



Spinal Anaesthesia with Midline and Paramedian Technique in Elderly Patients

KEYWORDS

Spinal anaesthesia, midline, paramedian, elderly patients.

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ABSTRACT Spinal anaesthesia can be given by midline or paramedian approach. It can be difficult by the midline approach in elderly patients due to calcified ligaments. An observational study was conducted to find out the efficacy, success rate, advantages and complication of midline and paramedian technique for spinal anaesthesia in elderly patients.

The study included 100 patients of either sex, aged 60 years and above, who received spinal anaesthesia either with the midline approach (group M, n=50) or paramedian approach (group P, n=50). The success rate of both the groups was 100%, while the first attempt success rate was 92% in group P and 68% in group M. Paraesthesia was felt in 4 patients (8%) in midline group and in 2 (4%) in paramedian group. Hemorrhagic tap was seen in 2 patients in group P as against one in midline group. None of the patients had postdural puncture headache (PDPH).

Thus we conclude that paramedian approach is a better approach for spinal anaesthesia in elderly patients and should be routinely used as first choice.

Introduction

Subarachnoid blockade is widely used due to its procedural simplicity, low cost and better physiological benefits and thus reduced complications than that of general anaesthesia.¹ Subarachnoid space can be approached from the posterior aspect of the vertebral body either through the midline or paramedian approach (PMA). Accurate identification of the subarachnoid space is paramount as multiple attempts at needle insertion may cause patient discomfort, higher incidence of spinal hematoma, trauma to the neural structures and PDPH.² The most commonly practiced technique is the midline approach.³ This approach is technically difficult in the geriatric patients because of degenerative changes in the spine.⁴ Calcification of supraspinous and interspinous ligaments in the geriatric age group makes midline approach difficult.

Paramedian approach is not routinely practiced and is used only when midline approach has failed or is not possible due to anatomical variations like ankylosing spondylitis.⁵ PMA is also a very easy and effective technique that can be practiced routinely as well as for some clearly indicated cases.

Thus we decided to do an observational study to find out the efficacy of midline and paramedian approach of spinal anaesthesia with regards to success rate, difficulties, advantage and complications in geriatric patients.

Method

After ethical approval, an observational study was conducted in Karpaga Vinayaga Institute of Medical Sciences. Informed consent was obtained and 100 patients scheduled to undergo elective surgery under spinal anaesthesia were included in the study. Inclusion criteria were patients with age above 60 years undergoing surgery under spinal anaesthesia.

Exclusion criteria were patients not willing for spinal anaesthesia, 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 received spinal anaesthesia with midline approach) or Group P (patients received spinal anaesthesia with paramedian approach) by systemic randomization. Each group had 50 patients. Preoperative evaluation and routine investigations were done. All the patients were pre-loaded with 500 ml Ringer's lactate and monitoring was done with ECG, heart rate, noninvasive blood pressure and arterial oxygen saturation.

Under all aseptic conditions, spinal anaesthesia was given with 25 gauge 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. An attempt was considered unsuccessful if the operator removed the stylet and there was no CSF. In case of failure or insufficient block, general anaesthesia was given.

The number of attempts, success rate, paraesthesia (sharp shooting pain along the nerve roots), bloody tap, skin to needle distance was observed. The patients were followed for 48 hours for PDPH.

Results

Age of the patients varied between 60 and 82 years. The mean age in the midline group was 66.3 and in the paramedian group 68.1.

The mean weight in group M was 60.72 kg and in paramedian group was 61.18 kg. The mean age group and weight were similar in both the groups.

There were 22 females and 28 males in midline group. The paramedian group had 26 females and 24 males.

Table 1. Demographic data

	Group M	Group P
Mean age (in years)	66.3	68.1
Mean weight (kg)	60.7	61.8

More than one attempt was required in 16 patients (32%) in midline group and 4 patients (8%) in the paramedian group. First attempt success rate was 68% in midline group and 92% in the paramedian group.

Table 2. Number of attempts

Attempts	Midline group		Paramedian group	
	Number of patients	Percentage	Number of patients	Percentage
First	34	68%	46	92%
Second	16	32%	4	8%
More than three	0	0	0	0

Paraesthesia was felt by 4 patients (8%) in midline group and 2 patients (4%) in paramedian group.

Haemorrhagic tap was noticed in 1 patient in midline group and in 4 patients in paramedian group which gradually cleared.

Mean skin to space distance was 4.6 cm in midline group and 5.8 cm in paramedian group.

None of the patient in both the groups had any PDPH or any other complication. There was no failure of spinal anaesthesia.

Table 3. Prevalence of side effects

Side effects	Midline group		Paramedian group	
	Frequency	Percentage	Frequency	Percentage
Haemorrhagic tap	1	2%	4	8%
Paraesthesia	4	8%	2	4%
PDPH	0	0	0	0

Discussion

Spinal anaesthesia is performed for lower abdominal and lower limb surgeries as it reduces post operative morbidity and other complications.

Usually spinal anaesthesia is performed using the midline approach. This can be difficult in elderly patients with calcified ligaments. It can also be difficult in obese patients and in patients for cesarean 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. Also using large bore needles can cause patient discomfort, pain and increase incidence of PDPH.

An alternative approach to needle placement is paramedian approach (PMA) and is associated with less technical problems as compared to midline approach⁶. The PMA avoids the supraspinous and interspinous ligaments. PMA hits the ligamentum flavum directly after passing through the para-spinal muscles. In PMA, there is less chance of bending or kinking of needle as bony ligaments are avoided. The paramedian approach does not require flexed position as in midline approach^{6,7}.

Podder et-al concluded that with a patient sitting in an

unflexed position it is usually possible to insert needle in PMA than in median approach⁸.

Rabinowitz A et-al conducted a study of 40 patients and compared the two approaches demonstrating success rate of 85% in PMA as compared to 45% in median approach⁹.

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%¹⁰.

Ahsan -ul-haq et al demonstrated that success rate with paramedian approach was 100% with the first attempt success rate of 60%⁶.

Our success rate with paramedian approach was 100%, with the first attempt success rate of 92%.

Paraesthesia was noted when the patient complained of a sharp pain in hips or legs while inserting the needle. Blomberg et al showed a statistically significant difference between the two techniques with regard to repeated number of attempts and paraesthesia¹¹.

In our study paraesthesia was felt in 4 patients in the midline group and 2 patients in paramedian group.

Vascular trauma can be a 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 in the paramedian group was 8% which is comparable with other studies⁶.

Behzad et al compared the median and paramedian approaches and demonstrated that the distance from skin to subarachnoid space was more in the paramedian group¹². Our study shows that the mean distance was more in the paramedian group than the midline group (5.8cm v/s 4.6cm).

PDPH is the commonest complication of spinal anaesthesia. It results due to excessive loss of cerebrospinal fluid (CSF) through the dural puncture resulting in lowering of CSF pressure and traction on intracranial structures. PDPH depends on patient's age, number of punctures, needle size and bevel. The incidence is reduced when smaller size Quinke needle is used. With the paramedian approach there is less leakage of CSF and less chances of PDPH¹³. None of our patients in the study had PDPH. This may be due to smaller gauge needle, older age group and single punctures in our study.

Other complications like backache was not present in our study as there was no excessive flexion, use of large gauge needles, and multiple punctures.

Advantage of the paramedian approach is a large target area. By placing the needle laterally, the anatomical limitation of the spinous process is avoided. This is of advantage in elderly patients where interspinous spaces may not open up due to inadequate flexion.

This study demonstrates that the paramedian approach is effective for spinal anaesthesia with 100% success rate. In our study paramedian approach was better as regards to success rate, the first attempt success rate and paraesthesia.

In conclusion, paramedian approach is better than midline approach especially in the geriatric patients and should be used more often as the first approach and not after midline fails.

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