

Preventing and Managing the impact of Awareness during Anaesthesia

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Awareness is the conscious experience of an event at the time that it occurs and recall denotes the retention of an event in memory after it has occurred. Unintended awareness during General anaesthesia is a rare but significant complication. The overall incidence is approximately 0.2%. However, there is higher incidence reported during general anaesthesia for trauma surgery, cardiac surgery and caesarian section.

Equipment failure, lack of complete understanding of the pharmacokinetics and dynamics of the anaesthetic drugs, patient variability and the lack of brain state monitoring are some of the main causes of unintended awareness during general anaesthesia.

Awake paralysis is nearly always associated with neuromuscular blocking drug use. Failure to supplement intravenous anaesthetics agents during a difficult / prolonged intubation attempt, empty vaporiser, circuit leaks and disconnections can cause awareness during the general anaesthesia. Patients on beta blockers, Calcium channel blockers, regular opiates or sedative medications may need higher doses of the anaesthetic medication. Similarly, drug or alcohol abusers also need higher doses. Failure to closely monitor these patient groups and administration of the necessary dose may lead to awareness during general anaesthesia.

High risk patients with limited cardiac reserve (ASA IV & V) and trauma patients with ongoing blood loss / hypotension are quite often given less inhalational agents which can predispose them to experience awareness. Certain anaesthetic techniques like an opioid based anaesthesia and Neuroleptanaesthesia and the use of a combined regional anaesthesia and 'Light' GA are associated with awareness.

Awareness during anaesthesia has a spectrum of presentation. Four stages have been described.

Stage 1: Conscious perception with explicit memory

Stage 2: Conscious perception without explicit memory

Stage 3: Subconscious perception with implicit memory

Stage 4: No perception and no implicit memory

Several methods are used to assess depth of anaesthesia and awareness during anaesthesia. These include PRST scoring, Isolated forearm technique, lower oesophageal contractility, Frontalis EMG, respiratory sinus arrhythmia and processed EEG monitoring.

In Bispectral Index (BiS) monitoring, the monitor processes the EEG and comes with a number between 0 and 100. The lower the number indicates deeper the anaesthetic state. The BiS has been validated in several studies. Another popular depth of anaesthesia monitor is the auditory evoked potential monitor. This exploits the fact that the auditory evoked potential changes with the depth of anaesthesia.

The following set of guidelines can help to reduce or prevent awareness significantly.

- Check all equipment carefully before use - particularly the vaporizer.
- Routine use of end-tidal anaesthetic gas monitoring is advisable.
- Premedicate with an amesic when possible.
- Consider beta blockers, ear plugs and head phones in high risk patients
- Supplement nitrous oxide / narcotic with volatile agent or propofol
- Avoid / minimise muscle relaxant use whenever possible
- Avoid light induction doses. Rebolus with IV hypnotic during multiple intubation attempts
- Use a EEG based monitor in high risk patients

Unintended awareness during anaesthesia can lead to patient developing a fear of anaesthesia, post traumatic stress disorder or patients getting flashbacks, anxiety and sustained emotional effects. Some patients can go on to develop a severe unexplained psychiatric disorder. A small percentage of patients end up taking the matter to court for compensation. The involved anaesthesiologist risks developing paronia, loss of confidence and suffering a financial loss. The compensation for the awake paralysis cases in the USA (closed claims database info) varies but can be upto \$840,000. Cases of intraop awake paralysis with explicit recall and pain are difficult to defend

If a patient complains of being awake or aware during a general anaesthesia postop, it should be taken seriously and the patient visited in the ward as soon as possible by the

involved anaesthesiologist along with a witness. Detailed history using the modified Brice questionnaire should be taken and fully documented. An attempt should be made to determine the cause using clinical history, anaesthetic records and theatre circumstances. Patient should be reassured and psychological support offered if necessary. If the patient goes to court, it is necessary to inform the hospital administration and the medical defence union and seek their advice. Out of court settlement is possible in significant number of cases.

Awareness among the general public about awake paralysis has significantly increased in recent years because of television programs, novels and movies based on this. Several support groups and information websites are now available online. The practising anaesthesiologist has a responsibility to update oneself with the current knowledge on the topic.