Comparative study of the effect of general anesthesia with Propofol, Sodium Thiopental and the combination of Propofol-Thiopental on Apgar score of newborn babies in the cesarean delivery

Maryam Tolyat¹, Malihe Zanguoie² and Reza Zanguoie³

¹Instructor, Department of Operating Room, Faculty of Paramedical, Birjand University of Medical Sciences, Birjand, Iran.
²Assistant professor, Department of Anesthesiology, Faculty of Medicine, Birjand University of Medical Sciences, Birjand, Iran.
³Corresponding: Pharmacologist and academic staff of Azad University of Medical Science, Birjand, Iran.

ABSTRACT
Cesarean delivery is one of the most current surgeries in women. Choice of different types of anesthesia depends on different factors like the degree of emergency of the surgery, the cause of operation and the patients’ desire. One of the most significant challenges of anesthesiologists in this kind of surgery is fetuses’ exposure to anesthetic drugs. If these drugs pass through the placenta, they may cause weakening of the central nervous system and respiratory system of newborns. Therefore, the present study aims at comparing the effect of Propofol, Thiopental Sodium and the combination of these two drugs on Apgar score of newborns and introduces a more appropriate drug for inducing general anesthesia in cesarean delivery. This study is a double-blind clinical trial which is conducted in Vali-e-Asr Hospital of Birjand city and it is done on pregnant women who are candidates of elective cesarean. The inclusion criteria are pregnant women who are candidates of elective cesarean delivery and have normal and full-term fetus and they should not have absolute prohibition of general anesthesia by one of the two drugs under study. The research samples are 84 women that enrolled in the study respectively after entering the operating room, being interviewed and signing the written consent and they were placed randomly based on table of simple random numbers in one of three groups namely, Propofol, Thiopental Sodium and combination of Propofol-Thiopental groups, each having 28 members. Based on clinical examination and definition of Apgar, the Apgar score of newborns were assessed and recorded carefully during first, fifth and tenth minutes after birth. For data analysis, the SPSS 16 software was utilized. The results showed a meaningful difference in the average Apgar score of newborns among the three groups in the first and the fifth minutes. The authors observed differences in Apgar score of Propofol and Thiopental groups in the first minute of birth. Also, they found differences in Apgar score of two groups of Thiopental and Propofol and also two groups of Thiopental-Propofol and Propofol. Given that Thiopental has more fetal side-effects, Propofol is a more appropriate drug than Thiopental Sodium and combination of these two drugs, in terms of its impact on newborns’ Apgar scores.

Keywords: Thiopental Sodium, Propofol, Cesarean, Apgar, Hemodynamic Changes.

INTRODUCTION
Cesarean delivery is one of the most current surgeries in women [1] and it is one of the most significant challenges of anesthesiologists in this kind of surgery is the fetuses’ exposure to

http://www.bipublication.com
Comparative study of the effect of general anesthesia with Propofol, Sodium Thiopental and the combination of Propofol Thiopental

Anesthetic drugs. If these drugs pass through the fetus, they may cause weakening of the central nervous system and respiratory system of newborns [2]. In the developed countries, around 17 percent of cesareans are performed by general anesthesia, but this number is much more in Iran. This will support the need to conduct more researches in this regard [3]. Because of fetus depression, the use of intravenous hypnotic medications during pregnancy is not recommended. However, the use of this kind of medication in general anesthesia for cesarean is inevitable. It is not possible to start surgeries before the drugs used in anesthesia induction have penetrated into the bloodstream of the fetus, resulting in fetal depression, laryngoscopy and surgical incision. Although the drug becomes diluted in the fetus bloodstream [4] and hemodynamic changes in general anesthesia induction is not enough to decrease fetus bloodstream, this issue is questionable that to what extent fetus is sensitive to these drugs [5]. The side-effects of general anesthesia can be minimized by shortening the time of surgery (baby’s birth) and using healthier medicine in anesthesia induction [6]. The most drugs which are used in cesarean to induce anesthesia are Thiopental Sodium. Various studies proved that Propofol does not have negative effects on Apgar scores of newborns [7]. Thiopental Sodium causes a reliable and fast induction. Its preferred dose is 4mg/g which rapidly passes through the placenta and it can be traced in the blood of the umbilical vein within 30 seconds after its injection [2]. Propofol is an intravenous drug which is of non-barbiturates group and is hypnotic via its impact on Gamma receptors [10]. Ghodrati et al., (2002) studied and compared the effect of anesthesia induction by Propofol and Thiopental Sodium on newborns’ Apgar scores and maternal hemodynamics in cesarean delivery. The research findings showed that Propofol and Thiopental Sodium which are medications that induce anesthesia do not have any negative effects on newborns’ Apgar score and maternal hemodynamics [3]. In a comparative study, Akhavan Akbari compared the effect of anesthesia induction by Thiopental Sodium or Propofol and spinal anesthesia on Apgar scores of babies born by cesarean. The research findings revealed that general anesthesia by Thiopental Sodium or Propofol and spinal anesthesia do not have any meaningful effects on newborns’ Apgar scores [1]. Lotf’ alizadeh (1390) studied the effect of general anesthesia by Thiopental Sodium and Propofol on newborns’ Apgar score and the amount of uterine relaxation in cesarean. The paper’s purpose was to determine cesarean newborns’ Apgar scores that that their mothers are anesthetized by Propofol, Thiopental Sodium and combinations of these two. Findings showed that Propofol is an appropriate drug for anesthesia and can be a suitable alternative for Thiopental when needed and it does not have any side effects on newborns’ Apgar scores. It causes a relatively stable homodynamic status [15].

**METHODOLOGY**

The present double-blind clinical trial was conducted in Vali-e-Asr Hospital of Birjand city. The research sample was pregnant women who were candidates of elective cesarean. The time of deciding to have elective cesarean is during pregnancy i.e. before time of childbirth. The inclusion criteria are ASA pregnant women in class 1 and 2 who were candidates of cesarean delivery and would receive general anesthesia. Also, their fetus should be normal and full-term and they should not have absolute prohibition of general anesthesia by one of the two anesthetic medications of the research and should not have any severe systemic diseases. Due to the previous studies, the research samples were 84 pregnant women who referred to Vali-e-Asr Hospital of Birjand for cesarean and were eligible to enter into the project. They were enrolled in the study respectively after entering the operating room, being interviewed and signing the written consent and they were placed randomly based on table of simple random numbers in one of three groups.
Comparative study of the effect of general anesthesia with Propofol, Sodium Thiopental and the combination of Propofol-Thiopental

28-person groups namely, Propofol, Thiopental Sodium and combination of Propofol-Thiopental groups. The research was conducted based on double-blind clinical trial, i.e. measurement of newborns’ blood pressure, heart rate and Apgar score was done by a person who was unaware of the kind of anesthetic drug used for patients and the patients themselves were also not aware of their anesthetic medications. All the patients received 100% Oxygen for 5 minutes before anesthesia induction. Then, according to the kind of groups under investigation, the Thiopental Sodium group received 4mg/kg dose intravenously, the Propofol group received 2mg/kg intravenously and Thiopental-Propofol group received 2mg/kg Thiopental Sodium and 1mg/kg intravenously. After induction, to sustain anesthesia the combination of Isoflurane 0.5%, Oxygen and Nitrous Oxide is used. It is worthy of notice that as time of cesarean is different due to the conversance of women surgeon, the cesarean delivery is done by on surgeon in all three groups. For data analysis descriptive statistics were used in format of frequency tables and also analytic statistics were used for analyzing the relationship between variables by considering the types of the variables by utilizing different statistical tests like Chi-square test, T-test and variance analysis in the SPSS software. Demographic variables of the patients were obtained through interview and clinical examination. Also, the Apgar scores of newborns were recorded by an anesthesiologist in the first, fifth and tenth minutes after birth. All the variables were recorded in a form that was designed for newborns’ Apgar score.

Findings

DISCUSSION AND CONCLUSION

Propofol is a medicine that has fast induction and recovery. In cases where Thiopental has contraindications it can be a good alternative. Findings of the present study showed that there were meaningful differences in the Apgar score of the three groups in the first and the fifth minutes after birth, so that the Apgar of the first minute in Propofol group was higher than thiopental group

<table>
<thead>
<tr>
<th>Apgar 1 minute</th>
<th>Apgar 5 minutes</th>
<th>Apgar 10 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>thiopental</td>
<td>8/4±0/7</td>
<td>9/1±0/5</td>
</tr>
<tr>
<td>Propofol-Thiopental</td>
<td>8/8±0/7</td>
<td>9/2±0/4</td>
</tr>
<tr>
<td>protocol</td>
<td>9/1±0/5</td>
<td>9/7±0/5</td>
</tr>
<tr>
<td>P value</td>
<td>P=0/002</td>
<td>P&lt;0/001</td>
</tr>
</tbody>
</table>

Table 1. The comparison of protocol with thiopental and the combination of Propofol-Thiopental as induction drug on neonatal Apgar during elective cesarean section(mean (SD).)

The average score of mothers’ ages in the present study was 23.6±4.4. All subjects had a full-term gestational age fetus, none of which faced any certain complications during induction before childbirth, after childbirth or during estuation. In all three groups the time average between induction anesthesia and childbirth. None of the babies in the three groups had low weight and there were not any meaningful differences in the three groups considering their gender. But there were meaningful differences among the three groups regarding the newborns’ Apgar scores average in the first and the fifth minutes after birth. Mann-Whitney test results revealed that there were meaningful differences between Thiopental and Propofol groups in the first minute of birth (P<0/001). Also, there were meaningful differences between Thiopental and Propofol groups in the fifth minute of birth (P<0/001). Finally, there were meaningful differences between Propofol and Propofol-Thiopental group in the fifth minute of birth (P<0/001).
Comparative study of the effect of general anesthesia with Propofol, Sodium Thiopental and the combination of Propofol-Thiopental

rapid depression of Propofol, this medicine can be suggested for cesarean and that Propofol causes less depression than Thiopental Sodium [14]. In a clinical trial study, a group of scholars compared the effect of Propofol and Thiopental Sodium on Apgar scores of newborns and concluded that the differences of Apgar scores of the two groups were not significant [3]. These findings differed with PjorDjevicetal.’s (1998) study which compared Thiopental and Propofol groups. There were not any meaningful differences between the Apgar score of the first and the fifth minutes in the two groups [8].

Ghodrati (2003) conducted a research in Alavi Hospital of Ardebil and found that there were not any meaningful differences between the newborns’ Apgar score of Propofol and Thiopental groups in the first, fifth, tenth and fifteenth minutes after birth [3]. Valtonen et al, (2000) studied 32 Finland women who wanted to deliver elective cesarean. They were divided into two 16-person groups. Results indicated that the Apgar scores of newborns were not different statistically in the two Thiopental and Propofol groups [14]. Celleno et al, (2003) studied 90 pregnant women with cesarean section in Rome University of Italy. The Apgar score of newborns in Propofol group was less than the Thiopental group. Of course, women enrolled in this study were both those who had elective cesarean and those who have to do emergency cesarean. Also, to sustain anesthesia, Halothane was used which was inconsistent with this study [5]. Gin et al, (1990) studied 40 pregnant women with cesarean section in Hong Kong. The Apgar scores of newborns in the two groups did not have any meaningful differences. Thus, the results were inconsistent with the findings of the present study [18]. Rabi’e et al;’s (2012) findings revealed that the effect of Thiopental Sodium and Propofol were the same on the Apgar scores of newborns. So, Propofol can be an appropriate alternative for Thiopental medicine for anesthesia induction of cesarean deliveries [19]. AkhavanAkbari et al, (2012) compared the effects of Propofol and

References

1. Akhavan, A.G., et al., The Comparison general anesthesia induced by thiopental sodium or
protocol with spinal anesthesia on the Apgar score of neonates delivered by cesarean section. Medical Journal OF Tabriz University of Medical Sciences, 2010.


Reza Zanguoie, et al. 983