Hemodynamic Changes During Spinal Anesthesia Assessed With Non-Invasive Bioreactance: A Randomized Controlled Trial of Bolus and Infusion Regimens of Phenylephrine to Prevent Hypotension

Abstract Type: Original Research
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Introduction: Phenylephrine is commonly used to prevent/treat hypotension during spinal anesthesia for cesarean delivery (CD). However, the optimal regimen for the administration of phenylephrine is undetermined. This study used a non-invasive cardiac output monitoring device based on bioreactance technology (NICOM) to compare the efficacy of an intermittent infusion versus a bolus regimen in that setting.

Methods: This was a double-blinded, randomized clinical trial. We recruited healthy women undergoing elective CD under spinal anesthesia (1.8 ml 0.75% hyperbaric bupivacaine, 10 µg fentanyl and 100 µg morphine). Patients received either intermittent boluses or a continuous infusion of phenylephrine solution containing 120µg/ml. Intermittent boluses were administered if SBP ≤ baseline. A continuous infusion was started immediately after the intrathecal injection and continued at 1 ml/min unless SBP > baseline. The NICOM monitored SBP, HR, CO, SV and SVR. The primary outcome was the maximum decrease in CO in the pre-delivery period. Secondary outcomes included the maximum decrease in HR, the incidence of hypo- and hypertension, nausea/vomiting and bradycardia, the total dose of phenylephrine and neonatal umbilical blood gases and Apgar scores.

Results: Sixty patients were studied. There was no significant difference in the maximum change in CO between the groups (p=0.941). The incidence of hypotension, hypertension, nausea/vomiting and bradycardia was similar in both groups. The infusion group received more phenylephrine (p< 0.001). The hemodynamic profiles showed significant differences in the maintenance of SBP (p=0.007). In the infusion group, there was a fall in SBP>10% from baseline in the initial 6 min after intrathecal injection followed by a recovery to baseline. In the bolus group, SBP was maintained within 5% of baseline during this time (Figure 1). Although there were statistically significant changes in HR over time (p=0.011), there were no significant differences in HR between the two groups.

Discussion: The decreases in CO are similar with both regimens of phenylephrine administration and are related to increases in SVR and decreases in HR. A bolus regimen provides better control of SBP during the initial establishment of spinal anesthesia, at lower doses of vasopressor. These hemodynamic changes are not associated with maternal and neonatal adverse effects other than maternal nausea/vomiting.

References: Br J Anaesth 2004; 92: 469-74
Figure 1: Hemodynamic profiles in the pre-delivery period.