



A STUDY TO COMPARE MEDIAN VERSUS PARAMEDIAN APPROACH REGARDING INCIDENCE OF POSTDURAL PUNCTURE HEADACHE AND LOW BACKACHE UNDER SPINAL ANESTHESIA IN CEASAREAN DELIVERY.

Anaesthesiology

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ABSTRACT

Background: Postdural puncture headache and low backache can be devastating for some parturients and for treating doctors. Though the incidence of complications has reduced drastically due to developments in spinal needle, the problem still exists. Studies suggest that paramedian approach is better alternative than median approach. So, this study was planned to evaluate effect of commonly used spinal needle by either of the approach on postoperative complications. **Method:** 200 parturients of age 18-35 years with ASA physical status I-III undergoing elective caesarean delivery under spinal anaesthesia were included in this study. Group M (n=100): parturients who received spinal anaesthesia by palpating spinous process and inserting spinal needle in midline. Group PM (n=100): parturients who received spinal anaesthesia by entering a spinal needle at a point 1cm lateral and 1cm below the spinous process at 10-15° cephalad angle. Post dural puncture headache and low backache was measured using a numerical rating scale (NRS) = 0 to 10 at 24hr, 72hr and 1 week after spinal anaesthesia. **Result:** Total 38 parturients complained of low backache. In immediate postoperative period, at 24hr, 72 hr and 1 week after spinal anaesthesia, statistically more number of parturients in group M complained of low backache compared to group PM. NRS scale was comparable in both group at all the time intervals ($p>0.05$). No patients developed PDPH in either group. **Conclusion:** Paramedian approach is equally effective as median approach with regard to post dural spinal headache and low backache.

KEYWORDS

Median approach, paramedian approach, PDPH, low backache.

INTRODUCTION:

Spinal anesthesia is achieved through either, median or paramedian approach. The median approach is most commonly used for administration of spinal anaesthesia. The paramedian approach is generally selected when identification of subarachnoid space is difficult like in pregnant, obese or geriatric patients and when patients cannot be positioned easily like in arthritic or deformed spine^[1].

Patients may develop complications following spinal anaesthesia; out of which postdural puncture headache (PDPH) and low backache is common presentation. PDPH is most probably caused by traction on pain-sensitive structures from low cerebrospinal fluid pressure (intracranial hypotension) following a leak of cerebrospinal fluid at the puncture site. Factors influencing incidence of PDPH include younger age group, female sex, pregnant women, in patients with previous history of headache, shape of needle tip, size of spinal needle, bevel orientation, number of attempts, angle of approach to dural puncture and anaesthetic experience^[2,3,4].

Early postoperative mobilization may also influence PDPH^[4]. Use of pencil point and smaller diameter spinal needles has reduced the incidence of PDPH significantly. Although noncutting bevel needle and smaller diameter spinal needles are useful, they are challenging to use and carry lesser success rate due to high failure rate, availability, need of introducer and cost^[3,5]. PDPH usually occurs within 72hrs of spinal anaesthesia can last up to 7 days. Post spinal headache, generally occurs in milder form and usually resolves within a few days but for some patients and for treating doctors it can be devastating.

Backache can be the most annoying complications in the postoperative period. Excessive stretching of spinal ligaments or localized tissue trauma is proposed as pathophysiological factors responsible for low backache.

Various studies have compared effect of median and paramedian approach of spinal anaesthesia on incidence of PDPH and backache, and the results have been equivocal. In a study done by Behery and El shahat (2016)^[6], observed significant reduction of PDPH, less frequent backache, paresthesia and postoperative need for additional analgesia in paramedian approach as compared to median approach. Firdous et al (2016) observed similar results, although they were statistically insignificant.^[7] While Nisar et al (2016), observed more incidence of PDPH with paramedian approach compared to median approach with statistically insignificant results.^[10] Hence, this study was planned to evaluate and compare postoperative complications in parturients undergoing elective caesarean delivery under spinal anaesthesia by median and paramedian approach.

MATERIAL AND METHODS:

After approval from institutional ethical committee and informed written consent, this observational prospective study was conducted in a tertiary care hospital from May 2020 – June 2022. 206 parturients with American Society of Anaesthesiologist's physical status I to III, age between 18 to 35 years and any pregnant woman given spinal anaesthesia during elective caesarean surgeries were included in this study. Parturient not willing to participate or to receive spinal anaesthesia or parturients with contraindications to spinal anaesthesia (allergy to local anaesthesia, coagulopathy, local infection and indeterminate neurological disease) were excluded from the study.

Pre-anaesthesia check up of all parturients scheduled for caesarean delivery and who fulfilled inclusion criteria was done to rule out systemic illness. Patients characteristics like: age, body mass index (BMI), gestational weeks and anatomy of spine- normal/ deformed during routine pre-anaesthesia check up were noted. Patients were explained about the procedure and were made aware of numeric rating scale (0-10).

All patients were prehydrated with 500ml of Ringer lactate after obtaining intravenous access and were given inj. metoclopramide 10 mg iv slowly. In operation theatre, standard monitors like pulse oximetry, manual blood pressure and ECG were attached. Approach of spinal anaesthesia was decided by attending anaesthesiologist and considered as Group M (n=100): in patients who received spinal anaesthesia by palpating spinous process and inserting spinal needle in mid line and as Group PM (n=100): in patients who received spinal anaesthesia by entering a spinal needle at a point 1cm lateral and 1cm below the spinous process at 10-15° cephalad angle.

Patients were allowed to choose lateral or sitting position in whichever position she was comfortable. In lateral position, the knees are flexed on the abdomen, and the head and shoulders are flexed toward the knees. In sitting position knees resting on the edge of operation table, legs hanging over the side and feet supported by a stool below. An assistant supported the patient and encouraged the patient to flex the back.

Then spinal anaesthesia was attempted with 23G/25G Quincke's spinal needle with either of the approach in supine position or sitting position at appropriate intervertebral space and when clear flow of CSF was observed, inj. heavy bupivacaine (0.5%) 2cc injected to achieve T6 level of spinal anaesthesia.

After the surgical procedure was over, parturients were followed up for post dural puncture headache and low backache till 1 week or till the

patient was discharged. If patient was discharged then telephonic calls were made. PDPH and low backache was measured using a numerical rating scale (NRS) = 0 to 10 at 24hr, 72hr and at 1 week after spinal anaesthesia. PDPH was defined as bilateral frontal or occipital headache that is worse in the upright position, along with nausea, neck pain, dizziness, visual changes, tinnitus, hearing loss, or radicular symptoms in the arms and it is relieved or reduced in intensity by lying down.

Statistical analysis

The sample size was taken as convenient sampling. The data was collected and entered into a database Microsoft excel sheet. The results were expressed as mean $\pm$ standard deviation or percentage. The statistical analysis was done using EPI software version 3.0 using the "unpaired student t test" for quantitative data and "chi square test" for qualitative data. The difference was considered to be statistically significant when P value <0.05 and highly significant when P value <0.001 . To generate graphs and tables, Microsoft office 2010 (Word and Excel) had been used.

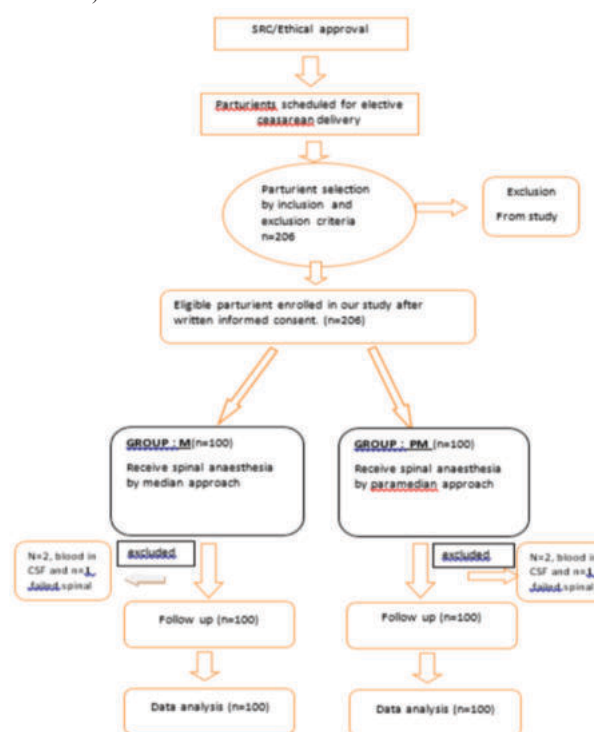


Figure 1: Flowchart

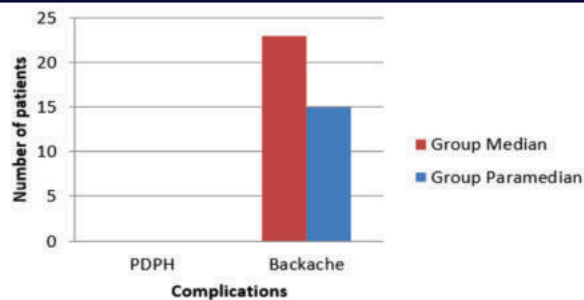
OBSERVATION AND RESULTS:

This study was conducted on 200 parturients. Six patients were excluded from study- four cases due to blood in CSF (2 patients in group M and 2 patients in group PM) and two cases due to effect not achieved satisfactorily as shown in flowchart 1. Mean age, mean ASA grading and mean BMI were comparable in both the groups as shown in Table 1 ($p>0.05$). Mean gestational weeks was 38 weeks in both the groups and comparable ($p>0.05$). Mean number of attempts in group M was 1.24 ± 0.49 and in group PM was 1.14 ± 0.40 ($p=0.12$).

Table 1: Patients characteristics:

Patients characteristics	Group M (n=100) Mean $\pm$ SD	Group PM (n=100) Mean $\pm$ SD	P value
Age (kg)	23.44 $\pm$ 3.12	24.80 $\pm$ 3.37	0.054
BMI (kg/m ²)	24.80 $\pm$ 3.37	23.44 $\pm$ 3.12	0.054
ASA	2.15 $\pm$ 0.36	2.11 $\pm$ 0.31	0.40
Gestational Week	38wk	38wk	
Mean no. of attempts	1.24 $\pm$ 0.49	1.14 $\pm$ 0.40	0.12

The parturients selected for the study had normal spine as examined during preoperative visit. All of them were given spinal anaesthesia in lateral position with 25 G quincke's spinal needle in the L3-L4 intervertebral space.



Graph 1: Post operative complications of study population

We observed that none of the parturient developed PDPH in either group (graph 1).

However, more number of parturients in group M complained of low back pain compared to group PM (graph 3), which was statistically significant in immediate postoperative period, at 24hr, at 72 hr and at one week of spinal anaesthesia, as shown in table 2.

Table 2: Low backache:

	Group M (n=100)	Group PM (n=100)	P value
Total patients	23	15	<0.05
Patients of backache after 24 hours	21	15	<0.05
NRS after 24 hours	2.57 $\pm$ 0.92	2.66 $\pm$ 0.97	0.767
Patients of backache after 72 hours	23	12	<0.05
NRS after 72 hours	2.60 $\pm$ 0.94	2.66 $\pm$ 0.98	0.865
Patients of backache after 1 week/discharge	14	5	<0.05
NRS after 1 week/discharge	2.42 $\pm$ 0.85	2.0 $\pm$ 0.0	0.284

Values are presented as mean $\pm$ SD or number of patients. Group M: median group, Group PM: paramedian group. P value less than 0.05 were considered statistically significant.

When severity of low back pain was evaluated on basis of NRS scale (0-10), mean NRS scale at 24hr, 72hr and at one week of spinal anaesthesia was comparable in both the groups (table 2). Here, we counted only active cases of backache at 24hr, 72 hr and at one week of spinal anaesthesia. The mean NRS scale was 2.42 ± 0.85 in group M and 2.00 ± 0.00 in group PM ($p>0.05$).

DISCUSSION:

Number of parturients presenting for caesarean delivery are increasing, especially in a tertiary care hospital. So, the frequency of spinal anaesthesia has increased tremendously, which is commonly delivered by median or paramedian approach. Hence, it is required to deliver safe practices by an anaesthesiologist.

Post spinal headache is one of the most common adverse effect occurring in patients undergoing surgery under spinal anaesthesia. There are two possible explanations for the cause of the headache, neither of which has ever been proven. First, the loss of CSF through the dura is proposed to cause traction on pain-sensitive intracranial structures as the brain loses support and sags. Alternatively, the loss of CSF initiates compensatory yet painful intracerebral vasodilation to offset the reduction in intracranial pressure. The characteristic feature of a post-dural puncture headache is a frontal or occipital headache that worsens with the upright or seated posture and is relieved by lying supine. Associated symptoms can include nausea, vomiting, neck pain, dizziness, tinnitus, diplopia, hearing loss, cortical blindness, cranial nerve palsies, and even seizures.^[4]

Due to development of smaller diameter and pencil-point spinal needles, there is reduction in incidence of PDPH. Still, there are various factors which may influence PDPH like: age, sex, psychological factor, angle of needle insertion, orientation of bevel etc. In our study, all parturients belonged to 18-36 years of age group.^[4] We found that no any patient developed PDPH in either group. This may be due to the fact that all spinal procedures were performed with 25G spinal needle with orientation of bevel towards the longitudinal axis of spinal dura mater by trained anaesthesiologist. And all spinal

procedures were conducted in lateral position in our study, whereas in all other studies, spinal puncture was attempted in sitting position.

To facilitate mother in breast feeding, nowadays, post cesarean delivery patients are made ambulatory earlier. Females are generally more apprehensive than males, hence in our study, statistically a greater number of parturients in median group had backache compared to paramedian group. Inadequate analgesia in the postoperative period might be one of the causative factors. Improper position of parturient and lack of back support are important factors in causing backache. Also, history of backache in the preoperative period is an important contributing factor for postoperative backache.^[5] However, in our study, we had excluded parturients with preoperative history of backache. When pain score was noted, NRS scale was comparable between both the groups during the entire survey period ($p>0.05$). Similar to our study, Behery M A et al (2016)^[6] observed no significant differences between paramedian and median approach of spinal anaesthesia in view of occurrences of backache, paraesthesia or the need of additional analgesia in their study conducted on 120 parturients. In another study done by Kumari R et al (2020)^[8] observed 3(6%) patients in group M developed lower backache and in Group PMM, 2 (4%) patients while using sprotte spinal needle ($p=0.646$).

In contrast to our study, Singh B et al (2018)^[5] observed 3(6%) patients in group M complained of mild backache compared to 1(2%) patient in group P. In group M, 2 (4%) patients complained of moderate backache compared to 0 patient in group P ($p=0.003$). Lee J H et al (2020)^[14] conducted a randomized study to evaluate incidence of newly developed postoperative low back pain in 100 patients after single attempt and observed no significant difference between two groups at 24hr, 7 days and at 1 month postoperatively. 1 patient in group M and 1 patient in group P reported pain continuously for 3 months and NRS pain score was comparable between both the groups at all the time periods. They concluded that the paramedian approach reduces the incidence of postdural puncture backache in early post operative period.

No other postoperative complications were noted.

Strengths of study:

All the cases in this study were evaluated by the researcher himself, so interpersonal variation in data collection was avoided. All the spinal anaesthesia procedures were performed by skilled anaesthesiologist. There was no gender bias as study was done in female patients only. Only 25G quinckes spinal needle was used in our study. The exclusion of patients with pre-existing backache.

Limitations of study:

The observational character of the study and impossible blinding. Smaller sample size due to which we didn't get statistically significant results. All spinal anaesthesia procedure were performed in lateral position, so the results can't be generalized for the procedure done in other positions. We did not monitor the use of postoperative supplemental analgesics.

CONCLUSION:

We conclude that paramedian approach is equally effective as median approach with regards to PDPH and low backache in parturients undergoing cesarean delivery. Though, more randomized trials are recommended using higher gauge needles involving different patient population.

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