

Awareness under General Anaesthesia during Emergency Cesarean Delivery: Incidence and Prevention

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Abstract:

Background: Awareness under general anaesthesia (AAGA) is a rare but distressing complication, with a higher reported incidence in obstetric anaesthesia, particularly during emergency cesarean delivery due to altered anaesthetic techniques and maternal–fetal considerations.

Objective: To determine the incidence of awareness under general anaesthesia during emergency cesarean delivery and to evaluate contributing factors and preventive strategies.

Methods: A retrospective observational study was conducted at SKMCH, Muzaffarpur, over a period of 10 months. Medical records of 100 parturients who underwent emergency cesarean section under general anaesthesia were reviewed. Data regarding demographic characteristics, anaesthetic technique, intraoperative events, and postoperative recall were analyzed.

Results: The incidence of intraoperative awareness was 3%. Awareness was significantly associated with rapid sequence induction, reduced volatile agent concentration, and hemodynamic instability ($p < 0.05$).

Conclusion: Awareness under general anaesthesia during emergency cesarean delivery, though uncommon, remains clinically significant. Strict adherence to anaesthetic protocols, adequate dosing, and vigilant monitoring are essential preventive measures.

Keywords: Awareness, General anaesthesia, Emergency cesarean delivery, Obstetric anaesthesia.

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Introduction

Awareness under general anaesthesia (AAGA) is defined as explicit recall of sensory perceptions during surgery under intended general anaesthesia. Although its incidence in the general surgical population ranges from 0.1–0.2%, obstetric procedures, particularly emergency cesarean deliveries, carry a higher risk [1,2]. This increased risk is attributed to physiological changes of pregnancy, urgency of surgery, and deliberate reduction of anaesthetic depth to minimize neonatal depression [3].

Emergency cesarean sections often necessitate rapid sequence induction with minimal pre-induction preparation, increasing vulnerability to inadequate hypnosis [4]. The avoidance of high concentrations of volatile anaesthetics before delivery further contributes to this risk [5]. Additionally, maternal hypotension, hemorrhage, and pre-existing comorbidities complicate anaesthetic management [6].

Intraoperative awareness can have profound psychological consequences, including anxiety, sleep disturbances, and post-traumatic stress

disorder [7]. Despite advances in anaesthetic drugs and monitoring, cases continue to be reported, emphasizing the need for continued evaluation [8].

Studies have highlighted risk factors such as emergency surgery, use of neuromuscular blockers, and absence of depth-of-anaesthesia monitoring [9,10]. Preventive strategies include appropriate drug dosing, balanced anaesthesia, and vigilant intraoperative assessment [11].

This retrospective study aims to determine the incidence of awareness under general anaesthesia during emergency cesarean delivery at a tertiary care center and to identify contributory factors and preventive measures.

Materials and Methods

Study Design and Setting: A retrospective observational study conducted at SKMCH, Muzaffarpur.

Study Duration: 10 months.

Sample Size: 100 patients.

Inclusion Criteria

- Emergency cesarean section
- General anaesthesia administered
- Complete anaesthetic and postoperative records

Exclusion Criteria

- Elective cesarean section
- Regional anaesthesia
- Incomplete records

Data Collection: Data were extracted from anaesthesia records and postoperative follow-up notes, including patient demographics, anaesthetic technique, intraoperative variables, and documented postoperative recall.

Outcome Measures: Primary outcome was incidence of awareness. Secondary outcomes included associated risk factors.

Statistical Analysis: Data were analyzed using descriptive statistics. Continuous variables were expressed as mean ± SD, categorical variables as frequency and percentage. Chi-square test was used for association analysis. A p-value < 0.05 was considered statistically significant.

Results

A total of 100 parturients who underwent emergency cesarean delivery under general anaesthesia during the 10-month study period were included in the final analysis.

Baseline Demographic Characteristics: The mean age of the study population was 26.8 ± 4.2 years. Primigravida patients constituted 58% (n = 58) of cases, while 42% (n = 42) were multigravida. Baseline demographic characteristics are summarized in Table 1.

Table 1: Demographic characteristics of study participants (n = 100)

Variable	Value
Age (years), mean ± SD	26.8 ± 4.2
Primigravida, n (%)	58 (58%)
Multigravida, n (%)	42 (42%)

Anaesthetic Technique and Intraoperative Parameters: All patients underwent rapid sequence induction with endotracheal intubation. A volatile anaesthetic concentration of <0.8 minimum alveolar concentration (MAC) prior to delivery was documented in 62% (n = 62) of cases. Benzodiazepines were administered intraoperatively

in 28% (n = 28) of patients. Intraoperative hypotension (defined as systolic blood pressure <90 mmHg) occurred in 24% (n = 24) of cases.

The distribution of anaesthetic and intraoperative variables is detailed in Table 2.

Table 2: Anaesthetic and intraoperative variables

Variable	n (%)
Rapid sequence induction	100 (100%)
Volatile agent <0.8 MAC before delivery	62 (62%)
Benzodiazepine use	28 (28%)
Intraoperative hypotension	24 (24%)

Incidence of Awareness under General Anaesthesia: Postoperative assessment revealed that 3 patients (3%) experienced definite

intraoperative awareness, while 97 patients (97%) reported no recall. The incidence of awareness is graphically represented in Figure 1.

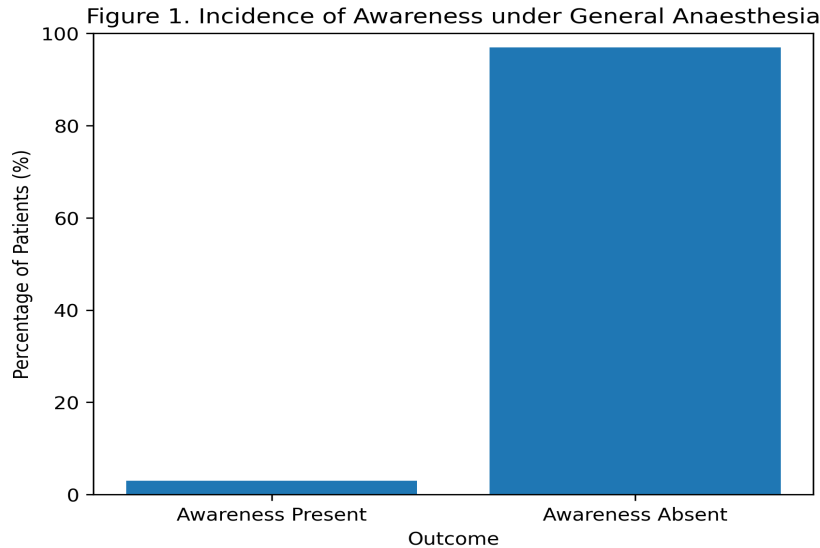


Figure 1: Incidence of awareness under general anaesthesia

Characteristics of Awareness Episodes: Among the three patients who reported awareness, all described auditory perception, while two patients

(66.7%) also reported a sensation of paralysis. None of the patients reported pain perception. These findings are summarized in Table 3.

Table 3: Characteristics of awareness episodes (n = 3)

Feature	n (%)
Auditory perception	3 (100%)
Sensation of paralysis	2 (66.7%)
Pain perception	0 (0%)

Association between Awareness and Intraoperative Factors: Reduced volatile anaesthetic concentration (<0.8 MAC) was present in 100% (n = 3) of patients who experienced awareness, compared with 60.8% (n = 59) of patients without awareness. This association was statistically significant (p = 0.04).

Intraoperative hypotension was observed in 66.7% (n = 2) of patients with awareness, compared to 22.7% (n = 22) in those without awareness, which was also statistically significant (p = 0.03).

No statistically significant association was observed between benzodiazepine use and awareness (p = 0.18). The association analysis is presented in Table 4.

Table 4: Association between awareness and intraoperative factors

Variable	Awareness Present n (%)	Awareness Absent n (%)	p-value
Volatile agent <0.8 MAC	3 (100%)	59 (60.8%)	0.04
Intraoperative hypotension	2 (66.7%)	22 (22.7%)	0.03
Benzodiazepine use	1 (33.3%)	27 (27.8%)	0.18

Summary of Key Findings: Overall, the incidence of awareness under general anaesthesia during emergency cesarean delivery was 3%. Awareness was significantly associated with reduced volatile anaesthetic concentration and intraoperative hypotension.

Reduced volatile anaesthetic concentration prior to delivery, a commonly practiced technique to prevent neonatal depression, was significantly associated with awareness in this study [14]. Similar findings have been reported by previous investigators [15,16].

Discussion

The present study demonstrated an incidence of awareness of 3% during emergency cesarean delivery under general anaesthesia, which is higher than that reported in non-obstetric surgical populations [12]. Obstetric anaesthesia poses unique challenges due to the need for rapid intervention and fetal safety considerations [13].

Intraoperative hypotension further compromises cerebral drug delivery, increasing the risk of inadequate anaesthetic depth [17]. The universal use of neuromuscular blockers in this cohort may have masked clinical signs of inadequate anaesthesia [18].

The psychological implications of awareness are substantial, emphasizing the need for preventive

strategies [19]. Depth-of-anaesthesia monitoring, although not routinely used in emergency obstetric cases, has shown promise in reducing awareness incidence [20].

Balanced anaesthetic techniques, timely administration of supplemental hypnotics after delivery, and meticulous hemodynamic management are essential preventive measures [21–23].

Despite its retrospective design and limited sample size, this study highlights important modifiable risk factors. Larger prospective studies are warranted to further refine preventive protocols [24,25].

Conclusion

Awareness under general anaesthesia during emergency cesarean delivery remains an important clinical concern. The incidence is influenced by reduced anaesthetic dosing and hemodynamic instability. Strict adherence to anaesthetic protocols, vigilant monitoring, and timely supplementation of anaesthetic agents can significantly reduce the risk.

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