

# Spinal Anaesthesia with Midline and Paramedian Technique in Pregnant Patients undergoing Lower Segment Caesarean Section Under Spinal Anaesthesia

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## Abstract

*Background and AIMS:* Subarachnoid blockade is widely used due to its simplicity, low cost and reduced complications due to general anaesthesia. Subarachnoid space can be approached from midline or paramedian approach (PMA). Accurate identification of the subarachnoid space is paramount as multiple attempts at needle insertion may cause patient discomfort, backache and Post Dural Puncture Headache (PDPH). The most commonly practiced technique is the midline approach. This approach is technically difficult in pregnant women due to inability to flex the spine adequately. The aim of the study is to compare the characteristics of midline approach (M) vs paramedian (P) for administration of spinal anaesthesia in patients posted for LSCS with respect to number of attempts, highest level of analgesia, duration of anaesthetic procedure and side effects such as blood tap, backache and PDPH after 48 hours. *Materials and Method:* 60 patients posted for caesarean section under spinal anaesthesia were divided into Group M: Spinal anaesthesia by Midline approach and Group P: Spinal Anaesthesia by Paramedian approach. The number of attempts, highest level of analgesia, duration of anaesthetic procedure and side effects such as blood tap, backache and PDPH after 48 hours were noted. *Results:* Paramedian group took fewer attempts and less time and a higher level of spinal block was achieved with the midline technique of spinal anaesthesia. *Conclusion:* Paramedian approach may be a better approach in the parturient as compared to the midline for administering spinal anaesthesia for LSCS.

**Keywords:** Parturient for LSCS; Midline Spinal; Paramedian Spinal Technique.

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## Introduction

Subarachnoid blockage is widely used due to its procedural simplicity, low cost and better physiological benefits and thus reduced complications that can occur during 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.

The most common technique is the midline approach. This approach is technically difficult in the pregnant patients because of lumbar lordosis and sacral oedema [2]. Midline approach has its own advantages like it is less traumatic as compared to midline approach due to fewer structures being

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pierced, also fewer blood taps are encountered as the epidural veins are located lateral from the midline [3].

Paramedian approach is not routinely practiced and is attempted when midline approach has failed or is not possible due to anatomical variations like ankylosis spondylosis [4]. The paramedian approach is especially useful when degenerative changes are encountered in the interspinous structures in elderly patients, when an ideal position is difficult to achieve like in pregnant women [5,6].

Advantages of this approach is that a larger target area is available through the interlaminar space and avoidance of the supraspinous and interspinous ligaments. This approach allows for faster procedural time, fewer attempts at needle insertion, and a lower incidence of PDPH [7,8]. This approach can be performed in patients in whom positioning due to any reason may not be optimal [9].

Failure to reach the subarachnoid space (SAS) with the midline approach may push us to use needles of a wider bore which can lead to a higher chance of patient discomfort, PDPH or back aches [10].

There is a better sense of accurate depth of needle penetration and needle control with the paramedian approach. This allows space attainment to be more accurate. Since only the ligament flavum is penetrated in this approach, less chance of needle kinking occurs [11].

Paramedian approach is an easy and effective technique that can be practiced routinely as well as for some clearly indicated cases.

## Materials and Method

Institute Ethics Committee clearance was obtained before commencement of the study. A prospective, randomised study was done between June 2016 and September 2016. All patients were subjected to a thorough pre- anaesthetic evaluation and relevant laboratory investigations were carried out. The patients were explained about the study in the language which is feasible to them and informed consent was obtained. The study was conducted on 60 American Society of Anaesthesiologist II fit patients (30 in each group) scheduled for elective and emergency LSCS.

Patient characteristics including age, height, weight and gestational age was noted prior to induction.

In the pre-operative waiting area an intravenous (IV) line was secured for all patients and they were

premedicated with Inj. Ranitidine 50mg and Inj. Metoclopramide 10 mg prior to induction. Preloading with 10 -15 ml/kg body weight using ringer's lactate was done.

Once in the operation theatre, application of standard monitoring equipment like non-invasive blood pressure [NIBP], electrocardiogram (ECG), and pulse oximetry SpO<sub>2</sub> was attached. Baseline vitals were recorded blood pressure and heart rate were measured with the patient in left lateral position. Under all aseptic conditions, local anaesthesia was given in the most suitable intervertebral spaces followed by spinal anaesthesia that was performed in the sitting position using a 26 G Quincke's needle in the L3-L4 or L4-L5 interspinous space.

Group P consisted of 30 randomly selected patient who were given spinal anaesthesia using the paramedian approach

Group M consisted of 30 randomly selected patients who were given spinal anaesthesia using the midline approach.

All patients received 2ml of 0.5% hyperbaric bupivacaine intrathecally. The patients were then placed in the supine position with a 15-degree left lateral tilt.

The number of attempts, level of analgesia and any complications like number of haemorrhagic taps was noted. Hypotension was defined as fall in systolic blood pressure less than 90 mmHg and was treated with boluses of 6mg Inj mephentermine and fluid replacement with ringer's lactate solution.

ECG, SpO<sub>2</sub> and NIBP were monitored for every 3 minutes till the delivery of the baby and after every 5 minutes till the end of the procedure.

The patients were followed up after 48 hours for PDPH.

### Statistical Analysis

All the results obtained in both the groups were tabulated and compared clinically as well as statistically. All the data WAS expressed as mean with standard deviation (SD).

The quantitative data was analysed using test of significance based on student's t-test. Inferences and conclusions of the study were drawn based on the statistical analysis. p values <0.05 was taken as significant and p value <0.001 as highly significant.

Sample size was calculated using Winpepi statistical package at a significance level of 5% with power 80%. A total sample size of 60 cases (30 cases in each group was obtained).

**Results**

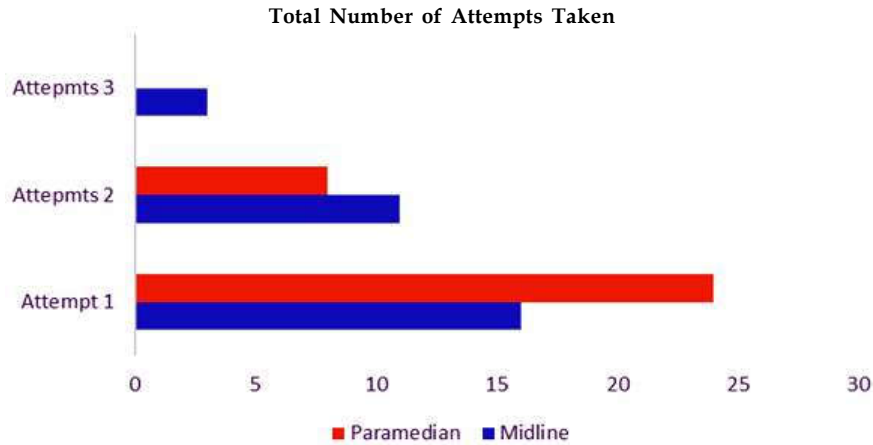
The demographic data and duration of surgery were similar in both groups.

The paramedian group took fewer attempts to achieve the SAS with a p value of < 0.01 (Graph 1).

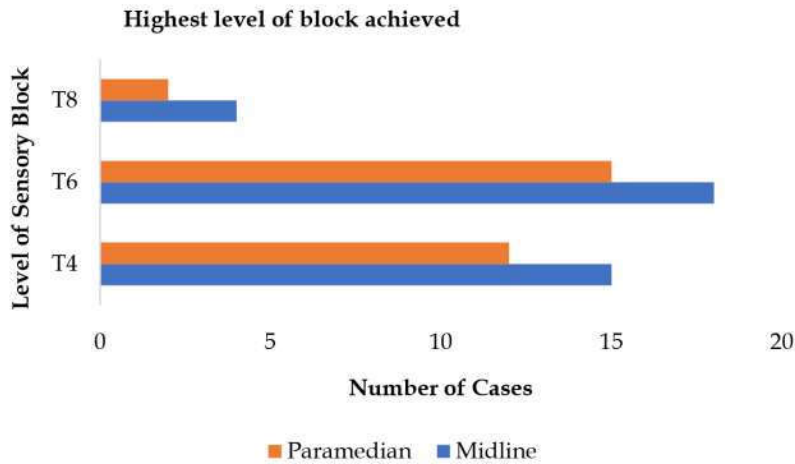
The level of spinal block achieved with the midline technique was higher than that with the paramedian technique (Graph 2).

More number of blood taps were seen in the paramedian group (Graph 3).

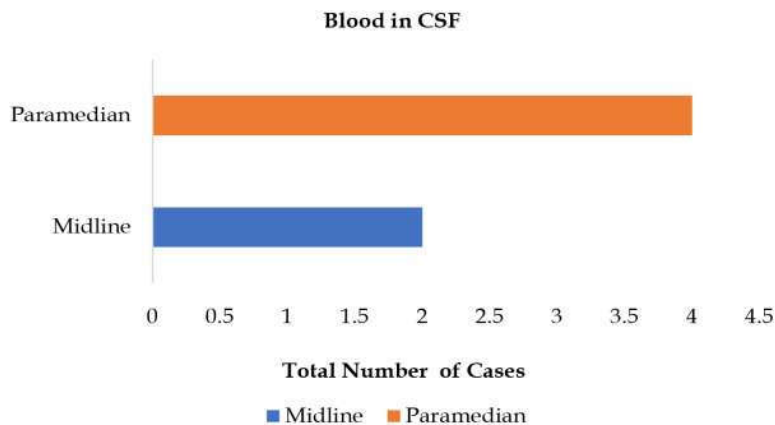
PDPH was seen more frequently in the Midline cases (Graph 4).



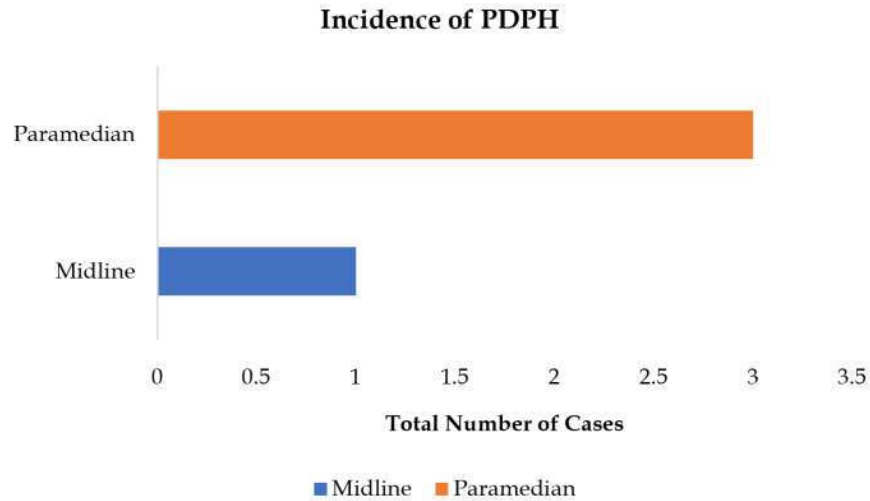
**Graph 1:** Total number of attempts taken to achieve the subarachnoid space



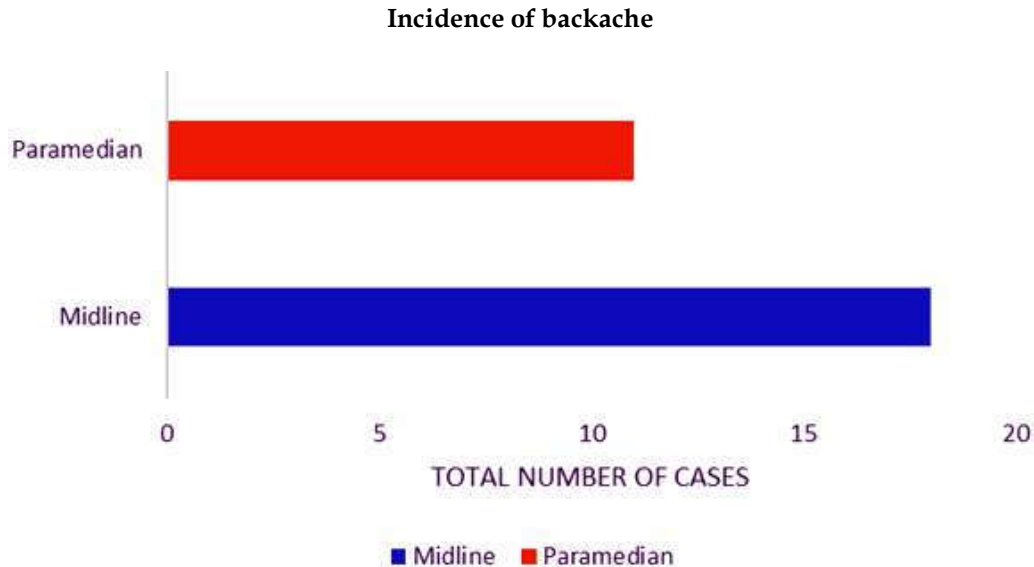
**Graph 2:** Level of sensory block



**Graph 3:** Blood in Cerebrospinal fluid



**Graph 4:** Incidence Post Dural Puncture Headache



**Graph 5:** Incidence of backache

More patients who were given the midline technique of spinal anaesthesia complaint of backache as compared to those who were in the paramedian group (Graph 5).

### Discussion

Spinal anaesthesia for caesarean section has several advantages over general anaesthesia like decreased risk of failed intubation, decreased risk of pulmonary aspiration of gastric contents and avoidance of the depressant effects of general anaesthetics on the neonate. Single shot spinal is most

commonly performed because it is simple, quicker, has faster onset with superior quality of block and infrequent failure, lesser risk of systemic toxicity due to local anaesthetic agent and lesser transfer to foetus as lower doses are used and because of its cost effectiveness.

Spinal anaesthesia can be administered in various ways. One of these being a midline approach and the other being a paramedian approach.

In the midline approach the needle has to pass through 3 ligaments and a narrow interspinous space in order to reach the SAS. Most of the resident anaesthetists are trained in this approach and it is the preferred technique used by them to administer

spinal anaesthesia. The benefit of the technique is that since the epidural vessels are situated lateral to the midline, blood in CSF is a less common occurrence while using this technique. However, in patients who cannot attain the optimal position of flexion of the spine due to scoliosis, ankylosis spondylitis [12] or like in our study parturient, multiple attempts and redirecting manoeuvres are needed to be able to reach the SAS. This causes discomfort to the patients and will lead to backache post procedure [13]. Back pain after spinal anaesthesia has been attributed to tears or other trauma to the ligaments, fascia, or bone with localized bleeding or to injury to the nerve roots in the cauda equina [14].

An alternative to the midline approach is the paramedian approach. In this technique only the ligament flavum is traversed and so it is an easier technique in patients who are not positioned properly and in those who have calcified ligaments. This may also be the reason as to why success rates in obtaining the SAS in the first attempt is higher than that of the midline technique. This will lead to fewer patients complaining of backache in the postoperative period. However incidence of blood in CSF which using this technique is slightly higher than the midline technique [15].

Leeda et al. [7] conducted study wherein they concluded that paraesthesia postoperatively was seen more in patients who were given the midline approach to spinal anaesthesia.

Joucot et al. [16] conducted a study where in the success rate at the first attempt was higher in paramedian approach as compared to median approach and the incidence of paraesthesia was definitely higher in midline approach (48%) as compared to paramedian approach (24%).

A similar study was done by Reynolds F [17] wherein he studied paraesthesia following spinal anaesthesia and he noted that injury to the spinal cord was more common than we assume while giving spinal anaesthesia more likely due to anatomical variations that we do not anticipate.

Muhammad Ahsan-ul-haq et al. [5] conducted a study on paramedian technique and demonstrate that success rate with paramedian approach was 100% with the first attempt success was 60%.

In our study we found that the total number of attempts were more in the Midline group, a higher level of block was achieved while using the Midline technique, more patients complaint of backache in the Midline group and incidence of PDPH was more in the Midline group of patients. Paramedian group

of patients had a slightly higher incidence of blood in the CSF.

## Conclusion

Our study concluded that Paramedian approach may be a better approach in the parturient as compared to the midline for administering spinal anaesthesia for patients taken up for LSCS.

There is difficulty in achieving adequate flexion in pregnant patients. This discomfort is avoided due to the ease of lumbar puncture using paramedian approach in an unflexed spine.

Hence residents need to be well versed with the paramedian approach to spinal anaesthesia as well as they are with the Midline approach.

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