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RESEARCH ARTICLE

COMPARISON OF SUBARACHNOID BLOCK INDUCTION IN TRADITIONAL SITTING POSITION AND CROSSED LEG POSITION FOR CAESAREAN SECTION: A RANDOMIZED CONTROLLED TRIAL

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Abstract

Background and Aims: The position of the patient during spinal anaesthesia has a role in its success.Landmarks of the spine can be easily identified in sitting position.The traditional sitting position (TSP) and crossed leg sitting position (CLSP) are positions used for neuraxial anaesthesia.In this study, we compared the ease of performing subarachnoid blocks in these two positions.The objectives were to compare the attempts at subarachnoid placement of the spinal needle, patient comfort, ease of landmark palpation.

Methods: This randomized trial was performed in 80 parturients posted forcesarean section. Parturients were assigned randomly to two groups. In group TSP, the subarachnoid block was performed in sitting position with legs side by side hanging by the side of the bed with feet propped up on a chair and hugging a pillow and in group CLSP with knees and hips flexed and hugging a pillow.

Results: The percentage of parturients with a successful subarachnoid block in the first attempt was higher in the CLSP than in TSP group (87.5% versus 55%). The remaining 12.5% parturients in the CLSP group had successful block in the second attempt. In the TSP group, 32.5% required two attempts and 12.5% required more than two attempts. This difference was statistically significant (**P**-value of 0.003). The landmark was easily palpable in 92.5 versus 67.5% of parturients in CLSP and TSP, respectively, with a **P**-value of 0.014.

Conclusion: CLSP is better than the traditional sitting position for reducing the number of attempts and improving the ease of performing the subarachnoid blockin a parturient.

Introduction:-

Successful spinal anesthesia administration is crucial to surgical procedures . Spinal anesthesia success rate is affected by several factors, such as the quality of the injection landmark, quality radiologic images of the vertebrae, the skill of the anesthesiologist, patient position, lumbar flexion, and the distance between the skin and the subarachnoid space.

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Patient position during spinal anesthesia administration determines whether the insertion of the spinal needle into the subarachnoid space is successful or not. Poor positioning may cause repeated spinal needle insertions and spinal needle-vertebrae bone contact, thus increasing the risk of back pain, post-dural puncture headache (PDPH), epidural hematoma, and neural trauma.

The position of the patient during subarachnoid block has a major role in its success. Sitting or lateral positions are the standard positions used in parturients for subarachnoid blocks.[1,2] The landmarks of the spine can be easily identified in sitting positions and hence preferred in obese parturients.[3,4] Sitting position will reduce the lordosis of the spine seen in pregnancy and make spinal puncture easier. The crossed-leg sitting position (CLSP) is a recently recognized alternative position recommended for positioning during regional anesthesia.[5] The CLSP is a comfortable position, particularly during pregnancy.

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The crossed-leg sitting position (CLSP) is a recently recognized alternative position recommended for positioning during regional anesthesia.[4] The CLSP is a comfortable position, particularly during pregnancy. The CLSP is associated with hip and knee flexion, causing an increase in the degree of lumbar flexion making it easier to perform spinal anesthesia.

In our study, we compared the ease of performing subarachnoid block with parturients sitting with the legs parallel (LPSP) on the table and sitting with legs crossed on the table.

The hypothesis of this study is that CLSP would be a better position for subarachnoid block.

Objectives:-

Primary objective:
Comparison of the number of attempts at subarachnoid placement in TSP and CLSP.

Secondary objectives:
To compare the patient comfort in positioning, ease of landmark palpation,hypotension.

Material and Methods:-

This prospective randomized controlled trial was done in Basaweshwar teaching and general hospital after attaining consent from parturients from July-August 2024. Term parturients with a singleton pregnancy between 18 and 40 years of age belonging to American Society of Anesthesiologists (ASA) physical classes II and III scheduled for cesarean section planned under subarachnoid block were recruited in this study. Parturients having an extreme height (<150 or >170cm), spinal deformity, difficulty in flexing knees, obesity with body mass index >30 kg/m^2, hypertensive disorders of pregnancy, diabetes mellitus, fetal abnormalities, and having any contraindication to spinal anesthesia were excluded from the study.

All parturients were premedicated with IV metoclopramide 10 mg and IV Ondansetron 8mg 40mins before the surgery. In the operating room, an 18 gauge IV cannula was inserted and monitoring with noninvasive blood pressure, saturation and electrocardiography were established. Patients were coloaded with ringer lactate (10 mL/kg).Patients were randomly allotted to two groups, by a computer-generated random sequence of numbers.Group TSP patients were positionedwith legs hanging by the side of the bed with feet propped up on a chair and hugging a pillow and Group CLSP patients were in the CLSP with knees and hips flexed and legs under the contralateral thigh for subarachnoid block. The parturients were asked to arch their back and bend forward by hugging a pillow. Subarachnoid block was performed in the L3-4 space by a single anesthesiologist using a land mark technique, and hyperbaric bupivacaine (0.5%) 10mg was given intrathecally over 20s using 25guage Quincke spinal needle.

The number of attempts required to perform subarachnoid block was assessed and was graded as 1, 2, or >3. Redirecting the needle was considered a separate attempt.

The difficulty of landmark palpation was classified to:
easily palpable (lower border of the superior spinous process and the upper border of the inferior spinous process clearly palpable) –1,
hardly palpable (lower border of the superior spinous process and the upper border of the inferior spinous process not palpable) –2,
and impalpable (the spinous process could not be palpated) – 3.
After injecting the spinal drug, parturients were placed in supine positionwith wedge under the right hip. Pulse rate and blood pressure were monitored every 5 min for 15 min and then every 15 min up to 60 min. The level of sensory block achieved was noted by loss of sensation to pinprick in the midline. Bradycardia (HR <50 bpm) was treated with intravenous 0.6 mg of atropine sulfate iv. Tachycardia was defined as HR >100bpm and hypotension as a decrease in systolic blood pressure greater than 20% from baseline. Intravenous phenylephrine 50μg was used to treat hypotension.

Total fluid administered and total dose of phenylephrine used intraoperatively were noted. Patient satisfaction was graded as 0–2 (0–not comfortable, 1– comfortable, and 2– very comfortable).

Statistical Analysis
Based on the mean and standard deviation of the number of successful first attempts between CLSP (1.2 ± 0.4216) and TSP (1.6 ± 0.6990) obtained from a pilot trial conducted with 10 samples in each group, with a 95% confidence interval and 80% power, the minimum sample size was 33 in each group. We enrolled 40 parturients in each group.

Statistical analysis was done using IBM SPSS Statistics 20.0 Windows (SPSS Inc, Chicago, USA). Continuous variables were represented as mean and standard deviation and categorical as a percentage. The Pearson Chi-square test was used for finding associations between categorical variables. To test the statistically significant difference in the mean parameters between groups, an independent sample **t**-test was applied. All tests of statistical significance were two-tailed. A **P**-value < 0.05 was considered to be statistically significant.

Results:-

Eighty parturients were recruited in this study [Fig 1]. The parturients in both the groups were comparable with respect to the distribution of age, height, weight, and ASA physical status[Table 1]. All patients in both groups had a successful subarachnoid block, and there was no conversion to general anesthesia. The intravenous fluid and phenylephrine consumption intraoperatively were comparable between the groups. Heart rate and systolic blood pressure were comparable between the groups at all time points. There were no incidences of bradycardia requiring treatment in both groups. The percentage of parturients with the successful subarachnoid block in the first attempt was more in the CLSP than the TSP group (87.5% versus 55%). The remaining 12.5% parturients in the CLSP group had a successful subarachnoid block in the second attempt. In the TSP group, 32.5% required two attempts and 12.5% of parturients required more than two attempts. This difference was found to be statistically significant (**P**-value of 0.003). The landmark was easily palpable in 92.5% of parturients in the CLSP group and 67.5% in the TSP group and this difference was statistically significant (**P**-value of 0.014). Positioning was not comfortable in 2.5 vs. 0%, comfortable in 92.5 vs. 85% and very comfortable in 5 vs. 15% in CLSP and TSP groups, respectively, which was not statistically significant [Table 2].

The table 3 presents the rates of hypotension (low blood pressure) in two groups of patients, CLSP and TSP, both before and after delivery. Additionally, p-values are provided for both time points to test whether there is a statistically significant difference between the two groups.There is no statistically significant difference between the two groups in terms of hypotension rates before delivery. Both groups have a similar proportion of patients experiencing hypotension, and this difference is likely due to random chance rather than a true underlying effect.Both groups show slightly increased rates of hypotension after delivery, but the difference between the CLSP and TSP groups is not large enough to be considered statistically significant.Therefore, based on the p-values of 0.6 and 0.55, we can conclude that there is no evidence of a significant difference in hypotension rates between the CLSP and TSP groups, both before and after delivery.

Table 1:-

VARIABLES	CLSP(n=40)	TSP(n=40)	P
Age in years (mean±SD)	27.30±4.60	27.58±4.36	0.208
Height in cm (mean±SD)	155±5.38	155.33±6.15	0.852
Weight in kg (mean±SD)	69.7±5.74	68.68±7.56	0.908

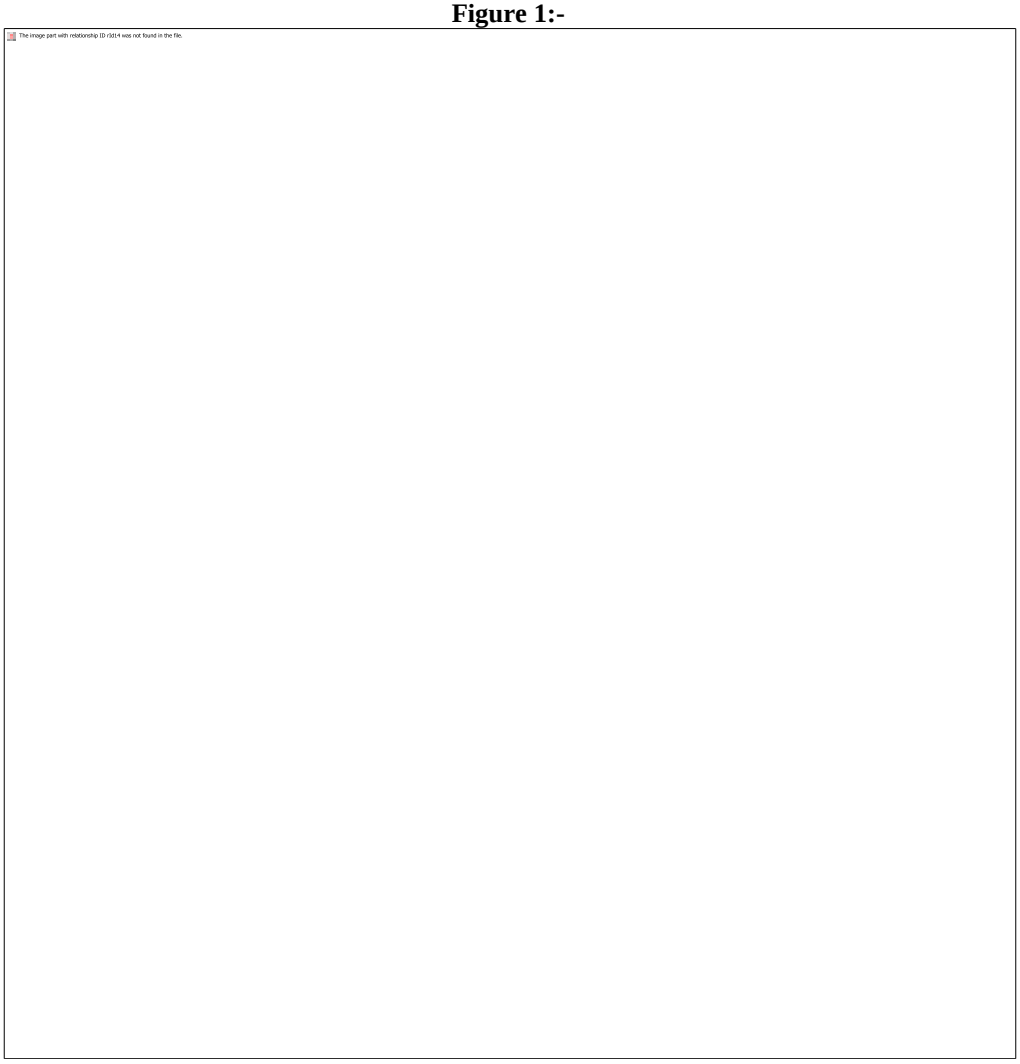
Table 2:-

VARIABLES	CLSP(n=40)	TSP(n=40)	P
Number of attempts n (%)			
1	35 (87.5)	22 (55)	0.003
2	5(12.5)	13 (32.5)	
3	0 (0)	5 (12.5)	
Difficulty of landmark palpation n (%)			
1	37 (92.5)	27 (67.5)	0.014
2	3 (7.5)	9 (22.5)	
3	0 (0)	4 (10)	
Patient comfort n (%)			
0	1 (2.5)	0 (0)	0.209
1	37 (92.5)	34 (85)	
2	2 (5)	6 (15)	

Table 3:-

Hypotension	CLSP(n=40)	TSP(n=40)	P
Before delivery	6(15)	8(20)	0.6
After delivery	8 (20)	10(25)	0.55

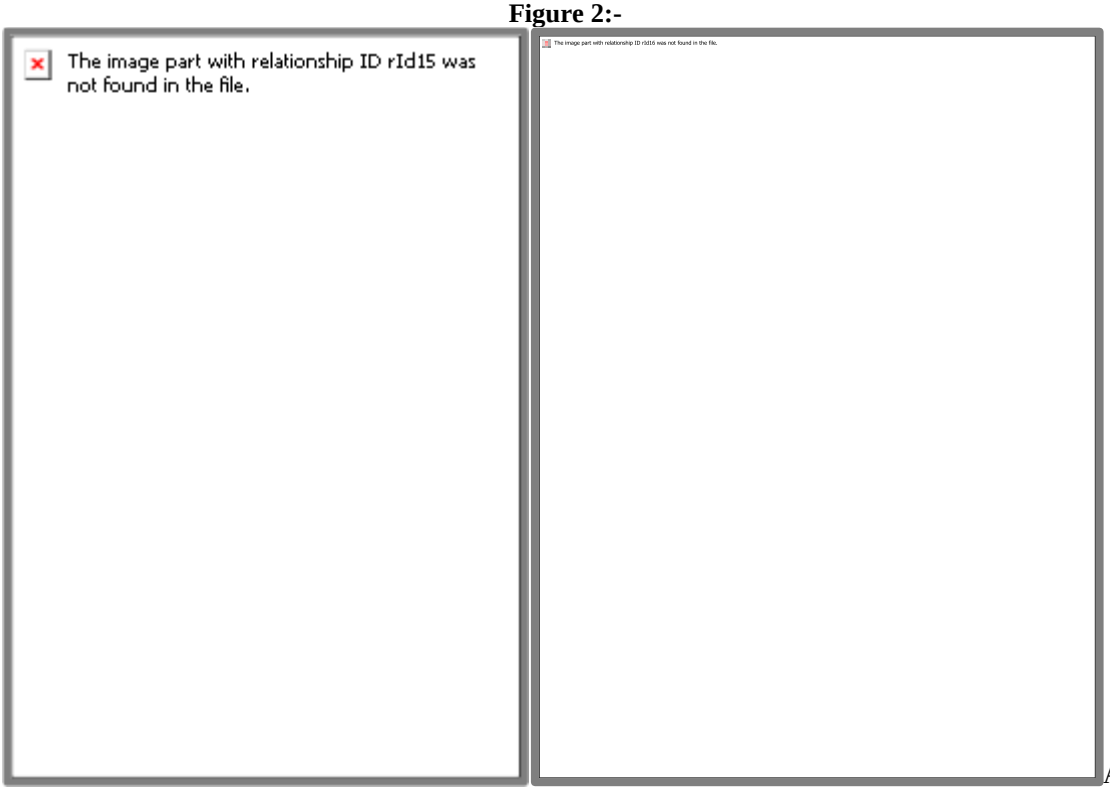
Figure 1:-



Discussion:-

The subarachnoid block was successfully given to all the patients in both groups with no failure or conversion to general anesthesia. The CLSP was found to be an efficient position for performing subarachnoid block in parturients posted for cesarean section. CLSP made palpation of interspinous space easier, and the subarachnoid block was better achieved in the first attempt. Difficulty in performing the subarachnoid block increases as the depth of the subarachnoid space from the skin increases.[5,6] CLSP is found to produce an additional 10–15° of lumbar flexion than the other sitting positions[Figure 2].[7] This helps to move the spinal cord more superficially toward the midline, making it easier to perform the subarachnoid block.[8] The successful performance of the block in the first attempt is influenced by the ability to identify the landmarks and the provider's experience. Hence, all the subarachnoid blocks were performed by a single anesthesiologist with adequate experience in performing subarachnoid blocks in parturients. In a study by Sandoval M et al, to find the best position for performing lumbar subarachnoid puncture by measuring the interspinous space by ultrasonography, it was observed that the space was more in sitting position than in lateral position.[9] On comparing the ease of performing subarachnoid block in the traditional sitting position with legs placed on a stool, it was observed that patients found legs placed on the operating table more comfortable.[10]

Figure 2:-



A-TRADITIONAL SITTING POSITION B-CROSSED LEG SITTING POSITION

In a study comparing the number of attempts required to perform subarachnoid block between sitting straight and sitting flexed, it was observed that lesser attempts were required with flexed position. This difference was attributed to the difficulty in palpating the spinous process with a straight back.[11,12] Enlarged uterus and hyperlordosis of the lumbar spine make it difficult to position parturients for subarachnoid block. Suboptimal positioning can lead to multiple attempts to achieve successful subarachnoid block causing inconvenience and pain to already distressed parturients. Hence, various studies have been conducted to find out the optimal positioning technique which is comfortable to the parturient and increases the first attempt success. Compared to lateral position, parturients prefer sitting position and this was found to improve the success of performing the subarachnoid block.[2] There was no difference in the hemodynamic parameters with the use of two positions, and the vasopressor consumption was comparable between the groups. There were also no incidences of bradycardia requiring treatment in both groups. The crossed-leg position for performing the subarachnoid block in urology patients was associated with better first time needle placement, ease of landmark palpation and lesser needle bone contact than traditional sitting position.[5] In a previous study for performing labor epidural anesthesia, it was observed that the crossed-leg position was better than the traditional sitting position.[13] Puthenveettil Net al compared the crossed-leg position with legs on a stool. In this study, a comparison between CLSP and sitting with legs on the stool was performed because in both these positions the parturient could be made to lie supine immediately without much effort after the block.

Several studies have compared different modifications of sitting positions for ease of performing subarachnoid blocks. Modified sitting positions with knees flexed completely were found to be better than the traditional sitting position for performing the subarachnoid block.[14] The squatting position was compared with the traditional sitting position and was found to produce less needle bone contact.[15] Pendant position with patient's underarms propped with a cantilever was compared with the traditional sitting position and was found to be better.[16] A 45° head-up tilt was found to make the performance of spinal anesthesia easier and comfortable in elderly patients.[17] In CLSP, there is the abduction of the thigh and crossing of legs with feet under the contralateral thigh leading to a larger surface area of contact with the theatre table making it a more stable position for parturients. It also provides additional space for the distended abdomen.

This study is limited by the fact that a single anesthesiologist performed all the subarachnoid blocks. This could have resulted in bias. We suggest further studies with anesthesiologists with varying experience of performing the block and including obese parturients in whom positioning and performance of the subarachnoid block would be difficult.

Conclusion:-

A CLSP is better than a traditional sitting position for reducing the number of attempts and improving the ease of performing the subarachnoid block for cesaerean section.

References:-

1.Tan ED, Gunaydın B. Comparison of maternal and neonatal effects of combined spinal epidural anaesthesia in either the sitting or lateral position during elective cesarean section. Turk J AnaesthReanim 2014;42:23-32
2.Xu Z, Yao X, Zhang Y, Chen X, Zhou X, Shen F, et al. Efficacy of different positions for neuraxial anesthesia in caesarean section:A meta-analysis. Int J ClinExp Med 2016;9:20255-67.
3. Kharge ND, Mali A, Gujjar P. Comparison of haemodynamic effects of lateral and sitting positions during induction of spinal anaesthesia for elective caesarean section. Int J Res Med Sci 2017;5:851-6.
4. Francis JH. The cross-legged position for insertion of an epidural catheter during labour. Anaesth Intensive Care 2010;38:956-7.
5. Kim JH, Song SY, Kim BJ. Predicting the difficulty in performing a neuraxial blockade. Korean J Anesthesiol 2011;61:377-81.
6. DeOliveira GR, Gomes HP, da Fonseca MH, Hoffman JC, Pederneiras SG, Garcia JH. Predictors of successful neuroaxial block; A prospective study. Eur J Anaesthesiol 2002;19:447-51.
7. Redai I, Flood P. In: Braveman FR, editor, Obstetric and GynecologicAnesthesia the Requisites in Anesthesiology. 1st ed. US: Elsevier Mosby; 2006. p. 29-38.
8. Manggala SK, Tantri AR, Satoto D. Comparison of successful spinal needle placement between crossed-leg sitting position and traditional sitting position in patients undergoing urology surgery. Anesth Pain Med 2016;6:e39314.
9. Sandoval M, Shestak W, Sturmann K, Hsu C. Optimal patient position for lumbar puncture, measured by ultrasonography. EmergRadiol 2004;4:179-81.
10. Afolayan JM, Areo PO, Adegun PT, Ogundipe KO, Filani AB. Comparison of ease of induction of spinal anaesthesia in sitting with legs parallel on the table versus traditional sitting position. Pan Afri Med J 2017;28:223.
11. Waindeskar V, Songir S, Batra M, Gaikwad MR, Khan MA, Dubey A. Comparison of straight versus flexed back in combined spinal epidural anesthesia for gynaecological procedure. PJSR 2015;8:34-8.
12. Biswas BK, Agarwal B, Bhattarai B, Dey S, Bhattacharyya P. Straight versus flex back: Does it matter in spinal anaesthesia? Indian J Anaesth 2012; 56:259-64.
13. Puthenveettil N, Sandhya S, Joseph N, Nair S, Paul J. Comparison of cross-legged sitting position with the traditional sitting position for the ease of insertion of an epidural catheter in parturient for providing labour analgesia: A randomised control trial. Indian J Anaesth 2020;64:199-203.
14. Baigmohammadi MT, Khan ZH. Modified sitting position: A new position for spinal anesthesia. AnesthAnalg 2007;105:549.
15. SoltaniMohammadi S, Hassani M, Marashi SM. Comparing the squatting position and traditional sitting position for ease of spinal needle placement: A randomized clinical trial. Anesth Pain Med 2014;4:e13969.
16. Pryambodho, Nugroho AM, Januarrifianto D. Comparison between pendant position and traditional sitting position for successful spinal puncture in spinal anaesthesia for caesarean section. Anesth Pain Med 2017;7:e14300.
17. Sahin SH, Colak A, Arar C, Yıldırım I, Sut N, Turan A. Modified 45-degree head-up tilt increases success rate of lumbar puncture in patients undergoing spinal anesthesia. J Anesth 2014;28:544-8.