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EFFECT OF LEG ELEVATION WITH WRAPPING (COMPRESSION OF LEGS) IN REDUCING THE INCIDENCE OF HYPOTENSION ASSOCIATED WITH SPINAL ANAESTHESIA FOR CAESAREAN SECTION IN IQ CITY MEDICAL COLLEGE, DURGAPUR, WEST BENGAL, INDIA.

Anesthesiology

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ABSTRACT

BACKGROUND Spinal anaesthesia in caesarean section has a rapid onset of action, reliable and provides good surgical conditions however there is a risk of maternal hypotension.

AIMS AND OBJECTIVE The Aim of our study was to analyze the effect of leg elevation with wrapping (Compression of legs) in reducing the incidence of hypotension associated with spinal anaesthesia for caesarean section.

METHODS AND MATERIALS class I Primipare Parturient undergoing elective caesarean section at term were involved in this prospective, randomized, controlled, double blinded study. 100 full term pregnant patients with uncomplicated pregnancy belonging to American Society of Anaesthesiologist (ASA) class-I or II, schedule for elective caesarean section under spinal anaesthesia were randomly assigned to group-A (non leg wrapping) (n=100) or Group B (leg wrapped) (n=100).

RESULT LE group showed a lower incidence of PSH. There was a significant decrease in systolic and diastolic blood pressure readings in both study and control groups after spinal block compared to the baseline values. Odds ratio for development of PSH with LE was 0.364 with 95% confidence interval (0.183- 0.714). There was no significant difference between both groups regarding heart rate, blood loss, urine output, intra operative and post operative nausea and vomiting.

CONCLUSION Wrapping of lower limb is a simple, safe and effective method of preventing hypotension in primigravida posted for caesarean section and can be of great value in routine practice. Leg elevation performed immediately after spinal block reduced the incidence of PSH in parturient undergoing caesarean section.

KEYWORDS

Caesarean section, Hypotension, Spinal anaesthesia and leg wrapping.

INTRODUCTION

Anaesthesia for caesarean section whether for elective or emergency procedure has always being a challenging proposition. Caesarean birth has become the most common hospital based operative procedure. The choice of anaesthesia for caesarean section depends on the indication for the surgery, degree of urgency, maternal status and desire of individual. Use of regional anaesthesia has dramatically increased and use of general anaesthesia for caesarean section has been steadily decreasing [1].Although spinal block provide excellent anaesthesia for caesarean section. It is frequently accompanied by hypotension generally proportional to the degree of sympathectomy[2].The central neuraxial blockade has become the preferred anaesthesia technique for caesarean sections and the use of general anaesthesia has drastically decreased [3]. Even though spinal anaesthesia provides excellent anaesthesia, it is commonly associated with adverse effects like hypotension. The hypotension caused depends on the level of block achieved [4]. In addition to fluids, technique currently in use for preventing hypotension is the administration of vasopressors. Mechanical compression of legs is a simple technique and found to be comparable with use of vasopressors, in the prevention of post spinal hypotension in caesarean parturient females. Leg wrapping being a simple, non-pharmacological and cost effective technique can be used on a daily basis to prevent hypotension [5, 6]. In this study we evaluated the efficacy of leg wrapping with crepe bandage before spinal anaesthesia in pregnant females undergoing caesarean section. Maternal hypotension is common after spinal anaesthesia for caesarean section with an incidence up to 60-70% [7, 8]. Post spinal hypotension (PSH) in caesarean section has been associated with many maternal and foetal complications [7]. Post spinal hypotension is mainly due to decreased vascular tone leading to decreased systemic vascular resistance and decreased venous return [8]. Thus measures used for prevention and management of PSH are mainly concerned by increasing vascular tone and increasing venous return which can be achieved by using vasopressors, fluid administration and positioning regimens [7-10].Although many measures have been reported for prevention and management of PSH [9,10], None of these measures totally eliminated the occurrence of hypotension [9]. Leg elevation (LE) creates an increase in venous return by translocation of blood from lower extremities to the thorax. Thus leg elevation leads to increased stroke volume (SV) and consequently cardiac output (CO) [11]. Leg elevation was previously used as first aid manoeuvre in acute circulatory collapse [12]. It has been also considered as a popular method for detection of fluid responsiveness [13]. The evidence for a possible role for leg elevation in prevention of PSH is unclear. In this study we investigated the efficacy of leg elevation performed after spinal block in prophylaxis of PSH during caesarean section. The study is designed to evaluate the effect of wrapping of lower limbs by crepe bandage along with preloading and 150 left lateral tilt on incidence and severity of post spinal hypotension in elective caesarean section, compare it with the conventional preloading and 150 left lateral tilt and to note complications if any.

AIMS AND OBJECTIVE

1. To study the effect of leg elevation with wrapping (Compression of legs) in reducing the incidence of hypotension associated with spinal anaesthesia for caesarean section.
2. To study the efficacy of leg elevation performed after spinal block in prophylaxis of post spinal hypotension (PSH) during caesarean section.

MATERIAL AND METHODS The randomized controlled study was conducted in the department of Anaesthesia, IQ City Medical College, Durgapur, westbengal. The study was performed during the period starting from April 2015 till March 2016.

After local ethics committee approval and written informed consent, class I Primipare Parturient undergoing elective caesarean section at term were involved in this prospective, randomized, controlled, double blinded study. All the participants in the study were instructed before the procedure and written informed consent was obtained individually before surgery. We recruited additional 10% of primigravida keeping in view a possibility exclusion.100 full term pregnant females with uncomplicated pregnancy belonging to American Society of Anaesthesiologist (ASA) class-I or II, schedule for elective caesarean section under spinal anaesthesia were randomly assigned to group-A (non leg wrapping) (n=100) or Group B (leg wrapped) (n=100).

The equipments used for this study is crepe bandages for leg wrapping. Thorough pre-anaesthetic evaluation including history, physical examination, spine examination, airway examination, were done day before surgery. All routine investigation like haemoglobin, differential count, total leukocyte count, bleeding time, clotting time, serum urea, serum Creatinine, serum sodium, serum potassium, fasting blood sugar were within normal limits in all participants. All the participants

were kept nil per oral 8 hours before surgery. In all the females' intravenous line was secured using 18-G cannula. Participants were full term (between 39 weeks and 40 weeks 6 days)

All the pregnant females were pre-medicated with Inj. Ranitidine (50 mg i.v) and inj. Metoclopramide 10 mg i.v one hour prior to surgery. I.v preloading was done with 10ml/kg of Ringer lactate solution over 15-20 minutes just prior to arrival to operation theatre. Pulse-oxymeter, ECG and non invasive blood pressure monitors were attached. In all base line blood pressure and heart rate were measured in the supine position with 15^0 left lateral tilt. 15^0 left lateral tilt was attained by keeping a wedge under right hip. Baseline values were taken as the average of three successive readings before administering spinal anaesthesia. Leg wrapping was done with crepe bandage (15 cm width, 40 cm stretched length) applied from the ankle to the mid-thigh in both legs. During wrapping lower extremities was lifted at an angle of 45^0. The crepe bandages were wrapped tight enough that the women felt the tightness, yet it was comfortable and not painful. Care was taken to avoid compressing the legs to greater than systolic arterial pressure by checking for capillary pulsation in the toes. After wrapping the crepe bandage was hidden to ensure blinding.

Under all aseptic conditions spinal anaesthesia was performed with 12.5 mg (volume 2.5 ml) of 0.5% hyperbaric bupivacaine using a 27-G whittacre needle in the L3-L4 or L4-L5 inter space intrathecal through midline approach in the sitting position. Thereafter all parturient were placed in supine position with 15^0 left lateral tilt by placing a wedge under right hip. Pulse rate, electrocardiography, non invasive blood pressure, oxygen saturation was continuously monitored intra operatively. Oxygen was supplemented by face mask. Fluid replacement was maintained with Ringers lactate solution. 20 units of oxytocin was put in the drip after delivery of baby and infused slowly. Any complication was noted and treated accordingly. The degree of hypotension was noted. Hypotension SBP was defined as fall in systolic blood pressure to < 90 mm of Hg or reduction of 20% of base line. Hypotension was treated immediately by increasing the rate of IV ringer lactate administration and by bolus 50 µg phenylephrine intra venous. Parameters recorded intra operatively for the study are: Heart rate every 2 minutes for 10 minutes after subarachnoid block and thereafter every 5 minutes till end of surgery. Systolic blood pressure (SBP), Diastolic blood pressure (DBP), and mean arterial pressure (MAP) every 2 minutes for 10 minutes after subarachnoid block and thereafter every 5 minutes till end of surgery by using NIBP. Time to reach maximum block height, total duration of surgery, Nausea and vomiting, shivering.

SELECTION CRITERIA

Inclusion Criteria: - Age group of 19 to 35 years with full term singleton parturient posted for elective caesarean section under spinal anaesthesia were included in this study. Exclusion Criteria:- All the females with post partum haemorrhage, chronic hypertension, Multiple pregnancies, pregnancy induced hypertension, diabetes mellitus, gestational diabetes mellitus, cardiovascular diseases, bronchial asthma, neurological diseases, body weight more than 100 kg, patients with contraindication to spinal anaesthesia, BMI above 30 kg/m2 , patients with baseline hypotension(SBP less than 100 mm Hg), ante partum bleeding or evidence of difficult airway, and patients refusal were excluded from this study.

STATISTICAL ANALYSIS All statistics were performed on a window based computer using the programme SPSS version 20.0. (IBM Inc., Chicago, USA). Parametric data were presented as mean + standard deviation, median (range) and numbers (percentage). Student's t-test was used for comparison between group data. Age and weight of the patients were compared using independent sample t-test. Hypotension and Bradycardia were noted down as "present" or "absent". Frequency of bradycardia and hypotension between the three groups was compared using Chi Square test. p value <0.05 was considered statistically significant. Data was summarized by descriptive statistics.

RESULT Two hundred parturient were assessed and were met the inclusion criteria and were available for analysis. Demographic data (age, weight, height and obstetric data) were compared between both study and control group (Table-1). LE group showed a lower incidence of PSH and lower ephedrine consumption compared to control group (33.6% Vs 66.4%, p=0.005), (4.8 ± 7.7 mg Vs 10 ± 11 mg, p=0.001) respectively. Odds ratio for development of PSH with LE was 0.364 with 95% confidence interval (0.183- 0.714). There was a significant decrease in systolic and diastolic blood pressure readings in both study and control groups after spinal block compared to the baseline values. LE group showed higher systolic and diastolic blood pressures compared to the control group after 1 minute and 2 minute from spinal block. There was no significant difference between both groups regarding heart rate, blood loss, urine output, intra operative and post operative nausea and vomiting.

Table-1: Demographic data and Patients outcome.

	LE group (n=100)	Control group (n=100)	P value
Age (years)	27±4	30±4	0.12
Weight (Kg)	68±6	72±7	0.02
Time from SAB to delivery of the foetus (minutes)	15.2±6.2	15.8±6.8	0.62
Total infused volume (ml)	1780±400	1860±450	0.28
Urine output (ml)	560±80	580 ±60	0.12
Blood loss (ml)	200±120	300±110	0.1
Incidence of hypotension	22 (22%)	34 (34%)	0.005
Ephedrine consumption (mg)	4.6±7.6	10±11	0.001
Nausea and vomiting	8 (8%)	14 (14%)	0.24
Incidence of bradycardia	4 (4%)	7 (7%)	0.52
Hypotensive episodes			0.014
One	12(12%)	22 (22%)	
Two	6 (6%)	11 (11%)	
Three	1 (1%)	4 (4%)	

LE leg elevation, SAB subarachnoid block, Not significant *denotes statistical significance (p value <0.05). Data are presented as mean± standard deviation and frequency (%)

DISCUSSION

Spinal anaesthesia is a popular technique of anaesthesia in pregnant females posted for caesarean section. However maternal hypotension is the most frequent complication of spinal anaesthesia which results from a decrease in arteriolar and venous tone secondary to sympathetic block causing reduction in systemic vascular resistance and redistribution of central blood volume up to 500-600 ml to the peripheral compartment [14].One would expect that compression would somehow decrease the magnitude and prevalence of post spinal hypotension. During spinal anaesthesia relaxation of calf muscles due to sympathetic blockade leads to loss of pumping action of calf muscles and the vascular distensibility of the calf vessel has been shown to increase by 17% [15]. Leg elevation alone or in combination with leg wrapping might cause cephalic displacement of hyperbaric solution due to flattening of the lumbar curvature of the spine resulting in a higher level of sensory, motor and sympathetic blockade. Parturient at term have more blood trapped in the lower extremities and spinal anaesthesia induced vasodilatation will increase the pooling of blood even more. Vasodilatation induced by spinal anaesthesia increases the proportion of blood that runs to periphery during systole. Mean arterial pressure, systolic and diastolic pressure were noted in both the groups over study of time course 45 minutes after spinal anaesthesia and compared by using "unpaired student t test". Leg wrapped patients had a non-significant decrease in systolic blood pressure, diastolic blood pressure and mean arterial blood pressure when compared with base line. In leg wrapped group, the systolic blood pressure, diastolic blood pressure and mean arterial pressure remained consistently above that of control and the difference in between the groups was significant at 4th, 6th, 8th, 10th, and 15thminutes. Similar study done by Goudie et al in where they found fall in diastolic and mean arterial pressure was greater in control group than leg wrapped group which correlates with the current study [15]. Bhagwanjee S et al 1990 [16] found systolic arterial pressure was significantly less in control subjects at 4 minute, 5minute, 6 minute, following spinal injection which correlates with the current study. They also found leg wrapped subjects had significant lower incidence (16.7%) of hypotension than control (83.3%). Only 2 subjects in leg wrapped group required ephedrine compared to 10 subjects in control

(p=0.0033) which correlates with the current study.

They also found decrease incidence of nausea and vomiting related to spinal anaesthesia induced hypotension in leg wrapped elective subjects in elective caesarean section which correlates with the current study. Rout CC et al showed that in leg wrapped group individual, systolic pressure did not significantly decreased to below baseline value [18]. Von Bogaert LJ et al found there was decrease in systolic pressure in both the groups but the systolic blood pressure of leg wrapped individual remained significantly above the systolic blood pressure of control which correlates with the current study [19]. They also found that 45.5% in non-leg wrapped individual and 15.8% in leg wrapped patients developed hypotension. (p=0.012) which is statistically significant and this correlates with the present study. They had shown decreased incidence of nausea and vomiting related to spinal anaesthesia induced hypotension in leg wrapped patients in elective caesarean section which correlates with the current study. Kunal Singh et al found significant difference in change of systolic and mean arterial blood pressure between the two groups (leg wrapped and unwrapped) at 4th to 12th minute, highly significant between 4th ,6th , 8th minute and no significant difference was observed after delivery. Leg wrapped group had higher mean arterial blood pressure throughout the measured interval [20]. Their results correlate with the present study.

CONCLUSION

From the current study it can be concluded that wrapping of lower limb just before spinal anaesthesia is an effective method to prevent hypotension during spinal anaesthesia for elective caesarean section without any unwanted side effects like hypotension, tachycardia, pulmonary embolism or any other maternal side effects. In addition to the above advantages, it reduces the incidence of nausea, vomiting and shivering intra operatively. As leg wrapping with elastic crepe bandage is cheap, easy, readily available, non invasive and non pharmacological method, it can be recommended in addition with preload and left uterine displacement for preventing post spinal hypotension and its subsequent adverse effect on the mother as well as on a baby. Leg elevation performed immediately after spinal block reduced the incidence of PSH in parturient undergoing caesarean section. Hence, wrapping of lower limb is a simple, safe and effective method of preventing hypotension in patients posted for caesarean section and can be of great value in routine practice.

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