Original Article

Anaesthesiology

Comparison of Hemodynamic Responses of Intrathecally Placed Hyperbaric 0.75% Bupivacaine Hydrochloride in Different Height Groups of Patients Undergoing Caeserean Section

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ABSTRACT

Objective: To compare the Hemodynamic response of intrathecally placed 1.5 ml of 0.75% hyperbaric bupivacaine hydrochloric in different height groups of patients undergoing caesarean section in spinal anesthesia
Study Design: Quasi experimental study.
Place and Duration of Study: This study was carried out in the Department of Anesthesia, Sindh Govt, Lyari General Hospital, Dow Medical College, Dow University of Health Sciences from July 2009 to December 2009.
Materials and Methods: In this study patients enrolled for elective caesarean section, were divided into two groups. In Group-A the height of the patients was equal or less than 60 inches (5 feet) and the height of the patients of Group-B was between 60 -66 inches (5 – 5.5 feet).
Results: Hypotension was observed in 67 patients. 46 patients belonged to Group-A and 21 patients from Group-B.
Conclusion: The study showed that height of the patients influenced the hemodynamic response of local Anesthetics given during spinal anesthesia
Key Words: Hemodynamic Responses, Bupivacaine Hydrochloride, Caeserean Section

INTRODUCTION

The neuroaxial anesthesia is gaining importance in anesthesia practice. There are various surgeries which can be performed under this form of anesthesia. Cesarean section can be done under general and regional anesthesia. International obstetric guidelines recommend spinal and epidural over general anesthesia for the cesarean section [1, 2]. The primary reason for recommending regional block is the risk of failed endotracheal intubation and aspiration of gastric contents in pregnant women, undergoing general anesthesia[3]. This is also evident that general anesthesia is associated with increased need for neonatal resuscitation[4]. As far as cesarean section is concerned, there is no exposure of neonatal depressant drugs and mother remains awake at birth of her child[5].Therefore it is currently the technique of choice in obstetric practice all over the world[6]. But spinal anesthesia is associated with some disadvantages as well like extensive block, fixed duration, postural puncture headache, Hypotension etc[7,8]. Hypotension and bradycardia occurs fairly common. A number of factors influence like dose, Height of patients, position of patient, baricity of solution, intra-abdominal pressure etc.

Hypotension can be prevented or treated with different strategies like fluid administration, compression devices on legs, leg raising technique and vasopressor[9]. The aim of this study was to determine the influence of height of the patient on hemodynamic response after receiving fixed dose of local anesthetic during spinal anesthesia.

MATERIALS AND METHODS

This Quasi experimental study was conducted in anesthesia department of Lyari General Hospital (Sindh Govt), Karachi after approval from competent authority, over a period of 6 months from July 2009 to Dec 2009. Hundred patients belonging to ASA I and II, undergoing elective cesarean section under spinal anesthesia, were included. Informed consents were taken from the patients at pre-anesthetic visit. Following patients were included and excluded.

Inclusion Criteria:

1. ASA I and II
2. Age above 20 years
3. Height of patient < 66” (5.5 feet)
4. Elective cases

Exclusion Criteria:

1. Refusal from patient
2. History of local anesthetic allergy
3. Emergent cases
4. Patients with coagulation abnormalities
5. Infection at lumbar puncture site
6. Any contraindication to spinal anesthesia

These 100 patients were divided into two groups. Group A and Group B. Patients in group A had height equal or less than 60 inches (5 feet) and in group B the height was between 60-66 inches (5-5.5 feet)

Patients were reassured, upon arrival in Operation Theater, to reduce their anxiety. Intravenous line was secured after receiving patient in operation theatre; monitors were applied, base line readings of heart rate and blood pressure were taken. Ringers lactate was used to preload the patient which was given according to body weight of the patient (15 ml/kg). The patient was placed in sitting position. After explaining the procedure and taking all aseptic precautions, interspinal space between L3 and L4 was identified and skin overlying was infiltrated with 2% Lidocaine. 25 G spinal needle was then introduced in interspinal space between L3 and L4, after confirming its intrathecal position by observing clear outflow of CSF, 1.5 ml of 0.75% hyperbaric bupivacaine was injected. After removing spinal needle sterile dressing was applied and patient was put in supine position with 15 degree left uterine displacement. Heart rate, systolic and diastolic blood pressures and oxygen saturation were monitored at 2 minutes interval for 10 minutes before the start of surgery to assess the hemodynamic response and then every five minutes till the end of surgery. Those patients showed hypotension was treated either with fluids, vasopressors or both.

Statistical Analysis: The data was collected on the Proforma and was analyzed by statistical package for social sciences (SPSS) version 10. Mean and standard deviation of the quantitative variables like age, weight, height, systolic blood pressure, diastolic blood pressure and heart rate for both groups, were determined. Independent sample t test was used to compare percentage changes in mean heart rate, systolic and diastolic blood pressures between groups. Chi square test was also applied to check proportion difference of hypotension between groups. $P<0.05$ was considered significant.

RESULT

In this study, 100 patients were divided into two groups: Group A and Group B. In group A patients had heights equal to or less than 60 inches (5 feet) and in group B, patients heights were 60-66 inches (5-5.5 feet).

Out of 100 patients 83 belonged to ASA – I (American Society of Anesthesiologist) and the remaining 17 patients were ASA-II. The average age, weight and height of the patients mentioned in Table-I.

The changes in Heart rate, Systolic and Diabolic blood pressure were recorded. The base line readings were not significantly different statistically (Table 2).

46 patients in group A developed hypotension whereas only 21 patients in group B developed Hypotension. Only 4 patients did not develop hypotension in group A. whereas in group B 29 patients did not develop hypotension (Table-3). The incidence of hypotension was significantly high in group A. So it could be concluded that influence of height of the patient was significant on the incidence of hypotension in patients receiving local anesthetics during spinal anesthesia.

Table No.1: Demographic and clinical characteristics of the patients

Variables	Group A (n=50) Mean +/- SD	Group B (n=50) Mean +/- SD
Age (years)	26.14 +/- 5.6	25.88 +/- 3.5
Weight (Kg)	60.40 +/- 4.8	65.12 +/- 4.2
Height (inches)	57.20 +/- 2.5	63.33 +/- 2.2
ASA I II	40 10	43 07

Data presented in mean +/- standard deviation
ASA: American Society of Anesthesiologists

Table No.2: Comparison of base line heamodynamics characteristics

Hemodynamic Characteristics	Group A (n=50) Mean +/- SD	Group B n=50) Mean +/- SD	P – Value
Systolic blood pressure (mm Hg)	115.06 +/- 4.4	118.01 +/- 4.5	0.10
Diastolic blood pressure (mm Hg)	65.27 +/- 3.8	68.88 +/- 4.1	0.82
Mean blood pressure (mm Hg)	81.66 +/- 5.0	85.33 +/- 4.8	0.09
Heart Rate	91.11 +/- 7.5	93.42 +/- 9.9	0.66

Values were considered significant when $p<0<0.5$
Data presented in mean +/- standard deviation

Table No.3: Comparison of frequency of hypotension between groups

Hypotension	Group A (n=50) Mean +/- SD	Group B (n=50) Mean +/- SD	Total (n=100)
Yes	46 (92%)	21 (42%)	67 (67%)
No	04 (08%)	29 (58%)	33 (33%)

Data presented in mean +/- standard deviation
Hypotension: Fall in Blood Pressure more than 25% of the base line

DISCUSSION

Regional anesthetic techniques particularly central blocks i.e. epidural and spinal anesthesia are safer anesthetic techniques and play an important role for decreasing the mortality and morbidity in patients. Hypotension and bradycardia occur frequently during this technique. Hypotension after spinal anesthesia for

cesarean section is common and may result in serious maternal and neonatal complications despite the use of uterine displacement and volume preloading[10].

In our study, patients divided into two groups according to their heights and tried to establish the effect of height on the spread of local anesthetic and frequency of hypotension. Intra operative hypotension is defined as the decrease in systolic blood pressure more than 25% of the base line.

Bupivacaine hydrochloride is the most commonly used drug for spinal anesthesia in our country. It is available in two different concentrations i.e. 0.5% isobaric or hyperbaric and 0.75% hyperbaric. In this study we used 0.75% hyperbaric bupivacaine hydrochloride. Hyperbaricity is thought to influence subarachnoid distribution of the drug[11]. The distribution of hyperbaric solution in cerebro - spinal fluid is governed by age, anatomy of the vertebral column, injection site, volume of drug, density and baricity of drug and position of the patient during injection beside height of the patient. Clinical observations confirmed that weight and height are significant variables in predicting the final level of the block[12].

A study by J.M. Harten and colleagues also showed that adjusting the dose of hyperbaric bupivacaine to the patients height and weight result in the decreased incidence and severity of maternal hypotension, decreased ephedrine administration and a lower incidence of high spinal block[12].

S. Kiran and N.K Singal demonstrated that a lower dose of 0.5% hyperbaric bupivacaine for elective caesarean section is associated with adequate anesthesia and less complications like hypotension, bradycardia, nausea, vomiting and high spinal blocks[13].

E. Nagata of Japan and C.J Chung of Korea also demonstrated the pregnant women require less dose of local anesthesia than do non-pregnant women and if dose is adjusted according to height of patient then adequate level of anesthesia is archived with less material hypotension[10, 14].

There are many variables involved in predicting the outcome of spinal anesthesia as far as hypotension is concerned. Altering the drug dose, concentration, baricity, site of injection and technique as well as individual patient's factors may individually or collectively produce diverse results. So to make spinal anesthesia an effective and safe technique, all these factors should be considered.

CONCLUSION

The study showed that height of the patients influence the hemodynamic response of local anesthetics given during spinal anesthesia. So an effective and safe spinal anesthesia require appropriate dose of local anesthetic according to height of patients, fluid preloading, monitoring, accurate technique, proper patients positioning with left uterine displacement.

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