

## The Prevention Of Systemic Hypotension In Caesarean Section By Subcutaneous Injection Of Ephedrine Before Spinal Anesthesia

Masoud Ghanei<sup>1</sup>, Reza Sahraei<sup>1\*</sup>, Abdolreza Sotoodeh Jahromi<sup>3</sup>

1. Department of Anesthesiology, Jahrom University of Medical Sciences, Jahrom, Iran

2. Research center for Social Determinants of Health, Jahrom University of Medical Sciences, Jahrom, Iran

[sahraeir@sums.ac.ir](mailto:sahraeir@sums.ac.ir)

**Abstract:** Spinal anesthesia is a common method of anesthesia in cesarean section and hypotension is the most common side effect of this method. The aim of this study is comparison between effects of ephedrine and distilled water on hypotension in patients under elective cesarean section with spinal anesthesia. This randomized clinical trial study included patients scheduled for elective cesarean section under spinal anesthesia. In this study 82 patients divided into two groups and they were injected subcutaneously randomly with 10 mg ephedrine (2 cc) or distilled water (2 cc). The patients hydrated 10-20 cc/kg before spinal anesthesia. After installation of cardiac lids and pulse oximetry, their blood pressure measured and recorded in 5 min before and 5, 10, 15, 30 min after spinal anesthesia. The Patients were received intravenous ephedrine if hypotension (hypotension was enumerated in blood pressure less than 90/60 mm Hg) was occurred. Diastolic hypotension was significantly occurred in ephedrine group was less than distilled water group in 30 min after spinal anesthesia ( $P=0.046$ ), but there was no significant difference between two groups in other earlier times. Prophylactic subcutaneous injection of ephedrine can effectively prevent diastolic hypotension after spinal anesthesia.

[Ghanei M, Sahraei R, Jahromi AS. **The Prevention Of Systemic Hypotension In Caesarean Section By Subcutaneous Injection Of Ephedrine Before Spinal Anesthesia.** *Life Sci J* 2014,11(6):320-322] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 43

**Keywords:** ephedrine, spinal anesthesia, cesarean, hypotension

### 1. Introduction

The benefits of regional anesthesia for cesarean section is reducing the risk of aspiration of gastric content, reducing of difficult intubation, reducing of preoperative blood loss and avoidance of drugs that suppress the central nervous system and respiratory depression are transferred to the baby via the placenta. Hypotension before birth may cause nausea and vomiting, restlessness, heart palpitations and metabolic acidosis and decreasing maternal and neonatal Apgar score at birth (Miller et al., 2010).

Acupuncture and prescribe prophylactic (preventive) ephedrine and phenylephrine has been proposed (Miller et al., 2010). Despite these precautions, it is still prevalent hypotension (decreased blood pressure) during cesarean section under spinal anesthesia is very high and average about 80 % have been reported (Miller et al., 2010, Aya et al., 2005).

Ephedrine mimic sympathetic (increase blood pressure) that is chosen by stimulating receptors alpha and beta on sympathetic leading to increased cardiac output and heart rate in the mother.

Since the injection of ephedrine has not side effect on uterine placental blood flow is used to treat hypotension after spinal anesthesia for cesarean section Aya et al., 2005, Visalyaputra et al., 2006).

Development in order to achieve the goal of anesthesia and analgesia occurred in this way to

achieve the simplest, most uncomplicated and economical treatment method, many attempts were made to (Miller et al., 2010). Single inhalation anesthetics may be gases or volatile liquids. Some explosive mixtures with air and other gases form. These materials vary in potency analgesic and muscle relaxant. The depth of anesthesia can be quickly created by changing the concentration and inhalation may change due to their rapid removal, there is no post-operative respiratory failure (Miceael et al., 2007).

Joint Commission accreditation of health care organizations (JCAHO) anesthetists are required to perform the pre-operative evaluation of patients who are going to be put under anesthesia. The administration of prophylactic ephedrine has two conventional intramuscular and intravenous use (Ayorinde et al., 2001, Manuchehrian et al., 2009). Ephedrine volume (due to less pain compared to intramuscular injection and prolonged effect than intravenous injection) is used to prevent systemic hypotension.

The effect of this study was to evaluate the effect of ephedrine for prophylaxis of hypotension induced spinal anesthesia in women undergoing cesarean section.

### 2. Material and Methods

Pregnant women admitted to Motahari hospital in Jahrom city undergoing elective caesarean section under spinal anesthesia were enrolled in this study. This clinical trial was carried on 82 pregnant women including study group (41 women) and control group (41 women) whom were assigned to the same environmental conditions.

The first blood pressure and heart rate 5 min before the injection (ephedrine or sterile distilled water) spinal anesthesia were recorded.

At this stage, patients of group A (control group) 2 ml placebo received (sterile distilled water) subcutaneously (equivalent to 10 mg of ephedrine) in the deltoid area received with TB syringe and patients in group B (intervention group) received 10 mg (2 mL) subcutaneously ephedrine at the same location and with the same conditions received.

Placebo and ephedrine was administered by a person who had no knowledge of the content of the injected material. Then, patients in both groups received intrathecal injection of 70 mg of 5% lidocaine into the intervertebral space between the 3rd and 4th or 4th and 5th level. Sensory level of spinal anesthesia was done T8-T10

After spinal anesthesia of patients, blood pressure and heart rate at 5 minutes before spinal anesthesia (before injection of ephedrine and placebo) and also at 5, 10.15, and 30 min after spinal anesthesia on Monitors were recorded.

In the event of systemic hypotension (less than 90/60 mm Hg) after spinal anesthesia, the patient is 5 mg ephedrine was given intravenously. (The amount of ephedrine was administered in the study). Hypotension (90/60) or other complications were excluded.

Obtained data were analyzed by SPSS software and P value less than 0.05 was considered as significant.

### 3. Results

In this study, 82 pregnant women were classified in 2 groups of 41 persons 19-40 years, mean age  $23.28 \pm 5.05$  years.

Mean age in study and sterile distilled water groups were  $28.20 \pm 5.40$  and  $28.20 \pm 4.60$  years, respectively ( $p > 0.05$ ).

Mean systolic and diastolic blood pressures in the ephedrine and group sterile distilled water are shown in table-1 and table-2, respectively.

Table-1: systolic blood pressure in ephedrine (study) and sterile distilled water (control) groups.

group	S BP 5 min before SA *	S BP 5 min after SA *	S BP 10 min after SA *	S BP 15 min after SA *	S BP 30 min after SA *
Study	$126.3 \pm 16.2$	$108.4 \pm 20.1$	$110.0 \pm 14.9$	$105.8 \pm 16.9$	$107.3 \pm 12.1$
control	$121.1 \pm 13.3$	$107.5 \pm 16.3$	$108.1 \pm 17.0$	$103.2 \pm 13.7$	$102.8 \pm 14.1$
P value	$> 0.05$	$> 0.05$	$> 0.05$	$> 0.05$	<b>0.046</b>

\*Mean  $\pm$  SD, S BP: Systolic Blood Pressure, SA: Spinal Anesthesia

Table-2: Diastolic blood pressure in ephedrine (Study) and sterile distilled water (Control) groups

group	D BP 5 min before SA *	D BP 5 min after SA *	D BP 10 min after SA *	D BP 15 min after SA *	D BP 30 min after SA *
Study	$76.8 \pm 13.7$	$65.1 \pm 14.8$	$62.2 \pm 13.8$	$58.4 \pm 12.4$	$61.5 \pm 12.3$
control	$77.0 \pm 10.6$	$65.4 \pm 13.6$	$62.4 \pm 11.9$	$57.9 \pm 14.7$	$56.9 \pm 13.0$
P value	$> 0.05$	$> 0.05$	$> 0.05$	$> 0.05$	$> 0.05$

\*Mean  $\pm$  SD, D BP: Diastolic Blood Pressure, SA: Spinal Anesthesia

### 4. Discussion

The prevention and treatment of hypotension-induced spinal anesthesia in women under-going cesarean section remains the most important problem, with no agreement to the optimal mode of management (Chestnut 2009, Miller et al., 2010, Ayorinde et al., 2001).

In present study, it was showed that there was no significant difference between ephedrine (study) group and sterile distilled water (control)

group in their efficacy for managing diastolic hypotension in healthy women under-going spinal anesthesia for cesarean section. However I was found a significant difference between ephedrine (study) group and sterile distilled water (control) group in managing systolic hypotension in the same women, but 30 min after subcutaneous injection.

It was concluded that ephedrine can prevent systolic hypotension-induced spinal anesthesia in women under-going cesarean section.

Clinical data have recommended that  $\alpha$ -adrenergic agonists, for example ephedrine may be given safely for prevention or treatment of hypotension during spinal anesthesia for cesarean section (Chestnut 2009, Miller et al., 2010, Lee et al., 2002).

Despite of the result of present study indicating ephedrine can prevent systolic hypotension induced-spinal anesthesia, it is not administer vasopressors as prophylaxis, Because: It is not morally right; for instance it couldn't be administered ephedrine to a patient had tachycardia, and also, previous clinical studies have not supported the prophylactic use of vasopressors for prevention of hypotension induced-spinal anesthesia (Chestnut 2009, Miller et al., Ngan et al., 2005, Thomas et al., 1996).

The results of this study, shows that ephedrine can prevent systolic hypotension following spinal anesthesia in patients undergoing cesarean section.

Further clinical trial studies are recommended for treatment and prophylaxis of hypotension induced-spinal anesthesia in women undergoing cesarean section.

#### Acknowledgements:

This research work was financed by Jahrom University of Medical Sciences.

#### Corresponding Author:

Dr. Reza Sahraei

Department of Anesthesiology, Jahrom University of Medical Sciences, Jahrom, Iran

E-mail: [sahraeir@sums.ac.ir](mailto:sahraeir@sums.ac.ir)

#### References

- 1-Miller RD, Eriksson LI, Fleischer LA, Wiener-Kronish JP, Young WL, Editors: Miller's Anesthesia, Vol.1,7<sup>th</sup> ed. New York, Churchill Livingstone, 2010:2046-2058
- 2-Aya AGM, Vialles N, Tanoubi I, Mangin R, Ferrer JM, Robert C, et al. Spinalanesthesia-induced hypotension: A risk comparison between patients with severe preeclampsia and healthy women undergoing preterm cesarean delivery.

Anesthesia & Analgesia. 2005; 101(3): 869-875.

- 3-Visalyaputra S. Is Ephedrine the Best Vasopressor for Treating Spinal Anesthesia-Induced Hypotension in Patients with Pre-Eclampsia? Anesthesia & Analgesia. 2006; 103(6): 1584-1585.
- 4- Miceael H A, William E. Effect of Anesthetic Structure on Inhalation Anesthesia: Implications for the Mechanism: 2007;2373-2375
- 5- Ayorinde B, Buczkowski P, Brown J, Shah J, Buggy D. Evaluation of pre emptive intramuscular phenylephrine and ephedrine for reduction of spinal anaesthesia induced hypotension during Caesarean section. British journal of anaesthesia. 2001; 86(3): 372-376.
- 6- Manuchehrian N, Nikooseresht M, Seif MA. The effect of prophylactic ephedrine to prevention of hypotension after spinal anesthesia in cesarean section. Journal of hamedan medical university; 2009;15(4);31-33.
7. Chestnut, D.H. (2009) Chestnut's obstetric anesthesia principles and practice. 4th Editon, Mosby, Philadelphia.
8. Lee, A., Ngan Kee, W.D. and Gin, T. (2002) A Quantitative, systematic review of randomized controlled trials of ephedrine versus phenylephrine for the management of hypotension during spinal anesthesia for cesarean delivery. Anesthesia & Analgesia, 94, 920-926. doi:10.1097/0000539-200204000-00028
9. Ngan Kee, W.D., Khaw, K.S. and Ng, F.F. (2005) Prevention of hypotension during spinal anesthesia for cesarean delivery: An effective technique using combination phenylephrine infusion and crystalloid cohydration. Anesthesiology, 103, 744-750.
10. Thomas, D.G., Robson, S.C., Redfern, N., Hughes, D. and Boys, R.J. (1996) Randomized trial of bolus phenylephrine or ephedrine for maintenance of arterial pressure during spinal anaesthesia for caesarean section. British Journal of Anaesthesia, 76, 61-65. doi:10.1093/bja/76.1.61.

3/3/2014