



MIDLINE VERSUS PARAMEDIAN APPROACH TO SPINAL ANESTHESIA FOR CAESAREAN DELIVERY: IT MAY BE BETTER NOT TO BE IN THE MIDDLE!

Anaesthesiology

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ABSTRACT

Subarachnoid block (SAB) more popularly called as Spinal anesthesia, remains a golden standard technique of anesthesia in caesarean delivery given its simplicity, reliability, safety and cost effectiveness. and particularly many significant advantages of the later technique compared to General anesthesia pertinent to this population group. The most commonly approach to spinal anesthesia till date remains the midline approach. But in pregnant women, given their limited ability to flex the spine, and also to lumbar lordosis associated with term pregnancy, the midline approach may be difficult at times as the success of the later depends much on the flexibility of the lumbar spine. So, the paramedian approach to the subarachnoid space that does not depend on the patient's spine flexibility is always a better option in the patients for caesarean delivery. **Aim of the study** The aim of our study was to compare was to compare the midline and paramedian approach to Spinal anesthesia in terms of number of attempts, time taken to complete the effective injection into the subarachnoid space, and side effects like post dural puncture headache (PDPH) and backache resulting from the subarachnoid injection. **Materials and methods** Sixty patients posted for elective and Emergency Caesarean section were randomly divided into two groups of 30 patients each. In one group SAB was established by using the midline approach and in the other group, the subarachnoid space was accessed by using paramedian approach as a primary technique to achieve subarachnoid block. The patients were followed up for 72 hours post procedure to take note of complications like backache and PDPH and managed accordingly. **Results** SAB using Paramedian approach was established in fewer attempts and in less time compared to the midline approach. The risk of complications like PDPH and backache associated with spinal anesthesia were also observe less to occur with paramedian approach than with midline approach. **Conclusion** Paramedian approach to SAB is a better option than midline approach for spinal anesthesia technique in patients for caesarean deliveries; the former approach requires relatively fewer attempts and the procedure time and risk of complications are lesser compared to the later approach.

KEYWORDS

Spinal Anesthesia, Midline Approach, Paramedian Approach, Caesarean Delivery, PDPH

INTRODUCTION

Subarachnoid block (SAB) has been the most commonly used technique of anesthesia in caesarean deliveries all over the world now for many years. This is because of its simplicity, quick onset, dense block, reliability, low cost, and overall, its safety when performed and monitored by experienced practitioners. In pregnant patients especially it has many advantages over general anesthesia as it obviates the risk of difficult or failed airway control and risk of aspiration that is particular higher in this population group. Besides it may put the new born at less risk to get exposed to medications that is needed to establish and maintain General anesthesia. In such a population group, it may also help reduce the overall surgical bleeding and the risk of thromboembolic phenomenon, and may also facilitate early bonding between the mother and the new born as soon the latter is born.

The SAB can be established by a midline (ML) approach or paramedian (PM) approach. In ML approach, the needle path traverses through more structures i.e. supraspinous ligament, inter spinous ligament and then ligamentum flavum before the needle enters the subarachnoid space(SAS) through the interspinous window between the spinous process of the two adjacent vertebrae, whereas in PM approach the needle enters the SAS through wider interlaminar space between the laminae of two adjacent vertebrae, and has to pierce a single ligament i.e. Ligamentum flavum to get access into the space. Moreover, the success of the ML technique is depended on the flexibility of the lumbar spine that opens up the interspinous space the needle needs to traverse to get access into the SAS. On the other hand, in PM approach, the needle path to SAS involves interlaminar space that is wider than the interspinous space and does not depend on the flexibility of the spine for its success.

The technique most common used for spinal anesthesia, including that in parturient for caesarean delivery has been the ML technique. The PM approach has been mostly used as a rescue technique when multiple attempts fail to succeed in the ML approach or in elderly patients due to challenges caused by change in the lumbar spine like degenerative changes in vertebrae, decrease in joint distance,

limitation of joint movements and spine flexibility, and increase in osteophytes.

In pregnant patients the ability to flex the lumbar spine due to gravid uterus may be limited. Lumbar lordosis associated with term pregnancy may further add to this limitation. So, in such population group the ML approach at times may prove challenging. The PM approach that does not depend on lumbar spine flexibility, and uses a wider interlaminar space to reach SAS for a successful SAB can be an attractive choice in such patients.

MATERIALS AND METHODS

After obtaining permission from the Hospital Ethical committee for the research, sixty patients posted for elective and emergency Caesarean Delivery (CD) under spinal anesthesia were allocated randomly into two groups of 30 patients each, the ML group and the PM group. The demographic characteristics of the patients including the age, height, weight, and gestational age was recorded.

All the patients were given aspiration prophylaxis as per the hospital protocol in the OR holding area before shifting them to operating room. In the operating room intravenous access was obtained and infusion of lactated Ringer solution started. Equipment for standard patient monitoring including heart rate, blood pressure, SPO₂, ECG were attached. All the patients were given spinal anesthesia in sitting position using aseptic technique with 25 G pencil point needle with an introducer provided with the needle randomly using either ML approach or PM approach as a primary spinal anesthesia technique. In all patients 0.5 % bupivacaine heavy 10- 12.5 mg was used without adjuvant. In ML technique, while in the sitting position, the patients were encouraged to flex her lumbar spine as much as possible and the spinous processes of the desired vertebrae were felt and the suitable target space was selected. A weal was raised by infiltration of the local anesthetic (LA) below the lower edge of the spinous process of the selected upper vertebra. The spinal needle was introduced through the weal after giving a while for the LA to act to access the SAS. After successful aspiration of cerebrospinal fluid (CSF), the LA was deposited in SAS by careful and slow injection. The needle was withdrawn, the puncture site covered with a sterile plaster and the

patient shifted back to the supine position.

In the PM approach, the point of the needle entry was selected as 1cm lateral and caudal to the upper spinous process of the vertebrae of desirable space. The spinal needle was directed by 10 -15 degrees angle medially and cephalad to reach the corresponding SAS. The injection was completed after successful aspiration of CSF in ML technique. The number of attempts and the total procedural time was recorded in each patient. The patients were followed up to 72 hours post injection for any possible complication like PDPH and Backache.

Statistical Analysis

The intergroup statistical and clinical comparison was expressed as mean with standard deviation (SD). The quantitative data was analyzed by using tests of significance based on student's t-Test. P values less than 0.05 were considered as statistically significant in comparative data analysis.

Table 1.1 Demographic Characteristics; ML: midline, PM: Paramedian; NS: non-significant

Parameter	ML group(n=30)	PM group(n=30)	p-value
Age	28±3.8	28±2.5	NS
Weight	70±5.3	75±4.2	NS

RESULTS

There was no statistical significance in demographic data comparisons between two groups. The PM approach was successful in fewer attempts and took lesser time to complete a successful injection into SAS than ML group. However, the height of block was a bit higher in ML group compared to PM group but it did not lead to any significant hypotension in ML group or any inadequate block for the surgery in PM group.

However, PDPH was observed more frequently in ML group than in PM group as the patients were followed for 72 hours in postoperative period. The incidence of backache following the spinal injection was also higher in ML group vis-à-vis PM group.

Table 1.2 Comparative analysis of the groups ML: midline, PM: paramedian, PDPH: Post dural puncture headache

Parameter	ML group(n=30)	PM group(n=30)	p-value
Mean additional attempts in a patient	2.6±0.8	2±0	0.41
No. of the patients required additional attempts	3(10 %)	2(6%)	0.24
Incidence PDPH	3(10%)	2(6%)	0.24
Backache	5(17%)	3(10%)	0.37

DISCUSSION

SAB for CD has been an anesthetic technique of choice for such long time, for many years now. It is a simple, quick, reliable, economical and safe method of anesthesia. In pregnant patients particularly, a successful SAB has advantages of getting away with any possibility of airway complications and risk of aspiration, the incidence of which is higher in this patient population than in others. It further reduces the possible exposure of new born to the side effects of any medication administered to mother while establishing and maintaining general anesthesia. It further promotes the early bonding between the mother and her newly born baby. In most of the pregnant patients for CD until the present, the ML approach is being most commonly and rather conventionally used. The later approach to SAS is largely dependent upon the ability of the patient to flex her /his lumbar spine that opens up the space between two adjacent spinous process to get an access to SAS for a successful SAB. In term pregnancy due to gravid uterus and also to the lumbar lordosis associated with the advanced pregnancy, the ability of the patient to flex her spine may be limited and as such at times it may be challenging to establish a successful SAB through ML technique. On the other hand, the PM approach that uses a wider interlaminar space and does not depend on lumbar flexibility like ML approach, is an attractive choice. The approach allows faster procedural time and fewer attempts at the needle insertion. Besides as the needle traverses only ligamentum flavum in PM approach vis-à-vis three ligaments in ML approach, the possibility of any ligament injury and thus any resultant backache is less in PM approach as compared to ML approach. Moreover, the incidence of PDPH was seen lower with

PM technique compared to ML approach. This may be also partly due to tendency to use wider bore needles and repeated dural trauma with multiple attempts in ML technique. We did not encounter any significant blood taps in PM approach compared to ML approach as has been reported in some studies.

In literature, we found at present, many studies that have demonstrated the superiority of PM technique over ML technique for successful SAB in CD.

CONCLUSION

Our study concluded that the PM approach, which has not received much attention by the clinicians, is an attractive and better option to establish a successful SAB in the patients for CD. The approach allows faster procedure time, fewer attempts at needle insertion and less incidence of PDPH and backache. So, it should be apt to say, in such patients, "it may be better not to be in the middle".

For any queries or comments pertinent to the above article please write to us at drishratmir@hotmail.com

Conflict of interest: No conflict interest

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