

Prevalence of Anesthesia Awareness during Surgery

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Abstract

Awareness during surgery is an intense issue for the anesthetist and the patient also. Such episodes are the reason for two percent of the legitimate cases against anesthetists while patients with intraoperative awareness encounter depict it as the most painful thing they have ever experienced. Pain, anxiety and failure to respond because of muscle loss of motion frequently prompt the circumstance called posttraumatic stress disorder which requests psychiatric help. The way that there are patients who report intraoperative experience, even a few days after surgery, brings up issues about the way the anesthetic medications meddle with the systems of memory and consciousness. Although, in list of sources, there are ponders demonstrating that even profoundly anesthetized patients can be impacted by auditory stimuli without being able to review them. Intraoperative checking of the anesthesia profundity is imperative for the avoidance of this issue. From all the accessible gadgets just the Bispectral Index Monitoring has been turned out to be successful for this reason yet the high cost per individual and the low specificity in forestalling mindfulness scenes don't permit its ordinary utilize. The surgeon and particularly the anesthesiologist has to know about the risk factors, the counteractive action measures and the moves that must be made after a mindfulness occurrence so as to limit the deplorable entanglements for both the patient and the specialists.

Keywords: Anesthesia; Memory; Awareness; Posttraumatic Stress Disorder

Introduction

Intraoperative awareness is the sudden and unequivocal review of tactile discernment amid general anesthesia. A standout amongst the most widely recognized worries of patients going to experience anesthesia is that they will recollect the intraoperative occasions. Despite the fact that the dangers related to anesthesia have continuously diminished, yet awareness during anesthesia remains a genuine entanglement with potential long term mental sequelae. The perils associated with anesthesia have gradually reduced, but the mecha-

nisms of action of anesthetic medicines continue poorly understood. This lack of awareness has limited the optimal use of drugs that are presently available and has reduced efforts to develop even harmless anesthetics. Several difficult and lengthy surgical procedures, frequently performed on medically compromised patients, have been made possible by modern anesthetic techniques. Though, anesthetic drugs, like other medications, have boundaries, contraindications and adversative effects.

One of the more typical concerns communicated by patients who are going to experience anesthesia is that they will recollect intraoperative events [1]. Many anesthesiologists are as of now detailing an expansion in the quantity of patients bringing up issues about intraoperative awareness, and specialists and essential care doctors may likewise soon be confronted with such enquiries. In this critique, we characterize the idea of the issue of mindfulness, distinguish the hazard factors, and portray techniques to decrease the frequency of intraoperative mindfulness and point to assets for additional data. Intraoperative mindfulness is the sudden and unequivocal review by patients of occasions that happened amid anesthesia. Maybe a couple in each thousand patients who get general anesthesia encounter this result, and the rate might be much higher among children [2]. Most patients who recollect intraoperative occasions don't encounter torment; rather, they have ambiguous sound-related review or a feeling of imagining and are not upset by the experience [3]. Though, a few patients encounter torment, which is sporadically serious.

The utilization of nitrous oxide and ether individually, was an upheaval is as yet considered as one of the best developments in medicine. From that point forward, the revelation and utilization of new, more secure analgesics and the fast movement of checking yet for the most part the real advances in anesthesiology have altogether added to the protected organization of anesthesia every day to a large number of patients on the planet. As indicated by Fleisher, passings that happen simply because of anesthesia are around 1 of every 200,000 analgesic actions [4]. Regardless of that, the harmful activities of analgesics, particularly on patients with significant medical issues and senior patients, keep on being under consistent research. General anesthesia is characterized as the state of pharmacogenic loss of cognizance with the goal that the patient is lethargic to difficult surgical stimuli. In spite of the way that anesthesia and loss of awareness are synonymous, there are many situations where patients review different encounters amid the operation. This reality brings up issues about the way surgical sedatives follow up on the components of memory and cognizance and the conceivable results of intraanesthetic mindfulness on their life after the operation. Likewise, the capacity of observing anesthesia profundity so as to distinguish and avert intraoperative awareness is another essential issue and the activities that an anesthesiologist and a specialist must take if mindfulness happens also [5].

Occurrence of intraoperative awareness

Intraoperative awareness may happen notwithstanding when checking devices are being used. A current report by Myles and colleagues proposed a lower occurrence of awareness among high-chance patients observed with the Bispectral Index framework [3]. An imminent study containing 19,575 patients was outlined by Sebel, *et al.* [2] to set up the frequency of awareness with review amid routine general anesthesia and to decide Bispectral Index values related with intraoperative mindfulness. The writers found no factually huge distinction when the screen was utilized (0.18% of patients) contrasted and when it was not utilized (0.10% of patients). Uncritical and far reaching dependence on cerebrum screens could bring about specific patients not encountering mindfulness but rather being bargained by relative overdose. Alternately, different patients may get lacking measurements. In the "Practice Advisory for Intraoperative Awareness and Brain Function Monitoring", the accord supposition in view of the therapeutic writing and on reactions from specialists and individuals from the American Society of Anesthesiology was that mind work checking is not routinely shown for patients getting general anesthesia, either to lessen the recurrence of intraoperative awareness or to screen the profundity of anesthesia. Because of the announcement, Cerebrum work screens are important and ought to be utilized to diminish the danger of intraoperative awareness for patients with conditions that may put them in danger for intraoperative awareness, around 63% of experts concurred or firmly concurred with the announcement, contrasted and 14% who were indeterminate, 14% who deviated, or 9% who unequivocally oppose this idea. This team report was express in showing that it was expected just as a practice admonitory as opposed to a practice standard as a result of

the absence of adequate quantities of controlled examinations expected to make firm suggestions. The training consultative additionally suggested the utilization of benzodiazepines for prophylactic amnesia for high-chance patients; however the choice to utilize this treatment ought to be presented on a case by-case basis [5].

This vexing issue of intraoperative awareness was tended to by the Task Force on Intraoperative Awareness which discharged a ‘Practice Advisory for Intraoperative Awareness and Brain Function Monitoring’ in 2006 [5]. This consultative distinguished certain patient attributes and factors that expansion the danger of intraoperative mindfulness and set forth certain proposals (Table 1).

Preoperative evaluation	Pre-induction phase of anaesthesia	Postoperative Management
<p>Review patient medical records for risk factors like:</p> <ul style="list-style-type: none"> -Substance abuse or use -Previous history of intraoperative awareness -History of difficult intubation -Chronic pain patients using high doses of opioids -ASA IV/V -Limited haemodynamic reserve <p>Interview patient</p> <ul style="list-style-type: none"> -Obtain history regarding previous experience with anaesthetics <p>Determine other potential risk factors</p> <ul style="list-style-type: none"> -Cardiac surgery -Caesarean section -Trauma surgery -Emergency surgery -Decreased anaesthetic doses in the presence of paralysis -Planned use of muscle relaxants during general anaesthesia -Planned use of nitrous oxide- opioid anaesthesia <p>Patients at high risk should be informed of the possibility of intraoperative awareness when circumstances permit.</p>	<p>Adhere to checklist protocol for checking of anaesthesia machine and equipment.</p> <p>Check proper functioning of intravenous access, infusion pumps, connections and backflow valves.</p> <p>Decision to administer benzodiazepines prophylactically should be made on a case to case basis.</p> <p>Intra-operative monitoring.</p> <p>Use multiple modalities to monitor depth of anaesthesia</p> <ul style="list-style-type: none"> - Clinical techniques (e.g. purposeful or reflex movement) - Conventional monitoring systems (e.g. ECG, BP, EtCO₂ etc.) - Brain function monitoring not routinely indicated for all general anaesthesia cases and should be used for selected patients (e.g. light anaesthesia) 	<p>Interview patient following the adverse event and offer counselling/psychological support.</p> <p>Initiate occurrence report for quality management.</p>

Table 1: Recommendations of the Practice Advisory for Intraoperative Awareness and Brain Function Monitoring [5].

Causes of intraoperative awareness

Clear investigations and case reports recommend that specific patient qualities might be related with intraoperative mindfulness including age, sex, ASA physical status and medication resistance or resilience. Patients at expanded hazard for intraoperative mindfulness incorporate those with a background marked by substance utilize or manhandle (e.g. opioids, benzodiazepines, cocaine) and incessant torment patients utilizing high measurements of opioids [2]. A previous history of mindfulness, troublesome intubation, ASA physical status of IV/V and a restricted haemodynamic hold are likewise chance factors. Procedures which are related with a higher hazard incorporate cardiovascular surgery, cesarean conveyance, injury and crisis surgery. The utilization of lessened sedative dosages within the sight of loss of motion, fast arrangement enlistment and aggregate intravenous anesthesia has additionally been implicated [6].

A cautious preoperative evaluation is consequently suggested by the Practice Advisory for identifying patients at risk and a thorough review of the patient's medical records, a complete physical examination and a patient or patient family interview could help recognize a vulnerable patient. The Task Force is of the consensus that patients at substantially increased risk of intraoperative awareness must be knowledgeable of its possibility by the clinician whenever possible. The causes of intraoperative awareness are as yet unknown, and the problem may be multifactorial. At least 4 broad categories of causes are plausible:

Unexpected patient specific variability in the dose requirements of anaesthetic drugs

A specific group of patients have been recorded to be safer to impacts of anaesthetics when contrasted with the others. A younger age group, smoking, long term utilization of medications like sedatives and liquor utilization may build the individual necessity for an analgesic drug [7]. The motivation behind why a few patients require a higher measurement of soporific is as yet not clear. It has been hypothesized that this inconstancy in measurements prerequisites might be a consequence of modified quality articulation or capacity of target receptors. In preclinical investigations in mice, Cheng and associates found that a hereditary lack in one kind of receptor for the inhibitory neurotransmitter, GABA (receptors that contain the $\alpha 5$ subunit), presented imperviousness to the memory blocking properties of the analgesic etomidate [8]. These receptors are overwhelmingly in the hippocampus district that is basically engaged with memory. Other preclinical examinations have demonstrated that the outflow of this memory blocking receptor changes after long haul presentation to liquor or tenacious seizures [9,10]. Concurrent prescriptions can likewise influence the digestion and conveyance of sedative specialists unfavourably. Polymorphisms for this GABA cc receptor 5 gene (GABRA5) exist in the human genome and there are no less than 3 unmistakable flag-bearer RNA isoforms in human grown-up and foetal brain tissue [11]. Pharmacogenetics may thusly be a critical factor adding to intraoperative mindfulness.

Requirement for light anaesthesia

Certain operations like cesarean area might need the anaesthesiologist to go for lighter anesthesia. In different cases, patients may frequently be not able endure an adequate dosage of anaesthetic as a result of low physiologic stores identified with components, for example, poor cardiovascular capacity or serious hypovolemia. Judgment about the sufficient profundity of anesthesia would thus be able to be uncertain in such patients.

Pharmacological masking of signs of inadequate depth of anaesthesia

Analgesic focuses that block awareness are not as much as those that avoid motor reactions to pain. Anonparalyzed but ineffectively anaesthetized patient commonly communicates by movement. The utilization of muscle relaxants render such a patient still and can quiet the anaesthesiologist into an incorrect conviction that all is well with the world. Likewise the utilization of medications like beta blockers or vasodilator operators which must be given preoperatively for disarranges like hypertension may influence intraoperative haemodynamics. At times the anaesthesiologist may utilize these medications to handle intraoperative tachycardia and hypertension without tending to the basic reason like deficient profundity of anesthesia. Thusly, physiologic attributes that would show the requirement for a further developing of anesthesia are covered [12].

Machines malfunction or misuse resulting in an inadequate delivery of anaesthesia

This could be caused by an empty vaporizer, a malfunctioning intravenous pump or a disconnection of its delivery tubing.

Consequences of intraoperative awareness

While pain amid surgery is the most upsetting element of awareness, different protests incorporate the capacity to hear discussions amid the operation, feelings of anxiety, powerlessness, loss of motion, panic and looming death. In a few patients mindfulness causes impermanent delayed consequences including rest unsettling influences, bad dreams and daytime tension, which in the long run diminish. In a little group, be that as it may, posttraumatic stress issue creates comprising of redundant bad dreams, fractiousness and anxiety. Why this issue grows just in a few patients and not in others is not clear. Elements that are referred to incorporate a patient identity, inclination to dysfunctional behavior, or the kind of enthusiastic reaction to the illness and surgery [13]. Intraoperative awareness would therefore be able to have long achieving results including medicolegal ramifications. Domino, *et al.* investigated cases from the ASA Closed Claims Project and found that intraoperative awareness represented up to two percent of all claims. What is noteworthy is that this frequency was like rates of cases for dangerous inconveniences like myocardial dead tissue and aspiration pneumonia. Cases were more typical in females and where the nitrous oxide-opioid relaxant system was utilized [14].

Risk Factors

The main risk factors of awareness during anesthesia are insufficient anesthetic medication, different anesthetic requirements by some categories of patients and malfunction of the anesthesia machine [15]. The first category includes operations where the anesthesiologist cannot manage large doses of anesthetics because of the hemodynamic uncertainty which for same reason could be caused and might prove unsafe for patient's life. These are mostly cardiothoracic operations, surgeries to multitrauma patients and mostly emergency cases, cesarean sections and operations on ASA 4 or 5 patients according to ASA (American Society of Anesthesiologists) categorization. The use of neuromuscular blocking agents is an extra risk factor due to it makes the patient unable to react by moving [5,16]. The second category contains patients who have more prominent requirement for soporific medications, similar to the individuals who take benzodiazepines or opioids constantly, alcoholic patients, patients who are exceptionally on edge preoperatively, patients with anticipated troublesome intubation who may be intubated conscious last patients with past mindfulness experience. The last category incorporates cases because of devices breakdown, wrong use or despicable checking of the anesthesia devices, so that the needed amount of analgesics is not directed to the patient [5,17].

Prevention of intraoperative awareness

Prophylactic administration of benzodiazepines as a premedicant particularly when light anesthesia is expected has been upheld. One twofold visually impaired randomized clinical trial assessed the viability of prophylactic organization of midazolam as an adjuvant amid add up to intravenous anesthesia and revealed a lower recurrence of intraoperative mindfulness in this gathering when contrasted with the fake treatment group [18]. The Practice Advisory Task Force has been that as it may yet not suggested the utilization of benzodiazepines as a part of anesthesia to decrease the danger of intraoperative mindfulness for all patients. Their agreement is that the choice to oversee benzodiazepines prophylactically ought to be put forth on a case by case basis for selected patients particularly those requiring minor doses of anaesthetics and those experiencing cardiovascular surgery, emergency surgery, injury surgery or aggregate intravenous anesthesia. They have forewarned that postponed emergence may go with the utilization of benzodiazepines [5].

Instances of intraoperative mindfulness have been accounted for to have come about because of anaesthetic concentration conveyance blunders. Bergman, *et al.* inspected 8,372 cases answered to the Anesthetic Incident Monitoring Study and discovered 81 situations where perioperative review was predictable with awareness. Awareness was subsequent to disappointment of conveyance of unpredictable analgesic in 16 of these patients while in 32 cases a medication blunder bringing about accidental loss of motion of an alert patient

had occurred [19]. The Practice Advisory Task Force has unequivocally suggested that the working of anesthesia conveyance frameworks (e.g. vaporizers, imbue pumps, crisp gas streams and intravenous lines) ought to be checked carefully preceding acceptance and customary upkeep be conveyed out. Regular checking of the sedative in the vaporizer, observing of the convergences of motivated and lapsed gasses and inhalational operators and organization of a soporific mixture by means of a devoted intravenous line are straightforward measures that go far in avoidance of mindfulness [5].

Intraoperative mindfulness can't be measured amid the intraoperative period as the review part of mindfulness must be resolved post-operatively by getting data specifically from the patient. The essential inquiry at that point is whether the utilization of clinical strategies, regular observing or cerebrum work screens diminishes the event of intraoperative mindfulness.

Clinical strategies used to evaluate intraoperative cognizance incorporate checking for development, reaction to charges, eyelash reflex, pupillary reactions, respiratory example, sweat and tearing. Customary observing frameworks incorporate ECG, circulatory strain, heart rate, end tidal sedative analyzer and capnography. No clinical trials or studies have been directed which particularly look at the affectability of these checking modalities in identifying intraoperative mindfulness. Leslie, *et al.* [20], tried the capacity of assessed propofol impact site focus to anticipate development to a boost in volunteers amid propofol/nitrous oxide anaesthesia. This was then contrasted and the prescient capacities of pupillary reflex, systolic circulatory strain, BIS and 95% unearthly edge recurrence of EEG, in a similar gathering. For this correlation, they utilized the prediction probability which specifically thinks about the execution of pointers having distinctive units of estimation. Numerically, prediction probability is the likelihood that an indicator predicts accurately which of a couple of arbitrarily designated stimuli, one causing development and the other not, will bring about a development. A pointer that predicts consummately whether a development reaction will happen has a prediction probability estimation of 1.0 while a marker that plays out no superior to anything risk has a prediction probability estimation of 0.5. In light of this, their correlational examination detailed prediction probability values ranging from 0.74 for blood grouping of propofol to 0.86 for BIS. All things considered, the creators reasoned that no critical contrasts in execution could be shown between these different pointers of sedative profundity. A large portion of the devices intended to screen cerebrum electrical action for surveying the soporific impact record EEG movement from anodes put on the temple. Frameworks can be additionally partitioned into those that procedure unconstrained EEG and electromyographic action and those that obtain evoked reactions to auditory stimuli.

Sound-related evoked possibilities are the electrical reactions of the mind stem, the sound-related radiation and the sound-related cortex to sound-related sound jolts as snaps conveyed by means of earphones. The brainstem reaction is generally obtuse to analgesics though early cortical reactions called midlatency auditory evoked potentials (MLAEPs) change in an anticipated way with expanding convergences of unpredictable and intravenous sedatives. Expanding soporific focuses prompt an expanded inertness and lessened adequacy of the different waveform parts. From a scientific investigation of the AEP waveform, the gadget produces an AEP index (AAI) that gives an associate of soporific focus. This AEP list is scaled from 0 - 100 and the AAI relating with a low likelihood of awareness is < 25. Randomized controlled trials contrasting MLAEP checking with standard clinical anesthesia rehearses without MLAEPs revealed lessened circumstances to enlightening or orientation. Another examination announced a Pk estimation of 0.99 for mindfulness after LMA insertion [21,22].

Conclusion

Intraoperative awareness is an imperative issue for the patient and the specialist. The patients have an extremely repulsive experience which can influence their emotional well-being and the rest of their life. The specialist from his side confronts an issue which is extremely hard to be recognized and counteracted and can have legitimate, moral and budgetary consequences. The total and appropriate preoperative assessment, the checking of the anesthesia device and the postoperative visits are vital. Likewise, the likelihood of intuitive memory and learning amid general anesthesia has not been barred and brings up issues about what the patient should "hear" amid the operation. Until the point when clear conclusions are made regarding these matters, the stuff of the operating room should be extremely watchful about what they are looking at during surgery [16,23].

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