Scholars LITERATURE

Journal of Womens Health Care and Management

Research Article

DOI: https://doi.org/10.47275/2692-0948-162
Volume 5 Issue 4

Post Spinal Anesthesia Hypotension in Pregnant Women Undergoing Caesarian Section

Suha Kadhim Jameel Al-Zubaidi[1*] and Ayman Kadhim Jameel Al-Zubaidi[2]

[1]Kidney Diseases and Transplantation Center, Al-Sadder Teaching Hospital, Basrah Health Directorate, Ministry of Health, Basrah, Iraq
[2]Department of Surgery, Al-Syab Teaching Hospital, Basrah Health Directorate, Ministry of Health, Basrah, Iraq

Abstract

The perfusion index (PI) is being regarded as a noninvasive monitoring aid for timely detection of hypotension following subarachnoid blockade (SAB). The aim was to establish the correlation of PI detect hypotension. An observational study was conducted by enrolled 100 women aged between 18 and 45 years. The study was conducted in our teaching hospitals from May 2022 till May 2023. The following parameters like blood pressure (BP), heart rate and oxygen saturation, PI and respiration were recorded. Spinal anesthesia (SA) was performed under strict aseptic precautions. Using a hyperbaric bupivacaine solution. It was found that there is a negative linear correlation between systolic BP (SBP) and PI. Moreover, the correlation was statistically significant ($p < 0.01$). There is a negative correlation between mean arterial pressure (MAP) and PI with statistic significant ($p < 0.01$). PI before and after oxytocin administration, the test showed that the up in PI after the administration of oxytocin was statistically significant ($p < 0.05$). Also, the decrease in PI after the administration of ephedrine was statistically significant ($p < 0.05$). PI as such alone can be used as a predictor of maternal hypotension after SA during caesarian section (CS). Moreover, the PI can also be used as a means to assess the response of ephedrine boluses and can help the anesthesiologist decide on further boluses or any other vasopressors. A significant effect posts the administration of oxytocin on the PI, which helps to assess the degree of hypotension which comes upon the administration of oxytocin.

Keywords: Caesarian section, Hypotension, Perfusion index, Non-invasive blood pressure, Cubarachnoid blockade

[*]***Correspondence to:*** Suha Kadhim Jameel Al-Zubaidi, Kidney Diseases and Transplantation Center, Al-Sadder Teaching Hospital, Basrah Health Directorate, Ministry of Health, Basrah, Iraq.

Citation: Al-Zubaidi SKJ, Al-Zubaidi AKJ (2024) Post Spinal Anesthesia Hypotension in Pregnant Women Undergoing Caesarian Section. J Womens Health Care Manage, Volume 5:4. 162. DOI: https://doi.org/10.47275/2692-0948-162

Received: July 18, 2024; **Accepted:** September 27, 2024; **Published:** October 02, 2024

Introduction

SA is the most preferable route in pregnancy undergo CS. Hypotension, is the most dreaded consequence of SA, that may impair the uteroplacental circulation, resulting in unfavorable maternal and fetal outcomes as fetal outcome include hypoxia, acidosis, altered consciousness, and cardiac arrest [1].

Over the years, many strategies have been employed to prevent or treat hypotension. The post spinal hypotension arises due to the blockade of the sympathetic nerve fibers which controls vascular smooth muscle tone [2].

During pregnancy, there is an increased sensitivity of the nerve fibers to local anesthetics and a general drop in responsiveness to vasopressors. Both of these conditions increase the probability of women in developing profound hypotension following SAB CS. Non-invasive BP (NIBP) measurement is accepted as the standard hemodynamic monitoring modality inside the operation theatre [3].

Ratio of pulsatile blood flow to non-pulsatile blood flow in the peripheral vascular tissue, measured using a pulse oximeter is called PI and it is based on the amount of infrared light absorbed. Its values range from 0.02 - 20% for an extremely strong pulse [4]. Hence, PI is being regarded as a new non-invasive monitoring aid for the timely detection of hypotension post SAB.

The aim of the study was to establish whether the trend in PI detect hypotension before the changes in NIBP values and to evaluate the effect of oxytocin infusion on PI during elective CS's under SA.

Methods

An observational study was conducted by enrolled 100 women aged between 18 and 45 years. The study was conducted in our teaching hospitals from May 2022 till May 2023. Sample size was calculated by:

$$n = \frac{Z^2 6^2}{d^2}$$

Where: Z = 1.96, a standard normal value at a 5% level of significance, 6^2, SD = 2.60622, and d = margin of Lewis = 5% with a 95% confidence interval and 80% power.

The following parameters like BP, heart rate, and oxygen saturation, PI and respiration were recorded. SA was performed under strict aseptic precautions. Using a hyperbaric bupivacaine solution [5].

Data analysis was carried out with Microsoft Software SPSS® version 22 (IBM) using Spearman's correlation with mean and SD. Correlation and simple linear regression analysis were also done. P value was defined as being ($p < 0.05$) which was regarded as statistically significant.

Results

It was found that there is a negative linear correlation between SBP and PI. Moreover, the correlation was statistically significant ($p < 0.01$) (Figure 1). There is a negative correlation between MAP and PI with statistic significant ($p < 0.01$) (Figure 2).

PI before and after oxytocin administration, the test showed

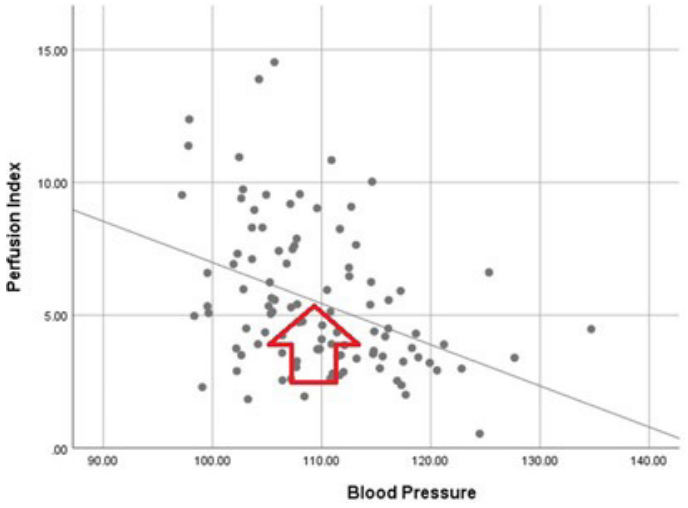

Figure 1: The correlation between BP and PI.

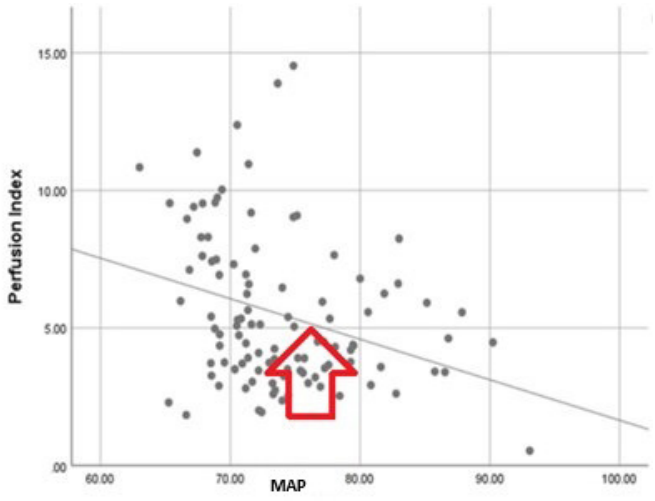

Figure 2: The correlation between MAP and PI.

that the up in PI after the administration of oxytocin was statistically significant ($p < 0.05$). Also, the decrease in PI after the administration of ephedrine was statistically significant ($p < 0.05$) (Table 1).

Table 1: The correlation in regard to oxytocin and ephedrine administration.

Parameter	PI
BP	< 0.0001
MAP	< 0.0001

Discussion

Various ways are available for predicting hypotension risk post SA like heart rate variability, skin conductance, plethysmography-variability index, sensory block level and bioimpedance-based hemodynamic monitoring and even PI [2].

In this study, the PI predict maternal hypotension. PI is a non-invasive parameter which is based on the principle of absorption of two lights at different wavelengths resulting in a fraction of pulsatile to non-pulsatile components [6]. During pregnancy, there is a general drop in systemic vascular resistance, and raise in the total blood volume and cardiac output which lead to a drop in systemic vascular resistance and hence a drop in peripheral vascular tone. It corresponds to peripheral perfusion, which is undoubtedly affected by peripheral vascular tone. As the tenor of these blood vessels decreases, this subsequently led to an elevatein the PI as there is an associated rise in the pulsatile components following vasodilation. Whenever anesthesia is given, the sympathectomy caused by it will cause a further drop in the tone of the blood vessels' wall, lead to pooling raise of blood and hence hypotension, reflecting even higher PI values. Other authors showed that a baseline PI > 3.5 correlate well with hypotension and can be considered a fair predictor of hypotension following SA [6-8].

Our data was not based on the baseline PI, instead, we decided to analyze serial BP readings and that of the PI to find a correlation. A similar was done by Mallawaarachchi et al. [5] focused on the serial changes in SBP, and MAP with that of PI. Our study showed that there is a negative correlation between both serial SBP and PI, and MAP and PI. In Duggappa et al. [6], it was shown that the starting PI value of > 3.5 and the number of episodes of hypotension are strongly correlated with eachother and more significant. Those women with baseline PI > 3.5 required a larger number of vasopressors.

In our study, PI also correlated well before and after the administration of ephedrine bolus during hypotension. This can further be used as a guide on the number of additional vasopressors to be used. Mallawaarachchi et al. [5] concluded that the effect on the vascular tone by oxytocin is significant although it does not cause significant hypotension. A lot more studies are required to be carried out before PI can be accepted as a universal non-invasive tool to predict hypotension after SA. In addition, further studies comparing PI with other non-invasive and accepted tools of hemodynamic monitoring may throw more light on its utility [9-11].

Conclusion

PI as such alone can be used as a predictor of maternal hypotension after SA during CS. Moreover, the PI can also be used as a means to assess the response of ephedrine boluses and can help the anesthesiologist decide on further boluses or any other vasopressors. A significant effect posts the administration of oxytocin on the PI, which helps to assess the degree of hypotension which comes upon the administration of oxytocin.

Acknowledgements

None.

Conflict of Interest

None.

References

1. Butwick AJ, Columb MO, Carvalho B (2015) Preventing spinal hypotension during caesarean delivery: what is the latest? Br J Anaesth 114: 183-186. https://doi.org/10.1093/bja/aeu267
2. Mitra J, Roy J, Bhattacharyya P, Yunus M, Lyngdoh N (2013) Changing trends in the management of hypotension following spinal anesthesia in cesarean section. J Postgrad Med 59: 121-126. https://doi.org/10.4103/0022-3859.113840
3. Wax DB, Lin HM, Leibowitz AB (2011) Invasive and concomitant noninvasive intraoperative blood pressure monitoring: observed differences in measurements and associated therapeutic interventions. Anesthesiology 115: 973-978. https://doi.org/10.1097/aln.0b013e3182330286
4. Hales JRS, Stephens FRN, Fawcett AA, Daniel K, Sheahan J, et al. (1989) Observations on a new non-invasive monitor of skin blood flow. Clin Exp Pharmacol Physiol 16: 403-415. https://doi.org/10.1111/j.1440-1681.1989.tb01578.x
5. Mallawaarachchi R, Pinto V, De Silva PDP (2020) Perfusion index as an early predictor of hypotension following spinal anesthesia for cesarean section. J Obstet Anaesth Crit Care 10: 38-41. https://doi.org/10.4103/joacc.JOACC_39_18

6. Duggappa DR, Lokesh M, Dixit A, Paul R, Rao RSR, et al. (2017) Perfusion index as a predictor of hypotension following spinal anaesthesia in lower segment caesarean section. Indian J Anaesth 61: 649-654. https://doi.org/10.4103/ija.ija_429_16

7. Toyama S, Kakumoto M, Morioka M, Matsuoka K, Omatsu H, et al. (2013) Perfusion index derived from a pulse oximeter can predict the incidence of hypotension during spinal anaesthesia for caesarean delivery. Br J Anaesth 111: 235-241. https://doi.org/10.1093/bja/aet058

8. Khan M, Gurcoo S (2020) Pulse oximeter derived perfusion index as a non-invasive predictor of hypotension following spinal anesthesia in lower segment caesarean section; an observational study. J Med Sci 23.

9. Huang B, Sun K, Zhu Z, Zhou C, Wu Y, et al. (2013) Oximetry-derived perfusion index as an early indicator of CT-guided thoracic sympathetic blockade in palmar hyperhidrosis. Clin Radiol 68: 1227-1232. https://doi.org/10.1016/j.crad.2013.07.003

10. Abdelnasser A, Abdelhamid B, Elsonbaty A, Hasanin A, Rady A (2017) Predicting successful supraclavicular brachial plexus block using pulse oximeter perfusion index. Br J Anaesth 119: 276-280. https://doi.org/10.1093/bja/aex166

11. Kuwata S, Suehiro K, Juri T, Tsujimoto S, Mukai A, et al. (2018) Plethvariability index can predict spinal anaesthesia-induced hypotension in patients undergoing caesarean delivery. Acta Anaesthesiol Scand 62: 75-84. https://doi.org/10.1111/aas.13012