Original Research Article

Comparison of sitting position and prone position for ease of spinal needle insertion in patients undergoing spinal anaesthesia

Pradeep Khobragade[1*], Harshal Mendhe[2], Ketaki Ramteke[3]

[1,3]Assistant Professor in Anaesthesia, Department of Anaesthesiology, Government Medical College and Superspeciality Hospital, Nagpur, Maharashtra, INDIA.
[2]Associate Professor in Community Medicine, Department of Community Medicine, Government Medical College, Ambikapur, Chhatisgarh, INDIA.
Email: drpradeepk1117@gmail.com

Abstract

Background: Position is of paramount importance while giving neuroaxial block to have a successful outcome. The best position is where lumbar lordosis is reduced so as to have better access through interspinous space to reach dura mater. There are few studies which compare sitting position (hamstring stretch position) and prone position. **Objective**: We compared supine position (hamstring stretch position) vs prone position for performing neuraxial block and hypothesized that there is no difference in reducing the lumber lordosis and needle bone contacts with both positions. **Methods**: We studied total 120 patients, aged 18-60 years with ASAI and ASAII classification scheduled for elective surgeries under spinal anaesthesia randomized in two groups. Our primary endpoint was the number of spinal needle bone contact and secondary endpoint was ease of needle insertion or space identification. **Results**: Demographic data was not statistically different between the study groups. Supine (hamstring stretch position) position was found to have less number of needle bone contacts and easier to finding intervertebral space was (P value ‹0.05). **Conclusion**: there was significant statistical difference between supine and prone position regarding the needle bone contacts and ease of identifying the intervetebral space.

Key words: supine position, prone position, spinal needle, spinal anaesthesia

***Address for Correspondence:**
Dr Pradeep Khobragade, Assistant Professor in Anaesthesia, Department of Anaesthesiology, Government Medical College And Superspeciality Hospital, Nagpur, Maharashtra, INDIA.
Email: drpradeepk1117@gmail.com

Received Date: 22/01/2021 Revised Date: 13/02/2021 Accepted Date: 29/03/2021
DOI: https://doi.org/10.26611/10151824

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 04 May 2021

INTRODUCTION

Patient position is very important while administering spinal anaesthesia. Inadequate reversal of lumbar lordosis results in improper position which can lead to back pain, post dural puncture headache, epidural hematoma and neural trauma as well. Most common position for administering spinal anaesthesia is sitting position. Other positions for administering spinal anaesthesia are lateral decubitus and prone position. The aim of any position for spinal anaesthesia is to reverse lumbar lordosis as much as possible so as to have better access through intervertebral space and pushing the thecal sac in more superficial position.[2] There are several studies which have compared different types of modified sitting positions. In the study by Sussan Soltani Mohammadi *et al.* in 2016 three modified sitting positions (hamstring stretch position, traditional sitting position and sqatting position) were compared having each group of 120 patients scheduled for elective surgeries under spinal anaesthesia. They found that there is no statistical difference in study groups regarding needle bone contacts and ease of finding

How to site this article: Pradeep Khobragade, Harshal Mendhe, Ketaki Ramteke. Comparison of sitting position and prone position for ease of spinal needle insertion in patients undergoing spinal anaesthesia. *MedPulse International Journal of Anesthesiology.* May 2021; 18(2): 79-82. http://medpulse.in/Anesthsiology/index.php

interverteberal space although it was found to be easier in traditional sitting position and sqatting position.[1] In a study by Toshayod *et al.* in 1980 had found hamstring stretch position (modified sitting position with maximum extension of knees, adduction of hips and forward bending) was found to be more effective in reducing lumbar lordosis and making spinal puncture easier. Even moderate passive extension of knees in sitting position leads to reduction of lumbar lordosis by stretching of hamstrings and increasing its tension.[3] Fischer *et al.* in the year 2009 studied and found both traditional sitting position and hamstring stretch position are equally effective in reducing lumbar lordosis for performing spinal anaesthesia. The number of needle bone contacts were same in both groups.[4] In another study in the year 2014 by Soltani Mohammadi *et al.*, 230 patients in traditional sitting position were compared with 222 patients in squatting position scheduled for elective lower limb and lower abdominal surgeries. The number of spinal needle-bone contacts were found to be lower in squatting position whereas ease of finding intervertebral space found to be same in both study groups.[5] Manggala *et al.* compared the crossed- leg sitting position with traditional sitting position in patients undergoing urologic surgery under spinal anaesthesia, found no significant difference in both study groups in success rate of needle placement and suggested that crossed-leg position can be used as an alternative sitting position for administration of spinal anaesthesia.[6] We conducted a double blind study to compare hamstring stretch sitting position (HSP) and prone position (PP) to study which position can effectively reduce spinal needle bone contact and by reducing lumbar lordosis improve space identification. Our primary aim was to minimize spinal needle bone contact and secondary aim was finding ease of needle insertion or identifying intervertebral space.

METHODS AND MATERIALS

This study was conducted at government medical college and superspeciality hospital Nagpur in 2019-2020, urology surgical operation theatre. A study protocol was given ethical committee approval by local ethics committee.

During preanaesthestic assessment patients were informed regarding proposed position for the procedure. Both positions were explained to patients. A written informed consent was obtained earlier before the procedure with likely risks and complications explained in detail. A total of 120 patients are studied. Patients were divided in two groups each having 60 patients.

Group HSP – Hamstring stretch position

Group PP -Prone position

INCLUSION CRITERIA

1. Patients age between 18-60 years
2. Gender either male or female
3. Patients with ASA physical status I and II
4. Patients scheduled for elective urologic surgeries under spinal anaesthesia

EXCLUSION CRITERIA:

1. Patients refusing to participate
2. Any history of allergy or hypersensitivity to local anaesthetics
3. Any contraindication to neuraxial block
4. Pregnancy
5. History of lumbar spine surgery/ scar
6. Patients with spine deformities
7. BMI ≥35

Randomization was done by lottery method, the name of the position was conceled in covered envelopes opened by the block performer before the spinal procedure. After confirming the patient and surgery, patient is taken inside the operation theatre. An intravenous access is established under sterile precautions. an intravenous isotonic saline was given 3ml/kg and injection fentanyl 50 micrograms given as premedication before performing spinal anaesthesia. ASA standard monitors are attached to patients and baseline parameters are recorded. All spinal blocks are perfomed by two experienced anaesthetists who have more than five years of experience after completing their postgraduation degree.

For hamstring stretch sitting position (figure 1), anaesthesiologist stand by left side of patient and level of the patient table height adjusted to block performers height. Under all aseptic precautions patients back is painted with betadine 10% solution and after 2 minutes wiped out with 2% chlorhexidine . An intervertebral space is identified by inspection and palpatory method and either of L3-L4 or L2-L3 intervertebral space is chosen. 2ml of 2% lignocaine is infiltrated in the intervertebral space with 25G needle. This is followed by 25G Quinke's type spinal needle by midline approach. In the meanwhile, an anaesthesiology resident recorded weight, height and surface landmarks graded by block performer as easy, difficult and impossible to palpate lumbar spinous process while the patient was positioned according to the allocation group. For prone position, patient was asked to lie down on belly with one or two pillows below the belly to achieve maximum possible lumber lordosis reduction. The block performer again stand by left side of the patient and table height is adjusted to comfortable level to the block performer. The spinal procedures were performed to improve needle insertion or space identification and minimize spinal needle-bone contacts. A spinal needle bone contact was defined as spinal needle contact against the bone which prevents further entry of spinal needle. Number of spinal bone contacts were recorded. The study was complete when subarachnoid space was confirmed by

observing free flow of Cerebro spinal fluid (CSF). Free flow of CSF was more clearly evident in hamstring stretch position (HSP) but in case of to prone position block performer has to wait for 10-15 seconds or negatively aspirate through the spinal needle so as to observe free CSF coming from the needle. In both study groups, if CSF flow is not free on negative aspiration spinal needle is rotated 90 degrees clockwise and block performer had to wait again for 5 seconds. The sequence of rotation continued for another three quadrant rotation of 90 degrees and wait for 5 seconds after each rotation. If even after this maneuver, no free flow of CSF observed on negative aspiration then spinal needle is advanced by 2mm. the block performer was not allowed to perform new puncture and only allowed to pull back spinal needle just to the subcutaneous tissue. When a bone was encountered in any of the study group patient, the needle was withdrawn just below the skin level and redirected more cephalad angle. If more than 4 spinal needle bone contacts were encountered then case was recorded as failure and the study was stopped.

We classified ease of insertion depending upon the number of needle bone contacts as follows:

1. Easy : upto 2 needle bone contacts
2. Difficult : more than 2 but less than 5 needle bone contacts
3. Impossible : 5 or more needle bone contacts

RESULTS

The mean age of patients in HSP group was 41.6 years and 41.8 years in PP group, which was comparable and the difference was not statistically significant. The mean weight of the patients in study group HSP was 64.74 kgs and in group PP was 62.93 kgs which was comparable and difference was not statistically significant.

Data was analyzed and compared.

Table 1: Descriptive Statistics

Variables	GROUP	N	Mean	Std. Deviation	Std. Error Mean
AGE	Group HSP	60	41.60	12.916	1.667
in years	Group P	60	41.83	12.437	1.606
WEIGHT	Group HSP	60	64.74	8.904	1.149
In kgs	Group P	60	62.93	6.197	.800
HEIGHT in cms	Group HSP	60	155.38	4.816	.622
	Group P	60	161.40	5.714	.738
BMI in kg/m2	Group HSP	60	26.78	3.24	0.42
	Group P	60	24.14	1.86	0,24

P value > 0.05

Table showing no statistical difference between two groups in demographic data. Hence both groups were comparable.

Table 2: T –test for equality of means

Variables	t Value	Sig. (2-tailed)	Df
AGE	-.101	.920	118
WEIGHT	1.291	.199	118
HEIGHT	-6.237	.000	118
BMI	5.473	0.000	118

df- degree of freedom

Ease score of identifying intervertebral space in HSP group is found to be more as compared to PP group on calculating interquartile range. Test statistics shows significant difference between HSP and PP study group with HSP group has significantly less needle-bone contacts compared to PP group.

Table 3: showing statistical difference

	VAR00001
Mann-Whitney U	1173.000
Wilcoxon W	3003.000
Z	-3.608
Asymp. Sig. (2-tailed)	.000

Table 4: Comparision of ease of finding intervetebral space

variable	Easy	difficult	impossible	Total patients
Group HSP	58	02	00	60
Group PP	52	06	02	60

Group P has less number of needle bone contacts as compared to group HSP.

DISCUSSION

Sitting position is one of the most common position used for administering spinal anaesthesia for the surgeries involving lower extremities and lower abdomen. It is also used for providing saddle anesthesia. Different types of modified sitting positions are described like traditional sitting position with flexion of knee, hamstring stretch position, sqatting position and crossed leg position which were compared for their ease of identifying intervertebral space and minimizing needle-bone contacts. Although described in the standard textbooks, prone position is practiced rarely as this position needs proper positioning and support along with surgical position requirement in most surgeries is supine or lithotomy position. A few studies compared different modified sitting positions and found statistically no difference in all the modified sitting positions. In our study, 120 patients each of comparable age, sex and ASA physical status scheduled for elective urologic surgeries under spinal anaesthesia randomly allocated and spinal anaesthesia was administered with hamstring stretch position (SP) in 60 patients and with prone position (PP) in 60 patients. The mean age of patients in group SP was 41.6 years and in 41.83 in group PP, which was comparable. Sussan Soltani Mohammadi *et al.* compared three different modified sitting positions in 120 patients in each study group and found no statistical difference between the different modified sitting positions. Fischer *et al.* studied 205 patients in traditional sitting position with 201 patients hamstring stretch position in pregnant females scheduled for labour epidural analgesia and found number of needle bone contacts were similar in both groups. Soltani Mohammadi *et al.* studied 222 patients in squatting position with 230 patients in traditional sitting position and found number of needle bone contact were less in squatting position as compared to traditional sitting position. In this study we found that there was statistically significant difference between HSP group and PP group with respect to needle bone contact. HSP group had significantly less needle bone contacts and successful spinal anaesthesia. It is also found that ease of finding intervertebral space was found to be more with HSP group. The significant difference found in group HSP may be due to most commonly practiced position in our hospital and very less exposure of prone position for spinal anaesthesia in day to day practice. No complications were found in both groups during study tenure.

CONCLUSION

There is significant difference of ease of finding intervertebral space and less number of needle bone contacts with hamstring stretch position which is most commonly practiced position for administering spinal anaesthesia as compared to prone position.

LIMITATIONS OF THE STUDY

In our study sample size is small which reduces the statistical power to detect difference. Most important limitation was less training and experience with respect to prone position in block performers. Anxiety among block performers can be another factor which can lead to erroneous results. However, as far as possible block performers were blinded regarding the real reason for data collection and any bias should have applied to both study groups.

ACKNOWLEDGEMENTS

We appreciate the cooperation by anaesthesia staff, urology surgeons and nursing staff that helped us to conduct study.

REFRENCES

1. Sussan Soltani Mohammadi, Mohammadreza Piri, Alireza Khajehnasiri. Comparing three differentmodified sitting positions for ease of spinal needle insertion in patients undergoing spinal anaesthesia.Anaesth Pain Medicine.2017;7(5):e55932. doi:10.5812/aapm.55932.
2. 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(3):259–64.doi:10.4103/0019-5049.98772.
3. Tashayod ME, Tamadon S. Spinal block in sitting position without moving the legs.Middle East J Anaesthesiologyl. 1980;5(8):529–33.
4. Fisher KS, Arnholt AT, Douglas ME, Vandiver SL, Nguyen DH. A randomized trial of the traditional sitting position versus the hamstring stretch position for labor epidural needle placement. Anesth Analg. 2009;109(2):532–4. doi: 10.1213/ane.0b013e3181ac6c79.
5. Soltani Mohammadi 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(2):e13969.doi: 10.5812/aapm.13969.
6. 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(4):e39314.doi: 10.5812/aapm.39314.
7. Garcia AM, Martí A, Rodriguez PM, Villamor M, Martínez A, Moral MV. Predictors of difficulty in neuroaxial block: A prospective study. Eur J Anaesthesiol. 2011;28:110
8. de Filho GR, Gomes HP, da Fonseca MH, Hoffman JC, Pederneiras SG, Garcia JH. Predictors of successful neuraxial block: a prospective study. Eur J Anaesthesiol. 2002;19(6):447–51.
9. Tanaka K, Irikoma S, Kokubo S. Identification of the lumbar interspinous spaces by palpation and verified by X-rays. Braz J Anesthe- siol. 2013;63(3):245–8. doi: 10.1016/S0034-7094(13)70224-1.
10. Fettes PD, Jansson JR, Wildsmith JA. Failed spinal anaesthesia: mechanisms, management, and prevention .BrJAnaesth. 2009;102(6):739– 48.doi: 10.1093/bja/aep096.

Source of Support: None Declared
Conflict of Interest: None Declared