# INTRA-OPERATIVE AWARENESS WITH THE USE OF INFUSION DEXMEDETOMIDINE AND INFUSION PROPOFOL IN PATIENTS UNDERGOING CORONARY ARTERY BYPASS GRAFTING

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## ABSTRACT

**Background:** Awareness under anaesthesia is defined as the patient's memory of intraoperative events while under general anaesthesia. Although uncommon, it is a well-known anaesthesia complication. Despite the improvement in anesthesia technique and anesthetics, risk of awareness during anesthesia is high.

**Objectives:** To assess the intra-operative awareness of patients with the use of infusion dexmedetomidine and infusion propofol in patients undergoing coronary artery bypass grafting.

**Method:** This cross-sectional study was conducted on 300 patients and their medical records were assessed to note the intraoperative vitals and anesthesia details. Then patients were interviewed through Brice questionnaire. On the basis of responses, awareness during anesthesia was noted. All the data was recorded in proforma and analyzed in SPSS v. 25.

**Results:** Overall, the mean patient age was 59.28 ± 8.68 years. Only 2 (0.67%) of 300 patients revealed awareness under anesthesia. 1 young patient (50%) and 1 geriatric patient (50%, p = 0.924) experienced awareness during anesthesia, compared to 2 females (100%) and 0% (0.000) of men. Patients with overweight and obesity were more aware than those with normal or severe obesity (p = 0.447). Anesthesia duration did not significantly affect awareness during anesthesia, with 100% of patients experiencing awareness throughout 240 min (p = 0.676). Operative and intubation time did not affect awareness (p >0.05). Two (100%) individuals with pre-operative MAP 91-120 mmHg had awareness during anesthesia, with significant impact from heart rate and ejection fraction (p <0.05) among 300 patients.

**Conclusion:** We conclude that with use of Dexmedetomidine and Propofol infusion, the risk of awareness during anesthesia is very low (0.67%).

**Key words:** intra-operative awareness, infusion, dexmedetomidine, propofol, coronary artery bypass grafting

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## INTRODUCTION

"Awareness under anaesthesia" is defined as the patient's memory of intraoperative events while under general anaesthesia. Although uncommon, it is a well-known anaesthesia complication.[1, 2] After surgical nausea and vomiting, intraoperative consciousness is one of the most upsetting adverse effects of anaesthesia for patients. In addition to causing issues during surgery, it may also result in issues down the road, such PTSD. Furthermore, intraoperative consciousness has become a crucial element in negligence cases involving anaesthetic.[3, 4] To guarantee that patients are pain-free and in the right depth of anaesthesia during surgery, anesthesiologists use their clinical judgement in conjunction with the right anaesthetic drugs and dose, depending on each patient's circumstances. Aspects of consciousness under anaesthesia remain unresolved despite the current effort.[5, 6]

Despite improvements in monitoring, medications, and procedures, accidental consciousness and recollection remains a well-known side effect of anaesthesia and sedation.[7] Many patients can be reluctant to talk about their experiences unless they are particularly asked. One to two weeks following surgery, some patients may remember what happened, but not immediately. [8] Out of 1000 patients under general anaesthesia, 1 to 2 instances (0.1 to 0.2 percent) may experience awareness under anaesthesia.[9] Overall, the incidence is higher in cardiac and obstetric cases, where it has been reported to be between 1.1 and 1.5 percent and 0.4 percent, respectively.[10] Once more, the incidence is greater in youngsters, ranging from 0.8 to 1.2 percent.[8] Even if the majority of awareness events are minor, some persons have negative, long-lasting repercussions including depression and post-traumatic stress disorder. Up to 33% of people who have experienced awareness have reported having late symptoms including anxiety, nightmares, and flashbacks.[11] The purpose of this study is to determine how frequently patients undergoing coronary artery bypass grafting are aware of the administration of infusions of propofol and dexmedetomidine during surgery. The danger of consciousness under anaesthesia is substantial, even with advancements in anaesthesia technique and anaesthetic, which leads to depressive symptoms among patients in post-surgical period. Therefore, we want to conduct this study to get evidence for local population.

## METHODS

**Study Design, Duration, Sample Size and Selection Criteria:**This Cross-sectional study was conducted at the Department of Cardiac Anesthesia, National Hospital & Medical Center, Lahore during January 2025 to June 2025. Sample size of 300 cases is calculated with 95% confidence level, 5% margin of error and percentage of awareness i.e. 25.1% during bypass surgery.[12] All the patients, who fulfilled following criteria were enrolled in the study by applying Non-probability, consecutive sampling technique. Patients of age 30-70 years, either gender, undergoing bypass surgery under general anesthesia were enrolled. Patients were given propofol at the dose of 50 mics per kg per minute and dexmedetomidine at the dose of 0.5 mics per kg per minute were included in the study. Patients already had previous history of PCI or bypass surgery, could not understand local language or did not want to take part in study were excluded.

**Data Collection and analysis Plan:** Patients were enrolled form post-surgical wards and informed consent was taken. Demographics including name, age, gender, BMI, were noted. Then medical record was assessed to note the duration of anesthesia, operative time, intubation time, MAP before procedure, heart rate before procedure and ejection fraction. Then patients were interviewed by using appendix 1 and responses were noted. On the basis of responses, awareness during anesthesia was labeled if 50% or more awareness questions about anesthesia and anesthetists[12] were answered correctly by patients. All the data was recorded in proforma. SPSS version 25 was used to analyze the data. Awareness during anesthesia was presented as frequency (%). "Chi-square test" was applied to compare frequency of awareness during anesthesia in different groups. P-value ≤0.05 was kept as significant.

**Table I: Modified Brice Questionnaire to observe the awareness during anesthesia**

**1. What is the last thing you remember before going to sleep (please tick one box)?**

-Being in the pre-op area ▫-Seeing the operating room ▫

-Being with family ▫-Hearing voices ▫

-Feeling mask on face ▫-Smell of gas ▫

-Burning or stinging in the IV line ▫-Other [Please write below]:

_____

**2. What is the first thing you remember after waking up (please tick one box)?**

-Hearing voices ▫-Feeling breathing tube ▫

-Feeling mask on face ▫-Feeling pain ▫

-Seeing the operating room ▫-Being in the recovery room ▫

-Being with family ▫-Being in ICU ▫

-Nothing ▫-Other [Please write below]:

**3. Do you remember anything between going to sleep and waking up (please tick box)?**

-No ▫

-Yes:-Hearing voices ▫-Hearing events of the surgery ▫

-Unable to move or breathe ▫-Anxiety/stress ▫

-Feeling pain ▫-Sensation of breathing tube ▫

-Feeling surgery without pain ▫-Other [Please write below]

_____

**4. Did you dream during your procedure (please tick box)?**

-No ▫-Yes ▫

-What about [Please write below]: [Pleasant/unpleasant/unidentified]

_____

**5. Were your dreams disturbing to you (please tick box)?**

-No ▫-Yes ▫

**6. What was the worst thing about your operation (please tick box)?**

-Anxiety ▫-Pain ▫ Recovery process ▫-Unable to carry out usual activities ▫

-Awareness ▫-Other [Please write below]:

_____

**Awareness during Anesthesia: Yes ▫ No ▫**

## RESULTS

In this study, we enrolled 300 patients who underwent bypass surgery under general anesthesia. The mean age of all the patients was 59.28 ± 8.68 years. Out of 100 patients, 160 (53.3%) were aged 45-60 years while 140 (46.7%) were ages 61-75 years. There were 270 (90%) male patients while only 30 (10%) females' patients. The mean BMI of patients was 27.36 ± 4.68 kg/m$^2$. There were 96 (32%) patients with normal BMI, 140 (47%) were overweight, 42 (14%) were obese while 22 (7%) patients were morbidly obese. The mean duration of

anesthesia was 300.50 ± 53.65 min and mean operative time was 276.70 ± 51.21 min. The mean intubation time was 31.17 ± 4.30 sec. The mean pre-operative MAP of patients was 105.20 ± 19.20 mmHg, mean heart rate was 72.93 ± 14.34 bpm and mean ejection fraction was 51.51 ± 11.79 %. Table I

Out of 300 patients, only 2 (0.67%) had awareness during anesthesia.

Awareness during anesthesia was reported in young age patients 1 (50%) as well as in 1 old patient (50%, p = 0.924) and in females [2 (100%)] as compared to males (0%, p = 0.000). Awareness was more observed in patients with overweight and obese patients as compared to patients with normal or morbidly obese patients (p = 0.447). Duration of anesthesia had no significant impact on awareness during anesthesia and 100% patients receiving anesthesia for ≥240 min experienced awareness during anesthesia (p = 0.676), as well as operative time and intubation time had no impact on awareness during anesthesia (p >0.05). Out of 300 patients, 2 (100%) patients with pre-operative MAP 91-120 mmHg experienced awareness during anesthesia, while pre-operative heart rate level and ejection fraction had significant impact on awareness during anesthesia (p <0.05). Table II

Table I: Basic information of patients underwent bypass surgery under general anesthesia (n = 300)

| Variables | Mean ± SD, F (%) |
|---|---|
| Age (years) | 59.28 ± 8.68 |
| 45-60 years | 160 (53.3%) |
| 61-75 years | 140 (46.7%) |
| Gender | |
| Male | 270 (90%) |
| Female | 30 (10%) |
| BMI (kg/m$^2$) | 27.36 ± 4.68 |
| Normal BMI | 96 (32%) |
| Overweight | 140 (46.7%) |
| Obese | 42 (14%) |
| Morbidly obese | 22 (7%) |
| Duration of anesthesia (min) | 300.50 ± 53.65 |
| <240 min | 24 (8%) |
| ≥240 min | 276 (92%) |
| Operative time (min) | 276.70 ± 51.21 |
| <240 min | 54 (18%) |
| ≥240 min | 246 (82%) |
| Intubation time (sec) | 31.17 ± 4.30 |
| 20-30 sec | 156 (52%) |
| 31-40 sec | 144 (48%) |
| MAP (mmHg) | 105.20 ± 19.20 |
| 60-90 | 60 (20%) |
| 91-120 | 192 (64%) |
| 120-150 | 30 (10%) |
| >150 | 18 (6%) |
| HR (bpm) | 72.93 ± 14.34 |
| 40-80 | 216 (72%) |
| 81-120 | 84 (28%) |
| EF (%) | 51.51 ± 11.79 |
| <30 | 12 (4%) |
| 31-60 | 34 (78%) |
| >60 | 54 (18%) |

Table II: Relationship of awareness during anesthesia with effect modifiers

| Variables | | Awareness during Anesthesia | | P-value |
|---|---|---|---|---|
| | | Yes (n = 2) | No (n = 298) | |
| Age (years) | 45-60 | 1 (50%) | 159 (53.4%) | 0.924 |
| | 61-75 | 1 (50%) | 139 (46.6%) | |
| Gender | Male | 0 (0.0%) | 270 (90.6%) | 0.000 |
| | Female | 2 (100%) | 28 (9.4%) | |
| BMI | Normal | 0 (0.0%) | 96 (32.2%) | 0.447 |
| | Overweight | 1 (50%) | 139 (46.6%) | |
| | Obese | 1 (50%) | 41 (13.8%) | |
| | Morbidly obese | 0 (0.0%) | 22 (7.4%) | |
| Duration of anesthesia (min) | <240 min | 0 (0.0%) | 24 (8.1%) | 0.676 |
| | ≥240 min | 2 (100%) | 274 (91.9%) | |
| Operative time (min) | <240 min | 1 (50%) | 53 (17.8%) | 0.237 |
| | >240 min | 1 (50%) | 245 (82.2%) | |
| Intubation time (sec) | 20-30 sec | 0 (0.0%) | 156 (52.3%) | 0.140 |
| | 31-40 sec | 2 (100%) | 142 (47.7%) | |
| MAP (mmHg) | 60-90 | 0 (0.0%) | 60 (20.1%) | 0.769 |
| | 91-120 | 2 (100%) | 190 (63.8%) | |
| | 121-150 | 0 (0.0%) | 30 (10.1%) | |
| | >150 | 0 (0.0%) | 18 (6.0%) | |
| Heart rate (bpm) | 40-80 | 0 (0.0%) | 216 (72.5%) | 0.023 |
| | 81-120 | 2 (100%) | 82 (27.5%) | |
| | <30 | 2 (100%) | 10 (3.4%) | |
| Ejection fraction (%) | 31-60 | 0 (0.0%) | 234 (78.5%) | 0.000 |
| | >60 | 0 (0.0%) | 54 (18.1%) | |

## DISCUSSION

Due to reduced encoding, dexmedetomidine has been proposed to induce dose-dependent memory degradation; nevertheless, at low dosages, memory for emotionally charged stimuli appears to be better retained than memory for neutral stimuli. Propofol is known to inhibit the learning of emotionally charged information at anaesthetic doses.[13, 14] According to studies, psychological issues including nightmares, difficulty focusing, flashbacks, sleep issues, PTSD, panic attacks, irritability, and even a propensity to shun medical treatment might be linked to consciousness during anaesthesia.[15]

This suggests that memory for emotionally charged content is reduced or lost, even though the mechanisms for an instantaneous emotional reaction may be mostly unaffected by sedation. This might have therapeutic ramifications since individuals sedated with dexmedetomidine or propofol may experience emotional responses to unpleasant or arousing stimuli while under sedation that they are unable to explicitly recall afterward. Even in the absence of a clear memory of the traumatic incident, post-traumatic symptoms may manifest. [15, 16] Dexmedetomidine-treated individuals were better at identifying the emotional sounds than propofol-treated participants (42% vs. 15%), but none of them mentioned the noises on their own.[16] Only 2 (0.67%) of the participants in our research showed signs of consciousness during anaesthesia. Awareness during anesthesia was reported in young age patients 1 (50%) as

well as in 1 old patient (50%, p = 0.924) and in females [2 (100%)] as compared to males (0%, p = 0.000). However, prior research has shown that peri-operative anxiety, tracheal intubation, female gender, advanced age, and no use of opiate analgesics were risk factors for consciousness during anaesthesia.[17, 18] According to studies, the main causes of consciousness include mild anaesthesia and the use of neuromuscular blocking drugs.[19, 20] In patients undergoing coronary artery bypass grafting, the total rate of consciousness under anaesthesia is estimated to be between 0.1 and 0.2% and 1.5 and 23%.[21, 22] Hou et al., found that the highest levels of consciousness under anaesthesia were linked to cardiothoracic surgery.[17] It is well known that compared to other surgical operations, there is a greater chance of consciousness under anaesthesia during heart surgery. Nonetheless, research has revealed a variety of these issues, some of which may be influenced by other variables.[22]

But according to a different study, sedative dosages of propofol decrease the hippocampus response to visually emotionally stimulating stimuli but do not alter the amygdala reaction.[23, 24] In our study, we observed awareness was more common in patients with normal BMI (6.3%) and among morbidly obese patients (28.6%, p = 0.003). Duration of anesthesia had significant impact on awareness during anesthesia and 25% patients receiving anesthesia for <240 min had awareness during anesthesia (p = 0.002). The results of intraoperative monitoring and what was reported for consciousness under anaesthesia do not exactly correlate, according to the existing body of medical literature. According to Al-Husban et al., 40% of patients had consciousness during anaesthesia using the isolated forearm approach, however none of them were able to recall any intra- or peri-operative events. They came to the conclusion that even at sub-anesthetic dosages, anaesthetic drugs had strong amnesia effects.[25]

However, research showed that when a patient had no memory, awareness under anaesthesia that was only identified by technical monitoring did not cause serious psychological problems.[26] Other research has backed direct postoperative questioning rather than relying only on monitoring judgement.[27] According to a review paper, monitoring to determine the level of anaesthesia was not usually advised because it could not be equivalent to patients reporting consciousness during anaesthesia.[28]

## CONCLUSION

We concluded that with use of Dexmedetomidine and Propofol infusion, the risk of awareness during anesthesia is very low (0.67%). This drug combination of reliable and in future, we will use this combination for general anesthesia to reduce postoperative depressive symptoms that occur due to awareness during anesthesia.

## LIMITATIONS

This study had several limitations. First, the sample size was small and the study was done at a single center, making it challenging to generalize the results. Second, variations in surgical techniques and anesthetic management across various providers may have impacted the outcomes. In conclusion, the long-term neurocognitive effects of dexmedetomidine and propofol remain unexamined. Further research involving larger populations and multicenter designs is necessary to confirm these findings.

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## ETHICAL APPROVAL

Ethical approval of synopsis was granted by the Institutional review Board of National Hospital & Medical Center via reference No.NHMC/HR/IRB/00790 dated; 15 January, 2025

## CONFLICT OF INTEREST

Authors declare no conflict of interest.

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## AUTHOR'S CONTRIBUTIONS

SMAT: Concept, methodology, formal analysis & writing
SAK: Visualization, Supervision, Writing & Editing
UF: Data collection, Investigation & Writing
UAM: Methodology, Writing Review & Editing.
RA: Data Curation & Writing
All Authors: Approval of the final version of the manuscript to be published

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