

Comparison of hematocrit concentration after cesarean section between two methods: general anesthesia Vs spinal anesthesia

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Abstract: Comparing hematocrit concentration after cesarean section (CS) between general and spinal anesthesia. In a clinical trial in 2010 in the Department of Obstetrics and Gynecology, Qazvin University of Medical Sciences on 200 pregnant women elected for pregnancy termination by CS due to obstetric emergency, hematocrit changes in patients with general and spinal anesthesia were studied before and after CS. Hct-Hb content was significantly reduced in patients with general anesthesia (4.2 and 1.6) compared to spinal anesthesia (3.2 and 1) ($p < 0.05$). Mean hematocrit loss in spinal anesthesia was significantly lower than in general anesthesia ($p = 0.035$). The results by the current study showed that hematocrit loss after CS in patients with general anesthesia is higher than in patients with spinal anesthesia. However, physicians should well consider the method of anesthesia, especially in high risk patients, to reduce the severity of postpartum hemorrhage and hematocrit loss.

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1. Introduction

Postpartum hemorrhage still remains as one of the main causes of maternal mortality. With hospital delivery and availability of blood for transfusion, the maternal mortality rate has dramatically dropped down (Ueyama, 2010).

Unfortunately, despite improving outcomes, the poor and minorities still lose their lives, highly and in a tragic way, due to hemorrhage and the subsequent problems. Among the diseases underlying or intensifying postpartum hemorrhage, general anesthesia and epidural anesthesia (halogenated agents) have also been mentioned (Cunningham, 2010).

Cesarean section (CS) is one of the most common surgeries in women (Van Houwe, 2006). The option of general or epidural anesthesia for CS depends on mother's desire and maternal-embryonic conditions (Soens, 2008).

Postpartum hemorrhage is an emergency condition⁷ and the cause of 33% of maternal mortality cases (Vimala, 2006). In countries with high prevalence of anemia during pregnancy, even partial reduction of postpartum hemorrhage is clinically very important (Hong, 2003).

Hong et al demonstrated that there is no significant difference in the hemodynamic and blood

loss in patients undergoing CS with general or epidural anesthesia ($p < 0.05$) (Hong, 2003).

Evaluating 341 CS patients, Lertakyamanee et al (1999) demonstrated that the amount of blood loss in patients with general anesthesia was significantly higher (Lertakyamanee, 1999).

Andrew et al demonstrated that halogenated drugs used for general anesthesia in CS increases the amount of blood loss during surgery (Andrews, 1992).

Gilstrap et al (1987) demonstrated that increased blood loss during surgery and after using halogenated compounds is due to reduced uterine contractions (Gilstrap, 1987).

The aim of this study is to evaluate changes of hematocrit (Hct) in patients undergoing general anesthesia and spinal anesthesia before and after CS.

2. Material and Methods

A clinical trial in 2010 in the Department of Obstetrics and Gynecology, Qazvin University of Medical Sciences conducted on 200 pregnant women elected for termination of pregnancy by CS due to obstetric emergency, hematocrit changes in patients with general anesthesia and spinal anesthesia were studied before and after cesarean section

After obtaining informed consent, patients were enrolled into the study and randomly divided

into two groups of A, with general anesthesia, and B, with epidural anesthesia for CS.

Patients with heart problems, clotting disorders, anemia, preeclampsia, atonia, polyhydramnios, multipara and macrosomia were excluded from the study. Obviously, patients who had previously chosen the type of anesthesia were also excluded.

HCT at the day of surgery and 24 hours after surgery was checked. The rate of Hct changes in both methods of general and epidural anesthesia was calculated in percentages and compared.

3. Results

In this study, 200 pregnant women elected for CS were studied in two groups of 100 patients. Mean age was 27.4 ± 5.1 in group A (with general anesthesia) and 27.3 ± 5.3 in group B (with spinal anesthesia), that there was no significant difference in age between the two groups of patients ($p > 0.05$). Mean duration of surgery was 40.8 ± 9 minutes for patients in group A (with general anesthesia) and 42.7 ± 9.2 for patients in group B (with spinal anesthesia), that there was no significant difference in duration of surgery between the two groups of patients ($p = 0.79$).

Parity, as one of hemorrhage risk factors, was not significantly different between the two groups of patients and two groups were quite similar ($p = 0.56$).

Mean hemoglobin and hematocrit before and after CS in patients of the two groups is shown in Table 1 and 2. According to the results, mean loss of hemoglobin and hematocrit in patients of group A were 1.6 ± 0.1 and 4.2 ± 1 respectively which was significantly reduced after surgery. In patients of group B, mean loss of hemoglobin and hematocrit were 1.05 ± 0.2 and 3.2 ± 0.5 which was significantly reduced after surgery.

Mean loss of hemoglobin was 1.05 ± 0.2 in group A and 1.3 ± 0.1 in group B, that the loss of hemoglobin in patients with general anesthesia (group A) was significantly higher than in patients with spinal anesthesia (group B) ($p = 0.017$).

Mean loss of hematocrit in patients with spinal anesthesia (group B) was significantly lower than in patients with general anesthesia (group A) ($p = 0.035$).

4. Discussions

Spinal anesthesia is the most common type of epidural anesthesia used in CS. Most physicians believe that in most cases, general anesthesia is more reliable for a rapid anesthesia for CS. Actually, the use of spinal anesthesia is increasing as an alternative

to general anesthesia in all patients (except emergency cases) (Vimala, 2006).

Analysis of data from this study showed that hemoglobin and hematocrit levels in both groups of general and spinal anesthesia had significantly dropped as compared with those before surgery ($p < 0.05$).

Table 1. Hemoglobin of patient at before and after surgery in both groups

		Hemoglobin		P (before/after)
		Before surgery	After surgery	
General anesthesia		12.9 ± 1.3	11.37 ± 1.3	<0.001
Local anesthesia		12.9 ± 1.2	11.85 ± 1.42	<0.001
P(between groups)	two	>0.05	0.017	-

Table 2. Hematocrit of patient at before and after surgery in both groups

		Hematocrit		P (before/after)
		Before surgery	After surgery	
General anesthesia		37.9 ± 2.7	33.7 ± 3.7	<0.001
Local anesthesia		38 ± 2.9	34.8 ± 3.6	<0.001
P(between groups)	two	>0.05	0.035	-

This means that surgery and postoperative hemorrhage lead to loss of hemoglobin and hematocrit after surgery, since 750-1000 ml of blood is usually lost during CS (Miller, 2004).

Most researches on blood loss and reduction of hemoglobin and hematocrit levels after cesarean section show that patients with general anesthesia have less hematocrit after surgery; i.e. the blood loss during CS is higher in patients with general anesthesia. In these studies it is suggested that the halogenated compounds added to Nitro Oxide to reduce the patient's awakesness in general anesthesia, may increase blood loss by reducing uterine contractions (Afolabi, 2003).

The results of the current study showed a significant difference in rate of hemoglobin loss after surgery (difference in the mean hemoglobin before and after surgery) in the two study groups ($p = 0.017$) which is due to more blood loss in general anesthesia using halogenated compounds; since these compounds cause reduced uterine contractions, uterine relaxation and increased blood loss.

Andrew et al (1992) demonstrated that halogenated drugs used for general anesthesia in CS may increase the amount of blood loss, and postoperative hematocrit level was lower in patients with general anesthesia (Andrews, 1992). The result of above mentioned study is similar to our study.

Besides, in the study of Hong et al (2003), it has been suggested that there was no significant difference in blood loss between patients with general

and epidural anesthesia, which is unlike the results of the current study (Hong, 2003).

Studies by Hood et al (1990) in the US have results similar to our study that halothane increases the blood loss by reducing uterine contractions (Hood, 1990).

In the study of Gilstrap et al (1987), it has been suggested that the halogenated compounds which may increase blood loss due to the reduction of uterine contractions have been identified in this study, using which will decrease hematocrit level. This result is similar to our study; however, the loss of hematocrit observed in the above mentioned study was higher than in our study (Gilstrap, 1987).

The results by the current study showed that hematocrit loss after CS in patients with general anesthesia is higher than in patients with spinal anesthesia.

However, physicians should well consider the method of anesthesia, especially in high risk patients, to reduce the severity of postpartum hemorrhage and hematocrit loss.

Patients also learn more about the types of anesthesia and their consequent complications and choose wisely.

Conclusion

Hemoglobin and Hematocrit content were significantly reduced in patients with general anesthesia (4.2 and 1.6) compared to spinal anesthesia (3.2 and 1) ($p < 0.05$). Mean hematocrit loss in spinal anesthesia was significantly lower than in general anesthesia ($p = 0.035$). The results by the current study showed that hematocrit loss after CS in patients with general anesthesia is higher than in patients with spinal anesthesia.

However, physicians should well consider the method of anesthesia, especially in high risk patients, to reduce the severity of postpartum hemorrhage and hematocrit loss.

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