



A CROSS-SECTIONAL STUDY ON INTRAOPERATIVE AWARENESS DURING GENERAL ANAESTHESIA

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ABSTRACT

Background: Intraoperative awareness is a distressing event for a patient undergoing surgery. It affects 1-2 per 1000 patients who undergo surgery under general anaesthesia. There is a dearth of studies carried out in India on intraoperative awareness. The present study was undertaken with the aim to determine the incidence of intraoperative awareness in patients undergoing general anaesthesia. **Methods:** A hospital based cross-sectional study was conducted among adult patients admitted to hospital for surgery. An interview in their local language with the help of a pre-structured and pre-tested questionnaire was carried out over 9 months. Anaesthesia depth was monitored clinically using measurements of end tidal concentration of volatile anaesthetic agents. After anaesthesia, accounts of patients regarding possible intraoperative awareness were analysed. **Results:** 238 patients were included in the study. None of the patients experienced awareness during general anaesthesia (Category A), possible intraoperative awareness was observed in 2 patients (0.8%) (Category B), and 11 patients (4.6%) experienced intraoperative dreaming. **Conclusion:** Our study suggests intraoperative awareness is an uncommon phenomenon.

KEYWORDS : Intraoperative awareness, General Anaesthesia, Depth of Anaesthesia

INTRODUCTION

Intraoperative awareness is defined as a recalled event in which a patient becomes conscious during a procedure performed under general anaesthesia. The term "awareness" is limited to 'explicit memory' during anaesthesia and does not include the time before general anaesthesia is fully induced or the time of emergence from general anaesthesia^{1,2}. The incidence of awareness has been reported to be between 0.1% and 0.2% in the general surgical population in the Western world.^{3,4} Patients undergoing caesarean section, cardiothoracic surgery or emergency surgery, patients with a difficult airway and those developing intra-operative hypotension are among those considered to have increased chances of awareness and the incidence in this group may be as high as 1-2%.⁵ The incidence of awareness may vary among patient population due to differences in genetic make-up and anaesthesia technique.⁶ Although the risks associated with anaesthesia have progressively decreased, yet awareness during anaesthesia remains a serious complication with potential long term psychological sequelae. Awareness during anaesthesia may occur despite apparently sound anaesthetic management and is usually not associated with pain. However, a few cases may experience excruciating pain and have long term neuropsychiatric sequelae like posttraumatic stress disorder. This adverse event can also have serious medicolegal implications.

MATERIALS AND METHODS

After approval from the institutional ethical committee and after obtaining informed consent from the patients the present study was done among adult (18-60 years), ASA 1 and 2 patients who were scheduled for surgical procedures under general anaesthesia in the departments of general surgery, gynecology, orthopedics and ENT over a period of 9 months (01 February 2018-30 November 2018). Exclusion criteria for this study were refusal of consent and any neuropsychological disorder.

The choice of anaesthetic agents, muscle relaxants, and

perioperative analgesia for a given surgical procedure was as per the routine protocol followed in the institution and patient's condition. All patients received balanced general anaesthesia (induction with induction agents, opioids and muscle relaxant with maintenance of anaesthesia with opioids, muscle relaxants and halogenated agents) with or without regional technique depending on the surgery and the theatre anesthetist. The depth of anaesthesia was assessed based on the patient's intraoperative vitals and minimal alveolar concentrations (MAC) of volatile anaesthetics. Instrumental monitoring of anaesthesia depth was not carried out. Volatile anaesthetic concentrations were within the range of 0.5-1.2 et MAC (end-tidal). Mandatory intra-operative monitoring included continuous electrocardiogram monitoring, pulse oximetry, temperature, capnography and noninvasive blood pressure. None of the patients had bispectral index (BIS) monitoring. Over the whole study period, anaesthesia technique remained consistent.

The first part of the questionnaire was used to collect demographic data concerning patients and anaesthetic procedures required for statistical analysis: age, sex, ASA score, type of anaesthesia and premedication, muscle relaxants used, time between anaesthesia and administration of the questionnaire, data regarding possible earlier awareness, and substances or drugs used and second part of the questionnaire was modified from Brice et al⁷. The patients were interviewed during their postoperative hospital stay using a pre-structured and pre-tested questionnaire. Evaluation of awareness was based upon the interview. The primary outcome measure was the incidence of confirmed awareness, which was defined by the patient's recollection of intra-operative events during the interview using the structured questionnaire. All patients who were suspected to have awareness as per interview were re-interviewed by an independent reviewer to confirm the diagnosis of awareness. Definite awareness was defined as occurring when the patient was certain of having been aware at any time during the operation. Awareness was considered as possible in those cases where the patient thought he had been awake during

surgery, but was not completely sure. These definitions were based on a previous study by Errando et al.⁵ Data was entered and analyzed using SPSS version 18.0 (SPSS Inc., Chicago, IL, USA).

RESULT

A total of 250 patients were selected for the study, 12 patients refused to participate and were removed from the study. Out of 238 patients enrolled, 60.1% were in the age group 18-40 years and rest 39.9% patients were 41-60 years old. The mean age of the participants was found to be 37.9 years. 55.5% participants were women and 45.5% were men. Almost half (47.1%) of participants were educated till primary school. All the participants were ASA physical status I & II (ASA I- 72.7% & ASA II-27.3%) [Table 1]

Table 2 gives a summary of the events remembered by the patients immediately before going to sleep which includes being in the pre-op area (17.2), seeing the operating room (14.3), feeling mask on face (12.6), hearing voices (11.7), burning/stinging in the IV line (10.5), being with family (9.7) and others. Table 3 summarizes events remembered by the patients immediately after waking up.

None of the patients experience intraoperative awareness (Category A). Two patients were observed to have possible intraoperative awareness (Category B). One of these patients remembered hearing voices just before waking up from anaesthesia. This patient was a 24 year old female ASA I posted for breast surgery without any addictions or previous history of awareness. She did not dream during anaesthesia and her report was classified as possible awareness (Category B). Another patient who was classified as possible awareness was 26 year old male ASA I posted for mastoid exploration surgery, who recalled looking at bright light just before waking up. He gave history of occasional drinking but no previous history of intraoperative awareness. One patient vaguely remembered feeling of pain but couldn't describe it. One patient recalled light which was associated with overhead lamp in OT, one patient remembered inability to move and hearing voices but this was recall from after waking up from anaesthesia. The above descriptions were classified as no awareness (Category C). The remaining 232 patients (97.5%) didn't remember anything between going to sleep and waking up.

Intraoperative Dreaming was observed in 11 (4.6%) patients. Five of these patients responded as having a dream during anaesthesia but they were not able to recall the nature of the dream. Three (1.2%) patients dreamt about their family/friend, one (0.4%) dreamt about fire/fiery red color, one (0.4%) just mentioned it as a good dream and another patient (0.4%) said it was a strange dream. [Table 5]

DISCUSSION

The incidence of intraoperative awareness correlates with depth of anaesthesia which depends on patient's condition and the type of monitoring methods applied to evaluate. Also awareness is a patient reported incident and it has to be thoroughly assessed by the physician. We divided patients with perioperative recall into those who recall concrete events associated with the surgery (awareness) and those who cannot describe their sensations precisely enough to consider them as fragments of events that occurred during surgery as mentioned in other studies.^{4,8,9,10}

After thorough interview and analysis we classified two patients as Category B (possible intraoperative awareness). Researchers from other countries define intraoperative awareness as situations in which patients describe events that actually occurred during surgery; possible yet unconfirmed incidents are considered separately.^{4, 8, 9, 10} According to the

above criteria, our study did not confirm any intraoperative awareness, which is likely given the incidence of intraoperative awareness and population studied.

In our study we also reported intraoperative dreaming and classified it as a separate category unrelated to intraoperative awareness. The occurrence of dreams is sometimes associated with too little depth of anaesthesia.^{3,10,11,12} Dreaming during anaesthesia is reported by 1-22% of anaesthetized patients.^{3, 10, 12.} In our study 4.6% of patients reported dreaming.

The strength of this study is that our study design involved no change in routine anaesthetic practices and this ensured that the results would be applicable to daily practice. In our study patients were interviewed only once in postoperative period at various time intervals following completion of anaesthesia which could be a limitation. In many studies, such assessments were performed two or three times.^{3,}

The risk of intraoperative awareness is increased by certain patient characteristics and surgical factors. Patient-related factors include age, limited cardiac reserves, drug resistance or substance abuse and a history of difficult intubation or previous episodes of intraoperative awareness. Certain surgeries are associated with increased risk of awareness viz. caesarean section, cardiac surgery, trauma surgery and procedures for which muscle relaxants are used. The causes of intraoperative awareness are as yet unknown. The reasons why some patients require a higher dose of anaesthetic than others remain unknown and may be multifactorial.

The development and common use of non-invasive techniques of anaesthesia monitoring, such as entropy, bispectral index and evoked auditory potentials combined with clinical observation of patients and experience of anesthesiologists should further reduce the incidence of intraoperative awareness and its adverse sequelae.^{4,13}

CONCLUSION

Intraoperative awareness exists but it is a rare phenomenon. The incidence can be reduced by identification of patients at risk, equipment checks, administration of adequate anaesthesia and careful monitoring and appropriate documentation of events

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