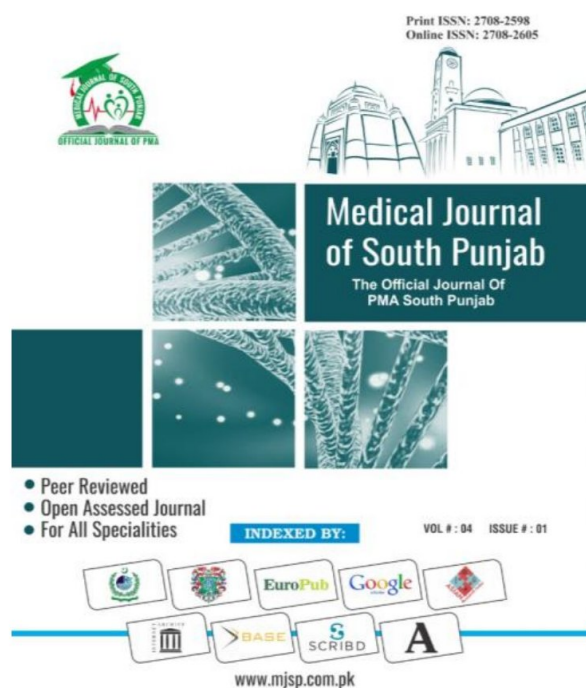


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Incidence of Unintended Intraoperative Awareness in Total Intravenous Anesthesia Using Modified Brice Scoring System as a Tool

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ABSTRACT

Objective: Current study was planned to assess the incidence of awareness in patients undergoing general anesthesia (GA).

Methods: Cross sectional study was conducted at Sindh Employees Social Security Hospital Landhi Karachi from June 2021 to May 2022 in one-year duration. A total of 200 patients who underwent various surgical procedures, including septoplasty, endoscopic sinus surgery (FESS), mastoidectomy, laparoscopic procedures, all performed under general anesthesia. Primary variable of study was intraoperative awareness that was assessed by using Brice scoring system.

Results: Modified Brice questions were asked to all of the patients. It was seen that 96.5% patients completely asleep for this operation. 9.5% patient's memory about going to sleep and waking up. 8.0% patients had dream during the procedure. In our study, 9.5% patients were aware categorized as A, 36.0% patients were possible aware categorized as B and 54.5% patients had no awareness.

Conclusion: The current study reveals a notably elevated incidence of intraoperative awareness in patient when compared to previous research, indicating a significant association between awareness and comorbidities among individuals undergoing surgery under general anesthesia.

Keywords: Intraoperative awareness, General anesthesia, Brice scoring system, Elective surgeries, Recovery

1. INTRODUCTION

Awareness under anesthesia, also known as intraoperative awareness, refers to a situation in which a patient becomes conscious and aware of their surroundings during surgery while under general anesthesia¹. The incidence of awareness during general anesthesia is generally considered low, with estimates ranging from 0.1% to 0.2% of patients experiencing this phenomenon². It is acknowledged that certain patient populations, such as obstetric and cardiac patients, may have higher rates of awareness. The increased incidence in these groups could be attributed to various factors, including the complexity of the surgeries involved, differences in anesthetic techniques, and the need for lighter levels of anesthesia to protect the fetus in the case of obstetric patients^{3,4}.

Some patients are too shy to share their experiences, especially regarding intraoperative awareness, which refers to a patient's awareness of events during surgery⁵. This phenomenon occurs when a patient becomes conscious during a surgical procedure and has the ability to recall aspects of it afterward⁶. Some patients have faint auditory memories or dream-like sensations, which may not be overly distressing to them. However, the mention of unpleasant dreams being remembered more often than actual events raise some interesting points⁷.

Approximately 36% of patients who experienced awareness reported feeling some form of pain, ranging from surgical incision pain to throat irritation⁸. It's necessary to note that awareness during anesthesia is generally considered a rare occurrence, and advances in monitoring techniques and anesthesia administration have significantly reduced its occurrence⁹. An incidence of 33% late symptoms such as

nightmares, anxiety, flashbacks affecting those who experienced awareness indicate the potential psychological toll of such an experience¹⁰. Monitoring and addressing these psychological effects are important components of post-operative care¹¹.

Addressing awareness during general anesthesia aligns with the broader goal of continuous quality improvement in anesthesia. By identifying and mitigating potential risks, the study aims to contribute to the overall enhancement of patient care and outcomes.

2. METHODOLOGY

Study conducted at Sindh Employees Social Security Hospital Landhi Karachi from June 2021 to May 2022 in one-year duration. The study focused on patients who underwent various surgical procedures, including functional endoscopic sinus surgery (FESS), mastoidectomy, septoplasty, or laparoscopic procedures, all performed under general anesthesia. The study excluded individuals who refused to participate, those with low Glasgow Coma Scale (GCS) scores, and those who didn't meet extubation criteria. Specifically, patients with a GCS score of less than nine were not included in the study. On the other hand, individuals with a GCS score ranging from 10 to 15/15 were considered eligible and included in the study. Extubation criteria include the patients with adequate ventilation and oxygenation, intact neurology, complete reversal of muscle relaxation and hemodynamically stable.

Data collection involved the utilization of a pre-validated semi-structured questionnaire comprising two sections. The first section was dedicated to gathering demographic information, encompassing details such as age, sex, type of surgery, history of surgery before, ASA status, comorbid conditions and substance abuse or chronic drug intake. Meanwhile, the second section incorporated the modified form of the Brice questionnaire,

a recognized tool designed for assessing awareness in patients undergoing general anesthesia.

During the procedure and throughout the recovery period, meticulously documented the patient's vital signs, encompassing parameters such as electrocardiography, oxygen saturation, heart rate and non-invasive blood pressure. Prior to surgery, the investigator provided counseling to the patients, securing their informed consent. The administered anesthesia was of the balanced type, accompanied by a muscle relaxant. We utilized Train of Four (TOF) monitoring to assess the neuromuscular blockage level for the supplementary administration of relaxants.

Following the completion of the surgery, administered the reversal agent for anesthesia, removed the endotracheal tube, and subsequently transferred the patient to the postoperative ward upon successful restoration of consciousness. Approximately one hour after their arrival in the postoperative ward, evaluated the study participants for intraoperative awareness through a questionnaire.

The questionnaire classifies patients into three categories: Class A, where experiences during anesthesia or surgery are remembered and confirmed by medical personnel; Class B, indicating potential awareness where patients may not recall specifics but could make connections to surgery. In Class C intraoperative events were not recalled but little scenarios pre and post-operative procedures.

Data were input into Microsoft Excel (Redmond, USA), and analysis was conducted using IBM SPSS Statistics for Windows. Qualitative variables were expressed using frequency and percentage, with the Chi-square test employed for assessing relationships.

3. RESULTS

Overall, 200 patients were included in our study, both genders. The mean age of the patients was 52.88 ± 5.82 years. There were 155 (77.5%) males and 45 (22.5%) females. According to ASA grading, 69 (34.5%) patients had I grade and most of the patients 131 (65.5%) had II grade. Diabetes was observed in 49 (24.55) patients and 61 (30.5%) patients were hypertensive. (Table. I).

Modified Brice questions were asked to all of the patients. It was seen that 193 (96.5%) patients completely asleep for this operation. 19 (9.5%) patients remembered anything between going to sleep and waking up. 16 (8.0%) patients had dream during the procedure. Whereas, 121 (60.5%) patients felt pain during operation. (Table. II).

In our study, 19 (9.5%) patients were aware categorized as A, 72 (36.0%) patients were possible aware categorized as B and 109 (54.5%) patients had no awareness. There was no association between age, gender, ASA grading and co morbidities with regards to modified Brice categories, ($p > 0.050$). (Table. III).

Table-1: Demographic and baseline characteristics of the study groups

Characteristic	Frequency	Percentage
Age (years)		
Mean±S.D	52.88±5.82	
Gender		
Male	155	77.5
Female	45	22.5
ASA		
I	69	34.5
II	131	65.5
Comorbidities		
Diabetes	49	24.5
Hypertension	61	30.5

Table-2: Modified Brice questions' responses of the study patients

Questions	Frequency	Percentage
Completely sleep		
Yes	193	96.5
No	7	3.5
Last talk that remembered by patients before sleep		
Stinging and Burning	160	80.0
Feeling of face mask	27	13.5
Smelling of gas	13	6.5
First thing remembers after waking up		
Feeling breathing tube	147	73.5
Feeling of face mask	31	15.5
Painful feeling	12	6.0
Lying in recovery room	10	5.0
Do you remember anything between going to sleep and waking up?		
Yes	19	9.5
No	184	92.0
Did you dream during the procedure?		
Yes	16	8.0
No	184	92.0
Were your dreams disturbing to you?		
Yes	14	7.0
No	186	93.0
What was the worst thing about your operation?		
Pain	121	60.5
Recovery process	42	21.0
Unable to carry out activities	37	18.5

Table-3: Association of demographic and baseline characteristics with modified Brice questionnaire

Characteristic	Category			p-value
	A 19 (9.5%)	B 72 (36.0%)	B 109 (54.5%)	
Age (years)	52.16±5.62	53.45±5.05	56.62±6.32	0.547
Gender				
Male	14 (73.7)	54 (75.0)	87 (79.8)	0.687
Female	5 (26.3)	18 (25.0)	22 (20.2)	
ASA				
I	6 (31.6)	25 (34.7)	38 (34.9)	0.961
II	13 (68.4)	47 (65.3)	71 (65.1)	
Comorbidities				
Diabetes	6 (31.6)	13 (18.1)	30 (27.5)	0.263
Hypertension	8 (42.1)	25 (34.7)	28 (25.7)	0.223

4. DISCUSSION

Insufficient administration of general anesthesia, whether due to surgical and patient factors necessitating intentional reduction in anesthetic depth or influenced by pharmacogenetic variables leading to varying anesthesia dosage requirements, may result in unintended awareness during a medical procedure^{12,13}. It was seen that 193 (96.5%) patients completely asleep for this operation. 19 (9.5%) patients remembered anything between going to sleep and waking up. 16 (8.0%) patients had dream during the procedure. Whereas, 121 (60.5%) patients felt pain during operation.

A review article by Schwender et al¹⁴, stating an incidence of awareness among patients undergoing general anesthesia as 0.5 to 2 percent, suggest that they found a relatively low occurrence of awareness. Studies conducted by Singla et al¹⁵ in 2017 and Ambulkar et al¹⁶ in 2016 reported difference in incidence of awareness 0.33% from our study and these earlier studies could indeed be attributed to several factors such as age differences or variations in sample size.

A study was compiled by Odor et al on total of 3115 patients and reported an incidence of awareness during surgery as 0.39% and describe an association between awareness and comorbidity (deranged BMI). Another study conducted in Ethiopia in 2019 by Tamire et al¹⁸ included 1065 patients and found 8.2% incidence rate of unintended awareness in perioperative period. Additionally, the study concluded that there was no association with comorbidities.

A study conducted by Parate et al¹⁹ in 2021 regarding the patient's dream prevalence undergoing general anesthesia in Karnataka, India and reported incidence of dream during surgery 12.5%. Another study was conducted by Lakshmi et al²⁰ and reported incidence of intraoperative awareness in 2% patients and incidence of dreaming in 2.5% of patients.

Limitations: The study have a small sample size, limiting the generalizability of the findings to a broader population. The results may not accurately represent the entire population of patients under general anesthesia. Awareness experiences and reporting tendencies may vary across different cultures and regions. The study's findings may not be universally applicable without considering these variations.

5. CONCLUSION

The current study reveals a notably elevated incidence of intraoperative awareness in patient when compared to previous research, indicating a significant association between awareness and comorbidities among individuals undergoing surgery under general anesthesia.

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