

Scandinavian guidelines:

How to avoid awareness in
obstetric patients undergoing
emergency caesarian section in
general anesthesia

Clinical question:

- Does propofol, as induction agent for an emergency C-sections in general anesthesia, give less incidence of awareness compared to thiopental?

PICO

P: Pregnant women having a caesarian section in general anesthesia.

I: Women receiving propofol as an induction agent.

C: Women receiving thiopental as an induction agent.

O: Incidence of awareness:

- Subjective signs: (Dreams, nightmares, sensation, PTSD)
 - Feedback from patients:
 - Spontaneous reporting
 - Survey
 - Interview
- Objective signs:
 - BIS monitor
 - Hemodynamic changes

Our articles

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Original Contribution

Hypnotic agents for induction of general anaesthesia in caesarean section patients: A systematic review and meta-analysis of randomized controlled trials^a

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ABSTRACT

Study objective: An ideal induction drug for caesarean section (CS) must have quick action, with minimum side effects such as awareness, haemodynamic compromise, and neonatal depression. Thiopentone is frequently used; however, no reliable evidence is available to support its use as a dedicated hypnotic agent in this setting. **Design:** A systematic review and meta-analysis, using PRISMA methodology, of randomized controlled trials (RCTs), comparing women undergoing CS with thiopentone with those undergoing CS with propofol, ketamine, or benzodiazepines as hypnotic agents. **Data sources:** Comprehensive search without language restrictions of MEDLINE, EMBASE, and the Cochrane Controlled Trials Register until May 2015, with an update in January 2017. Included trials must have reported at least one of the following variables: neonatal arterial or venous umbilical blood gas, maternal systolic blood pressure pre- and post intubation, or Apgar score. **Main results:** A total of 911 patients from 18 RCTs were eligible for quantitative analysis. The increase in maternal systolic blood pressure was smaller in patients administered propofol, compared with those administered thiopentone (weighted mean difference [WMD]: -11.52 [–17.60, –5.45]; $p = 0.0002$). Induction with propofol also resulted in a significantly lower umbilical arterial pH (WMD: -0.12 [–0.20, –0.04]; $p = 0.0049$) than induction with thiopentone. A comparison between propofol and thiopentone revealed no significant differences in other umbilical blood gas parameters or in Apgar scores. In contrast, when comparing ketamine with thiopentone, the number of neonates with a lower Apgar score (< 7) at 1 and 5 min was significantly higher in the ketamine group than in the thiopentone group ($p = 0.004$). **Conclusion:** The evidence, based on sparse and relatively old trials, indicates that propofol and thiopentone are equally suited for CS. After 1 and 5 min, ketamine yields lower Apgar scores than thiopentone. Additional well-designed trials are needed to reach firmer conclusions.

1. Introduction

Various induction agents are used when performing caesarean section (CS) under general anaesthesia. Since 1934, thiopentone has often been the drug of choice, despite its rapid placental transfer and barbiturate-related cardiorespiratory depressive effects. Drug-induced hypotension may reduce blood flow to the placenta, endangering the fetus [1–3]. The degree of transfer depends on the pharmacodynamic profile of the drug, as well as factors related to utero-placental circulation and the fetal unit [4]. Therefore, the ideal induction agent should rapidly

induce unconsciousness and provide a good recovery profile, in combination with minimal direct or indirect neonatal depression [5].

There are a number of agents that might be suitable for use in the induction of general anaesthesia in caesarean section patients, in place of thiopentone. Alternative agents might include benzodiazepines, ketamine, and propofol. However, as in the case of thiopentone, these agents all exhibit high degrees of lipid solubility and rapid maternal-fetal equilibration.

While midazolam, a relatively short-acting, water-soluble imidazo-benzodiazepine, may reduce the frequency of awareness [5,6] the use

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Comparison of the Effects of Thiopental Sodium and Propofol on Haemodynamics, Awareness and Newborns During Caesarean Section Under General Anaesthesia

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Objective: To compare the effects of propofol and thiopental on haemodynamics, awareness and newborns in pregnant women undergoing elective caesarean section.

Methods: Seventy pregnant women were assigned into two equal groups. For anaesthesia induction, 2 mg/kg propofol (Group P) and 5 mg/kg thiopental (Group T) were administered. Maternal haemodynamic parameters and bispectral index (BIS) values were recorded before induction, in 1-minute intervals within the first 10 minutes after induction and in 5-minute intervals thereafter, during skin incision, uterine incision, removal of infant, uterine sutures, skin sutures, eye opening and extubation in all cases. Core blood gas analysis and 1- and 5-minute APGAR scores were recorded. In all cases, a keyword was spelled to test during removal of the infant, and at the first postoperative hour, patients were questioned. Important time periods of surgery and anaesthesia and also the first postoperative-hour haemodynamic values, pain scores, nausea and vomiting were noted.

Results: The demographic data were similar among cases. In Group P, systolic arterial pressure (SAP), diastolic arterial pressure (DAP) and mean arterial pressure (MAP) at the first 2 minutes after induction and heart rate (HR) at almost all time points were significantly higher. BIS values from induction to the eighth minute and skin incision, uterine incision and removal of the infant were lower in Group P. No patient remembered the keyword spelled, while 4 patients reported dreaming during general anaesthesia. The effects of propofol and thiopental sodium on 1- and 5-minute APGAR scores, core blood gas values and postoperative visual analogue scale (VAS) scores were similar.

Conclusion: Propofol is a more appropriate anaesthetic agent than thiopental in anaesthesia for caesarean, since it provides better anaesthetic depth and more rapid recovery.

Keywords: Caesarean section, propofol, thiopental sodium, bispectral index, intraoperative awareness

Introduction

Regional techniques in caesarean sections are popular because of their advantages to mothers and newborns. However, the administration of general anaesthesia takes an important place in cases of coagulopathy, infection in the area of regional anaesthesia administration, hypotension, severe foetal distress and rejection of regional anaesthesia by the patient [1].

During caesarean sections performed under general anaesthesia, the problem of intraoperative awareness has often occurred in mothers under the effect of neuromuscular blockers as a result of rapid sequence induction application, non-use of opioids and benzodiazepine until delivery and use of low concentration volatile agents for reducing the newborn's depression to the minimum, and this issue has recently become more important [2]. In patients having intraoperative awareness, sleep disorder, dreams and nightmares, anxiety disorders and post-traumatic stress disorder may develop [3, 4]. Therefore, the choice of induction agent and administration dose has critical importance in the caesarean sections of patients having a high risk for anaesthetic awareness.

Propofol and thiopental sodium are induction agents frequently used in anaesthetic practices. Although propofol is a frequently used intravenous anaesthetic drug at present, there are some concerns about the possibility of neonatal depression

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Original Article

Incidence of accidental awareness during general anaesthesia in obstetrics: a multicentre, prospective cohort study

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Summary

General anaesthesia for obstetric surgery has distinct characteristics that may contribute towards a higher risk of accidental awareness during general anaesthesia. The primary aim of this study was to investigate the incidence, experience and psychological implications of unanticipated conscious awareness during general anaesthesia in obstetric patients. From May 2017 to August 2018, 3115 consenting patients receiving general anaesthesia for obstetric surgery in 72 hospitals in England were recruited to the study. Patients received three repetitions of standardised questioning over 30 days, with responses indicating memories during general anaesthesia that were verified using interviews and record interrogation. A total of 12 patients had certain/probable or possible awareness, an incidence of 1 in 256 (95%CI 149–500) for all obstetric surgery. The incidence was 1 in 212 (95%CI 122–417) for caesarean section surgery. Distressing experiences were reported by seven (58.3%) patients, paralysis by five (41.7%) and paralysis with pain by two (16.7%). Accidental awareness occurred during induction and emergence in nine (75%) of the patients who reported awareness. Factors associated with accidental awareness during general anaesthesia were: high BMI (25–30 kg m⁻²); low BMI (<18.5 kg m⁻²); out-of-hours surgery; and use of ketamine or thiopental for induction. Standardised psychological impact scores at 30 days were significantly higher in awareness patients [median (IQR) (range)] 15 (2.7–52.0 [2–56]) than in patients without awareness 3 (1–9 [0–64]), $p = 0.010$. Four patients had a provisional diagnosis of post-traumatic stress disorder. We conclude that direct postoperative questioning reveals high rates of accidental awareness during general anaesthesia for obstetric surgery, which has implications for anaesthetic practice, consent and follow-up.

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Keywords: accidental awareness during general anaesthesia; anaesthesia; general anaesthesia; obstetric; post-traumatic stress disorder; recall

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Evidence and limitations considering:

- Publication bias
- Study limitations
- Imprecision
- Inconsistency
- Indirectness
- Rating up

Evidence Profile (EP)

EP						
Signs/Outcomes	Number of studies	Limitations	Inconsistency	Indirectness	Imprecision	Publication bias
Recall and dreams	3; Cakirtekin , Odor, Khemlani.	<i>Serious</i> loss of follow up, misunderstanding the questioning	<i>Serious</i> 72 hospitals, too much unknown data.	<i>Moderate</i> only ASA I-II	Yes, too few patients, too few cases of awareness) Risk of random error.	Yes, English articles only.
BIS monitor	1. Cakirtekin	not serious	no	no	no	no
Hemodynamic changes	2; Khemlani, Cakirtekin	<i>Serious</i>	<i>Cakirtekin: Yes, measuring Bp at intervals.</i>	Cakirtekin: no Khemalin: yes	Cakirtein. yes Khemlani: no	Cakirtekin: no Khemlani: no

Summery of Findings (SoF)

SoF						
Studies	Quality	Number of participants		Absolute risk %		RR
		Thiopental	Propofol	Thiopental	Propofol	
Odor	LOW	9/1649 5.5/1000	2/1419 1.4/1000	0,5.	0,14	0,28.
Cakirtekin	LOW	0/35	0/ 35	0	0	0
Khemlani	LOW	9/314	No info	2,9		0

Conclusion and Recommendations:

- For the purpose of reducing the risk for awareness, propofol is the preferred induction agent for caesarian sections in general anesthesia compared to thiopental.
- However our recommendations are based on few studies and the studies have many weaknesses. Therefore our recommendations are also considered very *weak*.