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Original Article

Anaesthesia Section

Comparative Efficacy of 20-Degree versus 30-Degree Angled Wedges on Inferior Vena Cava Diameter and Haemodynamic Stability during Spinal Anaesthesia for Caesarean Section: A Randomised Controlled Trial

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ABSTRACT

Introduction: Spinal anaesthesia is the preferred method of choice for Lower Segment Caesarean Section (LSCS) and is safe for both the mother and foetus. Spinal anaesthesia also provides adequate pain relief for parturient. The most common condition that occurs during the pregnancy is supine hypotension syndrome, which gets aggravated after spinal anaesthesia. Hypotension can be prevented by fluid preloading, vasopressors, inotropes and by placing the wedge below the right gluteal region.

Aim: To know the impact of different angled wedges on Inferior Vena Cava (IVC) diameter and its effect on intraoperative haemodynamic changes.

Materials and Methods: This study was randomised controlled single-blinded study conducted at the the Department of Anaesthesiology at Sri Ramachandra Medical College, Chennai,Tamil Nadu, India, from January 2024 to December 2024 done on pregnant patients aged from 20-40 years. In this study, in preoperative area IVC diameter was measured using ultrasound in supine position. After the measurement of IVC diameter, Group A received a standard 20-degree wedge (control) and Group B received a 30-degree angled wedge, both placed in right gluteal region and waited for 10 minutes. After 10 minutes change in IVC diameter was assessed and compared to baseline. All the study participants received same wedges intraoperatively and effect of these wedges on IVC diameter, haemodynamic parameters Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP), Heart Rate (HR) and rescue phenylephrine requirements were assessed. Data were analysed using independent t-test, Chi-square test and paired t-test, with $p \leq 0.05$ considered as statistically significant.

Results: Both groups were comparable in demographic characteristics like age and Body Mass Index (BMI). In the present study, the mean IVC diameter in Group A, assessed without wedge at zero minute was 1.25±0.29 cm and after using wedge for 10 min) was 1.40±0.31cm (p-value within the group <0.001). In Group B, the mean IVC diameter assessed without wedge (0 min) was 1.22±0.25 cm and after 10 minutes of using wedge, the mean IVC diameter was 1.48±0.25 cm (p-value within the group <0.001). Patients in Group B required less rescue phenylephrine than those in Group A ($p<0.005$). Patients in Group A had significantly lower SBP and DBP at 4 min after spinal anaesthesia.

Conclusion: The mean IVC diameter after placing the wedge was significantly increased in both groups, but the difference between both groups was not statistically significant. Patients in 30-degree wedge group required lesser amount of phenylephrine than those in the 20-degree wedge group.

Keywords: Abdominal aorta, Abdominal delivery, Hypotension, Lateral tilt, Patient positioning, Phenylephrine, Pregnancy, Supine position

INTRODUCTION

In LSCS, spinal anaesthesia is preferred as it is safe and relieves pain more effectively. A local anaesthetic is injected into the subarachnoid space, which helps to achieve surgical anaesthesia by blocking the nerve root [1]. However, the side-effects include hypotension, nausea, vomiting, shivering, urinary retention, headache, cardiovascular collapse, failed spinal blockade, total spinal and direct needle trauma, vertebral canal haematoma [2,3]. Hypotension in spinal anaesthesia is due to blockade of lumbar sympathetic outflow, which causes systemic venous, arterial and arteriolar vasodilation, leading to drop in cardiac output because of decrease in preload [4,5]. Hypotension after spinal anaesthesia is defined as a 10% drop in the SBP from the baseline value.

Hypotension due to spinal anaesthesia in LSCS can be prevented by preloading, co-loading, use of vasopressors, using wedge which prevents compression of IVC. Other methods like compression stockings, inflatable splints/boots and Trendelenburg tilt. The effect of posture on IVC compression has been studied and various methods have been established, like placing a wedge, left lateral tilt and left uterine displacement [6-8]. Zhou ZQ et al., showed in their study that the lumbar wedge was more helpful in reducing hypotension than the pelvic wedge [6]. Kundra P et al., reported that manual displacement of the uterus significantly decreases the incidence of hypotension and the need for ephedrine compared to a 15-degree left lateral table tilt in parturients following Caesarean delivery [7]. Furuya T et al., observed that left lateral tilt and left uterine displacement might be similarly efficient in widening the constricted IVC diameter compared to the supine position [8].

The change in haemodynamics, like BP, HR and MAP, are deemed to be less specific and sensitive [5]. Hence, the need for dynamic parameter like the diameter of IVC and its collapsibility index is used which can be measured by ultrasonography. The variability in the diameter of IVC during respiration is considered as a valuable predictor of volume responsiveness. In spinal anaesthesia, hypotension is due to an increased sensitivity to the nerve fibres towards local anaesthetic drug and aortocaval compression [9,10]. Despite various methods established to prevent aortocaval compression, there is gap in evidence comparing the efficacy of different wedge angles in optimising IVC diameter and subsequent haemodynamic stability.

Hence, the authors designed the present study to compare the conventional 20-degree wedge with 30-degree angled wedge on IVC diameter and changes in perioperative haemodynamics and vasopressor consumption. Sympathetic blockade with arteriolar vasodilation, causes reduced SVR and venous pooling due to decreased vasomotor tone, which are the common causes for hypotension after spinal anaesthesia. Decrease in the SVR is the main predictor for hypotension; thus, patients are preloaded with fluid prior to spinal anaesthesia [11]. Due to decreased level of sympathetic activity causing peripheral vasodilation, which decreases preload and venous return, resulting in bradycardia, hypotension, nausea and vomiting [12,13]. Acute hypotension reduces the cerebral perfusion, resulting in cerebral hypoxia, thereby causes decreased maternal cerebral blood volume cerebral oxygenation, activates vomiting centres and causes nausea and vomiting [14,15].

After second trimester the pregnant women are prone for supine hypotension syndrome, there is a drop in SBP by 15-30 mmHg due to aortocaval compression, which can lead to nausea, vomiting, tachycardia, giddiness and loss of consciousness [16]. Maternal hypotension plays a significant role; when there is hypotension for more than two minutes, it causes an increase in the levels of oxypurines and lipid peroxides in the umbilical vein [17]. If it prolongs for more than four minutes, it causes neonatal neurobehavioural changes within the first four to seven days [17,18]. The aim of this study was to assess the impact of 20-degree and 30-degree angled wedges on IVC diameter and their effect on intraoperative haemodynamic changes and vasopressor consumption.

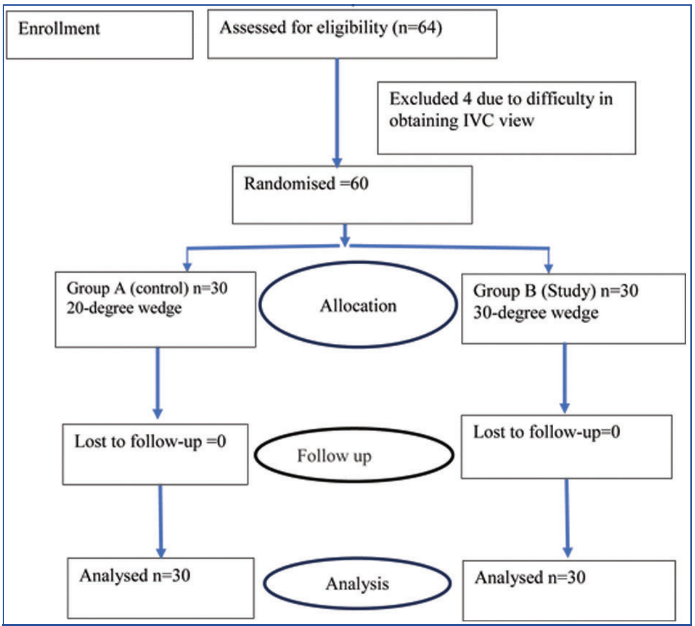
MATERIALS AND METHODS

This study was randomised controlled single-blinded study done in the Department of Anaesthesiology at Sri Ramachandra Medical College, Chennai, Tamil Nadu, India, from January 2024 to December 2024. The present study was approved by the Institutional Ethics Committee (CSP-MED/23/APR/86/84) and registered in the Clinical Trials Registry of India (CTRI/2024/01/061070).

Sample size calculation: The sample size calculation was based on the study by Furuya T et al., study on ultrasound assessment of IVC diameter in supine position, left lateral tilt position and with left uterine displacement manoeuvres in full-term pregnant patients [8]. With a mean difference of three and standard deviation in Group 1 of 3 and in Group 2 is 2.8, a power of 95%, an alpha error of 0.05 and an effect size of 1.03 were used to determine the total sample size, which was calculated to be 52 (26 in each group) [16]. Assuming 15% dropout in study eight patients were added. The final sample size came as 60 (30 in each group).

Inclusion criteria: After obtaining written informed consent, patients classified as American Society of Anaesthesiologists (ASA) II patients, aged between 20 to 40 years, with gestational age of 37 weeks and above, primigravida individuals and patients with history of previous LSCS, who were posted for elective Caesarean section under spinal anaesthesia, were included in the present study.

Exclusion criteria: Patients who refused to participation in the study, Body Mass Index (BMI) >35 kg/m², patients with history of allergy to local anaesthetics, hypertension, multiple gestation, hepatic or renal disease and patients with abnormal placentation, preeclampsia, or cardiac disease were excluded from the study. A total of 64 patients were screened and four patients were excluded due to difficulty in obtaining IVC views and refusal to consent [Table/Fig-1].



[Table/Fig-1]: Flowchart of study participants as per Consolidated Standards of Reporting Trails (CONSORT).

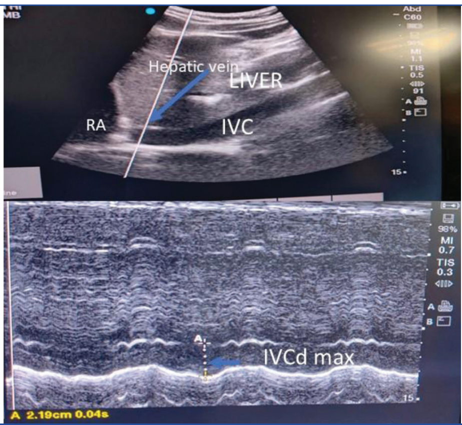
Study Procedure

Preoperatively, vitals like SBP, DBP, MAP and HR were noted. General examination, airway examination and systemic examination were done. After preoperative assessment, patients were kept nil per oral as per institutional protocol. On the day of surgery, patients were received from the ward and transferred to preoperative holding area. In the holding area, patients were made to lie in supine position for 10 minutes then during deep inspiration, using M-mode imaging the curvilinear probe in subxiphoid region IVC diameter was measured. Vitals like SBP, DBP, MAP, heart rate and foetal monitoring, were done during this procedure.

Using computer-generated block randomisation, patients were divided into two groups: Group A and Group B [Table/Fig-1]. Block randomisation with a fixed block size of four was performed using a computer-generated random number sequence created by an independent statistician. The block randomisation technique ensured equal distribution of participants between groups throughout the recruitment period. The randomisation codes were kept in sequentially numbered, opaque, sealed envelopes that were opened only after patient enrolment to determine group allocation.

All study participants were blinded to type of wedge placed below the right hip region. The wedges were covered with identical sterile drapes to conceal their angle. The data collector recording haemodynamic parameters was different from the anaesthesiologist performing the ultrasound for measuring IVC diameter. Additionally, the statistician analysing the data was blinded to group (20/30 degree) allocation. All these measures reduced performance and detection bias.

In Group A 20-degree wedge was kept behind the right hip region and waited for 10 minutes. After 10 minutes was allowed. After this period, the IVC diameter was measured by placing the curvilinear probe in the subxiphoid region and baseline vitals like heart rate, SBP, DBP, MAP and fetal monitoring were done during the procedure. In Group B, a 30-degree wedge was placed behind the right hip region for left uterine tilt and waited for 10 minutes was observed. Then, the IVC diameter was measured by placing the curvilinear probe in the subxiphoid region and baseline vitals were measured [Table/Fig-2]. In both the groups, the IVC diameter was measured through subcostal window in long axis. Simultaneously, M-mode was kept perpendicular to long axis at 2-3 cm distance IVC and right atrium junction and IVC diameter was measured [19].



[Table/Fig-2]: IVC diameter measurement RA is right atrium, Inferior Vena Cava (IVC) arrow indicates M-mode cursor.

After measuring the IVC diameter, patients were shifted to the operating room and spinal anaesthesia was given with 2 mL of 0.5% heavy bupivacaine using 27 G Pencan needle. The same wedges used preoperatively were taken to the operating room and used intraoperatively. SBP, DBP, MAP, HR were measured every two minutes until the baby was delivered and the incidence of hypotension was noted.

The primary outcome measured was the change in IVC diameter 10 minutes after placing the 20-degree and 30-degree wedges for term patients from 36 weeks of gestation to 40 weeks + 5 days, who were posted for elective caesarean section. Other outcomes like the amount of phenylephrine rescue dose, SBP, DBP, MAP and heart rate were also recorded between both groups every two minutes up to 18 minutes. Hypotension was defined as a decrease in SBP of ≥10% from baseline. For hypotension, phenylephrine was administered as an intravenous bolus of 20 µg, with repeat doses given as needed to maintain SBP within 10% of baseline value. The maximum dose of phenylephrine was limited to 100 µg per episode of hypotension, with 6 mg of ephedrine considered as rescue medication if hypotension persisted despite maximal phenylephrine dosing.

STATISTICAL ANALYSIS

Normality distribution was assessed using two tests: the Kolmogorov-Smirnov test and the Shapiro-Wilk test. By employing the Student's independent t-test, normally distributed continuous variables were compared between the groups, while categorical variables were compared using the non parametric Chi-square (χ^2) test. We also used a paired t-test to compare the change in IVC diameter before and after placing the wedge within the same group. The statistical procedures were undertaken with the assistance of the statistical package IBM Statistical Package for the Social Sciences (SPSS) Statistics 23.0. The p-values less than or equal to 0.05 ($p \le 0.05$) were considered statistically significant.

RESULTS

The demographic data did not show any statistical differences between two groups [Table/Fig-3]. Comparison of the IVC diameter between two groups revealed that in Group A, the mean IVC diameter without wedge (0 minutes) was 1.25±0.29, while the mean IVC diameter after using wedge (10 min) was 1.40±0.31. The mean difference within Group A was statistically significant (p<0.001) [Table/Fig-4]. In Group B, the mean IVC diameter without wedge (0 min) was 1.22±0.25 and the mean IVC diameter after using wedge (10 min) was 1.48±0.25. The mean difference within Group B was statistically significant (p<0.001) [Table/Fig-4]. However, the mean IVC diameter after using wedge (10 min) between the Groups A and B was not statistically significant.

In Group A, 22 out of 30 patients (73.3%) required phenylephrine as a rescue vasopressor, compared to 12 out of 30 patients (40%) in Group B [Table/Fig-5]. The total percentage of the patients required rescue phenylephrine was higher in Group A. In Group A, 22 (73.3%) patients required phenylephrine compared to 12 (40%) in Group B (p=0.005). Specifically, 5 (16.7%) patients in Group A versus 9 (30%) in Group B required 20 mcg phenylephrine; 8 (26.7%) versus 2 (6.7%) required 40 mcg; 7 (23.3%) versus 1 (3.3%) required 60 mcg; and 2 (6.7%) versus 0 required 80 mcg, respectively [Table/Fig-5].

Parameters	Group A	Group B	p-value
Age (y)	30.53±4.81	30.03±3.70	0.65
BMI (kg/m^2)	29.56±3.18	29.13±3.42	0.61

[Table/Fig-3]: Comparison of demographic data between Group A and Group B.
*Unpaired t-test was used to compare the difference between both groups; Values presented in mean±SD

IVC diameter	Group A (n=30)	Group B (n=30)	p-value
IVC AT 0 min (cm)	1.25±0.29	1.22±0.25	0.70
IVC AT 10 min (cm)	1.40±0.31	1.48±0.25	0.30
p-value within the group	0.001*	0.001*	

[Table/Fig-4]: Comparison of Inferior Vena Cava (IVC) diameter between Group A and Group B.
Values presented in mean±SD; *Indicates difference within the group was statistically significant. Unpaired test was used to compare the difference between groups. Paired t-test was used to compare the difference within the group

Phenylephrine	Group A (n=30) n (%)	Group B (n=30) n (%)	p-value
Number of patients required phenylephrine secondary to hypotension	22 (73.3)	12 (40)	0.0001*
20 mcg phenylephrine-1 dose	5 (16.7)	9 (30)	0.03*
40 mcg phenylephrine 2 doses	8 (26.7)	2 (6.7)	0.002*
60 mcg phenylephrine 3 doses	7 (23.3)	1 (3.3)	0.001*
80 mcg phenylephrine 4 doses	2 (6.7)	0	0.007*
No need of phenylephrine	8 (26.7)	18 (60)	0.0001*

[Table/Fig-5]: Comparison of phenylephrine (mcg) consumption between Group A and Group B
The Chi-square test was used to compare the difference in percentage between both groups
Indicates difference between the groups was significant and p<0.05

The mean SBP of both the groups were compared. No significant difference was noted between the two groups from preoperative to two minutes after using wedges. At 4 and 8 minutes after using wedge, mean SBP variation was statistically significant (p<0.05**) between two groups [Table/Fig-6].

SBP (mmHg)	Group A	Group B	p-value
Preoperative at 0 min	117.83±20.20	117.93±13.35	0.98
Preoperative at 10 min	117.40±12.75	118.33±12.12	0.77
Intraoperative - 0 min	115.20±11.86	116.57±12.07	0.66
2 min	107.80±13.26	112.53±13.42	0.17
4 min	101.70±10.67	108.03±13.16	0.04*
6 min	104.27±11.29	108.63±13.37	0.11
8 min	102.73±20.72	111.53±10.87	0.04*
10 min	107.80±1.67	112.53±4.73	0.10
12 min	108.76±10.96	112.44±11.09	0.21
14 min	109.30±10.65	113.17±10.84	0.20
16 min	112.14±12.57	114.41±12.43	0.57
18 min	113.39±11.28	114.45±11.36	0.80

[Table/Fig-6]: Comparison of Systolic Blood Pressure (SBP) (mmHg) between both groups
Unpaired t-test was used to compare the difference between both groups; *Indicates significant difference between both groups

The mean DBP of both the groups was also compared, showing no significant difference between two groups from preoperative to 18 minutes after using wedge. At 4 min after using wedges there was a statistically significant difference in the DBP (p<0.05*) between the two groups [Table/Fig-7].

DBP (mmHg)	Group A	Group B	p-value
Preoperative at 0 min	68.73±9.21	71.27±8.52	0.27
Preoperative at (10 min)	69.80±8.09	71.30±6.4	0.43
Intraoperative at 0 min	69.20±9.37	71.07±9.2	0.44
2 min	63.40±9.99	64.23±7.9	0.72
4 min	58.43±8.69	63.33±8.7	0.03**
6 min	61.01±8.68	62.47±8.0	0.50
8 min	62.13±9.76	64.90±7.4	0.22
10 min	61.23±7.37	63.43±7.1	0.24
12 min	62.38±10.04	65.11±6.8	0.24
14 min	62.04±7.97	65.54±6.8	0.09
16 min	63.68±10.26	67.12±7.6	0.25
18 min	63.72±7.91	65.91±7.2	0.46

[Table/Fig-7]: Comparison of Diastolic Blood Pressure (DBP) between Group A and Group B.
Unpaired t-test was used to compare the difference between both groups
*Indicates significant difference between both groups

The mean arterial pressures of both groups were compared and there were no significant variations noted between the groups with respect to mean arterial pressure from preoperative to 18 minutes after using wedge between two groups [Table/Fig-8]. The mean heart rate of both the groups was compared, with no significant variations noted between the groups from preoperative to 16 minutes after using wedges. At 18 minutes after using wedge the heart rate difference between the groups A and B was statistically significant (p=0.05) [Table/Fig-9].

MAP (mmHg)	Group A	Group B	p-value
Preoperative at 0 min	85.40±9.89	86.13±9.11	0.76
Preoperative at 10 min	85.47±8.61	86.70±7.64	0.56
Intraoperative at 0 min	84.37±9.09	84.73±9.24	0.87
2 min	77.87±10.5	78.37±9.26	0.84
4 min	72.80±8.54	76.33±10.25	0.15
6 min	75.07±8.44	75.93±9.75	0.71
8 min	76.01±9.28	79.43±7.69	0.12
10 min	76.30±7.56	78.30±8.23	0.33
12 min	77.41±9.08	79.59±7.47	0.33
14 min	77.93±8.11	78.63±7.91	0.75
16 min	79.23±710.01	80.71±7.81	0.61
18 min	79.94±7.66	79.91±8.44	0.99

[Table/Fig-8]: Comparison of Mean Arterial Pressure (MAP) between both groups.
*Unpaired t-test was used to compare the difference between both groups

Heart rate (in beats per min)	Group A	Group B	p-value
Preoperative at 0 min	85.67±10.47	86.03±11.27	0.89
Preoperative 10 minutes after using wedge	85.67±11.02	85.00±11.22	0.81
Intraoperative 0 min	85.40±12.16	88.37±11.16	0.32
2 min	89.83±16.43	88.90±9.61	0.98
4 min	90.73±15.63	88.23±11.90	0.48
6 min	87.63±12.43	86.70±13.53	0.78
8 min	86.50±11.94	85.93±12.63	0.85
10 min	86.33±11.95	85.20±10.12	0.69
12 min	86.97±11.69	84.56±9.56	0.41
14 min	86.67±9.85	82.04±12.01	0.13
16 min	87.45±11.35	85.18±12.75	0.55
18 min	86.89±8.93	79.91±8.98	0.05

[Table/Fig-9]: Comparison of heart rate between both groups.
*Unpaired t-test was used to compare the difference between both groups

DISCUSSION

In the present study, 20-degree and 30-degree angled wedges were used to assess the IVC diameter preoperatively in patients posted for elective caesarean section under spinal anaesthesia. Intraoperatively, the same wedges were used and haemodynamics (heart rate, SBP, DBP and MAP) were monitored every two minutes until the baby was delivered. The present study also compared the use of phenylephrine as a rescue vasopressor between two groups. Phenylephrine is preferred because the ephedrine crosses the placenta to a greater extent, which increases the incidence of fetal acidosis [20].

The demographic data of the present study population shows no significant difference between two groups in terms of age and BMI (p>0.05). In the present study, there was an increase in IVC diameter after using angled wedges compared to supine position in both groups (Group A, p<0.001; Group B, p<0.001). Zhou ZQ et al., found that the lumbar wedge group was significant in preventing hypotension when compared to the pelvic wedge group [6]. Kundra P et al., observed that leftward manual uterine displacement reduced the incidence of hypotension and the use of ephedrine requirement when compared to 15-degree lateral tilt of the table [7]. You J et al.,'s study observed the effect of supine position and 15-degree left tilt of operating table on the IVC dimensions and their influence on the haemodynamics during caesarean section under combined spinal-epidural anaesthesia. They found that on 15-degree left tilt of the operating table relieved IVC compression and reduced the incidence of hypotension [21]. Singh Y et al., found that IVC diameter on using wedge in elective caesarean patients was higher than when compared to supine position; however, the study showed that IVC diameter is not a predictor for post-spinal hypotension [22]. Furuya T et al., found a significant difference in IVC diameter in both left lateral tilt and left uterine displacement when compared to supine position; however, there was no significant difference between left lateral tilt and left uterine displacement [8].

Spinal hypotension during caesarean section can be minimised by preloading with intravenous fluids, by preventing aortocaval compression by left uterine tilt or the use of wedges and by judicious use of vasopressor agent. It has been shown that decrease in maternal arterial pressure leads to decreased placental perfusion. In the present study, hypotension is defined as ≥10% reduction from baseline SBP. In the present study there was a significant difference in the SBP after using the wedge between Groups A and B at four and eight minutes. The incidence of hypotension was reduced in Group B (40%) than in Group A (77.3%). The number of rescue phenylephrine dose was also lower in Group B when compared to Group A. In the present study, phenylephrine was used as the primary vasopressor due to its favourable maternal and fetal profile. However, in some clinical scenarios where maternal bradycardia is a concern, alternative vasopressors such as mephentermine or ephedrine may be preferred. Mephentermine, with its mixed α and β effects, may be particularly advantageous in patients with baseline bradycardia or when phenylephrine-induced reflex bradycardia occurs. A study by Mohta M et al., demonstrated comparable efficacy between phenylephrine and mephentermine for preventing spinal hypotension during caesarean delivery, with mephentermine showing a more favourable heart rate profile [23].

The present study correlates with the findings of Calvache JA et al., which indicated a reduction in hypotension in the wedge group compared to the supine group [24]. The effect of leg elevation had been shown to reduce the incidence of hypotension by 34.7% in pregnant patients after spinal anaesthesia and reduced the requirement of vasopressors. While Desta AB et al., reported benefits of leg elevation, it is important to note that this technique was implemented immediately after spinal anaesthesia and maintained for 10 minutes [25]. This approach differs from the present wedge technique, which can be maintained throughout the procedure without requiring active patient participation. The feasibility of leg elevation after spinal anaesthesia may be limited by motor blockade and procedural considerations. Bangera A et al., reported that Oxford position was found to maintain haemodynamic stability by preventing the ascend for spinal blockade when compared to native position [26].

In the present study, use of 30-degree wedge reduced the incidence of hypotension and also reduced the requirement of rescue phenylephrine in Group B. Ceruti S et al., observed that incidence of hypotension was lower in the Inferior Vena Cava Collapsibility Index (IVCCI)-guided fluid administration group and there is a decrease in need for vasoactive drugs in the IVC Ultrasound (US) group [27]. Brooker RF et al., compared the effect of phenylephrine and ephedrine in maintaining the blood pressure in LSCS after spinal anaesthesia. The result showed that SBP and DBP were maintained well in both groups, but the DBP was maintained better with phenylephrine group [28]. The effectiveness of both phenylephrine and ephedrine in maintaining SBP and DBP was same. No significant difference were observed between the groups, except that the need for additional vasopressor support was higher in ephedrine group than in the phenylephrine group [28].

Bhardwaj N et al., compared phenylephrine, ephedrine and mephentermine, reported that while all effectively prevented hypotension, mephentermine provided better heart rate stability and maternal comfort [29]. Future studies directly comparing the efficacy of phenylephrine versus mephentermine with different wedge angles would be valuable to optimise haemodynamic management during caesarean delivery. Other methods like prophylactic norepinephrine and phenylephrine infusions could be considered to prevent spinal hypotension [30].

The strengths of the present study include its prospective randomised design, blinding of participants and outcome assessors, standardised measurement techniques using ultrasound for objective assessment of IVC diameter, comprehensive haemodynamic monitoring and analysis of clinically relevant outcomes such as vasopressor requirements. Furthermore, the present study is one of the few to directly compare specific wedge angles rather than simply comparing lateral versus supine positioning or left uterine displacement.

Limitation(s)

In the present study, IVC collapsibility index was not used for preloading the patient. All patients' haemodynamics were monitored for up to 18 min after spinal anaesthesia. Although hypotension may manifest at any point during the procedure, our primary objective is to investigate the effects of aortocaval compression with various wedges on the diameter of the IVC and the resulting haemodynamic alterations. Foetal blood gas analysis was not conducted. Future research may prove beneficial with various angled wedges, hypotension and foetal acidosis.

CONCLUSION(S)

The present study demonstrates that both 20° and 30° wedges effectively increase IVC diameter compared to the supine position in term parturients undergoing caesarean section. The 30° wedge was associated with significantly lower phenylephrine requirements, suggesting improved haemodynamic stability despite similar IVC diameter increases. These findings have important clinical implications for the prevention of spinal hypotension during caesarean delivery. The use of a 30° wedge may be preferable as a simple, non pharmacological strategy to reduce vasopressor requirements. Future studies should explore whether combining optimal wedge angle with other preventive strategies could further improve maternal haemodynamic stability and neonatal outcomes.

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