

A PROSPECTIVE OBSERVATIONAL STUDY OF INTRA OPERATIVE AWARENESS AND RECALL DURING GENERAL ANESTHESIA

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Abstract

Introduction: Intraoperative awareness is an unexpected memory of intraoperative events. The types of intraoperative awareness are classified into explicit and implicit memories. Explicit memory is the intraoperative awareness that can be recalled spontaneously or may be provoked by postoperative events or questioning. In contrast, implicit memory is the memory that may be consciously recalled but might affect the person's behavior later.

Materials and Methods: The Present study was conducted at the Department of Anaesthesia, Rangaraya Medical College, Kakinada from November 2022 to April 2023 which includes 200 patients who underwent different routine general surgeries. Written informed consent was taken from the patients for participation in this study.

Results: These 200 patients were interviewed as per the protocol in Post anaesthesia care unit (PACU) on the day of surgery. Our study found that among these 100 patients, 2 patients reported remembering something between going to sleep and waking up from anaesthesia, thus 2 cases of awareness were identified. 4 patients reported dreaming and 2 cases of possible awareness were identified.

Conclusion: Awareness occurs despite the usual clinical monitoring of anaesthetic depth like BP, HR and even with the use of entropy. There is currently no evidence that awareness and recall could be prevented by monitoring consciousness with sophisticated methods such as BIS or entropy. If a patient has suffered from awareness and recalls this postoperatively, psychiatric consultation and followup is recommended.

Key Words: Intraoperative awareness, BP, HR, PACU, entropy.

INTRODUCTION

Intraoperative awareness is an unexpected memory of intraoperative events. The types of intraoperative awareness are classified into explicit and implicit memories. Explicit memory is the intraoperative awareness that can be recalled spontaneously or may be provoked by

postoperative events or questioning. In contrast, implicit memory is the memory that may be consciously recalled but might affect the person's behavior later.¹

The causes of intraoperative awareness are not fully established and may be multifactorial. Patients younger in age group, smokers, drug addicts, or long-term use of drugs like opiates and alcohol consumption may increase the individual requirement for general anesthetic drugs.²

It has been postulated that this patient-specific variability, like dose requirements, may be due to altered gene expression of target receptors. Some preclinical studies have shown that long-term exposure to alcohol or persistent seizures has increased the expression of this memory-blocking receptor. The genetic polymorphism of the gamma-aminobutyric acid (GABA) α receptor 5 gene is also an important factor in contributing to intraoperative awareness.^{3,4}

The prevalence of awareness among non-cardiac and non obstetric cases is 0.1% to 0.2%. In a study from Australia, Myles et al reported a frequency of awareness of 0.1%. The prevalence in cardiac cases ranges from 1.1 to 1.5%, in obstetric cases 0.4% and in major trauma cases 11-43%. Sadin et al performed one of the largest study on this topic which included 11785 patients, they identified 18 cases of awareness and reported an overall incidence of 0.16%. Prevalence of awareness was 0.18% in cases in which NMB agents were used and 0.1% in absence of NMB agents.⁵

The main objective of this study is to find the incidence of awareness and recall in patients who undergo different types of surgeries under general anaesthesia.

MATERIALS AND METHODS

An acknowledged and well-established method of detecting awareness involves the use of a structured Brice et al interview 1970 which asks the following questions:

1. What was the last thing you remember happening before you went to sleep?
2. What was the first thing you remember happening on waking up?
3. Did you dream or have any other experience in between?
4. What is the worst thing you remember about your operation/anaesthesia?

The Present study was conducted at the Department of Anaesthesia, Rangaraya Medical College, Kakinada from November 2022 to April 2023 which includes 200 patients who underwent different routine general surgeries. Written informed consent was taken from the patients for participation in this study.

Exclusion Criteria:

1. Patients with abnormal mental status.
2. Patients not expected to survive.
3. Patients Transferred directly to ICU.
4. Patients who belong to Extremes of age (<15 and >60).

Pre-anaesthetic evaluation was done and noted down. In the operating room IV line established, multichannel monitor attached and standard monitoring including baseline pulse, NIBP, SPO2 and ECG connected. Entropy and NM monitoring equipment was attached.

The choice of inducing agent, neuromuscular blocker and maintenance for general anaesthesia was based on the patient and nature of surgical procedure.

Design of the Study and Setting

A prospective observational study for the incidence of awareness with recall during general anaesthesia was conducted. Patients for elective or urgent surgery requiring general anaesthesia were selected.

Patient Interview, Detection and Evaluation

Our definition of awareness is when patient spontaneously or at interview stated or remembered that he or she was awake during operation.

Awareness Classification

AWR-YES: when patient in response to structured questions is sure of having been awake at any time during the operation.

AWR-NO: when patient is sure of having been asleep during anaesthesia and operation.

AWR-POSSIBLE: when patient believes to have been awake and aware during anaesthesia/operation but not sure.

Dreams: YES or NO.

The detection of awareness depends on the interview technique, timing of interview and structure of interview.

Protocol for Patient Detection and followup of the Intraoperative Awareness with Recall-

- Structured interview in PACU on day of surgery.
- Confirmative structured interview by study coordinator 3 days after surgery.

- Structured telephonic interview 30 days after surgery to explain possible cause and propose psychological treatment or advice.

Analysis of possible cause of awareness from data of anaesthesia record.

Statistical Methodology

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc./Chicago, Illinois, USA). Continuous variables were summarized in the form of means and standard deviations and categorical variables were expressed as frequencies and percentages. Graphically the data was presented as bar diagrams. Chi-square test was applied for comparing categorical variables. A P-value of <0.05 was considered statistically significant. All P values were two tailed.

RESULTS

These 200 patients were interviewed as per the protocol in Post anaesthesia care unit (PACU) on the day of surgery. Our study found that among these 100 patients, 2 patients reported remembering something between going to sleep and waking up from anaesthesia, thus 2 cases of awareness were identified. 4 patients reported dreaming and 2 cases of possible awareness were identified.

Awareness Study Results			Total
Awareness	No	Possible	
1(0.5%)	196 (98%)	3 (1.5%)	200 (100%)

Table 1: Awareness and Dreams Study Results

Incidence of Dreams N (%)	Dreams		Total
	No	Yes	
	196 (98%)	4 (2%)	200 (100%)

Table 2: Incidence of Dream

Awareness and Dreams Study Results as per Nature of Surgery

Elective

Total no. of cases = 100.

Awareness = 0 (0. %).

Possible awareness = 1 (1 %).

Emergency

Total no. of cases= 100.

Awareness = 1 (1%).

Possible awareness = 3 (3%)

			Awareness Study results			Total	P Value
			Yes	No	Possible		
Nature of surgery	Elective	N	0	99	1	100	0.003
		%	0	99	1	100%	
	Emergency	N	1	96	3	100	
		%	1	96	3	100%	

Table 3: Possible Awareness Results

Crosstab			Dreams		Total	P Value
			No	Yes		
Nature of surgery	Elective	N	96	4	100	0.004
		%	96	4	100%	
	Emergency	N	98	2	100	
		%	98	2	100%	

Table 4: Incidence of Dream: Elective versus Emergency

DISCUSSION

In our study, 2 cases of awareness (1%) and 2 cases of possible awareness (1.3%) were identified. Our study is comparable to the previous study done by Sabel et al (The incidence of awareness during anaesthesia: A multicentre United States study) and study done by Seppo Ranta (Awareness with recall during general anaesthesia). Like these mentioned studies our study also shows that awareness and recall under general anaesthesia can occur despite using a proper anaesthetic technique and intraoperative monitoring including entropy.⁶

The description of the awareness cases identified in this study closely resembles those reported previously. A significant proportion of awareness episodes occur either during endotracheal intubation or at surgical incision i.e. times when the level of patients stimulation is highest.⁷

Besides the abovementioned reported observations, many patients complained of auditory perceptions and being unable to move or breathe, anxiety, stress, panic, paralysis, pain and sensations of the endotracheal tube were also reported.

Dreaming during anaesthesia was described by 4 patients (2%) and this is consistent with the common occurrence of perioperative dreaming reported in several European studies. Dreaming was more frequently reported in the recovery room than later after surgery. The significance of dreaming and its relationship to awareness during anaesthesia is unclear.⁸

These awareness cases were followed retrospectively to study the intraoperative events and vitals, anaesthetic technique and preoperative status, including demographic data. We could not find any significant predictor of possible awareness in these cases of awareness. All the cases were monitored intraoperatively by using entropy from induction to emergence at fixed intervals

of time and in these 2 cases of awareness entropy was found consistently above 60 but there was no association between increased entropy readings and the incidence of awareness as many patients had entropy above 60 but did not report awareness in our study.

Awareness is caused by the administration of general anaesthesia that is inadequate to maintain unconsciousness and to prevent recall during surgical stimulation. Common causes include large anaesthetic requirements, equipment misuse or failure and smaller doses of anaesthetic drugs.

Various studies found an increased risk of awareness with sicker patients undergoing major surgery, this finding may reflect the use of smaller anaesthetic doses and light anaesthetic techniques in sicker patients.⁹

In many cases, awareness during anaesthesia is a potentially avoidable adverse anaesthetic outcome. In light of followup studies suggesting that such victims of awareness may exhibit significant psychological after effects such as PTSD, attempts to further reduce its incidence are warranted.

Because awareness occurred despite the usual clinical monitoring of anaesthetic depth (BP, HR and end tidal anaesthetic monitoring), a monitor of cerebral function and depth of anaesthesia may be of theoretical benefit.¹⁰

The limitation of our study is that it did not assess the long term psychological sequelae of intraoperative awareness and recall among the victims.

CONCLUSION

Awareness is caused by the administration of general anaesthesia that is inadequate to maintain unconsciousness and to prevent recall during surgical stimulation. Awareness occurs despite the usual clinical monitoring of anaesthetic depth like BP, HR and even with the use of entropy.

There is currently no evidence that awareness and recall could be prevented by monitoring consciousness with sophisticated methods such as BIS or entropy. However, any clinical signs are much more unreliable in this respect and certainly it would be wise to use EEG based monitoring if a patient has history of awareness with recall under general anaesthesia. If a patient has suffered from awareness and recalls this postoperatively, psychiatric consultation and followup is recommended.

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