ORIGINAL ARTICLE

Comparison of Frequency of Hypotension after Subarachnoid Block Either Giving Prophylactic Intramuscular Ephedrine or Crystalloid Preload in Parturients Undergoing Cesarean Delivery

*WAQAR AHMED QURESHI, *SYED ZIA HAIDER, *MUHAMMAD ARSHAD, **SYED ZEESHAN HAIDER, *AHMED ALI, **TOOBA MOON, ***MARYAM SHOAIB*

ABSTRACT

Objective: To compare the frequency of hypotension after subarachnoid block either giving prophylactic intramuscular ephedrine or crystalloid preload in parturients undergoing C-section.

Material and methods: This study included a total of 100 patients. Group-A received crystalloid preload (50 patients) and Group-B ephedrine intramuscular (50 patients). Two intravenous lines were saved with 18 gauge cannula. Mandatory monitoring for arterial pressure, ECG, heart rate and oxygen saturation was applied.

Results: Mean age of the patients was observed 29.1±2.9 years in group-A and 28.7±1.7 years in group-B. Hypotension was developed in 25 patients (50.0%) in group-A and 10 patients (20.0%) in group-B. Difference between two groups was statistically significant. Majority of the patients in group-A, 30 patients (60.0%) and in group-B, 31 patients (62.0%) had parity 1-2. Mean parity of group-A was 2.3±1.1 and of group-B 2.4±0.9. Mean heart rate was observed 82.3±7.4 and 81.5±5.2 in group-A and B.

Key words: Crystalloid preload, Ephedrine intramuscular, Caesarean section.

INTRODUCTION

Anaesthesia to a parturient requires special care because the anaesthesiologist has to look after two individuals, mother and fetus.[1] Subarachnoid block also called (Spinal Anaesthesia) was introduced in clinical practice by German surgeon Karl August Bier in 1898[2]. It has recently gained popularity for cesarean section because of the low risk of toxicity of the drug, due to its small dose and volume[3] Subarachnoid block (SAB) offers a fast, profound, and high quality sensory and motor block in patients undergoing cesarean delivery.

The most common complication of subarachnoid block for cesarean delivery is hypotension.[4] It occurs due to preganglionic sympathetic blockade below the level of T4 along with sensory and motor fibres.[5] It is caused by an increase in venous capacitance and a reduction in systemic vascular resistance[6].

Frequency of maternal hypotension is reported to be as high as 80%. It is associated with the distressing-symptoms of dizziness, nausea and vomiting and may interfere with the surgical procedure[7]. Hypotension may be detrimental to the mother and the resulting placental hypoperfusion to the fetus[1].

**Department of Anaesthesia, Sir Ganga Ram Hospital, **Department of Obs & Gynae, Social Security Health Management Company Hospital, Manga, Raiwind Road, Lahore, Department of Obs & Gynae, Bolan Medical College, Quetta*

Correspondence to Dr. Waqar Ahmed Qureshi, Medical Officer, Anaesthesiology, Email: .dwaqar@gmail.com

Aortocavel compression by the gravid uterus may result in reduced venous return and subsequent hypotension, so lateral uterine displacement with a 15 tilt is essential in parturients. Maternal hypotension may be prevented with a crystalloid bolus before spinal anesthesia for cesarean delivery[6]. Lateral uterine displacement and intravenous (IV) crystalloid preloading is routinely used to prevent hypotension but have a limited efficacy and a vasopressor drug is often required[4]. phedrine, an indirectly acting sympathomimetic amine is considered to be the drug of choice in obstetric anaesthesia[7]. It maintains uterine blood flow, whereas other vasopressor drugs may restore systemic blood pressure at the expense of uterine blood flow. This study was designed to compare the usefulness of ephedrine and crystalloid to prevent hypotension after subarachnoid block and to improve the safety in parturients.

MATERIAL AND METHODS

One hundred patients from the obstetric ward fulfilling the inclusion criteria, were selected by using random numbers table. They were divided into two groups designated, Crystalloid Preload as A and Ephedrine IM as B.. After placing the patient on operating table, two intravenous lines were saved with 18 gauge cannula. Mandatory monitoring for arterial pressure, ECG, heart rate and oxygen saturation was applied. Baseline non-invasive arterial pressure readings were recorded at 2 min intervals by an automated non-invasive “Bedside Monitor” (Nihon Kohden) model

BSM – 2301K for 10 minutes before the start of preload in Group A and for 10 minutes before administering IM injection ephedrine 30 mg in group B. The baseline was taken, as the lowest MAP recorded in the 10 min before receiving the preload or IM injection ephedrine. Group A received 1500ml of Lactated Ringer as preload over twenty minutes. Group B received only IM injection of ephedrine 30mg into the left Gluteus Maximus muscle 10 minutes prior to subarachnoid injection. The lumber puncture was then performed at L2-3 or 3-4 interspace in sitting position and 1.4ml of 0.75% hyperbaric bupivacaine was injected intrathecally. Intraoperative arterial pressure monitoring at 2 minutes interval started immediately after the completion of intrathecal injection of 0.75% hyperbaric bupivacaine and continued until the surgery was completed. The cut off value of MAP was 60mmHg. Below this value patient's blood pressure was corrected by taking all the necessary and adequate measures. The percentage change in MAP was calculated from the difference between baseline and the recorded MAP, during the study period. Data was entered on a predesigned research proforma Descriptive statistics was used. Age, was presented as Mean and standard deviation (SD). The frequency of hypotension presented as percentage. The significance of difference in the frequency of hypotension taken in the two groups was tested by Chi Square test. P value ≤0.05 was taken as significant.

RESULTS

A total of 100 patients (50 in each group) were recruited in this study. Regarding age distribution, 30 patients (60.0%) in group-A and 31 patients (62.0%) in group-B were between 20-30 years of age. In group-A, 17 patients (34.0%) and in group-B, 14 patients (28.0%) were between 31-40 years while 3 patients (6.0%) and 2 patients (4.0%) were < 20 years in group-A and B, respectively. Mean age was observed 29.1±2.9 years in group-A and 28.7±1.7 years in group-B (Table-1). In group-A, 30 patients (60.0%) and in group-B, 31 patients (62.0%) had parity 1-2.

Table-1: Distribution of cases by age

Age (Year)	Group-A		Group-B	
	No.	%	No.	%
< 20	03	06.0	02	04.0
20-30	30	60.0	31	62.0
31-40	17	34.0	14	28.0
Total	50	100.0	50	100.0
Mean±SD	29.1±2.9		28.7±1.7	

In group-A, 18 patients (36.0%) and in group-B, 19 patients (38.0%) had parity 3-4. Only in group-A, 2 patients (4.0%) had parity greater than 4. Hypotension was developed in 25 patients (50.0%) in group-A and 10 patients (20.0%) in group-B. Difference between two groups was statistically significant (P=0.001) (Table-3). Mean heart rate was observed 82.3±7.4 and 81.5±5.2 in group-A and B, respectively (Table-3).

Table-2: Distribution of cases by parity

Parity	Group-A		Group-B	
	No.	%	No.	%
1-2	30	60.0	31	62.0
3-4	18	36.0	19	38.0
> 4	02	04.0	-	-
Total	50	100.0	50	100.0

Table-3: Hypotension

Hypotension	Group-A		Group-B	
	No.	%	No.	%
Yes	25	50.0	10	20.0
No	25	50.0	40	80.0
Total	50	100.0	50	100.0

P value = 0.001

DISCUSSION

Spinal anesthesia is very popular for cesarean delivery because it offers a fast, profound, and symmetrical sensory and motor block of high quality[8] with a low risk of toxicity of the drug, due to its small dose and volume.[3] Hypotension is the commonest serious problem following spinal anaesthesia for caesarean section, with an incidence reported in the literature of up to 83%.[9] This study demonstrates that IM injection of ephedrine 30mg may significantly lower the incidence and limit the severity of hypotension during elective cesarean delivery under spinal anesthesia as compared to crystalloid preload. One reason why crystalloid preload may not successfully prevent hypotension is the short intravascular half-life of crystalloid solutions as they are quickly redistributed from the intravascular to the extravascular space. Park et al[10] studied the effect of varying amounts of crystalloid volume prior to spinal anaesthesia on the incidence of hypotension. Increasing the amount of IV crystalloid administered from 10 to 30 ml/kg did not significantly alter the incidence of hypotension or decreased ephedrine requirements. The increasing crystalloid volume was however associated with decreasing maternal colloid osmotic pressure (COP). Therefore, a large preload may cause pulmonary oedema by potentiating the physiological reduction in COP that already occurs in pregnancy. In young, healthy parturients the clinical significance of this change appeared to be minimal[5]. Gutsche[11] similarly demonstrated that 25–50mg ephedrine given IM within 30 minutes of instituting a subarachnoid block significantly decreased the incidence of hypotension. However, two other studies reported an unacceptably high risk of fetal acidosis

and rebound hypertension when using these large ephedrine doses.[12,13] Not every study has found benefit to the prophylactic administration of ephedrine. Several studies, in fact, have reported little or no benefit from prophylactic ephedrine.[14,15] A study by Gajraj et al[16] designed to compare the efficacy of an ephedrine with crystalloid administration for reducing the incidence of hypotension. Fifty-four ASA-I patients scheduled for postpartum tubal ligations under spinal anesthesia were randomly allocated to receive either 15 mL/kg of crystalloid (crystalloid group) or an ephedrine infusion (infusion group). Spinal anesthesia was performed using 70–90 mg of hyperbaric 5% lidocaine. Patients in the infusion group immediately thereafter received an ephedrine infusion at a rate of 5 mg/min for the first 2 min and then 1 mg/min for the next 18 min. The incidence of hypotension was 15/27 (55%) in the crystalloid group and 6/27 (22%) in the infusion group ($P < 0.05$). There was no significant difference between the groups in relation to the level of anesthesia or maximal heart rate, and hypertension did not occur in either group. It was concluded that a prophylactic ephedrine infusion was effective for minimizing and managing hypotension associated with spinal anesthesia and compares favorably with crystalloid administration in this patient population in terms of efficacy and incidence of side effects.[16] Prevention of hypotension during subarachnoid anaesthesia is a contentious subject and there is no perfect method to prevent it. Bhagat et al[2] evaluated in a double blinded manner the combination of preloading and vasoconstrictor as a method for its prevention. Ninety patients were randomly allocated into three different groups. Group I patients received preloading with 15 $mlkg^{-1}$ of ringer's lactate. Group II patients received prophylactic ephedrine. Group III patients received preloading with half the volume as in group I and ephedrine in half the dose as in group II. Hypotension was managed with boluses of I.V. fluids 2 $mlkg^{-1}$ (maximum three). If it failed to reverse hypotension, ephedrine 6 mg was given intravenously and repeated if necessary. The incidence of hypotension was only 3.33% in group III, 16.66% in group II and 43.33% in group I. The duration of significant fall in systolic arterial pressure, hypotensive episodes and requirement of I.V. fluids and ephedrine for management of hypotension were least in group III and maximum in group[2].

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