

Table Tilt Versus Pelvic Tilt Position for Preventing Hemodynamic Changes During Spinal Anaesthesia for Caesarean Section

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Abstract

Background: Hypotension is one of the most common complications associated with regional anaesthetic technique for CS. Several studies have been done for methods to prevent hypotension, which have been widely discussed in past decades, without definite conclusions. Hence we designed a study as such to compare the effect of placing a Crawford wedge or giving a table tilt (left) after spinal anesthesia for caesarean section, by observing the hemodynamic changes as suggested by previous study, to determine which would be best suit for cesarean section parturients in preventing supine hypotension syndrome. **Materials and Methods:** A total of 120 parturients who met the inclusion criteria were enrolled into the study and were randomly allocated into either the wedge group or the table tilt group. After placing the wedge or table tilt, patient hemodynamic parameters such as Heart rate, Blood pressure, Oxygen saturation were recorded between the groups. **Results:** In Tilt group 50% were Primigravida and 50% were Multigravida respectively, in wedge group 45% were Primigravida and 55% were Multigravida. Mean Hear rate increased to 90.2 ± 8.7 bpm at 10 min in Tilt group and to 90.6 ± 9.1 bpm at 20 min in Wedge group. Mean SBP was higher in Wedge group after 5 min of positioning than in tilt group. Mean DBP was higher in Wedge group after 5 min of positioning than in tilt group. Mean MAP was higher in Wedge group after 5 min of positioning than in tilt group. The results show that there is no significant differences regarding Heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure, saturation between wedge group and table tilt group. **Conclusion:** We observed that there was incidence of hypotension in both the groups but the placement of Crawford wedge and execution of table tilt were equally efficient in preventing supine hypotension syndrome for patient undergoing cesarean section.

Keywords: Caeserean section; Spinal Anaesthesia; Wedge; Table tilt; Supine Hypotension.

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Introduction

Caesarean section (CS) is a surgical procedure performed on women to deliver one or more babies and the rate has been increasing dramatically in recent years. CS is necessary in critical conditions, where vaginal delivery would put the baby or mother's life or health at risk [1]. The institutional

delivery rates vary widely between settings, from 21% in rural India to 90% in urban India. The proportion of private and charitable facility births delivered by CS 73% in Bangladesh, 30% in rural Nepal, 18% in urban India and 5% in rural India [2]. The most common reason for an increase in CS is big babies and less physical activities [3,4]. Compared to general anaesthesia, regional anaesthesia is the most commonly performed anaesthetic technique

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for caesarean section [5]. Hypotension is one of the most common complication associated with regional anaesthetic technique for CS. This hypotension will exacerbate with Supine hypotension syndrome [6]. The Supine hypotension syndrome is manifested as Hypotension, tachycardia, nausea, dizziness, syncope and decreased uteroplacental perfusion. Anaesthetic drugs and techniques that cause sympathectomy may aggravate the impact of aortic caval compression. These changes in blood volume and cardiac output may become more critical for parturients who have an associated cardiac disease [7]. Decreased cardiac output secondary to vena-cava obstruction by the gravid uterus can be prevented by many other methods like left lateral tilt position, manual uterine displacement, Crawford wedge of 10 cms height, angled arbitrarily at 15°, conventionally, a small pillow or wedge is used to provide left uterine displacement of 15° to 20° degrees, by tilting operating table [8].

Several studies have been done for methods to prevent hypotension, which have been widely discussed in past decades, without definite conclusions. Hence we designed a study as such to compare the effect of placing a Crawford wedge or giving a table tilt (left) after spinal anesthesia for caesarean section, by observing the hemodynamic changes as suggested by previous study, to determine which would be best suit for cesarean section parturients in preventing supine hypotension syndrome.

Materials and methods:

A randomized clinical trial study was carried out at Sri Manakula Vinayagar Medical College and Hospital, Puducherry during the period of November 2015 to April 2017. This study was conducted as per Good clinical practice Guidelines (GCP) defined by WHO. Sample size (n=120) was calculated using 95% confidence interval, 80% power and 10% non-response rate. The study subjects were divided into two groups of 60 patients in each group.

Group (T) 15° left lateral table tilt

Group (W) Pelvic tilt 15° with wedge under right hip

Inclusion criteria: Parturients of ASA status II undergoing caesarean delivery under spinal anaesthesia, aged between 20 to 35 years with height of 145-165 cm and weight of 45-70 kg were included in the study.

Exclusion criteria: Parturients with Fetal distress, Multiple gestation, Pre-eclampsia, Hypertension, Diabetes, Renal disease, Intra Uterine Growth Retardation (IUGR) and Factors contraindicating a standard spinal anaesthetic technique were excluded from the study.

Procedure: Pre-anaesthetic check-up was done prior to surgery and patients were kept fasting for 8 hours on the previous night of surgery. On the day of surgery all patients were reassessed in preoperative holding area, standard vital monitors such as SpO₂, NIBP, ECG, HR were connected. Intravenous (IV) cannulation was secured in non-dominant hand with 18 Gauge IV cannula, and preloaded with Ringer's lactate solution (10 ml kg⁻¹) along with premedication of metoclopramide (10 mg) i.m., ranitidine (50) mg i.v. infusion slowly, 30 mins prior to surgery. In the operation theatre all the patients were connected to standard vital monitors such as ECG, HR, NIBP, and SpO₂. Baseline parameters such as heart rate (HR) mean arterial pressure (MAP), systolic blood pressure (SBP), diastolic blood pressure (DBP) and oxygen saturation (SpO₂) were observed and noted. After explaining the procedure to the patient, subarachnoid block was performed in the sitting position as per our institute protocol: midline approach in the L3-L4 interspace, with 10 mg (2 ml) hyperbaric 0.5% bupivacaine under strict aseptic precautions, using a 25G Quincke's spinal needle. Patients were put in the position according to the group assigned. In group W, patients were made to lie supine with a Crawford wedge of 10 cm height beneath the right hip, to tilt the pelvis to 15°. In group T, the table was tilted to left side by 15°. If the patient felt discomfort by the tilted position, an assistant was kept to support the patient. Sensory block was assessed at one minute interval by using loss of sensation to touch with cotton wool test. Motor block was assessed by Bromage scale. Time of onset of sensory blockade at T10 and maximum height of dermatomal block after 20 min, or when there was no change in three consecutive reading, were assessed. Recordings of blood pressure were done by a multipara monitor at baseline, 2 mins, 5 min then every 10 minutes for till the end of surgery. At similar time interval, HR and SpO₂ were monitored. Complications like hypotension, bradycardia, nausea, vomiting were noted in the data sheet. Bradycardia was defined as the heart rate falling less than 60 per minute, and it was treated by injection atropine 0.6 mg I.V bolus. Hypotension was defined as systolic blood pressure falling less than 90 mm Hg were treated by bolus of IV fluids and injection ephedrine 6 mg

I.V bolus. Once the baby delivered, the wedge or tilt was removed and all patients hemodynamic parameters were continuously monitored till the end of surgery and above said complications were managed accordingly.

Results

A total of 120 parturients who met the inclusion criteria were enrolled into the study and were randomly allocated into either the wedge group or the table tilt group, and given spinal anaesthesia. Majority of subjects in both the groups were in the age group 26 to 30 years. There were no statistically significant differences in the mean of patient maternal characteristics between the Tilt and Wedge group (Table 1).

All patients in both the groups achieved onset of sensory blockade (T10) at 1 minute and maximum level of sensory blockade (T4) at 5 minutes. Motor Blockade by Bromage Scale was achieved at 5 minutes in both the groups (Table 2).

In Tilt group 50% were Primigravida and 50% were Multigravida respectively, in wedge group 45% were Primigravida and 55% were Multigravida (Figure 1).

The hemodynamic parameters (heart rate, blood pressure, oxygen saturation) were recorded. Mean Heart Rate at baseline in Tilt group was 85.3±8.5 bpm and in Wedge group was 85.4 ± 9.9 bpm. Mean Hear rate increased to 90.2 ± 8.7 bpm at 10 min in Tilt group and to 90.6 ± 9.1 bpm at 20 min in Wedge group (Figure 2). Mean SBP was higher in Wedge group after 5 min of positioning than in tilt group.

Table 1: Patient’s Demographic profile

Characteristic	Tilt group n=60	Wedge group n=60
Age (yr)	25.7 ± 3.2	25.3 ± 3.1
Weight (kg)	62.8 ± 5.1	63.4 ± 4.4
Gestational Age (days)	267.2 ± 9.5	268.8 ± 2.2

Table 2: Sensory and Motor Blockade

		Tilt group n=60	Wedge group n=60
Onset of Sensory Blockade (T10)	1 min	100%	100%
Maximal level of Sensory Blockade (T4)	5 min	100%	100%
Motor Blockade by Bromage scale	5 min	100%	100%

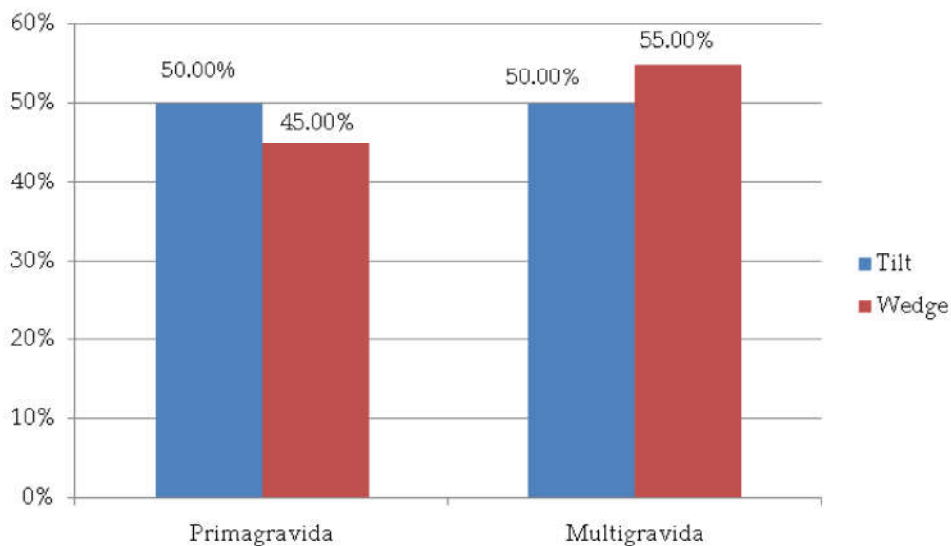


Fig. 1: Obstetric score of subjects in both the groups

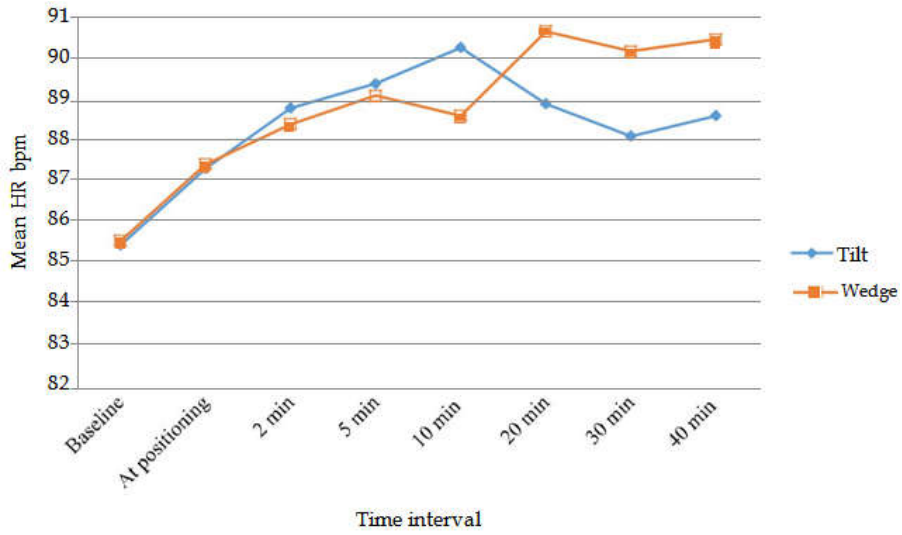


Fig. 2: Heart Rate comparison between two groups at different time intervals

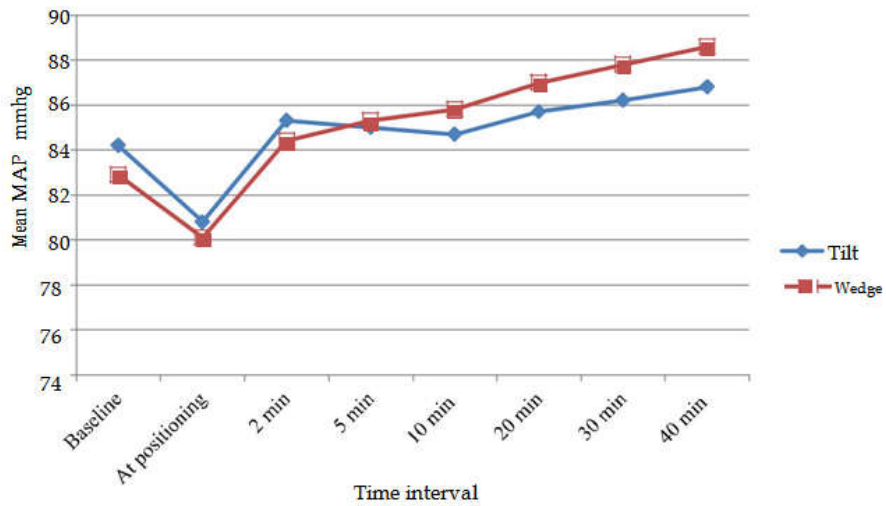


Fig. 3: MAP comparison between two groups at different time intervals

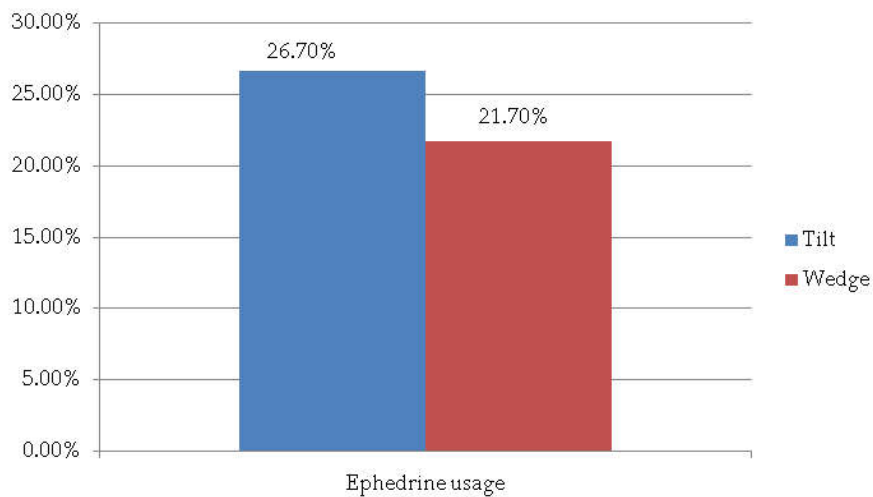


Fig. 4: Ephedrine usage comparison between two groups

Mean DBP was higher in Wedge group after 5 min of positioning than in tilt group. Mean MAP was higher in Wedge group after 5 min of positioning than in tilt group (Figure 3).

The results show that there is no significant differences regarding Heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure, saturation between wedge group and table tilt group.

Discussion

Supine hypotension syndrome results in severe adverse effects. Pressure of Gravid uterus over inferior vena cava results in decreased venous return and cardiac output causing hypotension, tachycardia, nausea, vomiting, headache, syncope [7,9,10]. To alleviate supine hypotension syndrome different methods were tried, includes full lateral position, head tilt of operation table [11], placing water bags, rubber wedges, airbags, and sand bags under the hip or flank, mechanical displacement. Among these traditionally using methods are wedge under the right hip or left table tilt [12]. At present there is no ideal positioning for the mother during Cesarean section. Various studies are going on proper positioning of the mother during C-section to provide better outcome to mother and child and also to prevent supine hypotension syndrome.

Here in this study we tried to determine the position of the mother during C-section with good cardiovascular stability and for avoiding supine hypotension syndrome. Using 10 cm wedge under the right hip or buttock, left lateral tilt can give to mother up to 15°. Crawford et al. used 15° tilt for positioning of pregnant women. Caval and aortic compression still evidenced in many studies whatever the degree of tilt is, even at 34° [13]. Caval compression can result up to 15° tilt and aortic compression up to 35° tilt. There are evidences that reversible reduce in lower limb arterial pressure [13] and improved cardiac output by tilt of mother during C-section either by manual uterine displacement [14] or by full lateral position reduce lower limb arterial pressure [15]. In Lesser degrees of tilt like 5°, 10°, 12.5° little changes occur in maternal cardiovascular changes even though caval compression is present 10, but women feels insecure in lesser degree. In higher degree like 30° patients may slide off the inclined plane [16].

To avoid maternal morbidity and mortality due to hypotensive attacks during cesarean section, proper management from the time of spinal anesthesia

until recovery of mother is necessary, to prevent adverse effects during spinal anesthesia one should use appropriate drug dosage, technique, proper positioning and good patient monitoring is very much needed. Oxygen therapy and intravenous crystalloids as per the need Among indications for cesarean section, Out of 120 pregnant women 56 were presented with primi gravida - 16 transverse lie presentation, 20 were Cephalopelvic disproportion, 20 were safe confinement and 64 were previous caesarean section.

In this study Mean SBP was higher in Wedge group after 5 min of positioning than in tilt group. There was no significant difference in mean SBP between two groups at all the intervals. Mean DBP was higher in Wedge group after 5 min of positioning than in tilt group. There was no significant difference in mean DBP between two groups at all the intervals. Mean HR was increased at 10 min in Tilt group and at 20 min in Wedge group. However there was no significant difference in mean HR between two groups at all the intervals.

In contrast to our study, Cluver C et al., observed that reduced incidence of hypotensive events among pregnant women undergoing cesarean section with manual displacement when compared to Wedge under right hip respectively. In our study, we observed that placement of Crawford wedge and execution of table tilt were equally efficient in preventing supine hypotension syndrome for patient undergoing cesarean section [17]. Srihari babu Gonuguntal et al., Concluded there is no much difference in Hemodynamic changes either by Manual uterine displacement or Wedge under right hip. In similar to our study, placement of Crawford wedge and execution of table tilt were equally efficient in preventing supine hypotension syndrome for patient undergoing cesarean section [1].

Surgeons and patients feel more comfortable with Manual uterine displacement than Wedge under right hip, but anaesthetists feel better with wedge because there is no need to hold the uterus continuously till delivery of the baby, so anaesthesiologist can engage in patient monitoring and treatment [1].

In similar to our study Kinsella S.M. et al., in their study showed that lateral table tilt and a pelvic wedge were equally effective in producing tilt of the pelvis. Patients tolerated wedge better than tilt and wedge is posed lesser difficulty to surgery than tilt. In our study, placement of Crawford wedge and execution of table tilt were equally efficient in preventing supine hypotension syndrome for patient undergoing cesarean section [18].

In contrast to our study Calvache J.A. et al., in their study, they concluded that the use of right lumbar-pelvic wedge was not effective in reducing the incidence of hypotension during spinal anesthesia for cesarean section. Patients in whom the wedge was used had higher systolic blood pressure values during the first 5 min of anesthesia and fewer episodes of nausea. The risk of hypotension remains substantial. But in our study, we observed that placement of Crawford wedge and execution of table tilt were equally efficient in preventing supine hypotension syndrome for patient undergoing cesarean section [19]. In contrast to our study Kundra P et al., conducted a study and conclude that manual displacement of the uterus effectively reduces the incidence of hypotension and ephedrine requirements when compared to 15 degrees left lateral table tilt in parturients undergoing Caesarean section. But in our study we observed that placement of Crawford wedge and execution of table tilt were equally efficient in preventing supine hypotension syndrome for patient undergoing cesarean section [20].

In contrast to our study Lewis. N.L et al. concluded that, the LL position is associated with a relatively slower block onset, but produces a spinal block with similar characteristics to that obtained in the SW position. But in our study onset of sensory and motor blockade was achieved within minutes and there were no significant difference. In our study, we observed that placement of Crawford wedge and execution of table tilt were equally efficient in preventing supine hypotension syndrome for patient undergoing cesarean section [21]. Bamber J.H. et al., During the study they observed that tilting that table were intimidating the patients to slide off the table and suggested alternate methods like wedging as better tolerated. Finally concluded that as it was impractical to give a complete lateral tilt, it is preferred to make the patient lie supine then give a lateral tilt as varying degree of tilt didn't show much advantage in increasing cardiac output [22]. Haleem. S during the study they observed that Wedge placement caused increased incidence of hypotension and higher blockade after spinal anaesthesia as compared to left lateral table tilt position, there was no adverse effects on foetus and patients tolerated wedge better than left lateral table tilt position. Also surgery was easier to perform after wedge placement [23]. In our study we observed that placement of Crawford wedge and execution of table tilt were equally efficient in preventing supine hypotension syndrome for patient undergoing cesarean section.

Conclusion

We observed that there was incidence of hypotension in both the groups but the placement of Crawford wedge and execution of table tilt were equally efficient in preventing supine hypotension syndrome for patient undergoing cesarean section.

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