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Research Article

Effect of General Anesthesia with Thiopental Sodium and Propofol on the 1- and 5 Minute Apgar Newborns by Cesarean

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ABSTRACT

Background: The Apgar score of newborn babies is a determining factor involved with mortality of newborns after birth. Regarding the disagreement on advantages and possible disadvantages of propofol and thiopental in the available references, the study was triggered with the aim of analyzing effects of two mentioned drugs on babies' Apgar score.

Methods: In this double-blind clinical trial, a total of 100 healthy women who volunteered to undertake cesarean operation were selected and then divided randomly into two equal groups using statistical blocking. One group was treated by propofol while other one was treated by thiopental. The prescribed drugs for both groups were identical. Babies' Apgar score 1 and 5 minutes after birth and recovery period and some of the critical maternal parameters after operation were recorded. The obtained data were analyzed by SPSS 19 software.

Results: Apgar score I minute 1 (p=0.317) and Apgar score in minute 5 (p=1.00) for propofol group were not different meaningfully. The groups had significant differences in the indices such as first systolic (P=0.00) and diastolic (P=0.00) pressure in recovery, last diastolic pressure in recovery (P=0.001) and duration of postoperative recovery (P=0.001). Statistical analysis of nausea and vomit in both groups showed that they are lower in propofol group rather than the thiopental group (p=0.000).

Conclusion: Propofol and thiopental did not differ significantly in Apgar score, but it seems that propofol can be a better option to induce anesthesia for an elective cesarean operation.

Caesarean section, is the use of surgery to deliver babies [1]. In 2012, about 23 million C-sections were done globally [2].

A C-section typically takes 45 minutes to an hour [3]. It may be done with a spinal block, where the woman is awake, or under general anesthesia [4]. Regional anesthesia may be preferred as it allows the mother to be awake and interact immediately with her baby [5]. Compared to general anesthesia, regional anesthesia is better at preventing persistent postoperative pain 3 to 8 months after caesarean section [6]. Other advantages of regional anesthesia may include the absence of typical risks of general anesthesia: pulmonary aspiration (which has a relatively high incidence in patients undergoing anesthesia in late pregnancy) of gastric contents and esophageal intubation [7]. One trial found no difference in satisfaction when general anesthesia was compared with either spinal anesthesia [8]. Regional anesthesia is

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used in 95% of deliveries, with spinal and combined spinal and epidural anesthesia being the most commonly used regional techniques in scheduled cesarean section [9]. Regional anesthesia during caesarean section is different from the analgesia (pain relief) used in labor and vaginal delivery [10]. The pain that is experienced because of surgery is greater than that of labor and therefore requires a more intense nerve block. General anesthesia may be necessary because of specific risks to mother or child. Patients with heavy, uncontrolled bleeding may not tolerate the hemodynamic effects of regional anesthesia [11]. General anesthesia is also preferred in very urgent cases, such as severe fetal distress, when there is no time to perform a regional anesthesia [12]. Given the abdominal filling of patients during pregnancy, general anesthesia for cesarean section requires laryngoscopy and intra-tracheal intubation, both of which provide an extremely severe stimulus and increase the patient's heart rate and blood pressure. Thus, in general anesthesia, opiates - beta-blockers and nitroglycerin - lidocaine and deeper anesthesia are used to control this complication [13].

Thiopental sodium and propofol are among the drugs widely used to induce anesthesia [14]. In the usual cases, thiopental sodium is used, but propofol has also gained prominence in anesthesia in recent decade. Propofol improves the quality and recovery time, which is associated with a lower proportion of postoperative nausea and vomiting [15]. Rapid disposal, lack of cumulative effects of the drug and its bronchodilator effects are other notable properties of the drug [16]. On the other hand, Propofol can reduce the patient's blood pressure relatively. This property is particularly important in preeclampsia and can modulate the increase in blood pressure following intubation [17]. Propofol passes through the placenta in large quantities and rapidly. This may disrupt the neural function of the infant and reduces fetal blood flow with an effect on the mother's blood pressure [18].

The Apgar score is a method to quickly summarize the health of newborn children against infant mortality [19]. This score is determined by evaluating the newborn baby on five simple criteria on a scale from zero to two, then summing up the five values thus obtained. This grading uses three criteria (breathing, heart rate and skin color) to decide how and when resuscitation begins and the other two components of Apgar (muscle tone and irritability reflex) determine neurological status. The resulting score ranges for every criterion from zero to 10 [20].

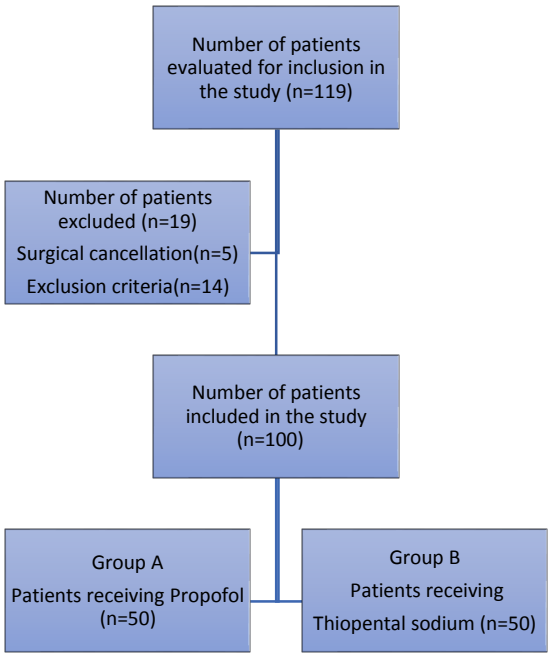
In this study the effect of general anesthesia with thiopental and propofol on neonatal Apgar score of first and fifth minutes in cesarean section was investigated.

Methods

This study, reviewed and approved by the Research Ethics Committee of Sabzevar University of Medical Sciences, with registration code of IR.MEDSAB.REC.1396.86.

In this double-blind clinical trial, 100 pregnant women with age range 18-35 years and being in ASA Class I or II, who were candidates for elective cesarean section were selected and randomly assigned to A and B groups (50 persons in each group). Any suffering from heart diseases, high blood pressure, diabetes, allergy to certain drugs of the study, eclampsia and preeclampsia diseases, gestational diabetes mellitus (GDM), placental abruption, oligohydramnios, placental disorders, coagulopathy, fetal disorders, addiction to drugs and cold made volunteers unqualified for this study. Limiting and matching techniques were used to control confounding variables, and demographic profiles of both groups were identical. To induce anesthesia, propofol (2.5 mg/ kg) was administered to patients in group A and thiopental sodium (4.5 mg / kg) to group B patients (Figure 1). Succinylcholine was used to establish muscle relaxation for intubation in each group. However, anesthesia was maintained with 0.5% isoflurane and a mixture of oxygen and nitrous oxide. In each group, at thirty seconds after birth, 5 factors of heart rate, respiratory status, skin color, muscle tone and reflex responses by midwife unaware of medication were recorded and assessed in a checklist.

Figure 1- Diagram of how patients are enrolled



Results

In this study, for group propofol, the Apgar score at 1th minute was recorded 8 for a newborn and 9 for 49 newborns. The Apgar score at 5th minute was recorded 10 for all newborns. While, for thiopental group, the Apgar score at 1th minute was recorded 9 for all newborns. The Apgar score at 5th minute was recorded 10 for all 50 newborns (Table 1).

According to the results in (Table 2), the groups had significant differences in the indices such as first systolic (P=0.00) and diastolic (P=0.00) pressure in recovery, last diastolic pressure in recovery (P=0.001) and duration of postoperative recovery (P=0.001), while the mean scores in the propofol group were significantly higher than the thiopental sodium group.

The statistical analysis of nausea and vomiting in both groups made it clear that either nausea or vomiting in propofol group was meaningfully less than that in thiopental group (P=0.00).

Table 1- Comparison of Apgar score at 1 and 5 minutes in terms of anesthesia induction drug

Groups	Mean of Apgar score in 1th minute	Mean of Apgar score in 5th minute
A (Propofol)	8.98	10.00
B (Thiopental sodium)	9.00	10.00
P value	0.317	1.00

Table 2- Comparison of some cardiovascular markers in two groups of patients

Indexes	Group	Mean	SD	P value
Systolic pressure before induction of anesthesia	A	123.1400	16.58990	0.139
	B	126.4800	14.18571	
Diastolic pressure before induction of anesthesia	A	80.2200	11.56929	0.568
	B	81.5600	11.80481	
Heart rate before induction of anesthesia	A	98.3600	10.99492	0.119
	B	91.9000	17.00450	
The first systolic pressure in recovery	A	147.1600	17.39970	0.00
	B	130.3400	16.26140	
The first diastolic pressure in recovery	A	98.3200	13.67620	0.00
	B	80.8600	14.37971	
The last systolic pressure in recovery	A	111.0000	8.20652	0.098
	B	109.0200	12.52343	
The last diastolic pressure in recovery	A	74.0400	8.50920	0.001
	B	68.8800	8.91145	
Heart rate after induction of anesthesia	A	98.0000	2.52062	0.00
	B	97.9900	2.52062	
Duration of recovery after surgery	A	7.9600	2.41560	0.001
	B	2.7600	1.11685	

A: Propofol group
B: Thiopental sodium group

Discussion

In this study, the Apgar score of cesarean infants at 1 and 5 minutes induced by propofol was approximately similar to those treated with thiopental; likewise, first systolic and diastolic pressure in recovery, last diastolic pressure in recovery and duration of postoperative recovery showed a meaningful difference. Incidence rate of nausea and vomiting in propofol treated group was less than those in thiopental treated group. In this study, the participants were matched and randomized regardless of whether they were primiparous or multiparous.

Studies on 40 Hong Kong women who had registered for the cesarean operation showed that Apgar scores of newborn babies, in both thiopental and propofol groups, who were born through elective cesarean, were similar. The study was enjoying a proper matching process and a sufficient fluid therapy has been practiced prior to inducing anesthesia, however, their results were similar to ours [21].

Celleno et al. studied 90 Italian women. The Apgar scores of cesarean babies who had been inducted with propofol were less than babies inducted with thiopental. Thus, their results were in contradiction to ours [22].

32 Finnish women who had registered in hospital for cesarean operation were divided into two groups, each 16

women. The Apgar scores of the cesarean newborn babies who had been inducted with thiopental and propofol did not differ meaningfully; both groups were treated with propofol for maintaining anesthesia condition. Likewise, the results were similar to our results [23].

Ghodrati et al. reported in Ardabil's Alavi Hospital no meaningful difference among Apgar scores (at 1, 5, 10 and 15 minutes) of the cesarean newborn babies, who had been inducted with propofol and thiopental. Similarly, in this study, mothers' hemodynamic changes were found without meaningful difference for the two groups. In order to maintain the anesthesia condition, halothane had been used; however, regarding its effects on liver, recently it has been used very rarely. Using this anesthetic to maintain anesthesia condition for both groups, can justify similar results in both groups [24].

Djordoevi et al. studied 40 Serbian pregnant women who were inclined to give birth to their children through cesarean operation. They found that the Apgar score at 1 minute of the cesarean newborn baby who had been treated with thiopental, as the anesthesia induction, was higher. In this study, both elective cesarean and emergency cesarean were included and groups' matching has not been explained. Propofol was used to maintain anesthesia [25].

Conclusion

Although propofol and thiopental did not differ significantly in Apgar score, however with regard to advantages and disadvantages of these two drugs, it seems that propofol can be a better option to induce anesthesia for an elective cesarean operation when no certain risk threatens mother and fetus and there is not any contraindication.

References

[1] Gholitabar M, Ullman R, James D, Griffiths M. Caesarean section: summary of updated NICE guidance. Bmj. 2011; 343:d7108.

[2] Gibbons L, Belizan JM, Lauer JA, Betran AP, Merialdi M, Althabe F. Inequities in the use of cesarean section deliveries in the world. American journal of obstetrics and gynecology. 2012;206(4):331.e1-19.

[3] Kumar A, Khinchi MP, Khan MS, Singh SP, Nagar L. PREGNANCY: AN OVERVIEW OF C-SECTION DELIVERY. Asian Journal of Pharmaceutical Research and Development. 2017; 1:1-2.

[4] Kato R, Terui K, Yokota K, Nakagawa C, Uchida J, Miyao H. Anesthetic management for cesarean section in moyamoya disease: a report of five consecutive cases and a mini-review. Int J Obstet Anesth. 2006; 15(2):152-8.

[5] Bloom SL, Spong CY, Weiner SJ, Landon MB, Rouse DJ, Varner MW, et al. Complications of anesthesia for cesarean delivery. Obstet Gynecol. 2005; 106(2):281-7.

[6] Andreae MH, Andreae DA. Regional anaesthesia to prevent chronic pain after surgery: a Cochrane systematic review and meta-analysis. Br J Anaesth. 2013; 111(5):711-20.

[7] Recker DC, Perry PM. Postsurgical pain syndromes: Chronic pain after hysterectomy and cesarean section. Techniques in Regional Anesthesia and Pain Management. 2011; 15(3):133-9.

[8] Moawad HE, El Hefnawy AS. Spinal vs. general anesthesia for percutaneous nephrolithotomy: A prospective randomized trial. Egyptian Journal of Anaesthesia. 2015; 31(1):71-5.

[9] Lew E, Yeo SW, Thomas E. Combined spinal-epidural anesthesia using epidural volume extension leads to faster motor recovery after elective cesarean delivery: a prospective, randomized, double-blind study. Anesth Analg. 2004; 98(3):810-4.

[10] Eltzschig HK, Lieberman ES, Camann WR. Regional anesthesia and analgesia for labor and delivery. N Engl J Med. 2003; 348(4):319-32.

[11] Mechanick JI, Kushner RF, Sugerman HJ, Gonzalez-Campoy JM, Collazo-Clavell ML, Guven S, et al. American Association of Clinical Endocrinologists, The Obesity Society, and American Society for Metabolic & Bariatric Surgery Medical Guidelines for Clinical Practice for the perioperative nutritional, metabolic, and nonsurgical support of the bariatric surgery patient. Endocr Pract. 2008; 14 Suppl 1:1-83.

[12] Morgan BM, Magni V, Goroszenuik T. Anaesthesia for emergency caesarean section. BJOG: An International Journal of Obstetrics & Gynaecology. 1990; 97(5):420-4.

[13] Dresner MR, Freeman JM. Anaesthesia for caesarean section. Best Practice & Research Clinical Obstetrics & Gynaecology. 2001; 15(1):127-43.

[14] Shaaban MF, Kassem MM, Kammar EL, Mahmoud H, Korittum SA. Clinical Evaluation of Intravenous Propofol Alone or in Combination with Diazepam, Ketamine Hcl and Thiopental Sodium to Induce General Anaesthesia in Dogs. Alexandria Journal for Veterinary Sciences. 2018;57(1):106-114.

[15] Mahjoubifard M, Heidari M, Dahmardeh M, Mirtajani SB, Jahangirifard A. Comparison of Dexmedetomidine, Lidocaine, and Fentanyl in Attenuation Hemodynamic Response of Laryngoscopy and Intubation in Patients Undergoing Cardiac Surgery. Anesthesiol Res Pract. 2020; 2020:4814037.

[16] Gardner DK, Weissman A, Howles CM, Shoham Z, editors. Textbook of assisted reproductive techniques fourth edition: volume 2: Clinical perspectives. CRC press; 2012; 27:114-115.

[17] Hynson JM, Sessler DI, Moayeri A, McGuire J, Schroeder M. The effects of preinduction warming

on temperature and blood pressure during propofol/nitrous oxide anesthesia. Anesthesiology. 1993; 79(2):219-8.

[18] He YL, Tsujimoto S, Tanimoto M, Okutani R, Murakawa K, Tashiro C. Effects of protein binding on the placental transfer of propofol in the human dually perfused cotyledon in vitro. British journal of anaesthesia. 2000; 85(2):281-6.

[19] American Academy of Pediatrics. The Apgar score. Adv Neonatal Care. 2006; 6(4):220-3.

[20] Gawande AA, Kwaan MR, Regenbogen SE, Lipsitz SA, Zinner MJ. An Apgar score for surgery J Am Coll Surg. 2007; 204(2):201-8.

[21] Gin T, Gregory MA, Oh TE. The haemodynamic effects of propofol and thiopentone for induction of caesarean section. Anaesth Intensive Care. 1990; 18(2):175-9.

[22] Celleno D, Capogna G, Emanuelli M, Varrassi G, Muratori F, Costantino P, Sebastiani M. Which induction drug for cesarean section? A comparison of thiopental sodium, propofol, and midazolam. J Clin Anesth. 1993; 5(4):284-8.

[23] Valtonen M, Kanto J, Rosenberg P. Comparison of propofol and thiopentone for induction of anaesthesia for elective caesarean section. Anaesthesia. 1989; 44(9):758-62.

[24] Ghodrati M, Akhavan-akbari G, Amani F. Comparison of propofol and thiopental for induction of anaesthesia for elective Caesarean section on aogar score. Persian. Res Sci J Ardabil Univ Med Sci Health Ser. 2003; 3(9):52-8.

[25] Djordjević B, Stojiljković MP, Mostić T, Vojvodić L, Loncar-Stojiljković D. Propofol and thiopentone in elective cesarean section: effect on the mother and neonate. Vojnosanit Pregl. 1998; 55(6):601-4.