

## Psychological consequences of awareness and their treatment

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Intraoperative awareness with subsequent recall is a rare but serious complication with an incidence of 0.1–0.2%. In approximately one third of the patients who have experienced awareness, late severe psychiatric sequelae may develop. The psychiatric symptoms in these patients fulfil the diagnostic criteria for post traumatic stress disorder. To prevent awareness as a negative outcome after anaesthesia, a thorough perioperative management of anaesthesia is necessary. The definite risk for post traumatic stress disorder following awareness indicates the necessity of postoperative clinical routines to identify awareness patients. The problem must be acknowledged. Professional psychiatric assessment and follow up should constitute standard practice. The treatments of choice are Eye Movement Desensitisation Reprocessing and Cognitive Behaviour Therapy.

**Key words:** anaesthesia; awareness; post traumatic stress disorder; consciousness; memory; cognitive behavioural treatment; eye movement desensitisation; reprocessing.

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### INTRODUCTION

After the first ether anaesthetic, the patient was able to recall specific events that undoubtedly had occurred during the surgery. Awareness during general anaesthesia therefore has been recognized as a complication since 1846. Awareness is still reported as a feared complication. In addition to immediate, intraoperative suffering during wakefulness, long-lasting, severe mental symptoms may develop. Previous

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chapters in this book have considered how to identify patients at high risk of awareness and how to prevent awareness from occurring by meticulous intraoperative management and the use of electroencephalographic (EEG)-based monitors. This chapter will consider the immediate and long-term psychological effects of awareness and their treatment.

The pioneer study on the incidence of awareness was published in 1960 by Ruth Hutchinson.<sup>1</sup> As a part of a routine postoperative visit, the patients were asked about the last thing they remembered before, and the first thing they remembered after, the operation and whether they had any dreams. Awareness was defined as recall of specific events that undoubtedly had occurred during surgery. Dreams which seemed to have any possible perioperative relationship were analyzed further. Among 656 elective and emergency general surgical, gynaecological and neurosurgical patients, 8 (1.2%) were considered aware. Interestingly, only one patient mentioned the awareness spontaneously after surgery. In addition, one of the patients did not seem to be particularly distressed by his experience. This early study highlighted the variability in patient responses to awareness and the necessity for direct questioning.

Since 1960, the incidence of awareness has gradually decreased.<sup>2,3</sup> In 2000, Myles and co-workers investigated the reasons for dissatisfaction after anaesthesia<sup>4</sup> as part of a quality improvement programme. 10,811 patients were interviewed within 24 h of surgery. In 12 patients, definite recall was identified, corresponding to an incidence of awareness of 0.1%. An episode of awareness was a strong predictor of dissatisfaction with care. The same year, Sandin et al.<sup>5</sup> published a prospective case study in 11,785 patients. Based on a suspicion that memory for awareness may be delayed, all patients were interviewed on three occasions: in the recovery room, after 1–3 days and after 7–14 days, using the structured interview modified from Brice et al.<sup>6</sup> Overall, 18 patients were identified who had experienced awareness (0.16%). However, at the first interview, only 9 of the 18 patients reported memories of anaesthesia, emphasising (for the first time) the need to interview patients more than once. Recently, quality improvement data were reviewed from 87,361 patients who had received general anaesthesia. The incidence of awareness was 0.0068%.<sup>7</sup> However, the patients were not asked a direct question about awareness, possibly explaining the low incidence compared previous large studies.<sup>4,5</sup>

## INITIAL MANAGEMENT OF THE AWARE PATIENT

The opportunity to report recall of intraoperative events should be given to all patients, through a routine postoperative interview. All patients who report recall of intraoperative events must be thoroughly evaluated to obtain details of the event and to discuss possible reasons for its occurrence. A questionnaire or a structured interview is recommended in order to obtain a detailed account of the patient's experience. It is of major importance to listen carefully, and with concern, and to be absolutely clear about what the patient experienced. The possibility that the patient was aware during anaesthesia should definitely not be denied. The patient's symptoms may be made worse if he or she is not believed and it is suggested that the episode of recall was imagined. Once an episode of intraoperative awareness has been identified, a report of the event should be completed for the purpose of quality assurance and further follow up. Psychological support should be offered to all patients who report an episode of awareness. This offer should be made on multiple occasions and should constitute standard practice.

## PSYCHOLOGICAL SEQUELAE OF AWARENESS

In 1961, Meyer and Blacher reported about patients who suffered from late psychological sequelae after general anaesthesia that had included the use of suxamethonium.<sup>8</sup> Other studies, using a variety of methods to identify patients, have followed. These methods include referral of historical cases by colleagues, advertising in newspapers and analysis of closed claim studies.<sup>9,10</sup> There is a considerable risk of bias in these studies. One concern is that only the patients with the most severe symptoms may seek contact. Alternatively, the opposite may occur as patients with the most severe symptoms may try to avoid health care providers and avoid taking part in studies. Although it is not possible to draw any conclusions about the incidence of awareness from these retrospective studies, they have painted a very good picture of the severity of suffering among patients following their experience of awareness under general anaesthesia.

In 1992, Macleod and Maycock described three patients who had experienced awareness, and whose symptoms were strongly suggestive of post traumatic stress disorder.<sup>11</sup> The patients gave a story of severe stress due to their experiences during surgery. They reported clear consciousness during surgery and could recall in detail being unable to move; unable to scream; hearing conversations; feeling helplessness, fear, panic, and pain; believing they were dead or having an "out of body experience". However, one patient recalled being not particularly distressed. The patients reported that they had initially not been believed by the staff or anaesthetist when recounting their distressing experience.

The experience of awareness can undoubtedly be considered as a distressing event outside the normal range of normal human experience. Such distressing events may cause psychiatric symptoms as re-experiencing the traumatic event, hyper-arousal, nightmares and sleep disturbances, intrusive memories and avoidance behaviour such as emotional numbing and forgetting, which meet some of the diagnostic criteria for post traumatic stress disorder (PTSD).

It has been recognised for a long time that, in addition to immediate, intraoperative suffering during wakefulness, long-lasting, severe mental symptoms are possible.<sup>12</sup> However, the long term sequelae of an episode of awareness have been difficult to study, due to the low incidence of awareness, lack of prospectively collected data and lack of suitable diagnostic criteria. The average risk for developing mental sequelae, the average severity and duration of symptoms, and whether these patients met the formal diagnostic criteria for PTSD, was not reported until recently.

In the study by Sandin et al<sup>5</sup>, 18 patients with explicit recall were identified. After  $\approx 2$  years, 9 of the 18 consecutive, prospectively identified patients with recall were interviewed about possible persisting problems and diagnostic criteria for PTSD.<sup>13</sup> Four of the nine interviewed patients were still severely disabled due to psychiatric and/or psychological symptoms. Two of these patients had professional psychiatric contacts and help. Another three patients had less severe, transient mental symptoms that they could cope with in daily life. Two of those three patients with moderate symptoms had been aware during non-relaxant anaesthesia and had denied any mental problems in the immediate postoperative period. Two patients denied any sequelae from their awareness episode. Overall, 39% of the patients had psychological symptoms approximately 2 years after awareness.

Up to 3 weeks after their awareness episode, repeated information and discussions had been offered to all patients. All the 18 patients declared that all symptoms related

to their experience of awareness had disappeared, that they were satisfied with the discussions and that they did not need any further contact. All patients declined referral to a psychiatrist. The only patient who was not entirely confident thought that she might become worried again if she would need surgery in the future. Despite the fact that all patients at that time claimed to be satisfied with this management and eventually considered no further contacts necessary, this was obviously inaccurate.

Six of the 18 prospectively identified patients declined to participate in this study. This is disturbing, since avoidance is part of the PTSD. There was reason to fear that at least two of those patients wanted to avoid another confrontation with traumatic memories. The investigators also believed that avoidance was the reason why at least two of the interviewed patients falsely stated within 3 weeks after their awareness episode that they had recovered and did not need further help. These two or more patients thought that they *should* recover if they could avoid everything that reminded them of their traumatic experience.

Other studies have also attempted to assess the late sequelae of awareness. In her retrospective investigation, Janet Osterman reported that patients who had experienced awareness met the formal diagnostic criteria for PTSD. The patients were recruited from advertisements, fliers or television news, or were referred by colleagues. The diagnostic criteria for PTSD were found in nine out of 16 [56.3%] studied patients.<sup>14</sup> Moerman et al. found that 70% of patients reported at least one unpleasant psychological effect after awareness<sup>9</sup> and Schwender et al. reported that long lasting psychological sequelae were found in 49% of the patients in their study.<sup>10</sup> In a recent study, Samuelsson and co-workers reported that 33% of patients with previous awareness had experienced late psychological symptoms.<sup>15</sup> These studies show that the risk of PTSD after an episode of awareness remains substantial.

## POST TRAUMATIC STRESS DISORDER

Here we provide more about PTSD in general, especially the therapies that are most useful in its treatment.

### Definition and incidence

Post-traumatic stress disorder (PTSD) is a serious psychiatric disease that may follow a variety of known severe overwhelming stressors such as major accidents, torture, rape, war experiences, terror actions, disasters etc.<sup>16</sup> Life threatening illness such as myocardial infarction, stroke, HIV infection, acute respiratory insufficiency and experiences of intensive care may also result in PTSD.<sup>17</sup>

The incidence of psychiatric disease or symptoms following traumatic experiences and or threats has been increasingly debated recently. The occurrence of PTSD in a Swedish population has been reported to be 3.6% in men and 7.4% in women corresponding to a 5.6% occurrence in the studied group. The study group was randomly chosen from the Swedish population register and consisted of 1,500 men and 1,500 women in the age range 18–70 years.<sup>18</sup> In recent directed follow up study, more than 1.5 years after a traumatic event, the incidence of PTSD varied considerably; 18.7% after traffic accidents and 37.8% among terrorist victims.<sup>19</sup> After a fire in a discotheque, the incidence of PTSD was 25%<sup>20</sup> and after military operations 78% fulfilled the criteria of PTSD.<sup>21</sup>

## Assessment

In order to establish whether a patient has symptoms of PTSD or actually has PTSD, a screening instrument such as the “Impact of Event Scale”<sup>22</sup> or “PTSD Symptom Scale”<sup>23</sup> can be useful. However, in order to make a diagnosis, a clinical interview must be performed. Certified psychotherapists, clinical psychologists, and psychiatrists are the professionals who are approved to assess and treat PTSD.

## Criteria for diagnosis

The DSM IV lists the criteria for PTSD.<sup>24</sup> A severe stressor is when a patient has been exposed to a event or situation of great significance which most probably should induce severe stress in most individuals. This corresponds to the first criterion among six main diagnostic criteria for PTSD, Criterion A–F.

Criterion A: The person has been exposed to a traumatic event in which both of the following were present:

1. The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others.
2. The person’s response involved intense fear, helplessness, or horror.  
Note: In children, this may be expressed instead by disorganized or agitated behaviour.

Criterion B: The traumatic event is persistently re-experienced in one [or more] of the following ways:

1. Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions.  
Note: In young children, repetitive play may occur in which themes or aspects of the trauma are expressed.
2. Recurrent distressing dreams of the event.  
Note: In children, there may be frightening dreams without recognizable content.
3. Acting or feeling as if the traumatic event was recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated).  
Note: In young children, trauma-specific re-enactment may occur.
4. Intense psychological distress at exposure to internal or external cues that symbolize or resembles an aspect of the traumatic event.
5. Physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.

Criterion C: Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the following:

1. Efforts to avoid thoughts, feelings, or conversation associated with the trauma.
2. Efforts to avoid activities, places, or people that arouse recollections of the trauma.
3. Inability to recall an important aspect of the trauma.

4. Markedly diminished interest or participation in significant activities.
5. Feeling of detachment or estrangement from others.
6. Restricted range of affect (e.g. unable to have loving feelings).
7. Sense of foreshortened future (e.g. does not expect to have a career, marriage, children, or a normal life span).

Criterion D: Persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following:

1. Difficulty falling or staying asleep.
2. Irritability or outbursts of anger.
3. Difficulty concentrating.
4. Hyper vigilance.
5. Exaggerated startle response.

Criterion E: Duration of the disturbance (symptoms in criteria B, C and D) is more than 1 month.

Criterion F: The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

The PTSD diagnosis is considered acute if the duration of symptoms is less than 3 months and chronic if the duration of symptoms is 3 months or more. Delayed PTSD is when the onset of symptoms is delayed more than 6 months after the stressor.

The experience of awareness during general anaesthesia is considered to be stressful enough to induce PTSD. However, the severity of the illness itself is not considered predictive for PTSD. Therefore, an important question is whether PTSD is a result of the trauma per se or represents symptoms more dependant on factors related to how the individual copes with the event.

In a study of people who had witnessed or suffered violent crime, the initial emotional response strongly predicted PTSD six months later.<sup>25</sup> The most frequently reported intense experiences that awareness patients describe are: unable to communicate, trapped in an immobile body, helplessness, terror, fear, panic, feeling unsafe, abandoned, betrayed by medical staff and fear of pain. The initial emotional response has also been considered most severe if pain is experienced. However, in the follow up study of the cohort study of Sandin et al<sup>5</sup> only one of the four patients who still suffered from severe mental sequelae after 2 years had complained about pain during wakefulness, while all 4 had experienced intraoperative anxiety. Only 1 of the 5 interviewed patients who had been anxious during wakefulness escaped PTSD. Thus, in this study, the experience of intraoperative anxiety rather than pain was associated with subsequent long-term mental suffering.

In the study by Samuelsson et al<sup>15</sup> they found that acute emotions as fear, panic and helplessness were the only factor during awareness that was significantly related to late psychological symptoms. The appraisal of the trauma and the sorts of memories the patient has (fragments or very precise memories) seems crucial for the effects on the individual and the development of PTSD.<sup>15</sup> The pre-morbid personality was not investigated before anaesthesia, but the serious findings were not explained by any predisposing mental symptoms that the authors were able to identify *post hoc*. Thus, the grave result in the study supports previous retrospective findings among non-consecutive awareness cases recruited by referral or advertising.

### *Risk factors for PTSD*

Risk factors for developing PTSD include: (1) the severity of the trauma; (2) female sex; (3) middle age; (4) single status; (5) previous psychiatric problem; (6) low educational status; (7) borderline personalities and (8) the personal state factors such as alcohol misuse, beliefs, culture factors and previous experience of trauma.

### *Treatment for PTSD*

The empirical literature on treatment of PTSD has evolved rapidly in the past two decades. This has led specialists to state that Cognitive Behavioral therapy [CBT] and Eye Movement Desensitization and Reprocessing [EMDR] should be considered as first-line treatments.<sup>25,26</sup> The growing evidence that PTSD is characterized by psychobiological dysfunction has led to increased interest in evaluating the effects of medication. Selective serotonin reuptake inhibitors (SSRIs) have been found to be effective in the treatment of PTSD, acting on reducing the core symptoms such as intrusions, avoidance and hyperarousal symptoms.<sup>27,28</sup> In addition, a combination of SSRI and CBT/EMDR has been found to be effective both in the short and long term.

There are also an increasing number of studies on the neurobiological mechanisms causing PTSD suggesting that PTSD is associated with small hippocampal size or that preexisting small hippocampus size increases the risk of traumatic exposure or the development of PTSD. If this hypothesis is accepted, it may well affect the choice of treatments and of refinements in investigating individuals at risk of developing PTSD.<sup>29,30</sup>

Before treatment, a thorough assessment must be made to establish the patient's potential for successfully going through the therapy. Co-morbidities such as drug and alcohol abuse, borderline personality disorders, and psychotic episodes should all be carefully evaluated. Trauma characteristics, previous experience, beliefs and current state are also central factors to assess – these factors are also of importance for therapy outcome.

*Eye movement desensitisation reprocessing.* EMDR treatment includes a three part approach<sup>31</sup>: (1) processing of experiences contributing to the dysfunction; (2) processing triggers that elicit present disturbances, and (3) incorporating imaginable patterns of positive/useful skills and behaviors for future adaptive actions.

The basis for EMDR treatment is bilateral stimulation (eye movement, taps or audio tones), measurement of target memory, desensitization, installation and body scanning and lastly a re-evaluation of the patient's view of the trauma and what may have happened.

The patient is instructed to focus on one part of the traumatic event such as, for example, hearing the staff discussions, feeling pain during surgery and identifying a negative cognition. Such a negative cognition might be, *I'm not in control* and a positive cognition produced by this might be, when you now bring up the negative event what would you like to believe about your self right now – *I'm now in control*. The patient assesses the validation of the positive cognition on a 7 degree scale. The patient then identifies and assesses the emotions resulting from the traumatic event on an 11 degree scale. Then the physical sensations and the body sensations are located.

The patient is then instructed to focus on the traumatic event and the therapist moves her fingers approximately two cm from the patients eyes and the patient follows with eye movements approximately 20–24 times. A pause is then taken, and after that the therapist discusses feelings/sensations and cognitions that are arising. This

procedure is repeated until no new material is seen to emerge. In general, the patient receives 10–15 treatment sessions.

Stickgold<sup>32</sup> offers a neurobiological explanation of the finding that EMDR is an effective treatment, namely that the repetitive redirecting of attention in EMDR stimulates a neurobiological state similar to that of REM sleep, which is optimally configured to support the cortical integration of traumatic memories into the general semantic network. This can then lead to a reduction in the strength of hippocampally mediated episodic amygdala-dependent negative effects.

*Cognitive behavioural therapy (CBT)*. CBT with exposure therapy involves techniques designed to expose the patient to the anxiety provoking stimuli and can be conducted imaginally or *in vivo*. Exposure is believed to effect changes via habituation of anxiety when the exposure is structured to occur gradually or rapidly and is also conducted in conjunction with other interventions, such as psychoeducation about PTSD, cognitive reconstruction and or relaxation.<sup>33,34</sup> The good effects of exposure and reconstruction of cognitions are explained by the observations that the person is able to stop avoiding behavior, dysfunctional behavior (drugs, alcohol, driving etc) and changes in the negative appraisal of the trauma and its sequelae. This has a direct effect on sleep, flashbacks memory processing and evaluation of the trauma.

A protocol for CBT treatment for PTSD following awareness under anesthesia could be outlined as follows:

- Inform the patient about symptoms and effects of PTSD as well as how CBT works.
- Determine the patient's general status i.e. medical history, medication, depression and anxiety levels, experience of surgery and trauma.
- Assess the patient's avoidance and cognitions such as avoidance of hospital and medical treatment, intrusive thoughts, flashbacks, fear etc.
- Explain how exposure works and educate the patient in relaxation techniques and then use a couple of sessions to let the patient talk about the event in sessions in the present tense and measure anxiety levels at the end of the session with a five-minute relaxation period.

*In vivo* exposures starts with the clinician and patient doing a hierarch together i.e. listing provoking situations in connection with the trauma. Then the least anxiety provoking situation is exposed for in order to do *in vivo* exposures and imaginary exposures. The patient is then given homework on the imaginary exposures – homework that challenges the cognitions such as: *If I think about the trauma I will go mad, fall apart, lose control, or get a panic attack. If I do not control my feelings I will lose my job, my children etc.* Often the patient tries very hard to avoid these thoughts by keeping occupied with other more neutral thoughts, working hard, avoiding people who have been ill, use of alcohol, taking drugs. *In vivo* exposures could start by visiting the hospital; watching hospital-based TV shows, and visiting the operation ward. In general a patient receives 10–12 sessions.

## SUMMARY

Intraoperative awareness with subsequent recall is a rare but serious complication with an incidence of 0.1–0.2%. In approximately one third of the patients who have experienced awareness, late severe psychiatric sequelae may develop. The psychiatric

symptoms in these patients fulfil the diagnostic criteria for post traumatic stress disorder. To prevent awareness as a negative outcome after anaesthesia a thorough perioperative management of anaesthesia is necessary. The definite risk for post traumatic stress disorder following awareness indicates the necessity of postoperative clinical routines to identify awareness patients. The problem must be acknowledged. Professional psychiatric assessment and follow up should constitute standard practice. The treatments of choice are Eye Movement Desensitisation Reprocessing and Cognitive Behaviour Therapy.

### Research agenda

- Further research into the incidence of post-traumatic stress disorder in prospectively collected patient cohorts is required.
- Further research is warranted to evaluate the treatment of patients with post-traumatic stress disorder using Eye Movement Desensitisation Reprocessing and Cognitive Behaviour Therapy.

### Practice points

- There is a tendency for avoidance rather than seeking help, indicating that clinical routines to identify cases of awareness after anaesthesia should be inaugurated.
- Speak with patients who report recall of intraoperative events to obtain details of the event and to discuss possible reasons for its occurrence.
- Acknowledge the problem. Treat the patient with respect. Believe the patient. Do not try to convince the patient that awareness is impossible.
- Offer counselling of psychological support to those patients who report an episode of intraoperative awareness.
- Professional psychiatric assessment, therapy and follow up should therefore constitute standard practice for affected patients.

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