

## AWARENESS DURING ANAESTHESIA: A REVIEW

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### ABSTRACT

Awareness during anaesthesia refers to a patient experiencing an intra operative event. True incidence of intra operative awareness is poorly documented but varies according to type and depth to anaesthetic technique. About 1% to 2% of patients experience awareness while under general anaesthesia, mostly during induction can occur without conscious awareness. Inability to recall intra perception can occur without conscious awareness. Inability to recall intra operative events does not preclude awareness of those events. Patients who experience awareness later report feeling of sever anxiety, panic, fear and dread of imminent death. By virtue of its nonphysical nature, awareness is not easily recognizable or quantifiable. The occurrence of awareness can be minimized by the addition of a benzodiazepine like midazolam or an inhalational agent to anaesthetics.

### HISTORY

In 1845, William Morton used diethyl ether or anesthetize a patient who later reported that he had been aware of the surgery but had felt no pain<sup>1</sup>. Since then, a continuous flow of case surveys, reports, and controlled studies have described the occurrence of awareness of awareness under anaesthesia, Nevertheless, after more than 150 years, anaesthetists still have no reliable means of monitoring the depth of

anaesthesia to determine whether a patient is conscious during surgery.

### INTRODUCTION

" I remember feeling the cold plastic tube being inserted down the back of my throat, I remember trying to cough, talk, open my eyes and do anything to signal that I was still awake. At that point, I began to panic, and I could feel my heart racing, I was crying inside, but no one noticed my tears. The sensation and memory were similar to what I have read about people being buried alive"<sup>2</sup>

As described above, awareness under general anaesthesia is a terrifying experience, which may lead to serious emotional injury. Thought it is assumed that emotional sequel of awareness are transient in nature, permanent disability due to recurrent nightmares, sleep disturbances, impaired interactions, difficulties at work and posttraumatic stress disorder may occur.

### INCIDENCE

The true incidence of intra operative awareness and recall is poorly documented but varies according to the type and depth to the anaesthetic technique. High rates of recall have been reported in major trauma (11 percent to 43 percent) and obstetric anaesthesia (2.5 percent to 4 percent). The overall incidence to awareness (0.2 percent for all general anaesthesia cases) has decreased during the past 10 years, coincident with increased perception of the problem by anaesthesiologist . Despite an increasing number of reports of awareness, there is little evidence of an actual increase in incidence. The likely explanations for this

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apparent increase are greater public awareness of the phenomenon as a result of lawsuits reported in the media.

### CAUSES OF AWARENESS

Most causes of awareness can be readily identified; and prevention, although a challenge to anaesthetic management can usually be achieved (Table)<sup>4</sup>.

### FACTORS CONTRIBUTING TO ANAESTHETIC AWARENESS

- Major trauma cases
- Female gender
- Obstetrical procedures
- Intra operative muscle relaxants
- Inadequate anaesthetic technique
- Excessive or unnecessary neuromuscular blocked
- Ultra short acting IV induction agents
- Difficult and/or prolonged intubation
- Equipment failure
- ASA status IV or V
- Cardiac surgery patient
- Total intravenous anaesthesia (TIVA)
- Bronchoscopy
- Morbidly obese patient
- Inexperienced anaesthesiologist
- Pharmacologic autonomic blocked
- Anaesthesia at high altitude
- Increased anaesthetic requirement

Table 1.

Modern anaesthesia techniques and agents are very reliable in producing amnesia during surgery. Differences are found among the individuals with respect to their tolerance, for instance, to alcohol. In an effort to appreciate individual's tolerance profile, the anaesthesiologist should enquire the habits with respect to consumption of alcohol and other drugs.

### TECHNIQUES OF MONITORING THE AWARENESS

Table 2 illustrates the techniques to monitor awareness during surgery.

<b>METHODS OF TESTING AWARENESS</b>
<b>MOTOR RESPONSE TO NOXIOUS STIMULI</b>
Minimum alveolar concentration (MAC)
Minimum infusion rate (MIR)
<b>END-TIDAL VOLATILE AGENT CONCENTRATION</b>
<b>AUTONOMIC CHANGES</b>
Heart rate
Blood pressure
Lacrimation
Sweating
<b>MECHANICAL CHANGES</b>
Isolated limb
Esophageal contraction
<b>ELECTRICAL METHODS</b>
Frontalis electromyography
Electroencephalography
Unprocessed
Processed
Aperiodic analysis
Auditory-evoked potentials

Table 2

One research suggest that the MAC-awake, at which 50% of patients respond meaningfully to a verbal stimulus, may be only slightly higher than the level of anaesthesia needed to abolish learning and memory. There is interest in the concept to MAC-awake as an indication of time arousal after cessation of anaesthesia. This measure may help determine some forms of end point for awareness.

### PERCEPTION DURING AWARENESS

Awakening during surgery does not by itself appear to be the most distressing aspect of the phenomenon. What patients report as the most frightening or emotionally upsetting is the discovery that they cannot move their limbs or open their mouths to speak. Unable to understand or interpret surrounding events, patients are seized with panic and anxiety.



Patient awareness can occur with or without pain, and some form of perception can take place without conscious awareness. It should be noted that cases with the most adverse sequelae are associated with pain felt during the procedure. Moerman et al<sup>5</sup> interviewed 26 patients who recalled being aware during general surgery. The two most frequent complaints were "being able to hear" and "feeling of weakness or paralysis." The third most frequent complaint was pain. Reports of visual perception were also common. The patients emphasized feelings of severe anxiety and panic. They believed they were awake because the surgical procedure and anaesthesia were not under control. Some feared that death was imminent; others were more concerned about feeling pain.

The inability to communicate their fears during surgery because of the administration of a muscle relaxant was particularly distressing. Most of the patients also reported unpleasant aftereffects, including sleep disturbances, dreams, and nightmares, and flashbacks and anxiety during waking hours.

The most likely times for awareness to occur are during induction and emergence. Higher incidences have been reported in situations where light anaesthesia is used and may therefore be inadequate. These situations include childbirth, major trauma, the seriously ill surgical patients, cardiac surgery, and difficult intubations.

Acute psychic trauma can result from the memory of awakening during surgery, particularly if there is associated pain. The patient may become anxious and irritable, and experience nightmares or become preoccupied with fear of death. Resuming a normal working and family life may be difficult. The patient may feel depressed or enraged if this awareness is discussed, but full and open discussion is to be encouraged. Preoperative anxiety may play an important role in the psychological consequences of awareness.

### RECALLING INTRAOPERATIVE EVENTS THROUGH HYPNOSIS

There is evidence that postoperative hypnosis of patients can elicit recollections (particularly of negative comments made about them by the surgical team). Description of the operating room, and events that they could not have imagined. Those who promote the therapeutic application to this practice maintain that it establishes rapport with patients, removes barriers to recall of trauma, and makes use of what is known as "state-dependent memory". State-dependent memory means that information acquired and stored in one state, for instance, anaesthesia, is more easily recalled in similar state. A hypnotic state is claimed to be similar to the anaesthetic state.

Numerous trials have been conducted to test this hypothesis and demonstrate clinical efficacy. Few, however, have been well designed and carefully controlled. The Council of Scientific Affairs of the American Medical Association reports 'Recollections obtained during hypnosis can involve confabulation and pseudo memories and not only fail to be more accurate, but actually appear to be less reliable than non hypnotic recall'<sup>6</sup>

### AWAKE PARALYSIS

In one study most cases of awake paralysis were related to intravenous infusion errors syringe swaps or syringe swaps. Infusion errors included the use of non-labeled succinylcholine bags, Mislabeled succinylcholine bags and failure to check the label on unintended succinylcholine drips, accounting for two-thirds of the lawsuit claims for awake-paralysis. Syringe swaps occurred with properly labeled drugs in three cases and mislabeled syringes in two cases. Reviewers considered most cases of awake paralysis to be examples of substandard anaesthesia care, even though the paralysis was promptly recognized and appropriately managed<sup>7</sup>.



## RECALL AND UNCONSCIOUSNESS

In contrast to the awake-paralysis claims in lawsuits, most of which were secondary to vigilance errors, recall under general anaesthesia had a variety of etiologies. The anaesthetic agent was classified as substandard in 42 percent of cases, of cases, which was similar to classification for all other claims but less than the percentage for awake paralysis claims. In substandard cases, recall occurred as a result of failure to turn on a halogenated agent, vaporizer vaporizer malfunction or failure to administer appropriate amounts of anaesthetic agents during agents during induction; however, recall often occurred in the presence of an anaesthetic that met standard of care such as with use of amnestic agents of during a period of hemodynamic instability. Hypertension and tachycardia were occasionally clinical clues for awareness, although these signs were absent in most cases<sup>8</sup>.

## PREVENTION OF RECALL

Today we have reliable agents and techniques to provide effective anaesthesia to our patients. The vast majority of patients have no recall, whatsoever, of events that transpire during their operation. Close monitoring of our patient and surgeon as best as we can. Although it is not yet possible to guarantee 100% that no patient will have recall during anaesthesia, it remains a fairly rare occurrence.

In most cases, it ought to be possible to prevent recall. Careful management of anaesthesia machinery, close monitoring of the composition of inspired and expired gases, correct functioning of syringe pumps and vigilance throughout the procedure should rule out equipment failure as a cause.

Maintaining adequate levels of anaesthetics can prevent recall. Guidelines have been suggested to achieve this goal<sup>9</sup>. They include premedication of the patient with an amnestic agent such as midazolam, increasing the dose of induction agents immediately preceding administration of

succinylcholine and tracheal intubation, conservative use of muscle paralysis, and supplementing nitrous oxide and opioid agents with volatile agents to maintain an end-tidal concentration of at least 0.6% MAC when using 60% or higher nitrous oxide. When using inhalational agents alone 0.8 to 1 MAC has been recommended.

Reliance on IV agents only for total anaesthesia may permit consciousness and recall if the plasma concentration of the drug falls too far in proportion to the arousal intensity for a surgical stimulus. Variable rate infusion schemes can be operated by computer technology that can make nearly instantaneous adjustments in plasma concentrations to match the patient's needs. These may be shown to reduce the incidence of this problem<sup>10</sup>.

Preoperative visits by the anaesthesiologist are clearly beneficial in relieving present anxiety and in preventing future anxiety in patients. Although postoperative visits are not routine everywhere, they do provide the opportunity to identify patients in need of psychological support at an early stage. Even the opportunity of vocalizing problems associated with an awareness episode to a believing and caring person can convey a major positive therapeutic benefit.

## CONCLUSION

Even under the best of circumstances, we cannot give our patients an ironclad guarantee that they will not awaken while under anaesthesia. This should be explained to patients in advance. Giving patients the opportunity to discuss potential anaesthetic problems postoperatively and providing reassurance and explanations in appropriate circumstances will help allay untoward effects for awareness.

Why does the problem of awareness exist at all? Perhaps the reason lies with limitations of our skills. Insufficient time for an adequate preoperative assessment of the patient or a postoperative visit, errors in dosing, or errors in managing newer



technologies. Clearly, part of the problem arises from the complexity of the microhistology and biochemistry of the central nervous system. At least for the present, the best approaches to managing the problem of awareness consist of awareness consist of prevention, recognition, and skilled anaesthetic managements.

**REFERENCES:**

1. Ghoneim MM, Block RI. Learning and consciousness during general anaesthesia. *Anaesthesiology*. 2000;92:597-602.
2. Domino KB: Closed malpractice claims for awareness during anaesthesia. *ASA New letter* 1996;60(6):14-17.
3. Burrow B. Patient awareness during general anaesthesia *American journal of anaesthesiology* 1996; 15-20.
4. Burrow B. Patient awareness during general anaesthesia *American journal of*

- anaesthesiology 1996;15-20
5. Moernan N, Bonke B. Oosting J. Awareness and recall during general anaesthesia. *Anaesthesiology*. 1993; 79: 454-464
6. Council on scientific affairs. Council report; scientific status of refreshing recollections by the use of hypnosis. *JAMA*. 1985;253:1918-1923.
7. Liu WHD, Thorp TAS, Graham SG, et al Incidence of awareness with recall during general anaesthesia. *Anaesthesia*. 1991;46;435-437/
8. Promfrett C, Heart rate variability, BIS and 'depth of anaesthesia' . *British Journal of Anaesthesia* 199;82:559-661.
9. Lunn JN, Rosen M. Anaesthetic awareness. *BMJ*. 1990;30:938.
10. McCarthy GJ, Awareness during total intravenous anaesthesia, *Annual scientific meeting* 2000;1-4.

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