Comparison of Intravenous bolus Phenylephrine and Ephedrine in the Prevention of Post- spinal Hypotension during Cesarean Section

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Abstract

Introduction: Spinal anesthesia is a commonly used anesthetic technique for cesarean section. The hypotension is the serious and common complication for it. Prevention of this complication is an important challenge for anesthesiologists.

Objective: The aim of this study is to compare the effect of prophylactic bolus injection of Phenylephrine and Ephedrine in the prevention of hypotension during spinal anesthesia in elective cesarean section.

Materials and Methods: In this double-blind randomized clinical trial, in order to prevent hypotension in cesarean section, 80 pregnant women who were candidates for elective cesarean section were randomly assigned to two groups (Phenylephrine or Ephedrine). Immediately after spinal anesthesia, the first group received 10 mg ephedrine and in the second group, 100 micrograms of phenylephrine was injected bolus intravenously.
Both groups were evaluated for nausea and vomiting, systolic, diastolic, mean arterial pressure, heart rate and SPO2 at specific intervals. The neonatal Apgar score was evaluated at first and fifth minutes after birth. The collected data were analyzed by SPSS software version 16 at 95% confidence interval.

Results: Although nausea and vomiting, systolic, diastolic and mean arterial pressure were higher in the Ephedrine group than the Phenylephrine group, there were no significant differences between the two groups. There was also no significant difference between two groups in incidence of mean heart rate and SPO2 during surgery. There was no significant difference in neonatal Apgar score at first and fifth minutes between them.

Conclusion: In cesarean section, intravenous bolus injection of Phenylephrine without affecting the incidence of maternal nausea and vomiting and neonatal Apgar score, such as Ephedrine is effective in the prevention of hypotension following spinal anesthesia.
Conflict of interest: non declared

Key words: Spinal anesthesia \ Cesarean Section\ Ephedrine\ Phenylephrine

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Extended Abstract

Introduction: Spinal anesthesia is a commonly used anesthetic technique for cesarean section. The hypotension is the serious and common complication associated with it. Prevention of this complication is an important challenge for the physicians. Spinal anesthesia is a method of choice in patients for cesarean section due to rapid onset, predictable and reliable block, and excellent postoperative analgesia without the risks of general anesthesia such as airway difficulties and pulmonary aspiration (1-3). Two effective vasopressor drugs to treat hypotension associated with spinal anesthesia are Ephedrine and Phenylephrine. Ephedrine directly affects α and β receptors while phenylephrine is a selective agonist of α1 receptor (4).

Objective: As hypotension and its treatment following spinal anesthesia is a common and serious challenge for physicians during cesarean section, therefore, we decided to compare the effect of prophylactic bolus injection of Phenylephrine and Ephedrine in the prevention of hypotension during spinal anesthesia in elective cesarean section.

Materials and Methods: This prospective randomized clinical trial was performed between October 2016 and July 2017 in Fatemieh Hospital, Hamadan, Iran. The protocol of the study was approved by the Ethics Committee and registered in the Iranian Registry of Clinical Trials numbered IRCT.UMSHA.REC.1396.580. A written informed consent was obtained from all patients prior to the study. A total of 80 pregnant women aged 18 - 45 years with the American society of anesthesiologists (ASA) physical status I-II were enrolled in this study. They were randomly assigned to either Phenylephrine or Ephedrine group by using block randomization method with a block size of 4. Our exclusion criteria were pregnant women with contraindication for spinal anesthesia, emergency cesarean section, diabetes mellitus, cardiovascular and renal diseases and twin pregnancy. After pre-anesthetic evaluation, routine monitoring, i.e., non-invasive blood pressure (BP), pulse oximetry, and electrocardiography, was instituted in for all patients in the operation room. No sedative was prescribed for the patients before procedure. All pregnant women received 10 mL/kg crystalloid solution before spinal anesthesia as prehydration.

Spinal anesthesia was administered with 2 mL of 0.5% hyperbaric bupivacaine (10mg) plus 0.5 mL sufentanil (2.5 µg) at the L3 - L4 or L4 - L5 interspace with 25-gauge Quincke needle in the sitting position.

Immediately after spinal anesthesia, the first group received 10 mg ephedrine and the other group received 100 micrograms of phenylephrine bolus intravenously. Both groups were evaluated for nausea and vomiting, systolic, diastolic, mean arterial pressure, heart rate and SPO2 at specific intervals (before and one minute after spinal anesthesia and from minute 2, every 2 minutes until 10 minutes, every 5 minutes until 30 minutes, and every 10 minutes until 60 minutes). The neonatal Apgar score was evaluated at first and fifth minutes after birth. The collected data were analyzed by SPSS software version 16 at 95% confidence interval.

Results: Eighty pregnant women were entered in this study. There were 40 pregnant women in each group. No significant difference in demographic data between two groups (P=0.273) was observed.

Within each group, the analysis showed significant differences in systolic BP, diastolic BP and mean arterial pressure at specific intervals. However, there were no significant differences between phenylephrine and Phenylephrine groups in systolic BPs (P = 0. 060), diastolic BPs (P = 0. 062) and mean arterial pressures (P = 0. 090) at specific intervals. Like previous results, there were significant differences in heart rates within each group. However, there were no significant differences between two groups in heart rates (P>0.05) at specific intervals.

Moreover, there were no significant differences in SPO2 within each group and between the two groups.

Although the incidence of nausea and vomiting in the Ephedrine group (27.5%) was more than Phenylephrine group (20.0%), there was no significant difference between the two groups (P=0.430).

In addition, there were no significant differences between the first and fifth-minute Apgar scores of neonates between two groups (P = 0.706 and P = 0.7501, respectively).

Conclusion: Although there are different results when comparing the effect of prophylactic bolus injection of Phenylephrine and Ephedrine in the prevention of hypotension during spinal anesthesia in cesarean section in the literature, the findings of this study is in concordance with some studies demonstrating that intravenous bolus injection of Phenylephrine without affecting the incidence of maternal nausea and vomiting and neonatal Apgar score, such as Ephedrine is effective in preventing hypotension following spinal anesthesia in elective cesarean section.

References

1. Jones GW, Samuel RA, Biccard BM. Management of failed spinal anesthesia for caesarean section. S Afr Med J. 2017;107(7):611–4.
2. Tarbiat M, Majidi M, Manouchehrian N. Frequent spinal anesthesia in a patient with traumatic lower extremity injury: A case report. Anesth Pain Med. 2019;9(2):1-3.
3. Moslemi F, RasooliS. Comparison of prophylactic infusion of phenylephrine with ephedrine for prevention of hypotension in elective cesarean section under spinal Anesthesia: A randomized clinical trial. Iran J Med Sci. 2015;40(1):19-26.
4. VakiliH, EnayatiH,Dashipour A. Comparing Intravenous Phenylephrine and Ephedrine for Hypotension During Spinal Anesthesia for Elective Cesarean Section: A Randomized Double-Blind Clinical Trial. Iran Red Crescent Med J. 2017; 19(10):1-9.