was conducted on 400 elective available cases. The cases were all in ASA class I, II, III and candidate for abdominal, lower extremities, urological and colorectal surgeries in April and May 2019; All cases were between 16 to 74 years old. Exclusion criteria were any patients with convulsion and neurological problems, emergent patients, mentaly retarded patients, drug abusers (addictive drugs, anti-convulsive agents, psychological drugs) and discontent patients. All patients signed and filled an informed consent form. They were interviewed over which a structured questionnaire was answered once before the regional anesthesia, then during the first 24 hours after recovery and consciousness. The research proposal was approved by the Ethical Board Committee of Anesthesiology Department of Tehran University of Medical Sciences (TUMS).

To measure recent memory, a Wechsler Memory Scale-Revised (WMS-R) V questionnaire was used. It should be noted that WMS-R V is both valid and reliable. Due to the significant effects of the culture and local environment on

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memory and intelligence, the WMS-R V was controlled with respect to Iranian culture, and then was standardized in Farsi. The questionnaire considers five aspects of recent memory including personal information, orientation to time and place, mental control, logical memory and number repeat. Variables of the study are age, gender, past medical history and recent memory. All data were collected and analyzed by statistical means such as mean, median and standard deviation. Since data were found to match with normal distribution functions, Paired T-test method was employed to evaluate the obtained results. For this purpose, confidence interval was set at 95% and significant level less than 0.05; SPSS 25 software was employed for data analyses.

Results

Totally, 400 patients were enrolled in this study over which 220 patients were female and 180 patients were male. Their average age was 42.7 years old; the youngest patient was 16 and the oldest patient was 74 years old. Furthermore, 152 patients didn't suffer from any former diseases and had no history of former surgery, and 248 patients had history of previous surgery, hypertension, diabetes mellitus, hypothyroidism and so on.

(Table 1) lists the mean value of each question together with the corresponding T score. Considering the total score of all patients, the recent memory was found to be negatively affected upon the regional anesthesia. However, only three questions (Q1, Q3 and Q5) resulted in meaningful information, whereas orientation (Q2) and logical memory (Q4) of the patients were not directly found to be affected. Surprisingly, it was found that recent memory functioned slightly superior in term of personal information (Q1) after surgery, which could be a systematic error attributed to the usual stressful situations before operation. Unlike Q1, recent memory was found to be markedly reduced in terms of mental control (Q3) and number repeat (Q5) scores. It can be concluded that loss of recent memory in Q3 and Q5 was much more significant in comparison to the apparent memory enhancement implied from Q1.

Table 1- Mean, standard deviation (S.D.), T score and p-value of all questions together with the total score

Variables	Mean (S.D.)	T (sig)
Personal information(before)	5.23 (1.209)	- 2.85 (0.005)
Personal information(after)	5.25 (1.205)	
Orientation(before)	4.54 (0.831)	1.31 (0.191)
Orientation(after)	4.51 (0.819)	
Mental control(before)	4.98 (1.905)	5.93 (0.000)
Mental control(after)	4.80 (1.936)	
Logical memory(before)	6.94 (3.899)	1.040 (0.299)
Logical memory(after)	6.85 (3.995)	
Number repeating(before)	9.25 (2.32)	8.48 (0.000)
Number repeating(after)	8.96 (2.39)	
Total score(before)	31.025 (8.25)	6.22 (0.000)
Total score(after)	30.460 (8.50)	

The collected data were separately analyzed for men and women; it was found that recent memory was inferior in women. However, the regional anesthesia was found to similarly affect the recent memory in both gender. Moreover, patients with accompanied diseases and/or history of former surgery had worse recent memory but was similarly affected by the regional anesthesia. Finally, it should be mentioned that age is not an effective factor on the extent of loss of recent memory upon the regional anesthesia. Nevertheless, the recent memory function reduces as the age goes up.

Discussion

The results of this research strongly supported the common belief that the regional anesthesia negatively affects the recent memory. It is in contrast to a previous study [8] which reported that recent memory of group of young healthy men was not affected over the first 24 hours after recovery. In fact, cognitive disorder is believed to be a transient situation which would be resolved in the first 24 hours after anesthesia [9]. It seems that the rate at which the recent memory is recovered after the surgery is an important factor which has to be systematically studied.

Unlike previous reports [6], this study revealed that age, accompanied diseases and gender do not independently affect the recent memory upon regional anesthesia. Such contradicting reports might be due to the difference between target groups on which studies were conducted. For instance, the influence of accompanied diseases on the recent memory loss was not meaningful in all age categories under the Wechsler Memory Scale scheme.

The effects of possible systematic errors on the accuracy of Wechsler Memory Scale has to be taken into account when this mean is employed in a study. Patients in the current study were under mental stresses before surgery; it might give rise to negative performance of recent memory before surgery which would result in misleading conclusions. For instance, personal information of the patients was found to be slightly improved after anesthesia. This systematic error might be present in other questions, e.g. Q3 and Q5, but its magnitude is insignificant to change the overall results.

Conclusion

1. The regional anesthesia significantly affects the recent memory.
2. No clear correlation between age, accompanied diseases and gender has been found in this study.

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