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## RESEARCH ARTICLE

### A Comparative Study about the Effect of General Anesthesia and Spinal Anesthesia on Changes in Blood Parameters after Cesarean Section in Doctor Ganjavian Hospital in Dezful City in 2013

Hadi ZareMarzouni<sup>1</sup>, zohreh lavasani<sup>2</sup>, Shirin Riahi<sup>1</sup>, Zahra Riahi<sup>3</sup>, Reza Najjbipour<sup>4</sup>,

1. Student Research Committee, Dezful University of Medical Sciences, Dezful, Iran
2. Department of Obstetrics and Gynecology, Islamic Azad University, Tehran Medical sciences Branch, Tehran, Iran.
3. Teaching English Language Student in MA level at Science and Research University of Khuzestan, Ahwaz, Iran
4. Student Research Committee, Islamic Azad University, Tehran Medical sciences Branch, Tehran, Iran

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##### \*Corresponding Author

Shirin Riahi

#### Abstract

According to some studies about halogenated drugs which used in general anesthesia for performing cesarean section, it is possible that they increased the losing blood during surgery. Thus this study was performed by the aim that compared the effect of general anesthesia and spinal anesthesia on changes in blood parameters after cesarean section. This study was analytic-cross sectional and was performed on 180 women who were candidates for cesarean section and they were admitted in labor unit of Doctor Ganjavian hospital in Dezful in 2013. Exclusion criteria of this study were included: heart problems, coagulation disorders, anemia, preeclampsia, atonic (Polyhydramnios, multiparity, etc.), weight at birth which was greater than 4 kg, and the operation which takes long time (above 90 min). The research tool was questionnaire which included a consent form and demographic information. Four blood samples were taken from each patient (two samples before and two samples after delivery) for hematology tests. The mean age was  $26.8 \pm 0.8$ . Ninety patients used spinal anesthesia for caesarean section. The duration of surgery and anesthesia didn't differ in the two groups of general anesthesia and spinal anesthesia ( $p = 0.003$  and  $CI = 95\%$ ). According to this study the amount of the hemoglobin, hematocrit, and platelet has significantly decreased in each of the two groups of general anesthesia and spinal anesthesia compare to the preoperative ( $p < 0.008$  and  $CI = 95\%$ ). As well as their mean difference in patients who were undergoing general anesthesia was significantly higher than patients who were undergoing spinal anesthesia (before and after delivery). ( $p = 0.002$ ,  $CI = 95\%$ ). This study showed that the amount of decrease in hematocrit after cesarean section in patients who were under general anesthesia was higher than patients who were under spinal anesthesia. So it seems that the spinal anesthesia is a better choice for analgesia in laboring; because spinal anesthesia has fewer complications than general anesthesia. It is suggested to choose a suitable method by performing further studies.

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#### Introduction

Cesarean means removing fetus from the uterus through the incision on the abdomen and uterus (1). In emergency conditions which a pregnant woman doesn't have the ability for natural delivery or because of her fear of pain from

the natural delivery and its problems ,cesarean section which is a kind of surgery operation is used by her request (2) . Caesarean section is one of the most common surgical procedures (1, 3, 4 and 5).Some factors necessitate a cesarean section which include: the existence of the placenta previa, previa vessel , showing the umbilical cord, fetal distress at 24 weeks of age, dystocia delivery (such as delivery stop, mismatch the head of fetus with mother's pelvis), prolapsed umbilical cord, existing the genital herpes,the twin , when the head of the first fetus is not seen, Mono-amniotic twins, themismatch in the head of fetus with mater pelvis(1).Cesarean section like many other surgical operations requires anesthesia.Two common anesthetic techniques for cesarean section are general anesthesia and spinal anesthesia (6). General anesthesia begins with intravenous drugs or inhaled anesthetic, with or without Nitrous oxideand it causes the loss of consciousness. Neural-based regional anesthesia (spinal, epidural) is selected when it is desirable to maintain consciousness during surgery and is performed with the injection of spinal anesthetic solution into the subarachnoid space which contains cerebrospinal fluid (7, 8).

The decision for performing general anesthesia or spinal anesthesia that provides analgesia for caesarean section depends on the mother'srequest, maternal and fetal conditions. When cesarean section is selective, spinal anesthesia is preferred. Particularly it is desirable when mother is awake .Also inregional analgesia the risk of pulmonary aspiration of maternal and fetal distress is minimized (9, 10)

Statistical studies show that therates of cesarean delivery are increased. caesarean sections in Iran accounts for about 35% of all deliveries(11). In Fathian study and his colleges in Isfahan, the cesarean rate among pregnant women was 52.4% (12). In a study which was performed in our country in the second half of 2008 titled as the monitoring and evaluation of reproductive health, the percentage of cesarean sections in Iran ,during this period was 42.3%.(13,14).

Also according to the World Health Organization in 2010 which announced, only 10 to 15% of cesarean sections is permitted only for medical reasons (14), so we conclude that in addition to the rate of caesarean section in our country that is much higher than World Health Organization standards, the results of statistical studies show the increasing rates of cesarean delivery and the necessityfor performing anesthesia whichneeds to provide the services and treatment plans and establishing favorable conditions in which this procedure can be done in the best way. In the selective cesarean section both general anesthesia and spinal anesthesia are used because there is no need to speed in the induction of the anesthesia (15). More studies suggest that the type of anesthesia is effective on the rate of surgical bleeding and the rate of changes in blood parameters. (10, 16). The small amount andintermittent of evaporation anesthetic drug, reduces the possibility of motherawaking and increases the losing blood (10).

Changes in blood parameter viscosity due to the bleeding, causesome changes in stability of hemodynamic and physiologic status of the patients. Thisproblembecomes soeverewhen shows its effects with changes in amount of vital sign and endanger the patient's life (17).

Usually during Caesarean section, about 750 to 1,000 cc of blood is lost, in which the blood transfusions is rarely needed (10).

Currently, therapeutic interventions, such as serum therapy, medication, and in some cases a blood transfusion or blood products are done in order to minimize the side effects of these changes (17).

Although blood and its products can be used as a medicine for saving human lives but sometimes the side effectsof the blood transfusion such as allergic reaction, fever, hemolytic, transmitted bacterial disease, electrolyte and metabolite abnormalities can jeopardize human lives(18).

Consequently , due to unintentionally side effects of blood transfusion, limited resources of blood supplying, tough and costly conditions for maintaining theblood, multiplicative factors which need blood transfusion should be identified and is planned in order to reduce the causing of these factors .According to the high rate of caesarean sectionand also regards to have a good technique and a less complication anesthesia, therefore this study aimed to evaluate the changes in blood parameters in patients whowere undergoing general anesthesia and spinal anesthesia before and after cesarean section.

## Materials and methods

This study is cross – section. In this study 180 pregnant women who were 18 to 45 years old,that became a candidate for cesarean section (general anesthesia and spinal anesthesia) and they referred to the Doctor Ganjavianhospital in Dezful city in 2013 were examined. Participants were in two groups,the first group consisted of 90 pregnant women who underwent general anesthesia for performing cesarean section and the second group consisted of 90 pregnant women who underwent spinal anesthesia for performing cesarean section.

Sampling in both groups was randomly. In all patients, the physical examination and sonography were performed and women who had heart disease , clotting disorders , anemia , preeclampsia , gestational diabetes and Uterine rupture , atonic (Polyhydramnios , multiparity , etc.), weight at birth which was greater than 4 kg and operation

which takes long time ( above 90 min ) were excluded from the study .When all patients entered to the operating room became serum therapy with Ringer's lactate solution and they were under the monitoring of temperature, blood pressure , pulse oximetry , electro- cardiography. Before anesthesia, all patients in the operating room received no drug .General anesthesia was performed with thiopental 5mg/kg and atracurium 0.5mg/kg and O<sub>2</sub> and N<sub>2</sub>O gases with an equal volume.Spinal anesthesia was generated by injecting 75 mg of lidocaine 5 % , with a 25- gauge needle. During surgery, patient comfort, hypotension, bleeding, operation time, repeated anesthetics and anesthesia drugs were considered.

All patients received 20-30 units of oxytocin for contracting uterine at the end of the operation and after pulling out the placenta from the uterus.

Preliminary, data were collected based on the information obtained from the medical records of each patient and for analyzing blood parameters; blood samples at a rate of 2 cc were collected. This means that from each patient, were sampled in two times before surgery (6 and 24 hours before surgery) and 2 times after surgery (6 and 24 hours after surgery) and their average were calculated and recorded in each section. Blood pressure, heart rate, respiratory rate, fluid intake, and duration of surgery were recorded at before, during and after surgery. Statistical analysis was performed by using spss 13 software.

Mean, relative frequency and absolute frequency were used in descriptive statistics section.

Independent-sample T tests and Chi-Square Tests were used in inferential tests Section. P values which were less than 0 /05 were considered significantly.

**Results & Discussion :** The mean age of patients in the general anesthesia group was  $27.6 \pm 5.3$ , and in the spinal anesthesia group was  $26 \pm 4.3$  years old. The mean duration of surgery for general anesthesia was  $24 \pm 6.3$  minutes and for spinal anesthesia were  $30 \pm 8.6$  minutes. The duration of surgery and anesthesia didn't differ in both groups (general anesthesia and local anesthesia) ( $P < 0.02$  and  $CI = 95\%$ ).

In none of the participants, did not see general side effects such as sharp decrease in blood pressure and cardiopulmonary arrest during the surgery.

Distribution of mean values of hematological indices before and after surgery is shown in tables 1 and 2 respectively. The amount of the hemoglobin and hematocrit had decreased significantly in each of the two groups of general anesthesia and spinal anesthesia compared with preoperative ( $p < 0.005$  and  $CI = 95\%$ ). The results of this study showed that the amount of decrease in hematocrit and hemoglobin after the surgery in patients who were undergoing general anesthesia were significantly higher than patients who were undergoing spinal anesthesia ( $p = 0.002$  and  $CI = 95\%$ ). Hematocrit showed a greater decrease in cases which prolonged operative time.

This study investigated the effect of anesthesia on the rate of changes in blood parameters. The results of this study showed that the amount of decrease in blood parameters RBC, hemoglobin and hematocrit levels after cesarean section in patients who were undergoing general anesthesia, significantly higher than the patients who were undergoing spinal anesthesia.

According to the results of this study, the amount of decrease in RBC, hemoglobin and hematocrit in the general anesthesia group was  $0.9 \pm 0.4$  million per microliter ,  $0.8 \pm 0.03$  gram per deciliter and  $4.4 \pm 2.2$  percent and the amount of decrease in the spinal anesthesia group was  $0.3 \pm 0.05$  million per microliter,  $0.67 \pm 0.1$  gram per deciliter and  $4 \pm 0.6$  percent.

According to the study which was performed by Lertakyamane J and his colleagues in 1999 in Thailand, the amount of losing blood in patients who were undergoing general anesthesia was significantly increased and after surgery the amount of hematocrit in these patients became less (19).

According to the study which was conducted by Zamani and his colleagues in Hamadan in 2005, the amount of the hemoglobin and hematocrit in general anesthesia and spinal anesthesia, had a significant decrease compared before surgery.

Also the amount of decrease in hemoglobin and hematocrit after surgery in patients who were undergoing general anesthesia, were significantly more than patients who were undergoing spinal anesthesia (20).

Also in a study which was conducted by Naghibi and his colleagues in Isfahan, that investigated the changes in hemoglobin and hematocrit in 182 patients after general anesthesia; they stated that the mean of hemoglobin and hematocrit in the general anesthesia group showed a greater decrease than spinal anesthesia.

Also they stated that during general anesthesia, the rate of HB, HCT in peripheral venous blood incorrectly decreased about 7 to 10 percent due to vasodilatation and passing the plenty of red blood cells from the dilated capillaries. Awareness of this phenomenon prevents the premature and unnecessary transfusion (18). According to this study which conducted by Andrew Wwww and his colleagues in the united states in 1992 ,the rate of bleeding increased in patients undergoing cesarean section with general anesthesia compared to spinal anesthesia because of using halogenated drug , in general anesthesia (21). However based on the study which was conducted by Hong JY

and his colleagues in south Korea in 2003, that performed a comparative study about the effect of general anesthesia and local anesthesia on hemodynamic changes and the amount of blood losing in a mother.

It was found that, there were not significant differences between the two groups which being studied about the amount of blood losing and also according to the study which conducted by Naef RW and his colleagues that was performed on 1610 cases of cesarean section over 2 years, there was no association between the procedure of anesthesia and the amount of bleeding(23).

### Conclusion:

The result of this study showed that the amount of reduction in blood parameters after cesarean section in patients who were under general anesthesia, was higher than patients who were under spinal anesthesia. Several studies stated that the amount of blood losing during general anesthesia was greater than spinal anesthesia and they had mentioned that halogenated compounds which used in anesthesia was the reason for bleeding.

Therefore, it is recommended that further studies should be conducted to compare the Halothane with other anesthesia studies.

According to the results of this study, it seems that the spinal anesthesia is the effective option for labor analgesia because of less decreased in the rate of blood parameters. Further studies are recommended to achieve reliable results.

**Table 1- Distribution of mean values of blood parameters in general anesthesia and spinal anesthesia before cesarean section**

Anesthetic technique	The amount of RBC	The amount of WBC	The amount of Hb	The amount of HCT	The amount of Plt
General Anesthesia	4.2±0.49	12.3±1.4	12.4±1.1	36.6±2.5	197.2±55.1
Spinal Anesthesia	4.2±0.45	11.2±2.5	11.55±0.9	36.1±2.9	194.4±54.5

**Table 2- Distribution of mean values of blood parameters in general anesthesia and spinal anesthesia after cesarean section**

Anesthetic technique	The amount of RBC	The amount of WBC	The amount of Hb	The amount of HCT	The amount of Plt
General Anesthesia	3.8±1.4	12.8±3.9	11.6±0.37	32.2±0.3	183±56.5
Spinal Anesthesia	3.9±0.4	12.2±2.5	10.91±0.3	3.2±0.1	185±38.1

**Table 3- changes in the mean of blood parameters in general anesthesia and spinal anesthesia before and after cesarean section**

The type of Anesthesia	General Anesthesia	spinal Anesthesia	P – value
Blood Parameter	Mean±Standard Deviation	Mean±Standard Deviation	
Changes in Red Blood Cell	-0.4±0.9	-0.3±0.05	>0.05
Changes in White Blood Cell	+0.5±2.5	+1	>0.05

Changes in Hemoglobin	<b>-0.8±0.03</b>	<b>-0.67±0.1</b>	<b>&gt;0.05</b>
Changes in Hematocrit	<b>-4.4±2.2</b>	<b>-4±0.6</b>	<b>&gt;0.05</b>
Changes in Platelet Count	<b>-14.2</b>	<b>-9.4±1</b>	<b>&gt;0.05</b>

## References

1. ParvizGharekhani, AsgharSadatian, Principles of pregnancy and delivery .Tehran. Noor Danesh. Fifth edition.2009:248.
2. John W Williams, Cunningham F Gary. Williams Obstetrics. 21sted, 2001. 242
3. John W Williams, Cunningham F Gary. Williams Obstetrics. 21sted, 2001. 320.
4. Robert K, Stoelting, Ronald D Miller. Basics of Anesthesia. 4thed. 2000. 458-62.
5. Robert K, Stoelting Stephen F. Dierdorf. Anesthesia and co-existing disease. 4thed. 2002. 536-9.
6. Afolabi BB, Lesi AFE, Merah NA. Regional versus general anaesthesia for caesarean section. Cochrane Database of Systematic Reviews 2006, Issue 4. Art. No.: CD004350. DOI: 10.1002/14651858.CD004350.pub2.
7. Robert K, Stoelting, Ronald D Miller. Basics of Anesthesia. 4thed. 2000:193-196.
8. Robert K, Stoelting, Ronald D Miller. Basics of Anesthesia. 4thed. 2000:259-265.
9. Hawkins JL, Koonin LM, Palmer SK, Gibbs CP.(1997) Anesthesia-related deaths during obstetric delivery in the United States, 1979-1990. Anesthesiol; 86:277.
10. Lam DT, Ngan Kee WD, Khaw KS. Extension of epidural blockade in labour for emergency Caesarean section using 2% lidocaine with epinephrine and fentanyl, with or without alkalisation(2001). Anaesthesia7(4); 56:790.
11. Soheila Riahinejad, Hamidreza Nikyar, Mahnoush Salem, Fereshteh Haghghat, Maryam Riahinejad, Reza Kazemi, Maryam Mohsenikia(2012). Depression and Perceived Social Support Evaluation in Iranian Pregnant Women Who Underwent Elective or Non-Elective Cesarean Delivery in 2011-2012. GMJ. ;1(2):72-77
12. Fathian Z, Sharifirad G. Factors affecting delivery, Esfahan(2008). Health Policy.;4 786-793.
13. Dadras S .Evaluation of bacteriuria in pregnant women in Tehran(1999). Hakim.; 2(1) 23-26.
14. Khosrovan S, Mansoorian M. High risk pregnancies in Gonabad(2000). Lorestan medical journal.2(4): 23\_25 .
15. Kenepp, NB, Kumar, S, Shelley, WC. Fetal and neonatal hazards of maternal hydration with 5% dextrose before caesarean section(1982). Lancet; 1:1150.
16. Fatemeh Haji Mohammadi, ShahriyarArbabi, AfsharEtemadi Al Agha. The effect of anesthesia (general and regional) on the amount of bleeding in selective caesarian section(2002). Anesthesiology and intensive care:( 32)22.the second period number3:52-56
17. Ronald Miller, Robert Stoelting. Basics of anesthesia of Miller in 2007, Translators(2011) OmidMoradi, Reza Shahrani, ArashOstovari, Ali Reza Kheshti. Tehran .Andishe Rafi .Third edition:271-283
18. KhosroNaghbi , Ahmad Yaraghi ,PeymanAdibi (2010)Changes on hemoglobin and hematocrit in patients after general anesthesia .Research in medical sciences journal 4(6):321.322
19. Lertakyamane J, Chinachoti T, Tritrakarn T, Muangkasem J, omboonnanonda A, Kolatat T. Comparison of general and regional anesthesia for cesarean section: success rate, blood loss and satisfaction from a randomized trial(1999). J Med Assoc Thai Jul;82(7):672-80.
20. MehrangizZamani ,Mandana Mansour Ghenaee ,PooranHajian ,Shahla Nasr Elahi. Comparing the general anesthesia and local anesthesia on changes in hemoglobin after delivery(2008). Women, obstetrical, infertility journal in Iran .Summer ( 2).11.41-48.
21. Andrews WW, Ramin SM, Maberry MC, Shearer V, Black S, Wallace DH(1992). Effect of type of anesthesia on blood loss at elective repeat cesarean section. Am J Perinatol May;9(3):197- 200.

22. Hong JY, Jee YS, Yoon HJ, Kim SM(2003) Comparison of general and epidural anesthesia in elective cesarean section for placenta previa totalis: maternal hemodynamics, blood loss and neonatal outcome. Int J Obstet Anesth Jan;12(1):12-6.
23. Naef RW, chauhan SP,chevalier SP(1994):Prediction of hemorrhage at cesarean delivery. Obset-Gynecol;83(6):923-6