Section: Anaesthesia

Original Research Article

# COMPARISON OF POST-OPERATIVE PAIN IN MEDIAN VERSUS PARAMEDIAN SPINAL ANESTHESIA: A HOSPITAL BASED STUDY IN RAJASTHAN

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## Abstract

**Background:** The choice of needle insertion point, whether median or paramedian, can affect the spread of the anaesthetic agent and may lead to differences in outcomes such as block success rate, hemodynamic stability, and postoperative pain. The aim of this study is to compare the incidence and severity of pain after surgery with median versus paramedian spinal anaesthesia. **Materials and Methods:** This study was a prospective, randomized, controlled trial conducted in a one center. A total of 90 adult patients planned for elective surgeries were randomized to receive either median or paramedian spinal anesthesia. **Result:** The study included 90 patients, with 43 in the median and 47 in the paramedian group. Baseline characteristics, including age, gender, height, weight, and BMI, were similar between the two groups. In median group, Post dural puncture headache (PDPH) was observed in 7 (14.89%) and in para median group it was noted in 5 (11.6%) of patients. Lower backache was observed in 12 (25.53%) in median and 4 (9.3%) in paramedian group. **Conclusion:** Our study suggests that the paramedian approach may be preferred to reduce PDPH and lower backache after spinal anesthesia. However, larger studies with comprehensive measures are needed to validate these findings.

## INTRODUCTION

Spinal anesthesia is a widely used technique for lower limb surgeries due to its ease of administration, rapid onset, and predictable duration of action. However, the choice of needle insertion site - median or paramedian - remains a matter of debate among anesthesiologists. The median technique involves inserting the needle at the midline, while the paramedian technique involves inserting the needle lateral to the midline, in the direction of the pedicle. Proponents of the paramedian approach argue that it reduces the risk of dural puncture and post dural puncture headache, while opponents argue that it is more difficult to perform and may lead to unilateral block. Despite these arguments, there is a lack of consensus on which technique is superior over the others in terms of clinical outcomes.

One of the most frequent negative outcomes experienced by patients who undergo surgery with spinal anesthesia is a headache following the procedure, known as a postspinal headache or PDPH.[1] The cause of a postspinal headache may be attributed to the irregular distribution of collagen and elastic fibers within the dura mater. Research on the structure of the dura mater has revealed that its thickness varies across different regions. Thinner areas of the dura are more prone to perforation, resulting in a greater leakage of cerebrospinal fluid (CSF), which can cause tension on the pain-sensitive dura and lead to a headache caused by low CSF pressure and vasodilation of the cerebral vessels when the patient is in an upright position. Typically, lying down can provide relief from this type of headache.[2]

Another common complication following spinal anesthesia is known as post dural puncture backache (PDPB), which involves persistent pain around the site of the spinal puncture without any associated radicular pain.[3]

## MATERIALS AND METHODS

Study Design was a prospective, randomized, controlled trial conducted in a single center at Dr. SS Tantia Medical College, Hospital and Research Center, Sri Ganganagar, Rajasthan. Study Participants comprised of a total of 90 adult patients (18 years of age or older) planned for elective surgeries under spinal anesthesia were screened for


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eligibility. Inclusion criteria included no history of allergy to local anesthetics or contraindications to spinal anesthesia. Exclusion criteria comprised of a history of prior spinal surgery or spinal deformities, pregnancy, significant cardiovascular, respiratory or neurological deficits, and inability to give informed consent. The study consisted solely of patients who were undergoing orthopedic surgeries or receiving treatment for orthopedic conditions in the orthopedics department. Randomization procedure: Eligible participants were randomized in a 1:1 ratio to receive either median or paramedian spinal anesthesia using computer-generated randomization tables. The allocation will be concealed in sequentially numbered, opaque, sealed envelopes opened just before the spinal puncture. All patients received standard preoperative care, including fasting, hydration, and prophylactic antibiotics. In the operating room, standard monitoring devices (electrocardiogram, pulse oximetry, and noninvasive blood pressure) were applied. Outcomes: Age, gender and BMI were compared as baseline characteristics. Incidence of pain was recorded and pain scores via the Visual analogue scale were compared across the groups that provided the quantitative assessment.

**Data Collection and Analysis**

Double blinding was used for data collection by trained research assistants. The descriptive statistics were used to summarize the demographic and clinical characteristics of the study participants. The differences between the median and paramedian groups was analyzed using appropriate statistical tests such as t-tests, chi-square tests, or Wilcoxon rank-sum tests, as appropriate. A p-value of less than 0.05 was considered statistically significant. This study was conducted in accordance with the ethical guidelines and had received approval from the institutional review board. Written informed consent was obtained from all study participants.

## RESULTS

A total of 90 patients were included in the study. As per the protocol equal number of patients were to be distributed across the groups but due to failure in administration in paramedian group, median approach was followed which resulted in final patient distribution of 47 and 43 across median and para median group of study participants.

While comparing the baseline characteristics age and gender were similarly distributed across two group (p value >0.05). Height, weight and BMI was also equal among the patients across different groups (p >0.05). Operating time as mean and standard deviation was comparable in both the groups with test value using t test as 0.531, p value >0.05. Number of attempts for anesthesia were also analogous but were slight more in case of median group. Means were compared using student t test while the categorical distribution was checked for significance by the use of chi square test.

**Table 1: Baseline characteristics among the study groups.**

| | | Median (n=47) | Paramedian (n=43) | Test Value | p value |
|---|---|---|---|---|---|
| Age in years (mean ± SD) | | 51.25 ± 12.5 | 54.41 ± 14.25 | t = 1.12 | 0.2655 |
| Gender | Male | 27 | 20 | 1.0762 | 0.299 |
| | Female | 20 | 23 | | |
| BMI in Kg\m2 | <18.5 | 8 | 7 | 0.578 | 0.748 |
| | 18.5-24.99 | 25 | 20 | | |
| | >24.99 | 14 | 16 | | |
| Total operation time in minutes (mean ± SD) | | 108.25 ± 21.36 | 105.95 ± 19.54 | t = 0.5314 | 0.595 |
| Number of attempts (mean ± SD) | | 1.12 ± 0.36 | 1.089 ± 0.42 | t = 0.3769 | 0.7070 |

**Table 2: Incidence & severity of pain among participants in median and paramedian group.**

| Pain | Median (n=47) | Paramedian (n=43) | Test Value | p value |
|---|---|---|---|---|
| Headache (PDPH) | 7 (14.89 %) | 5 (11.6 %) | z = 0.4552 | 0.6455 |
| Lower backache (LBA) | 12 (25.53 %) | 4 (9.3%) | z = 2.0116 | 0.0444 |
| Severity of PDPH (VAS score) Mean ± SD | 3.5 ± 1.1 | 3.1 ± 0.9 | t = 1.8777 | 0.063 |
| Severity of LBA (VAS Score) Mean ± SD | 4.9 ± 2.2 | 4.5 ± 1.8 | t = 0.9388 | 0.3504 |

In median group, PDPH (Post dural puncture headache) was observed in 7 (14.89%) of patients, while in para median group it was noted in 5 (11.6%) of patients. Additionally, lower backache was observed in 12 (25.53 %) patients in Median group and 4 (9.3%) patients in Group of paramedian approach. Only the difference of lower back ache among the two groups was statistically significant. The incidence of lower back ache was observed up to 3 months following surgery and the incidence shown is the total incidence that was reported till the end of the follow up period. There was no significant difference in the severity of the pain either headache or lower back ache in both the groups.

## DISCUSSION

The objective of this study was to compare the occurrence of post dural puncture headache (PDPH) in patients who underwent spinal anesthesia via median and paramedian approaches. Our results indicate that the incidence of PDPH was lower in the paramedian group as compared to the median group. These findings suggest that the paramedian approach


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would be a better choice to minimize the incidence of PDPH.

PDPH is the most frequent complaint reported after spinal anesthesia or analgesia, and it typically occurs several hours to days after the dural puncture.[4] The primary factor contributing to PDPH is the loss of cerebrospinal fluid (CSF) from the intrathecal space, leading to a decline in intracranial CSF volume and pressure.[5] This phenomenon induces gravitational traction on pain-sensitive structures, resulting in headache.[6]

A study conducted by Haider et al,[7] involved 25 patients undergoing elective surgical procedures under spinal anesthesia. The results revealed that the incidence of post-spinal headache was 4% and 28% for the paramedian and median approaches, respectively. In another similar study, out of 250 patients, 26 (10.4%) experienced post-spinal headaches. In comparison between the two groups, 11 out of 125 patients (8.8%) in the median group (group I) had typical post dural puncture headaches, whereas 15 out of 125 patients (12%) in the paramedian group (group II) experienced such headaches.

Lower backache is a well-known complication after spinal anesthesia, and it may lead to significant discomfort and morbidity for patients. Lower backache was reported in 12 (25.53%) patients in median group and 4 (9.3%) patients in paramedian group. The difference in the incidence of lower backache between the two groups was statistically significant. The severity of pain was not significantly different between the two groups. In a study conducted by Lee et al,[8] Group median had a greater overall incidence of PDPB (18/50, 36%) than Group paramedian (8/50, 16%) (p value = 0.023). Eight patients in Group M and six patients in Group P complained of back ache 24 hours after surgery. Pain was reported by 16 patients in Group M and 5 individuals in Group P seven days after surgery (p value = 0.007). After one month, five patients in median group and one patient in paramedian group complained of discomfort. After three months, just one patient in each group reported discomfort. During the research period, no significant variations in NRSs were observed across groups.

In a study by Rabinowitz et al, also compared the two ways of spinal anaesthesia on 100 patients having lower abdomen and lower limb procedures and discovered that the paramedian group has a lower incidence of postspinal puncture headache and backache than the median group.[9]

In another study postspinal headache was found in 4% of the paramedian group and 20% of the median approach group. The incidence of backache in both groups was 2% and 10%, respectively. The statistically computed p value was 0.05, indicating that the paramedian method was statistically significant in terms of the occurrence of both postspinal headache and backache.[10]

It is important to acknowledge the limitations of our study. Firstly, the sample size was relatively small, and a larger sample size would strengthen the reliability of the results. Secondly, we only assessed PDPH and lower backache as the outcome measures. Other critical factors such as the success rate of spinal anesthesia, hemodynamic stability, and patient satisfaction were not evaluated in this study.

## CONCLUSION

To sum up, our study suggests that the paramedian approach could be a more favourable choice in reducing the incidence of both PDPH and lower backache following spinal anaesthesia. However, more extensive studies with larger sample sizes and more comprehensive outcome measures are required to confirm the findings of this study.

## REFERENCES


1. Wulf HF. The centennial of spinal anesthesia. Anesthesiology. 1998;89:500–6.
2. Patin DJ, Eckstein EC, Harum K, Pallares VS. Anatomic and biomechanical properties of human lumbar dura mater. Anesth Analg. 1993;76:535–40.
3. Benzon HT, Asher YG, Hartrick CT. Back pain and neuraxial anesthesia. Anesth Analg. 2016;122:2047–58.
4. Blomberg S, Emanuelsson H, Kvist H, Lamm C, Pontén J, Waagstein F, et al. Effects of thoracic epidural anesthesia on coronary arteries and arterioles in patients with coronary artery disease. Anesthesiology. 1990;73:840–7.
5. Wantman A, Hancox N, Howell PR. Techniques for identifying the epidural space: A survey of practice amongst anaesthetists in the UK. Anaesthesia. 2006;61:370–5.
6. Boon JM, Prinsloo E, Raath RP. A paramedian approach for epidural block: An anatomic and radiologic description. Reg Anesth Pain Med. 2003;28:221–7.
7. Haider SJ, Butt KJ, Aziz MA, Qasim M. A post dural puncture headache: Comparison of midline and paramedian approach. Biomedica. 2005;21:90–2.
8. Lee JH, Yoon DH, Heo BH. Incidence of newly developed postoperative low back pain with median versus paramedian approach for spinal anesthesia. Korean J Anesthesiol. 2020 Dec;73(6):518-524.
9. Rabinowitz A, Bourdet B, Minville V, Chassery C, Pianezza A, Colombani A, et al. The paramedian technique: A superior initial approach to continuous spinal anesthesia in the elderly. Anesth Analg. 2007;105:1855–7.
10. Singh B, Sohal AS, Singh I, Goyal S, Kaur P, Attri JP. Incidence of Postspinal Headache and Low Backache Following the Median and Paramedian Approaches in Spinal Anesthesia. Anesth Essays Res. 2018 Jan-Mar;12(1):186-189.




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