

A comparison of the effects of spinal anaesthesia between sitting and lateral positions in patients undergoing hysterectomy surgery

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Abstract

Aim

The main purpose of this present study is to determine the effects of sitting (S) and lateral (L) position during spinal anaesthesia on patient satisfaction, Post dural puncture headache (PDPH), Post-Operative Nausea and Vomiting (PONV).

Study Design

Prospective comparative study

Place and Duration of study

Charusat Healthcare and Research foundation (CHRF), Changa, Gujarat, between September 2021 to November 2021.

Methodology

A total of 50 female volunteers who were above the age of 18 years, had an American Society of Anaesthesiologist (ASA) status of I & II and those who have undergone hysterectomy surgery are included in this study. The patients were categorized into two groups, group S (n=25) and group L (n=25). Patients were asked about PONV 4 hours after surgery and the possibility of PDPH on post-operative days 1 and 2. The study was analysed by using descriptive statistics, chi-square and Kruskal-Wallis test.

Results

When comparing the incidence of PDPH on post-operative day 1 and day 2, there is a statistically significant difference between the Sitting (group S) and Lateral decubitus (group L) groups (P-value= 0.14 and .001). On the other hand, there is no statistical significant difference found for PONV when compared between both the groups (P- value= .776).

Conclusion

Spinal anaesthesia with lateral decubitus position has better outcomes than sitting position for the incidence of Post dural puncture headache. However, there is no difference in both groups for PONV.

Keywords

Peri-operative care, Spinal anaesthesia, Post dural puncture headache, Post-Operative Nausea Vomiting

Introduction

Spinal anaesthesia is a widely used procedure during urological, gynaecological and lower limb surgery to provide surgical anaesthesia^[1]. When compared to epidural technique, spinal anaesthesia technique eliminates the risks of accidental dura puncture^[2]. It is the choice of anaesthetic for geriatric patients undergoing lower abdominal surgeries, usually administered in sitting or lateral position. However, it is time consuming, requires finer expertise, and may lead to unnecessary side effects due to degenerative anatomical changes associated with the natural aging process such as vertebral collapse, osteophytes, calcified ligamentum flavum etc. In elderly patients, lateral decubitus position is difficult as it is uncomfortable to lie in the same position for a prolonged period, as compared to sitting position which is more easier and less stressful^[3]. The most frequently identified complication is post-dural puncture headache (PDPH), with an occurrence of between 10% and 50%. Usually after 24 – 48 hours of procedure, PDPH is observed among the patients which lasts for 1 – 2 days. PDPH is frequently accompanied by moderate neck pain, nausea, hearing loss, tinnitus and photophobia^[1]. Headache usually varies with location and is often accompanied by blurring of vision in a throbbing pattern. The PDPH mechanism is unknown, but the standard hypothesis suggests the leakage of cerebrospinal fluid (CSF) from the dural hole. Some variables may lead to PDPH, such as gender, age group, needle size, needle bevel design and direction^[4]. Due to its higher success rate,

faster onset and high block density spinal anesthesia is widely preferred technique in lower limb surgeries, but it is also associated with some complications, majorly hypotension. Due to the gravity, the sitting position increases peripheral blood pooling leading to hypotension [3]. Incidence of hypotension is common in sitting when compared to the lateral position [5]. The incidence of hypotension ranged from 55 % to 64 % following subarachnoid administration of 0.5 percent bupivacaine [6]. A dynamic multifactorial issue arising from anaesthetic and non-anaesthetic factors is intraoperative nausea and vomiting (IONV). Hypotension is the primary causative factor, but other factors such as surgical interventions, uterotonic agents and increased vagal activity also produces nausea and vomiting [7]. About 30 % of all patients suffer from nausea and vomiting in the post-anaesthetic period without previous prophylaxis, with the highest occurrence being observed in the first 6 hours following surgery [8]. During the surgical process, nausea and vomiting can also be present, causing distress for the parturient, impairing the gynaecologist's surgical conditions. This may lead to medical side effects such as gastric fluid aspiration, increased intra and postoperative pain and even bleeding or surgical trauma [9]. PONV remains one of the most widely used elements in surveys measuring patient satisfaction with the perioperative time and rating systems for the quality of anaesthesia recovery [10]. The well-being of patients can be seriously affected by nausea - vomiting (NV), and may experience serious discomfort [11].

The main purpose of the study is to check the effects of positioning during spinal anaesthesia on patients for PONV, 4 hours from the time of closure and followed by assessing the patient for PDPH on post-operative day 1 and day 2 in hysterectomy surgery.

Material and Methods

After approval from the institutional ethics committee (Ref no: CIPS/SRC/21/003) and informed consent from the patients, the prospective comparative study was conducted between September 2021 to November 2021. The data was collected from Charusat Healthcare and Research foundation (CHRF), Changa, Gujarat. Convenient sampling technique was used. Sample size was calculated by using the formula given below.

$$n = Z^2 \times p \times (1-p) / e^2$$

$$= (1.96)^2 \times 0.5 \times (1-0.5) / (0.05)^2 = 385.$$

Since then, a total of 52 patients have had hysterectomy surgery, with two of them requiring general anaesthesia over the course of the study duration, adjusting the sample size for a finite population.

$$n_o = n \times N / \{(N + (n-1))\}$$

$$= 37$$

where, n= minimum required sample size

Z= 1.96 at 95% Confidence Interval (CI)

p= prevalence taken as 50% for maximum sample size

q=1-p= margin of error i.e., 0.05

n_o = adjusted sample size

N=Total number of patients undergoing hysterectomy surgery, requiring spinal anaesthesia i.e. 50.

The study included 50 ASA I and II female patients of age more than 18 years undergoing spinal anaesthesia for hysterectomy surgery. Consent refusal, patient undergoing general anaesthesia, laparoscopic technique, day-care surgery, C-sections and patient with contraindication to regional anaesthesia were excluded from the study.

Patients were classified randomly for both the positions, Group S (n=25) spinal anaesthesia in sitting position and Group L (n=25) spinal anaesthesia in lateral position. Patient's age, gender and BMI was taken pre-operatively. Spinal anaesthesia was given in lateral position at L₃ –L₄ and L₄ –L₅ level through midline approach by placing their back parallel to the edge of the operating table with their thighs flexed on their abdomen and their neck flexed to allow the forehead to be closer to the knees. In sitting position, a stool was used as foot rest and pillow was given on their lap. An assistant maintained the patient in a vertical plane while flexing the patient's neck and arms over the pillow. Quincke spinal needle was used for the procedure. Bupivacaine (Anawin Heavy 0.5%) 12.5 mg was injected with the needle bevel directed upwards followed by immediate supine position post induction. For every 30 min vitals of the patient were checked. Decrease in blood pressure was treated by mephentermine and decrease in heart rate was treated with Glycopyrrolate 0.2 mg. For prophylactic purpose, ondansetron 4 mg was given preoperatively.

Pre and post induction of anaesthesia, patient's satisfaction was asked regarding the positioning. The comfortability was assessed by giving them two options: Pleasant and Unpleasant. Patient's blood pressure was checked 30 minutes from the time of induction. Post-operative nausea and vomiting (PONV) was assessed by simply asking the patients. For post-dural puncture headache (PDPH), patients were questioned regarding frontal and occipital region headache on the post-operative day 1 and day 2. PDPH was divided into four stages: No headache (0), mild (1-3), moderate (4-6) and severe (7-9)^[4]. Post-operative nausea and vomiting (PONV) was assessed by simply asking the patients 4 hours after the closure.

Data was analysed using IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp. The descriptive statistics for age and BMI were analysed using mean and standard deviation. Chi-square test was applied to compare the patient comfort level. Kolmogorov-Smirnov test was applied to check the if the data was normally distributed. After applying the K-S test, we found out that the data was not normally distributed. Thus, for further analysis we had to apply non-parametric test. Kruskal-Wallis test was used to assess PDPH for both the positions. Chi-square test was applied to compare PONV. A p-value of less than 0.05 was considered statistically significant.

Result

Demographic data of patients in both the groups were compared. There is no statistical significance among the age and BMI in both the groups [Table no 1].

Variable	Group	Mean	Standard Deviation	p-value
Age of patient (in years)	Sitting	47.68	12.77	.099
	Lateral	53.64	12.29	
Body Mass Index	Sitting	22.72	3.00	.915
	Lateral	22.80	2.52	

Table 1. Demographic data: Age and BMI.

On post-operative day 1, in sitting group, 6 patients had severe headache, 8 patients had moderate, 4 patients had mild and 7 patients had no headache. In Lateral group, 1 patient had severe headache, 2 had moderate, 16 had mild and 6 had no headache. On post-operative day 2, in sitting position, 2 had moderate headache, 13 had mild headache and 10 had no headache, in lateral group 1 had moderate, 3 had mild and 21 had no headache. There were 0 cases of severe headache in both the groups. For post-operative nausea and vomiting, 12 patients from sitting group and 10 in lateral group have PONV [Table no 2].

Position	PONV		P- value
	Yes	No	
Sitting	12	13	.776
Lateral	10	15	

Table 2. Comparison of position for PONV (4 hours after the closure)

The comfort level in lateral was higher when compared with sitting position, 11 patients from sitting and 7 from lateral group complained about positional discomfort [Figure 1-2].

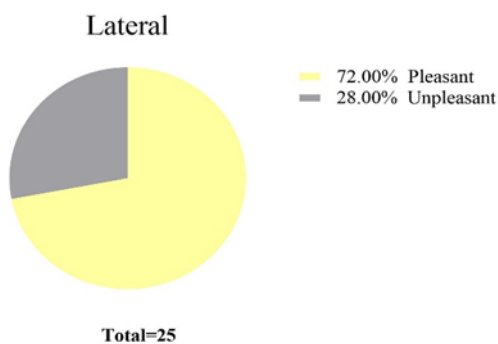


Figure 1. Comfort level in Lateral position.

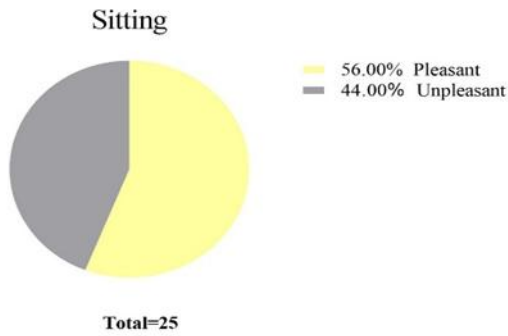


Figure 2. Comfort level in sitting position.

When the pain severity was compared between both the group, there was statistical difference between them for post-operative day 1 and as well as for post-operative day 2 (P-value= 0.14) and (P-vale= .001) respectively [Table no 3-4].

Patients pain assessment	Group S (n= 25)	Group L (n=25)	P-value
No pain	7	6	.014
Mild pain	4	16	
Moderate	8	2	
Severe	6	1	

Table 3. Comparison of incidence of PDPH between both the groups on Post-operative day 1

Patients pain assessment	Group S (n= 25)	Group L (n=25)	P-value
No pain	10	21	.001
Mild pain	13	3	
Moderate	2	1	
Severe	0	0	

Table 4. Comparison of incidence of PDPH between both the groups on Post-operative day 2.

Discussion

Hysterectomy was most commonly found in women of older age groups (45–49 years), residing in rural regions, Obesity and high parity rate being the major risk factor for hysterectomy^[12]. The major indication for the hysterectomy procedure included Abnormal uterine bleeding and Benign Ovarian cyst being the least common indication in India^[13]. During and after the administration of spinal anesthesia may cause various complications such as postural discomfort, post-dural puncture headache, PONV etc. One of the most significant aspects of the procedure is the patient's comfort in their position during the injection of spinal anaesthesia. So the main focus of the study to evaluate which posture is best suitable and the related complications that may arise after spinal anaesthesia is administered. Shahzad K and, Afshan G published a study based on spinal anaesthesia in which they concluded that the lateral position was more comfortable as compared to sitting position for spinal anaesthesia^[14]. In regional techniques, spinal anaesthesia is the most common method used around the globe^[15]. PDPH is the most commonly recognized unfavourable impact related with immobilization, inability, and delayed hospitalization^[16]. In terms of easier blocks in sitting position as compared to lateral position in relation to the incidence of PDPH, the function of optimal position at the time of performing the procedure will update the performer and also enable weighing of risk benefits^[17]. This study adds to the evidence that positioning during lumbar punctures has a significant impact on the development of PDPH. When compared for CSF pressures, sitting position has greater pressure of 40 cm H₂O than lateral position which has maximum of 20 cm H₂O, which is one of the reasons to trigger PDPH^[18]. In the present study we found statistical significant difference for PDPH on both the post-operative days. The key reasons for choosing why the sitting position is favoured over the lateral decubitus position are the lower probability of failure in obese patients and the ease with which the midline structures can be identified^[19]. The lateral decubitus position has many benefits, including a smoother sensory block due to the distribution of local anaesthetics^[20]. A high incidence of PONV has been linked to gynaecological surgery^[21,22]. In the immediate postoperative period, there had been a higher prevalence of itching and more frequent vomiting with spinal anaesthesia^[23]. In patients receiving ondansetron 4 mg near the end of surgery, PONV was reported in 52.8 percent of cases at the same time^[24]. In the present study there is no statistical significant difference for PONV when compared. It has some limitations, firstly, patients were from ASA I and ASA II group, with normal spine. Secondly, this study had been done in single centre with a limited

sample size as the patients were chosen from gynaecology setting who underwent hysterectomy surgery. Further studies are recommended with larger sample size which could lead to better accuracy for the incidence of PDPH.

Conclusion

The present study concluded that there is no statistical significance of age and BMI with patient postures. However, comparing pain severity it was found that the lateral decubitus position gives better outcome over sitting position during lumbar puncture for the prevention of post dural puncture headache in patients undergoing hysterectomy surgery. The present study indicates best postural comfortness in the lateral decubitus position with minimal adverse effects as compared to sitting position. The current study also makes anaesthesiologists and anaesthesia technologists more aware of the importance of providing a clear opinion regarding positioning during spinal anaesthesia, which will definitely improve patient care during the procedure. Further studies will be needed with better alternative techniques to decrease the incidence of PDPH.

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Conflict of Interest

NIL.

Author's Contribution

Karan Morje and Akhlaque Ahmad had contributed to the design of the study and wrote the first draft of the manuscript. Akhlaque Ahmad and Karan Morje also contributed to the collection of data. The analysis and interpretation was done by Manna Debnath. Karan Morje and Santosh Ojha had scrutinized the article for quality content. All authors read and approved the final manuscript.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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