



A COMPARISON OF LEFT UTERINE DISPLACEMENT USING CLINOMETER GUIDED TABLE TILT VS CONVENTIONAL CRAWFORD WEDGE DURING SPINAL ANAESTHESIA IN CESAREAN SECTION- A PROSPECTIVE RANDOMIZED STUDY

Dr. Jeya Pratheef Muthiah

Assistant Professor, Department Of Anaesthesiology Tirunelveli Medical College Hospital.

Dr. Senthil Kumar. N*

Assistant Professor, Department Of Anaesthesiology Govt Sivagangai Medical College Hospital. *Corresponding Author

ABSTRACT

INTRODUCTION: Enlarged gravid uterus causing aortocaval compression may decrease the venous return and cause maternal hypotension. Maternal position after neuraxial blockade may exacerbate the impact of aortocaval compression and consequences on cardiovascular instability. Left uterine displacement (LUD) after spinal anaesthesia in lower segment cesarean section is essential in preventing supine hypotension syndrome. Decreased cardiac output secondary to vena cava obstruction by the gravid uterus can be prevented by lateral tilt position.

AIM OF THE STUDY: This study is therefore designed to evaluate the role of leftward uterine displacement by table tilt using clinometer software or by using Crawford wedge tilt and compare the effects on hemodynamics in parturient undergoing lower segment cesarean section (LSCS) under subarachnoid block

MATERIALS AND METHODS: The study was carried out in the Department of Anaesthesiology involving Department of Obstetrics and gynecology in Kanyakumari Government Medical College from January 2018 to June 2019. Patients were allocated into two groups by randomization. After spinal anaesthesia parturient in **Group T:** Lateral Table Tilt by using clinometer -15 degree- (40 parturient). Parturient in **Group W:** Crawford wedge Tilt- (40 parturient). Patients, age, body weight, BMI and baseline vital parameters were recorded. Incidence of hypotension after spinal anaesthesia in a cesarean section, Total dose Vasopressor required, Level of blockade, APGAR Score, Surgeon satisfaction grading.

RESULTS: The demographic parameters like age, height, weight, BMI and the indication for surgery were similar in both groups. There were no difference in mean height level of block between both groups. In comparison of hypotensive incidence in both groups, the high incidence noted in the GROUP W (wedge group) (35%) is higher than the incidence in GROUP T (table tilt) (7.5%). The incidence of hypotension is significantly noted at 2nd, 4th, 5th minute after the subarachnoid block in wedge group compared to the table tilt group. The dose of vasopressor requirements and average ephedrine dose used is less in GROUP T (table tilt) (0.6±2.3mg) compared to GROUP W (wedge) (3.9±5.7 mg). In comparison of surgeon satisfaction between both groups, surgeons are much satisfied with the wedge group patient and found difficult, disturbing and sometimes unbearable while perform the surgery for the patient in table tilt. The APGAR Scores in GROUP W at 1st minute and 5th minute is (7.3±0.5 and 8.7±0.5) respectively which are relatively satisfactory compared to the GROUP T (6.8±0.6 and 8.3±0.6) at 1st and 5th minute.

CONCLUSION: Table tilt provide a good relief from inferior vena cava and aortocaval compression when compared to the wedge placed under the right hip during cesarean section done under subarachnoid block. Using the wedge is easier and surgeons at our institute found it more comfortable than the table tilt to 15° but anesthetists feel better with table tilt because there is little incidence of hemodynamic variation. We conclude that all the parturient posted for caesarean section should be given a table tilt of 15° placed with angle measured exactly by clinometer to decrease incidence of hypotension occurring due to aortocaval compression

KEYWORDS : Table tilt, wedge, hypotension, spinal anaesthesia

INTRODUCTION

Hypotension occurs commonly in parturients during spinal anaesthesia. Enlarged gravid uterus causing aortocaval compression may decrease the venous return and cause maternal hypotension. Maternal position after neuraxial blockade may exacerbate the impact of aortocaval compression and consequences on cardiovascular instability. Only about 8% pregnant women in the 2nd and 3rd trimesters develops hypotension in supine position when aortocaval compression is severe. The presence of sympathetic blockade reduces or eliminates vasoconstriction in response to decreased venous return thus prevention of aortocaval compression is imperative. Left uterine displacement (LUD) after spinal anaesthesia in Lower segment cesarean section is essential in preventing supine hypotension syndrome. Decreased cardiac output secondary to vena cava obstruction by the gravid uterus can be prevented by lateral tilt position. Many methods have been evaluated to decrease degree of aortocaval compression during LSCS like left lateral tilt with wedge, tilting of operating table, mechanical or manual displacement of uterus. The fundamental principle in the management of pregnant women, particularly during labour or at cesarean delivery is by avoiding supine position to prevent aortocaval compression.

AIM OF THE STUDY

This study is therefore designed to evaluate the role of leftward uterine displacement by table tilt using clinometer software or by using Crawford wedge tilt and compare the effects on hemodynamics in parturient undergoing lower segment cesarean section (LSCS) under subarachnoid block.

MATERIALS AND METHODS

The study was carried out in the Department of Anaesthesiology involving Department of Obstetrics and gynecology in Kanyakumari Government Medical College from January 2018 to June 2019. It is a Prospective, randomized, observational study

Randomization: Sample were randomized by closed envelope method. 80 plain covers each with a single sheet written T for 15 degree table tilt in 40 sheets, written W for Wedge tilt in 40 sheets were prepared and kept in the operation theatre. The covers were mixed thoroughly. Before start of the surgery the patient pick up a cover of her choice and the patient was given lateral tilt accordingly.

Sample size:

- Sample size is calculated using formula

$$n = \frac{2\{Z_{\alpha} + Z(1-\beta)\}^2 \sigma^2}{\Delta^2}$$

Where Z_{α} - α error = 1.96 (for two tailed study) for confidence

level of 99.9% and $Z(1-\beta) - \beta$ error = 0.84 (for 80% power)
 σ - standard deviation = 0.49, Δ - expected improvement = 0.36

Based on the previous studies Shahla Haleem et al 2011 Lateral tilt in cesarean section parturient the sample size was found to be thirty eight in each group. For convenience of study 40 patients are selected in each group.

Group allocation: Patients were allocated into two groups by randomization. **Group T:** Lateral Table Tilt by using clinometer -15 degree- 40 parturient. **Group W:** Crawford wedge Tilt- 40 parturient

INCLUSION CRITERIA: Age 20-35 yrs, ASA II, Height 145-165 cm, Singleton pregnancy; BMI < 35, Written informed consent

EXCLUSION CRITERIA : Patient's refusal , ASA 3 & 4, BMI > 35, Multiple Gestation, Hypertension, Preeclampsia, Intrauterine growth retardation (IUGR) , Coagulation abnormalities/thrombocytopenia, Failed Spinal

Pre-operative preparation: Patients, age, body weight, BMI and baseline vital parameters were recorded.

Intervention: All the patients were kept nil orally for 8 h before surgery and premedication IV Metoclopramide 10mg and IV Ranitidine 50mg were given in the morning 30 minutes before surgery. In the operation theatre, after securing 18-gauge cannula, each parturient will be pre hydrated with 500 ml of Ringer lactate. On positioning the patient Table tilt is measured with clinometer-android software and adjusted to zero degree. Baseline cardiopulmonary parameters (non-invasive blood pressure, Pulse rate, SpO₂ and electrocardiogram) were recorded using Multi parameter. Blood pressure is measured in the right upper arm. Subarachnoid block is performed in the right lateral position under aseptic precautions. A 25 gauge spinal needle (Quincke's) was inserted in the L3-L4 interspace and 2 ml (10mg) of hyperbaric (0.5%) Bupivacaine was injected after confirming free flow of CSF. In patients belonging to Group W following spinal anaesthesia patient made to lie in supine and Crawford wedge is placed under Right hip. In patients belonging to Group T after spinal anaesthesia patients made to lie in supine position. Table was tilted to left side by 15 degrees. Table tilt is measured using clinometer - android application software;

Parameters monitored: Sensory block were assessed by perceiving cold sensation when using spirit cotton at 1 min after spinal anaesthesia. Level of block were assessed. Recordings of blood pressure were done by an oscillometric sphygmomanometer using Philips suresign VM8 multipara monitor at baseline, every one minute till delivery of baby and every 5 minutes till the end of surgery. At the similar time interval, pulse rate were also noted. Total dose of vasopressor required during the surgical procedure were noted. Incidence of hypotension after spinal anaesthesia till the end of surgery were registered. Apgar score after delivery of baby also noted. Surgeon satisfaction after positioning of the patient during surgery were graded according to the difficulty were noted.

Outcome : Incidence of hypotension after spinal anaesthesia in a cesarean section, Total dose Vasopressor required, Level of blockade, APGAR Score, Surgeon satisfaction grading.

SURGEON SATISFICATION GRADING:

- Grade 1 (very much satisfactory) - No difficulty
- Grade 2 (satisfactory) - Difficult abdominal access on the other side.
- Grade 3 (Just acceptable)- Extension of angle of incision, difficulty in securing Bleeders & difficulty in suturing
- Grade 4 (unsatisfactory)- Difficulty in removal of placenta
- Grade 5 (disturbing)- Difficulty in delivering baby

- Grade 6 (unbearable)- Difficulty in all steps of surgery

Clinometer:

The clinometer application is an easy tool used to measure angle of slope, elevation or depression of an mobile device with respect to gravity. It can be used for measurement of table tilt angle or inclination from a neutral position on a plane surface when used perpendicular to the surface and when kept in horizontal direction. Android operating system are the software platform for various application. Clinometer application can be downloaded free from the play store for android gadgets. It utilizes the gyroscope sensor and determines the plane of gadget in horizontal and vertical direction. The exact degree of tilt is objective and quantitatively documented after subarachnoid block by using clinometer application.



Clinometer device in upright position (perpendicular)

Crawford wedge: Crawford (1972), advocated the use of a wedge shaped cushion (10 cms of height), arbitrarily angled at 15 degree . Wedge is prepared with firm rubber foam material. Dimension is 11 *7 *3 inches -15 degree.

Statistical analysis and interpretations:

The continuous variables of the study subjects were described in terms of mean and interpreted by student independent "t" test between the wedge and table tilt groups. In respect of categorical variables were described in terms of percentages and interpreted by χ^2 (Chi-square) test. The above statistical procedures were performed with the help of the statistical package namely IBM SPSS statistics-20. The P-values less than or equal to 0.05 ($P \leq 0.05$) were considered as statistically significant.

RESULTS:

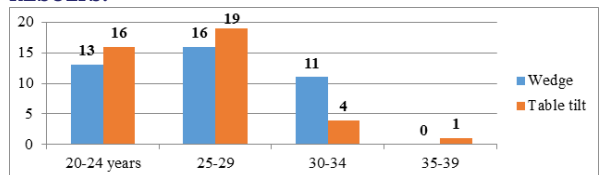


Fig 2: Age group wise comparison of Wedge and table tilt subjects:

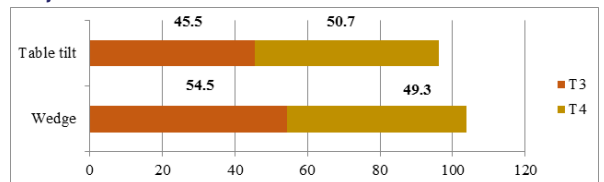


Fig-3: Comparison of Level of block between the two groups:

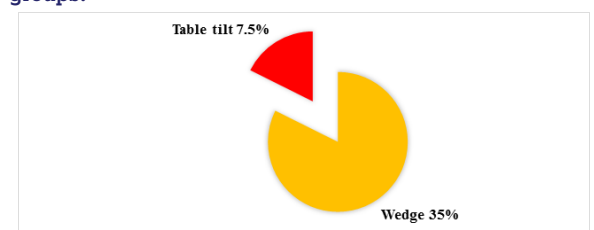


Fig-3: Comparison of hypotension between the two groups:

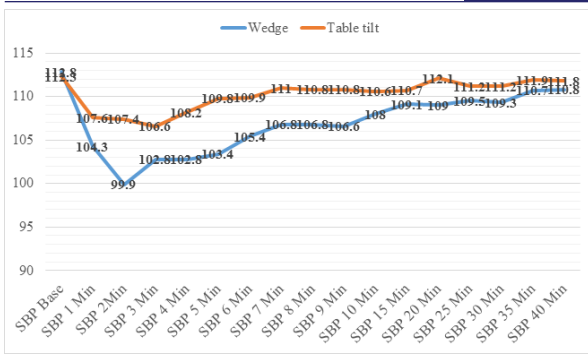


Fig 4: Mean SBP of Wedge and table tilt group at Base through at 40 minutes

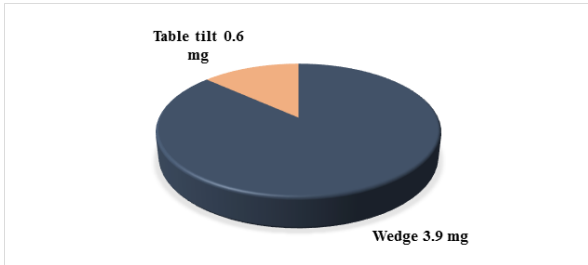


Fig 5: Mean dose of ephedrine used

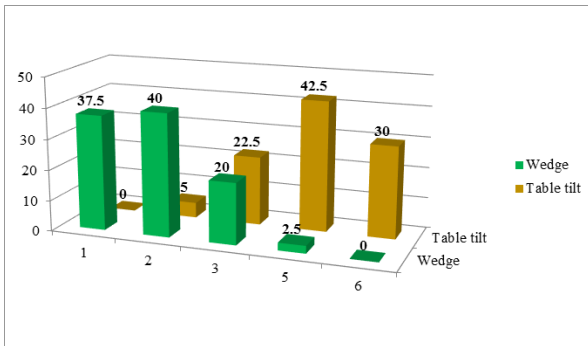


Fig-6: Comparison of surgeon's satisfaction:

DISCUSSION

Pregnant women in supine position shows partial obstruction of the aorta and complete obstruction of inferior vena cava at the level of the lumbar lordosis and enhanced compression during periods of maternal hypotension after spinal anaesthesia. Anaesthetic drugs or techniques that cause venodilation further reduce venous return with caval obstruction.

In our study, we have compared left uterine displacement using clinometer guided table tilt vs conventional Crawford wedge in 80 parturient undergoing caesarean section under sub arachnoid block. They were randomized and divided into two groups. The changes in hemodynamic parameters at varying time interval, block characteristics, APGAR score and difficulty faced by surgeon while performing the surgery in two different positions were assessed and compared. The demographic parameters like age, height, weight, BMI and the indication for surgery were similar in both groups. There were no difference in mean height level of block between both groups. In hemodynamic parameters there were no difference in heart rate at different time points in both groups and in comparison of hypotensive incidence in both groups, the high incidence noted in the GROUP W (wedge group) (35%) is higher than the incidence in GROUP T (table tilt) (7.5%). The dose of ephedrine drugs administered in wedge group was (3.9± 5.7 mg) compared to the table tilt group (0.6±2.3 mg). The surgeon satisfaction was associated with Grade 1, 2 and 3

(i.e. very much satisfactory, satisfactory and just acceptable) in respect of wedge group and the Grade 5 and 6 (i.e. disturbing and unbearable) in respect of table tilt group. The mean height of block achieved in wedge group at T4 level is (49.3%) and table tilt group at T4 level is (50.7%) and T3 level in wedge and table tilt is (51.5% & 49.5%) respectively. The observed difference between the two groups was not statistically significant (P>0.05). The mean APGAR score of wedge group at 1st minute was (7.3±0.5) and the table tilt group was (6.8±0.6). The mean APGAR score of wedge group at 5th minute was (8.7±0.5) and the table tilt group was (8.3±0.6).

CONCLUSION:

Table tilt provide a good relief from inferior vena cava and aortocaval compression when compared to the wedge placed under the right hip during caesarean section done under subarachnoid block. Though both produce left uterine displacement and decrease the incidence of hypotension and subsequently the need for vasopressors, but table tilt is superior in reducing the incidence of hypotension compared to the wedge group. Using the wedge is easier and surgeons at our institute found it more comfortable than the table tilt to 15° but anesthetists feel better with table tilt because there is little incidence of hemodynamic variation. Clinometer is better and easier tool to measure the angle of tilt exactly. Still further studies in multiple centers involving large samples are needed to come to conclusion regarding the best method for left uterine displacement. We conclude that all the parturient posted for caesarean section should be given a table tilt of 15° placed with angle measured exactly by clinometer to decrease incidence of hypotension occurring due to aortocaval compression

REFERENCES

- Haleem S, Singh NK, Bhandari S, Sharma D, Amir SH. Table tilt versus pelvic tilt position for intrauterine resuscitation during spinal anaesthesia for caesarian section. *J Anesthesiol Clin Pharmacol.* 2011;27:31-4.
- Ramamoorthy KG, Bailey K. Letterkenny; Correspondence. *Anesthesia.* 2012;67:552-3.
- Zarzur E: Anatomic studies of the human ligamentum flavum. *Anesthesia & Analgesia* 63(5):499-502, 1984.
- Ahmed Hasanin, Remoon Soryal, Tarek Kaddah, Sabah Abdel Raouf, Hemodynamic effects of lateral tilt before and after spinal anaesthesia during caesarean delivery *BMC Anesthesiology* volume 18, Article number: 8 (2018) DOI - 10.1186/s12871-018-0473-0
- Kundra P, Khanna S, Habeebullah S, Ravishankar M. Manual displacement of the uterus during caesarean section. *Anaesthesia.* 2007;62(5): 460-5. DOI:10.1111/j.1365-2044.2007.05025.x.
- Jones SJ, Kinsella SM, Donald FA. Comparison of measured and estimated angles of table tilt at Caesarean section. *British Journal of Anaesthesia* 2003
- Higuchi H, Takagi S, Zhang K, Furai I, Ozaki M. Effect of lateral tilt angle on the volume of the abdominal aorta and inferior vena cava in pregnant and nonpregnant women determined by magnetic resonance imaging. *Anesthesiology.* 2015;122:286-93.
- Cluver C, Novikova N, Hofmeyr GJ, Hall DR. Maternal position during caesarean section for preventing maternal and neonatal complications. This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in the Cochrane Library. wiley publishers. 2010;6.
- Chooi C, Cox JJ, Lumb RS, Middleton P, Chemali M, Emmett RS, Simmons SW, Cyna AM. Techniques for preventing hypotension during spinal anaesthesia for caesarean section. *Cochrane Database of Systematic Reviews* 2017, Issue 8. Art. No.: CD002251. DOI: 10.1002/14651858. Cd002251. pub3.
- S. Klöhr, R. Roth, T. Hofmann, R. Rossaint, M. Heesen Definitions of hypotension after spinal anaesthesia for caesarean section: literature search and application to parturients. *Acta Anaesthesiol Scand.* 2010 Sep; 54(8): 909-921. Published online 2010 Apr 23. doi: 10.1111/j.1399-6576.2010.02239.x
- Rees SGO, Thurlow JA, Gardner IC, Scrutton MJ, Kinsella SM. Maternal cardiovascular consequences of positioning after spinal anaesthesia for Caesarean section: left 15 degree table tilt vs. left lateral. *Anaesthesia* 2002 Jan; 57(1):15-2
- Crawford JS, Burton M, Davies P Time and lateral tilt at Caesarean section. *Br J Anaesth* 1972; 44: 477-84.
- Kerr, MG, Scott, DB, Samuel, E Studies of the inferior vena cava in late pregnancy. *Br Med J.* 1964. 1532-3.
- Calvache, JA, Muñoz, MF, Baron, FJ Hemodynamic effects of a right lumbar-pelvic wedge during spinal anesthesia for caesarean section. *Int J Obstet Anesth.* 2011. 20307-11