

Research Article

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The Incidence of Awareness during Surgery in Iranian Patients Who Undergo General Anesthesia: A systematic review and meta-analysis

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Abstract

Introduction: Consciousness during anesthesia is one of the complications of general anesthesia and refers to the state that during a period of general anesthesia, the brain is stored by an awakening stimulus and its experiences are stored in explicit memory that can be retrieved in the future. Patients may not be able to follow instructions during anesthesia, but they may recall things after the anesthesia is over. The aim of this study was to evaluate the Incidence of Awareness During Surgery in Iranian Patients Who Undergo General Anesthesia.

Methods: The methods used in this systematic review are developed based on the Checklist Guidelines (PRISMA). The searches were performed by two independent researchers and the purpose of the search was to find published studies from 1/1/2000 to 12/30/2020.

Results: A total of 5865 patients who underwent surgery were evaluated. total of 8 studies from 5 provinces that met the inclusion criteria were reviewed. According to the random effect model, the prevalence of awakening during surgery in 5865 patients with surgery was 3% (at 95% confidence interval and $I^2 = 54.5%$ equal to 3-4%).

Conclusion: Many patients who have experienced this condition consider it to be the worst experience of their lifetime. This causes the patient to be afraid of further anesthesia. The use of muscle relaxants during the operation prevents the patient from reacting to this complication.

Keywords

Postoperative
Complication,
Intraoperative
awareness,
Surgery,
Iranian Patients

Introduction

General anesthesia is a condition that patient is anesthetized under the influence of medication to not respond to painful surgical stimuli (1). The purpose of anesthesia is to destroy consciousness through drugs (2). So basically needed for patients, analgesia, amnesia and relieve anxiety be provided (3). Consciousness during anesthesia is one of the complications of general anesthesia and refers to the state that during a period of general anesthesia, the brain is stored by an awakening stimulus and its experiences are stored in explicit memory that can be retrieved in the future (4). Patients may not be able to follow instructions during anesthesia, but they may recall things after the anesthesia is over (5). This is a frightening experience that can lead to serious complications such as emotional trauma and stress disorder after PTSD injury (6). The experience of consciousness is not the same for all patients and can be in the form of memories of vocal perception, sense of touch, paralysis and difficulty in movement and breathing, sense of helplessness, panic, anxiety, dumbness and lack of awareness of the environment during surgery, and later chronic fear (7). Insomnia, recurrent nightmares, and flashbacks occur during the day, known as post-traumatic stress disorder, which require psychological treatment (8).

Methods

Inclusion criteria

The methods used in this systematic review are developed based on the Checklist Guidelines (PRISMA). The study includes cross-sectional studies, case studies, and cohort studies, and excludes case studies, letters to editors, case reports, clinical trials, study protocols, systematic reviews, and reviews.

Participants: All studies on the prevalence of waking during surgery were studied.

Sampling methods: All observational studies, regardless of their design, were included in the systematic review. The minimum sample size was 25 patients or more.

Search strategy

Published studies were searched in Persian and English. To ensure the adequacy of the studies, a list of relevant research sources or studies found by the search was read. Keywords used in search strategy are: Postoperative Complication, Intraoperative awareness.

Select study and extract data

The two researchers independently analyzed the titles and abstracts of the articles according to the eligibility criteria. After eliminating additional studies, the full text of the studies was collected based on the eligibility criteria and information about the authors if necessary.

General information (relevant author, province and year of publication), information about the study (sampling technique, diagnostic criteria, data collection method, research conditions, sample size and risk of bias) and output scale were collected.

Quality evaluation

The developed scale of Hoy et al. Was used to evaluate the quality of the method and the risk of bias in each observational study. This is a 10-item scale to evaluate the quality of studies according to their external validity (items 1 to 4 of the target population, sampling framework and minimum participation bias) and internal validity (items 5 to 9 of data collection, problem statement, Evaluates the research scale and data collection tools while item 10 evaluates the data analysis bias).

The risk of bias was measured by the two researchers independently and the differences were resolved by agreement.

Collecting data

All eligible studies were included in the data collection after systematic review and the data were integrated using the accumulation diagram.

The random effects model was evaluated based on the overall prevalence of the disease among the participants. The heterogeneity of the initial studies was assessed using the I^2 test.

In addition, subgroups were analyzed to determine heterogeneity based on age of participants, year of publication, and country. Finally, a meta-analysis was performed in STATA14 statistical software.

Results

Study selection

A total of 279 articles were extracted through initial searches in various databases. Out of 279 essential studies identified by analyzing titles and abstracts, 249 studies were omitted due to irrelevant titles. Out of the remaining 34 studies, 8 studies met the study criteria (figure 1).

Research specifications

A total of 5865 patients who underwent surgery were evaluated. total of 8 studies from 5 provinces that met the inclusion criteria were reviewed. Among these studies, 4 studies were from Tehran, 4 studies were from Hamedan, Gorgan, Arak and Lorestan.

The risk of bias was low in most studies. The main method of data collection was medical records.

Meta-analysis of wakefulness during surgery:

According to the random effect model, the prevalence of awakening during surgery in 5865 patients with surgery was 3% (at 95% confidence interval and $I^2 = 54.5%$ equal to 3-4%) (Figure 2).

Table 1: Summary of included studies

Author	Publication year	Province	Duration	Patients	Men	Women	Frequency of awareness	Mean age
Rezeai ²⁰	2019	Hamadan	2015-2016	400	249	151	10 (2.5%)-0.0078	42.45
Rezanejadi ²¹	2006	Lorestan	2000-2001	1500	1058	442	6 (0/4%)-0.00505	17-65
Jabal Ameli ²²	2005	Gorgan	2015	100	83	17	1 (1%)-0.00994	N/A
Salimi ²³	2018	Tehran	2017-2018	1558	47.6%	52.4%	N/A	N/A
Arefian ²⁴	2007	Tehran	2005-2006	N/A	N/A	N/A	3%-0.0120	N/A
Shahi ²⁵	2013	Tehran	N/A	700	N/A	N/A	2.6%-0.00601	N/A
Kamali ²⁶	2015	Arak	N/A	107	N/A	N/A	7.4%-0.0253	26.9
Jahan bakhsh ²⁷	2007	Tehran	N/A	1500	1056	442	N/A	N/A

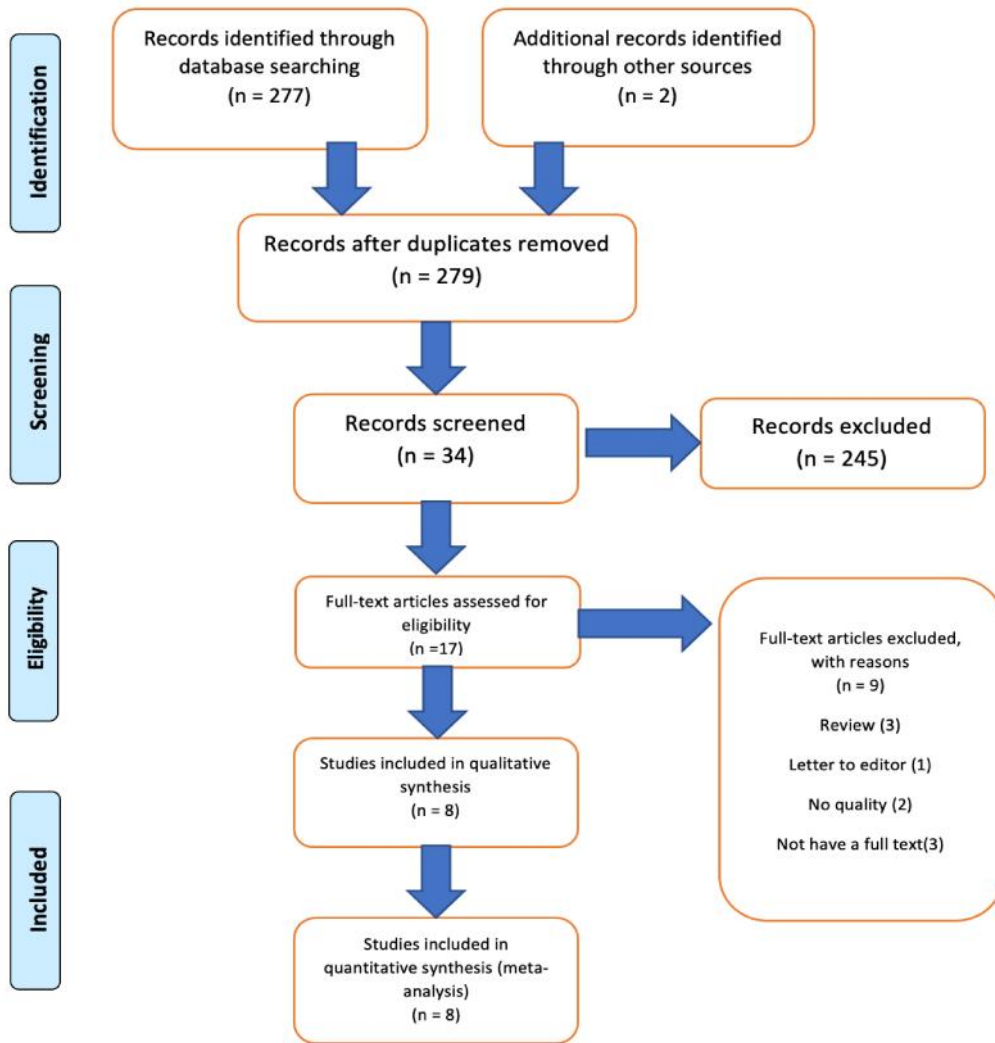


Figure 1 : PRISMA flow diagram

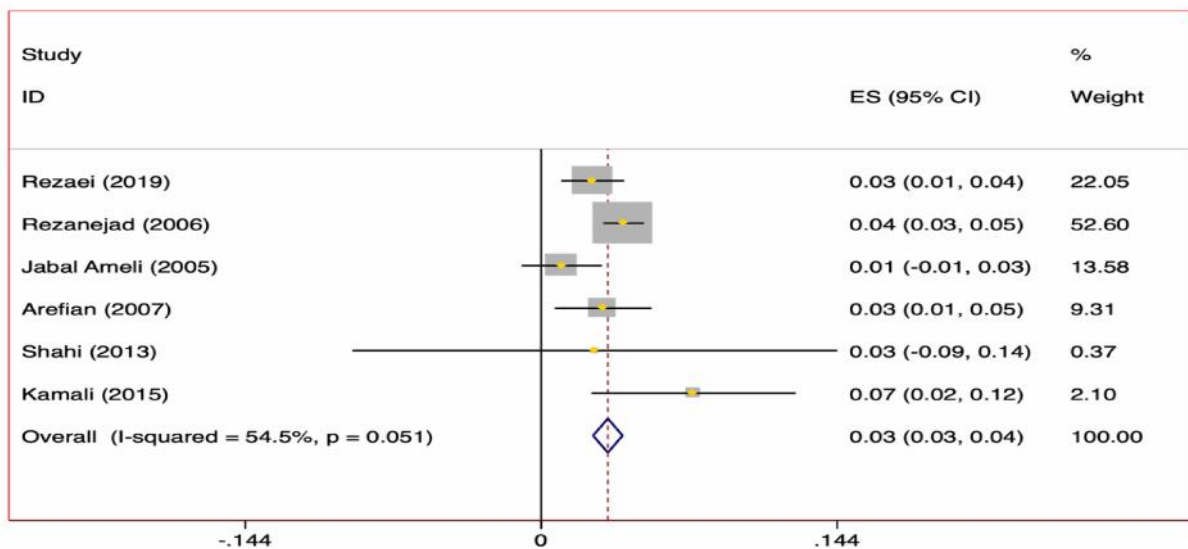


Figure 2: Meta-analysis the Incidence of Awareness During Surgery in Iranian Patients Who Undergo General Anesthesia

Discussion

According to the random effect model, the prevalence of awakening during surgery in 5865 patients with surgery was 3% (at 95% confidence interval and $I^2 = 54.5%$ equal to 3-4%). Consciousness during anesthesia is often caused by one of the following three reasons: Light anesthesia due to insufficient use of anesthetic drugs (9). Increased need for anesthetics in some people (10). Malfunction or misuse of devices The occurrence of this condition is often the result of light anesthesia techniques or the use of lower doses of anesthesia, device defects, addicted patients, excessive use of neuromuscular blocking agents and insufficient monitoring, special conditions such as emergency surgery (11). Those associated with significant blood volume loss, major trauma, gynecologic surgery, and cardiopulmonary bypass are considered risk factors for intraoperative awareness (12-13). Also in alcoholic patients, patients with long-term use of benzodiazepines, fever, hyperthyroidism, obesity, young age, smoking, recreational drugs (amphetamines, cocaine, opioids), chronic use of sedatives and previous exposure to drugs (14). They increase awareness during anesthesia. Routine monitoring methods, which are based on clinical signs such as changes in blood pressure, changes in heart rate, and tearing, are used to assess the depth of anesthesia, but are not reliable and do not necessarily relate to intraoperative awareness and practically prevent awareness (15-16). During the operation, they are ineffective. Various monitoring methods have been proposed to monitor the depth of anesthesia, the most accurate of which is BIS, which due to the high cost of using this tool, its use for virtually all patients is not economically justified (17). Awakening during surgery is one of the serious problems for anesthesiologists and patients and is one of the most important reasons for legal complaints from anesthesiologists (18). Pain, anxiety, and inability to respond can lead to PTSD in these patients and may later require psychiatric treatment; Many patients who have experienced this condition consider it to be the worst experience of their

lifetime. This causes the patient to be afraid of further anesthesia. The use of muscle relaxants during the operation prevents the patient from reacting to this complication(19-20).

References

1. Messina AG, Wang M, Ward MJ, Wilker CC, Smith BB, Vezina DP, Pace NL. Anaesthetic interventions for prevention of awareness during surgery. *Cochrane Database of Systematic Reviews*. 2016(10).
2. Morimoto, Y., Nogami, Y., Harada, K., Tsubokawa, T. and Masui, K., 2011. Awareness during anesthesia: the results of a questionnaire survey in Japan. *Journal of anesthesia*, 25(1), pp.72-77.
3. Tasbihgou SR, Vogels MF, Absalom AR. Accidental awareness during general anaesthesia—a narrative review. *Anaesthesia*. 2018 Jan;73(1):112-22.
4. Gillespie, B.M., Gwinner, K., Fairweather, N. and Chaboyer, W., 2013. Building shared situational awareness in surgery through distributed dialog. *Journal of multidisciplinary healthcare*, 6, p.109.
5. Cascella M, Bimonte S, Amruthraj NJ. Awareness during emergence from anesthesia: features and future research directions. *World journal of clinical cases*. 2020 Jan 26;8(2):245.
6. Kent, C.D., 2010. Awareness during general anesthesia: ASA closed claims database and anesthesia awareness registry. *ASA newsletter*, 74(2), pp.14-16.
7. Ambulkar RP, Agarwal V, Ranganathan P, Divatia JV. Awareness during general anesthesia: An Indian viewpoint. *Journal of anaesthesiology, clinical pharmacology*. 2016 Oct;32(4):453.
8. Groesdonk HV, Pietzner J, Borger MA, Fassl J, Haentschel D, Paarmann H, Ender J. The incidence of intraoperative awareness in cardiac surgery fast-track treatment. *Journal of cardiothoracic and vascular anesthesia*. 2010 Oct 1;24(5):785-9.

9. Kent, Christopher D. "Awareness during general anesthesia: ASA closed claims database and anesthesia awareness registry." *ASA newsletter* 74, no. 2 (2010): 14-16.
10. Cook TM, Andrade J, Bogod DG, Hitchman JM, Jonker WR, Lucas N, Mackay JH, Nimmo AF, O'Connor K, O'Sullivan EP, Paul RG. 5th National Audit Project (NAP5) on accidental awareness during general anaesthesia: patient experiences, human factors, sedation, consent, and medicolegal issues. *British journal of anaesthesia*. 2014 Oct 1;113(4):560-74.
11. Yabandeh NP, Behnampoor M. Evaluating the Consistency of the FNA Test in Pathologically Proven Nodules of Thyroidectomy. *Journal of Research in Medical and Dental Science*. 2018 Mar;6(2):427.
12. Odor, P.M., Bampoe, S., Lucas, D.N., Moonesinghe, S.R., Andrade, J., Pandit, J.J., A'Court, A., Abdel-Gadir, D., Abdu, A., Abisogun, C. and Aboud, Z., 2020. Protocol for direct reporting of awareness in maternity patients (DREAMY): a prospective, multicentre cohort study of accidental awareness during general anaesthesia. *International journal of obstetric anaesthesia*, 42, pp.47-56.
13. Noosheepormehr Yabandeh. (2019). Prevalence of appendicitis in Iranian patients with acute abdominalpain: a systematic review and meta-analysis. *Int. J. Curr. Res. Med. Sci.* 5(1): 15-20.El-
14. Gabalawy R. Patient awareness during critical medical events: communication is key. *Canadian Journal of Anesthesia/Journal canadien d'anesthésie*. 2020 Mar;67(3):289-91.
15. Bruchas RR, Kent CD, Wilson HD, Domino KB. Anesthesia awareness: narrative review of psychological sequelae, treatment, and incidence. *Journal of clinical psychology in medical settings*. 2011 Sep 1;18(3):257-67.
16. Noosheepormehr Yabandeh. (2019). Frequency of Wound Infection in Iranian Patients with SimpleAppendicitis: A systematic review and meta-analysis. *Int. J. Curr. Res. Med. Sci.* 5(2): 1-17.
17. Altinsoy S, Caparlar CO, Ergil J. The relation between preoperative anxiety and awareness during anesthesia: an observational study. *Brazilian Journal of Anesthesiology (English Edition)*. 2020 Jul 1;70(4):349-56.
18. Lee JJ, Lee NH, Park CM, Hong SJ, Kong MH, Lee KH, Yon JH, Song SO. Public awareness about the specialty of anesthesiology and the role of anesthesiologists: a national survey. *Korean journal of anesthesiology*. 2014 Jan;66(1):12.
19. Fang J, Prakash R. Antiseptic phobia in a patient experiencing anesthesia awareness during cleft palate repair surgery: a case report. *General hospital psychiatry*. 2013 Nov 1;35(6):681-e1.
20. REZAEI M, Zolhavarieh SM, Salimi A, SEIF RM, Safiarian K. The Incidence of Awareness During Surgery And Affecting Factors in Patients Who Undergo General Anesthesia in Besat Hospital in Hamadan2016.
21. Reza Nejadi, Jahanbakhsh and Farzan, 2007. Evaluation of the incidence of awakening and recall during general anesthesia. *Found*, 8 (4), pp.55-61.
22. Jabal Ameli, Hashemi, Seyed Jalal, Fatemi and Farnaz, Frequency distribution of Awareness and Recall after applying pressure on cricoid cartilage (Sellick's Maneuver) during general anesthesia. *Scientific Journal of Gorgan University of Medical Sciences*, 7 (2), pp.37-41.
23. SALIMI, A., MONJAZEBI, F., JAMAATI, H., SHARIFI, H., Rabanian, H. and AMINNEJAD, R., 2018. The public awareness regarding anesthesia and the role of anesthesiologists in Iran.
24. Arefian, N. M., and MOHAMMAD FATHI. "Evaluation of prevalence of awareness during general anesthesia for cesarean section during 2005-2006 in Shohada hospital." (2007): 1267-1271.

25. Shahi S, Foruzesh Fard M, Sadeghi M, Shoeibi G. The incidence of awareness during general anesthesia. *Anesthesiology and Pain*. 2013 Dec 10;4(3):47-54.
26. Kamali A, Shokrpour M, Pazoki S, Moshiri E, Taheri-Nejad M, Dadashpour N, Golestani Eraghi M. Determining the effect of BIS monitoring on level of awareness during anesthesia in women undergoing elective caesarean section. *Journal of Arak University of Medical Sciences*. 2015 Mar 10;17(12):56-63.
27. REZANEZHADI, JAHAN BAKHSH, and B. Farzan. "INCIDENCE OF AWARENESS WITH RECALL DURING GENERAL ANESTHESIA." (2007): 55-61.

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