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ORIGINAL ARTICLE

Comparison of Hemodynamic Changes after Use of Intrathecal 0.75% Hyperbaric Bupivacaine Versus 0.5% Hyperbaric Bupivacaine with Dexmeditomidine in Patients Undergoing Cesarean Section

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ABSTRACT

Objective: To compare analysis of hemodynamic changes after use of intrathecal 0.75% and 0.5% hyperbaric bupivacaine with dexmedetomidine in cesarean section patients.

Study Design: Comparative analytical study

Place and Duration of Study: Divisional Headquarters Teaching Hospital Mirpur from 1st April 2020 to 30th April 2021.

Methodology: Seventy women were enrolled as study participants. Full term pregnant women between the age of 20-35 years were enrolled. These women were further grouped into two major groups with both groups having equal number of participant (35 in each group). Group A consisted of those women who were given 12mg of 0.5% hyperbaric bupivacaine with 1µg dexmedetomidine while Group B women were intervened with 12mg 0.75% hyperbaric bupivacaine. The localized anesthesia with 2-3ml xylocaine (2%) was administered within intended space in all patients. A 25-gauge needle was used post confirmation of the free cerebrospinal fluid flow. Patient's vital signs were continuously monitored.

Results: The mean age was 31±4 years in group A while it was 27±4 year in group B. The post-operative parameters presented a decrease in blood pressure among both group women. The pulse rate showed that group A had slight higher reduction in pulse than group B however the difference was not significant (p=0.46).Both groups required ephedrine injections for substantial decrease in blood pressure.

Conclusion: Patients administered with 0.75% hyperbaric bupivacaine for lower segment caesarean section showed significant and relevantly more hemodynamic alterations than 0.5% hyperbaric bupivacaine with Dexmedetomidine.

Keywords: C-section, Spinal anesthesia, Adjuvants, Hemodynamic changes

INTRODUCTION

Spinal anesthesia is used in various surgical procedures including cesarean section below umbilicus. A temporary blockage of sensory nerves as well as motor functions of spinal nerves provides advantages during cesarean. Spinal anesthesia has advantages like rapid action, cost effective, symmetrical-sensory and motor nerves blockage. Systematic toxicity might rarely occur as a consequence of minimal amount of anesthetic applied.[1] Hemodynamic alteration after spinal anesthesia have always been a major concern of an anesthetist.[2] These changes include hypotension as well as bradycardia in addition to nausea, dyspnea or vomiting.

To prevent any complications resulting from spinal anesthesia, various modalities are adapted including preloading, intra-operative vasopressors (boluses/continual infusion), colloidal use and prophylactics.[3] Spinal anesthesia uses bupivacaine as a most common drug. The drug success is relied on production of sufficient nerve blockage and control over side effects.[4] Baricity is a significant indicator of anesthetic spread in the subarachnoid region.[5] A local anesthesia produces higher hyperbaricity, isobaricity or hypobaricity than cerebrospinal fluid. Literature supports that hyperbaric bupivacaine results in sufficient sensory/motor blockage with hemodynamic stability than isobaric bupivacaine.[6] Whereas other studies contradict any comparison between hyper or iso baric bupivacaine.[7]

Dexmedetomidine is sympatholytic -drug and agonist of α_2-adrenergic receptors which acts on certain brain parts. Combination of dexmedetomidine with minimal bupivacaine concentrations have been reported as addictive analgesic in post-operative conditions.[8] It has proven tranquillizing, analgesic properties and fewer hemodynamic variations peri-operatively. The present study was designed for comparison of hemodynamic variations post use of intrathecal 0.75% hyperbaric bupivacaine versus 0.5% hyperbaric bupivacaine with dexmedetomidine in patients undergoing cesarean section.[9,10]

MATERIALS AND METHODS

The comparative analytical study was conducted at the Divisional Headquarters Teaching Hospital Mirpur from 1st April 2020 to 30th April 2021. Prior the initiation of this study an ethical clearance was taken from the Institutional Ethical Committee. A total of full term pregnant women who required spinal analgesic for their cesarean delivery were enrolled. Women undergoing normal delivery were not included in this study as participants. Women suffering comorbidities like diabetes and cardiovascular diseases, hyper/hypotension were also excluded from the study. These women were further grouped into two major groups with both groups having equal number of participant (35/group). Group A consisted of those women who were given 12mg of 0.5% hyperbaric bupivacaine with 1µg dexmedetomidine while Group B women were intervened with 12mg 0.75% hyperbaric bupivacaine. The sample size was calculated through WHO sample size calculator which used level of significance as 0.05%, 95% CI, 80%, Power of test in addition to anticipated 26 populations with 68% proportion and 1 proportion with88%, proportion. The ASA physical status of the pregnant women was I and II. Hartman's solution was administered to all participants in context with 15ml/kg weight. The demographic, gender, clinical history and other related information was documented through a well-structured questionnaire generation. Spinal anesthesia was given to all the enrolled patients. Correct sitting positioning for spinal anesthesia was acquired. Post 2-5 min wait for appropriate antisepsis, space identification was done such as L4-L5. The localized anesthesia with 2-3ml xylocaine (2%) was administered within intended space in all patients. A 25-gauge needle was used post confirmation of the free cerebrospinal fluid flow. Patients vital signs were continuously monitored. Data was analyzed through SPSS version 26.0 using chi square test tools having a p value <0.05 as considered significant.

RESULTS

In the present study full term pregnant women between the age of 20-35 years were enrolled. The mean age of the patients was 31±4

years in group A while it was 27±4 year in group B. There was no significant difference in the weight of patients from both groups. Similarly, no significant (P>0.05) variance was observed in the cesarean section indications between both groups (Table 1).

The post-operative parameters presented a decrease in blood pressure among both group women. The pulse rate showed that group A had slight higher reduction in pulse than group B however the difference was not significant (p=0.46). There was a higher blood loss in group A women while less nausea tic episodes in comparison with the Group B cases (Table 2).

The cases of hypotension were higher as 65.7% in group B intervened cases than group A with only 17.1% hypotensive cases. Both groups required ephedrine injections for substantial decrease in blood pressure (Fig. 1).

Table 1: Comparison of demographic and cesarean parameters in both groups

Variable	Group A (n=35)	Group B (n=35)	P value
Age (years)	31±4	27±4	0.75
Weight (kg)	63±4	64±5	1.3
Indication of C-section			
Breach	13 (37.1)	11 (31.4)	0.89
Fetopelvic disproportion	12 (34.2)	17 (48.6)	0.32
Previous C-section	10 (28.5)	7(20)	0.44

Table 2: Comparison of post-operative parameters within group A and B

Parameter	Group A (n=35)	Group B (n=35)
Systolic	116±7	118±10
Diastolic	66±13	68±10
Baseline HR	102±12	96±15
Blood loss (ml)	180±60	150±60
Nausea	2 (5.7%)	5 (14.2%)

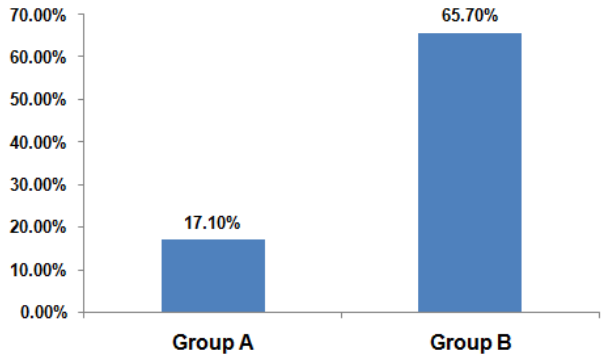

Fig. 1: Comparison of hypotension between group A and B

DISCUSSION

Spinal anesthesia is considered as an ideal choice for number of surgeries including cesarean section. Very less contradictions and limitations were reported for this method and it is widely accepted by international surgeons.[11] Few side effects are also reported that sometimes limit its acceptance that needs to be considered before considering this protocol. Hypotension is one of the main disadvantages that is associated with spinal anesthesia that sometimes leads to mortality and morbidity both for child and mother. Studies have described that; this risk can be minimized by lowering intrathecal local anesthetic dose.[12-14] Short duration of anesthetic effect is another shortcoming of this technique which can be reduced by adding adjuvants especially fentanyl and epinephrine etc.[15-19] Present study is designed for the comparative analysis of hemodynamic changes after 0.75% hyperbaric bupivacaine and 0.5% hyperbaric bupivacaine with dexmedetomidine in females undergoing for C-section.

Results have proved that, 0.5% bupivacaine with dexmedetomidine showed significant results on hemodynamics of females. On the other hand, no such positive results were observed in 0.75% bupivacaine and no such negative effects were determined in 0.5% bupivacaine. Same dosage level was used regardless of the patient's height as studies concluded that height has no considerable association with dosage requirement.[20,21] Blood pressure was also significantly dropped after administration of 0.75% bupivacaine. Nausea/vomiting was noticed in majority of the patients of both groups. Finding of this study is similar to already published data.[22]

CONCLUSION

Patients administered with 0.75% hyperbaric bupivacaine for lower segment caesarean section showed significant and relevantly more hemodynamic alterations with a higher incidence of nausea and vomiting, than 0.5% hyperbaric bupivacaine with Dexmedetomidine cases showing the later operative plan to be more successful.

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