

## Research Article

# A comparative evaluation between median and paramedian approaches for sub-arachnoid block in elderly patients

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### ABSTRACT

**Background:** Spinal anaesthesia in elderly patients is frequently associated with significant technical difficulties. Spinal anaesthesia can be given by either paramedian or median approach. Paramedian approach has been used as an alternative in case of failure with median approach. The goal of this study is to determine which of these two approaches should be preferred as a first choice of spinal anaesthesia in elderly patients.

**Methods:** The study included 100 patients of either sex, aged 50 years and above, who received spinal anaesthesia either with the midline approach (group M, n=50) or paramedian approach (group PM, n=50).

**Results:** The success rate of paramedian group was 100% as compared to 96 % in median group. The first attempt success rate was 90% in group PM and 70% in group M. Paraesthesia was felt in 5 patients (10%) in midline group and in 2 patients (4%) in paramedian group. Hemorrhagic tap was seen in 2 patients each in both the groups. None of the patients in Group M had postdural puncture headache (PDPH) as opposed to 2 patients in Group M.

**Conclusions:** Thus the study conclude that paramedian approach is a better approach for spinal anaesthesia in elderly patients in terms of success rate, success at first attempt, complications like paraesthesia, PDPH and failure of sub-arachnoid block. Thus study recommends the routine use of paramedian approach for sub-arachnoid block in elderly patients as first choice.

**Key words:** Paramedian approach, Classic median approach, Sub-arachnoid block, Spinal anaesthesia, Elderly patients

### INTRODUCTION

Subarachnoid (spinal) block is a safe and effective form of anaesthesia when the surgical site is located on the lower extremities or perineum. It is simpler, cheaper and offers better physiological benefits with lesser complications than general anaesthesia.<sup>1</sup>

It can be given by either median or paramedian approach. For the midline approach, the desired interspace is palpated and local anaesthetic is injected into the skin and subcutaneous tissue. The introducer is placed with a cephalad angle of 10 to 15 degree followed by passing of the spinal needle through the introducer. The needle goes through the subcutaneous tissue, supraspinous ligament,

interspinous ligament, ligamentum flavum, epidural space, dura mater, and subarachnoid mater in order to reach the subarachnoid space. If the patient has a heavily calcified interspinous ligament (as seen in elderly patients) or difficulty in flexing the spine, a paramedian approach is used for spinal anaesthesia.

After identifying the correct level for spinal anaesthesia placement, the spinous process is palpated. The needle is inserted 1 cm lateral to this point and directed toward the middle of the interspace. The ligamentum flavum is usually the first resistance felt. When the spinal needle goes through the dura mater, a pop is often appreciated. Accurate identification of the subarachnoid space is very important as multiple attempts at needle

insertion may cause discomfort to the patient, higher incidence of spinal hematoma, trauma to the neural structures and PDPH.<sup>2</sup>

Median approach is routinely practised whereas paramedian approach is used only when midline approach has failed or is not possible due to anatomical variations like ankylosing spondylitis. Hence this study was conducted to compare the efficacy of midline and paramedian approach of spinal anaesthesia with regards to success rate, difficulties, advantage and complications in geriatric patients.

## METHODS

After obtaining approval from the institutional ethical committee, this study was conducted in S.S. Medical College, Rewa, Madhya Pradesh, India. Well informed and written consent was obtained and 100 patients scheduled to undergo elective surgery under spinal anesthesia were included in the study. Inclusion criteria were patients with age 50 years and above, posted for surgery under spinal anesthesia. Exclusion criteria were patients not giving consent for spinal anesthesia, pre-existing neurological disorders, coagulopathies, and infection at the site of puncture, spinal abnormalities and more than three attempts for spinal. Selected patients were allotted to Group M (patients receiving spinal anesthesia with midline approach) or Group PM (patients receiving spinal anesthesia with paramedian approach) by

randomization. Each of the two groups had 50 patients each.

After pre-operative evaluation and routine investigations, all the patients were pre-loaded with 500 ml Ringer's lactate and monitoring was done using ECG, pulse oximetry and non-invasive blood pressure. Under all aseptic conditions, spinal anesthesia was given with 25 gauge Quinke's spinal needle with either the midline or paramedian approach in sitting position at L3-L4 interspace. Around 2.5 to 3.5ml of 0.5% (heavy) bupivacaine was used according to the type of surgery. In case of failure or insufficient block, general anesthesia was given and patient was excluded from the study. The number of attempts to give successful sub-arachnoid block, success rate, paraesthesia (sharp shooting pain along the nerve roots), bloody tap, skin to needle distance was observed. The patients were observed for 48 hours for PDPH.

## RESULTS

The mean age in the midline group was 68.5±9.8 yrs and in the paramedian group 69.6±8.7 yrs. The mean weight in group M was 62.12±5.6 kg and in paramedian group was 64.24±6.2 kg. The mean age and weight were statistically insignificant in both the groups. There were 23 females and 27 males in midline group. The paramedian group had 26 females and 24 males.

**Table 1: Demographic characteristics.**

	Group M	Group PM	P value	Remarks
Age (years)	68.5±9.8	69.6±8.7	0.55	Statistically insignificant
Weight (kgs)	62.12±5.6	64.24±6.2	0.07	Statistically insignificant
Sex	23 (females), 27(males)	26 (females), 24 (males)		Statistically insignificant

**Table 2: Numbers of attempts for spinal anaesthesia.**

Number of attempts	Group M	Group PM
First attempt	35 (70%)	45 (90%)
Second attempt	13	5
More than three attempts	2	0

**Table 3: Complications.**

	Group M	Group PM
Haemorrhagic tap	2	2
Paraesthesia	5	2
PDPH	2	0
Failure of spinal	2	0

More than one attempt was required in 15 patients in midline group and 5 patients in the paramedian group. First attempt success rate was 70% in midline group and

90% in the paramedian group. Paraesthesia was felt by 5 patients (10%) in midline group and 2 patients (4%) in paramedian group. Haemorrhagic tap was noticed in 2

patients in midline group and in 2 patients in paramedian group which gradually cleared. 2 patients in the median group had complains of PDPH. There were 2 cases of failure of spinal anaesthesia in the median group.

## DISCUSSION

Spinal anaesthesia is performed for infra-umbilical surgeries as an alternative to general anaesthesia. It reduces post-operative morbidity and other complications. Spinal anaesthesia can be performed either by median or paramedian approach. But, midline approach is most routinely used for spinal anaesthesia. This can be difficult in elderly patients because they have calcified ligaments.

It can also be difficult in obese patients and in patients for caesarean section where adequate flexion for proper positioning is not possible. Midline approach involves passage of needle through supraspinous, interspinous and ligamentum flavum. Calcification of supraspinous and interspinous ligaments in older patients causes difficulty in passing thin gauge spinal needles. But, using large bore needles can cause pain and discomfort to the patient and also increase the incidence of PDPH. An alternative approach is paramedian approach (PMA) which is associated with lesser technical difficulties.<sup>3</sup> The PMA avoids the supraspinous and interspinous ligaments. PMA hits the ligamentum flavum directly after passing through the para-spinal muscles. The paramedian approach does not require flexed position as in midline approach.<sup>3,4</sup>

Rabinowitz A et-al conducted a study in 40 patients and compared the two approaches demonstrating success rate of 85% in PMA as compared to 45% in median approach.<sup>5</sup> Mericq O et al concluded that in patients who are elderly and with spinal deformity, PMA is a safe alternative with success rate of 100%.<sup>6</sup> Ahsan ul-haq et al demonstrated that success rate with paramedian approach was 100% with the first attempt success rate of 60%.<sup>3</sup> Our success rate with paramedian approach was 100%, with the first attempt success rate of 90%.

Paraesthesia is observed when the patient complains of a sharp pain in hips or legs while inserting the spinal needle. Blomberg RG et al showed a statistically significant difference between the two techniques with regard to repeated number of attempts and paraesthesia.<sup>7</sup> In our study paraesthesia was felt in 5 patients in the midline group and 2 patients in paramedian group.

Vascular trauma is a known complication of spinal anaesthesia. Epidural vessels are situated laterally. So midline approach provides a relatively avascular plane. On the other hand paramedian approach may encounter vessels leading to bloody tap. In our study the incidence of haemorrhagic tap was similar in both the study groups which is comparable with other studies.<sup>3</sup> PDPH is a known complication of spinal anaesthesia. It results due to excessive loss of cerebrospinal fluid (CSF) through the

dural puncture that leads to lowering of intracranial pressure and traction on intracranial structures.

PDPH depends on patient's age, number of punctures, needle size and bevel. With the paramedian approach there is lesser leakage of CSF and less chances of PDPH.<sup>8</sup> Only 2 patient in our median group had complains of PDPH. This may be attributed to the use of smaller gauge needle (25 G), older age group ( $\geq 50$  yrs of age) and single punctures in our study. Other complication like backache was not present.

In paramedian approach of spinal anaesthesia, by placing the needle laterally, the anatomical limitation of the spinous process is avoided. This is of advantage in elderly patients where interspinous spaces are difficult to open up due to inadequate flexion. Our study demonstrates that the paramedian approach is more effective than median approach for spinal anaesthesia with 100% success rate. In our study paramedian approach was better as regards to success rate (100%), the first attempt success rate (90%) and paraesthesia (4%).

## CONCLUSION

Thus the study conclude that paramedian approach is a better approach for spinal anaesthesia in elderly patients in terms of success rate, success at first attempt, complications like paraesthesia, PDPH and failure of sub-arachnoid block. Thus study recommends the routine use of paramedian approach for sub-arachnoid block in elderly patients as first choice.

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