



**ADVANTAGE OF THE PARAMEDIAN APPROACH FOR LUMBER SPINAL
ANALGESIA A CLINICAL COMPARISON BETWEEN MIDLINE AND PARAMEDIAN
APPROACHES**

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ABSTRACT

Background: Spinal anaesthesia has increasingly become the technique of choice for lower segment caesarian sections, vaginal hysterectomies etc due to quick onset of action and reliability in producing uniform sensory and motor blockade and ease of administration. Right from the time spinal was started, methods were sought to ease the difficult spine, fused spine and obese patients. Especially for these difficult cases a paramedian technique was devised which eases the procedure. The paramedian approach was associated with a lower frequency of technical problems compared to the midline approach. **Methods:** Fifty patients, scheduled for lower segment caesarian sections, were studied. The patients were randomly allocated to one of the two methods of spinal puncture, midline or paramedian. Technical difficulties (in terms of no. of attempts, difficulty in identification of space) and the occurrence of complications were recorded. The extent of sensory and motor blockade was also compared. **Results:** The paramedian approach was associated with a lower frequency of technical problems compared to the midline approach. Statistically significant difference were demonstrated between the two techniques for the following factors: repeated attempts at needle insertion; difficulty in identification of the space; and the production of paraesthesiae (nine patients in the midline group compared to only one patient in the paramedian group, $p < 0.01$). No significant difference were demonstrated between the groups in the extent of sensory and motor blockade. **Conclusion:** The study supports the view that the paramedian approach has technical advantages over the midline approach for lumbar spinal analgesia and is associated with lesser complications.

KEYWORDS: Anatomy; spinal canal, median, paramedian Anaesthetic techniques.

INTRODUCTION

Advantages of the paramedian approach for lumbar spinal analgesia are claimed by several authors.^[1-6] A comparison was made in the same cadaver of the midline and paramedian approaches for lumbar spinal puncture introduction in a recent study using scopy in 14 autopsy included a small risk of accidental perforation of the dura mater, no tenting of the dura by the tip of the needle and the promotion of a straight course cephalad in the near midline. The factors responsible for these differences were found to be the different angle of the needle to the dura mater and the restricted mobility of the dura mater caused by the dorsomedian connective tissue band. The combined influence of these two factors was greatest for the midline needle.^[7]

Two clinical studies were presented with a comparison of the two techniques for lumbar spinal analgesia. Jaucot^[8] demonstrated in a retrospective study of obstetric analgesia a lower frequency of paraesthesia and of vascular puncture when the paramedian approach was

used. Griffin and Scott^[9] did not demonstrate any difference in the frequency of technical complications in a prospective study in obstetric analgesia.

The present prospective study was designed to investigate difference between the two techniques for lumbar spinal analgesia. Attention was paid to ease of identification of the spinal space and to the occurrence of technical problems and complications of needle insertion. Finally, the extent of sensory and motor blockade was compared in the two groups.

MATERIALS AND METHODS

After obtaining clearance from the ethical committee of the hospital, study was undertaken in department of anaesthesiology, peoples medical college and hospital in routine and emergency obstetrics department. Fifty patients who presented with a diagnosis of full term preg. with non descent, cord around neck, foetal distress etc. were studied. They were scheduled for surgery under spinal analgesia on 50 occasions. The patients gave

informed consents to participation in the study and were randomly allocated to spinal needle and introduction with either a midline or a paramedian approach. Patients who had a herniation of a lumbar disc or any general neurological disorder were excluded from the study.

Assessment before anaesthesia of the patients were performed by one investigator (R.G.B.) including the evaluation of technical difficulties. The onset and extent of sensory and motor blockade and the quality of analgesia during the operation were determined by one of the other two authors and included a postoperative examination 2 hours after the operation and an interview the next day. This investigator was unaware of the approach used.

Premedication was administered as an oral mixture of diazepam 12 mg for patients up to 70 years of age and 6 mg if the patient was older. No other sedatives or analgesics were given unless the patient was uncomfortable. Ringer acetate solution 500 ml was infused intravenously before the attempt at epidural. All patients were placed in the left lateral position and the spinal block performed with an 25-G spinal needle in the interspace L₃₋₄ (except one patient who set upright because was unable to lie on his side). Subcutaneous infiltration that included ligaments and periosteum was performed with 5 ml 2% xylocaine with adrenaline 5µg/ml at room temperature. The midline approach was with a cranial angle of the needle to the dorsal plane of the skin of 90-110°. The paramedian puncture was performed according to Bonica.^[1] 1.5cm lateral to the caudal part of the spinous process of L₄. The spinal needle, with the orifice pointing cephalad, was then directed towards the midline of the subarachnoid space of L₃₋₄, often after contact of the tip of the needle with the corresponding lamina. The cranial angle of the paramedian needle to the dorsal plane of the skin was 120-135°. The subarachnoid space was identified by loss by resistance and the position of the needle then immediately locked. Leakage of blood or cerebrospinal fluid (CSF) through the needle was sought. The

production of paraesthesiae was noted. Spontaneous and an aspiration test thereafter performed.

The total dose of local anaesthetic sensorcaine. 5% heavy 3ml +. 5ml fentanyl was calculated to cover the dermatomes from T₈ and S₅ using the segmental dose requirements in relation to age recommended by Bromage.^[10]

Blood pressure and heart rates were measured at least every 5 minutes during the onset of the block and throughout the operation. Ephedrine was administered in increments of 5 mg intravenously, in the event of a decrease in systolic blood pressure more than 30 mmHg below the preanaesthetic level.

The extent of sensory blockade was determined by the pinprick method at 10, 20 and 30 minutes after the complete injection of local anaesthetic. The degree of motor blockade was established with the aid of a modified Bromage scale. The patient was interviewed the next day about discomfort or pain during the epidural block procedure, as well as the occurrence of headache or pain in the back.

Statistical analysis

Differences between the two groups in frequency of technical problems were assessed using Fisher's exact test in all cases, except for the number of insertions of the spinal needle. An exact randomisation test was applied for this factor. These statistics were performed as single-tailed tests. Incidences of failure of spinal analgesia, hypotension and postoperative back pain were compared using Fisher's exact test and as two-tailed tests. Analyses of differences in extent of sensory and motor blockade were performed with student's t-test and with an exact randomisation test and as two-tailed tests. A p-value < 0.05 was considered significant.

Median group

Paramedian group

RESULTS

Table No. 1.

	Midline	Paramedian	Probability
Needle Problems			
Repeated insertions	5	2	
(a) two attempts	2	0	P<0.05
(b)three attempts			
Total	7	2	P<0.05
Difficult identification of space	6	1	P<0.05
Pain on needle insertion	0	0	-
Blood in needle	0	0	-

Table 2. Comparison of lumbar spinal analgesia in 25 subjects with midline and 25 with paramedian approach, and postoperative observations in 25 patient with midline insertion of needle and 25 with paramedian insertion.

	Midline	Paramedian	Probability
Sensory blockade-number of spinal Segments (mean, SD)	17.6(3.5)	18.1(2.5)	Not significant
Ephedrineadministration (hypotension)	5	8	Not significant
Supplementation, midazolam or pethidine, Requested by apprehensive patient	2	3	Not significant
Back pain after operation	5	4	Not significant
Headache after operation(no relation to patient postion)	2	2	Not significant

Table 3: Demographic characteristics.

Parameter	Median group (n=25) Mean \pm SD	Paramedian group (n=25) Mean \pm SD
Age (yrs)	34.4 \pm 7.56	35.33 \pm 7.4*
Weight (kg)	53.5 \pm 8.91	55.3 \pm 7.41*
Sex (M:F)	15:15	17:13 *
ASA I : II	24:6	25:5 *

*p-value > 0.05 **p-value significant at 0.05 ***p-value significant at 0.01.

Table 4: Analysis of Sensory, Motor blockade and Duration of analgesia.

Parameter	Median group (n=25) Mean \pm SD	Paramedian group (n=25) Mean \pm SD
Time in seconds for onset of sensory blockade	172.33 \pm 37.17	181 \pm 37.35*
Time in seconds for onset of motor blockade	302 \pm 57.97	288.3 \pm 53.848*
Duration of motor blockade	244 \pm 32.55***	167.5 \pm 23.44
Time for first rescue analgesia in hours	574 \pm 63.17 ***	219 \pm 38.4

*p-value > 0.05 **p-value significant at 0.05 ***p-value significant at 0.01.

DISCUSSION

There are conflicting results in the two systematic studies of comparison between the midline and paramedian approaches. Griffin and Scott^[9], prospectively studied 165 patients with obstetric analgesia and did not establish any significant difference between the two methods. They did not, however report the occurrence of paraesthesiae during the introduction of the catheter. The retrospective study of Jaucot^[8] was performed on 1010 patient with obstetric neuraxial analgesia; he reported a higher incidence of intravascular placement of the catheter with the midline approach (5.6%) compared to the paramedian (1.5%) and a frequency of initial paraesthesiae of 48% for the midline technique and of 24% for the paramedian.

One of the authors (R.G.B.) has considerable clinical experience with the paramedian approach for lumbar epidural analgesia and prefers it. The present study was performed in male patient in an age group that might be expected to accentuate any technical difficulties. The possibility of an investigator's bias was not completely excluded in this investigation, since the observation of

technical problems of epidural puncture and catheter introduction necessarily were made by the performer of the block, despite obvious knowledge of the approach used. The study was, however, carried out as objectively as possible with the source of error in mind.

The production of paraesthesiae during the introduction of an spinal needle must be taken as an indication of contact, possibly, with the spinal cord but more likely, especially in the lumbar region, with a nerve root or a nerve.

Some reference in the literature indicate a high frequency; Fortuna^[12] states that paraesthesiae are very common. Philip^[13] mentions an initial rate of 49% reduced to 29% after the injection of 10ml of air before introduction of the catheter. Rolbin^[14] indicates a frequency of paraesthesiae with two different types of catheter, as 44% and 24% respectively. The approach used was not specified in these three studies, while Jaucot^[8], as stated above, demonstrated a higher frequency for the midline approach, Minor and transient neurological sequelae seldom develop in patients

subjected to epidural analgesia, with incidence reported as 0.1%^[15] up to 0.4%.^[16] Any possible relationship between the production of paraesthesiae and the development of such neurological complications in rare cases still seems to need investigations. However, the low frequency of paraesthesiae demonstrated for the paraesthesiae approach in this study may be a potential advantage in this respect.

These observations, with reservations for the possibility of bias and the low frequency of paraesthesiae with the paramedian technique demonstrate the technical advantages of this approach for lumbar analgesia.

REFERENCES

1. Bonica JJ. Continuous peridural block. *Anesthesiology*, 1956; 17: 626-30.
2. Bonica JJ, BACKUP PH, ANDERSON CE, HADFIELD D, CREPPS WF, MONK BF. Peridural block: analysis of 3,637 cases and a review. *Anesthesiology*, 1957; 18: 723-84.
3. BROMAGE PR. Epidural analgesia. Philadelphia: W.B. Saunders, 1978; 187-8.
4. CARRIE LES. The approach to the extradural space. *Anaesthesia*, 1971; 26: 252-3.
5. ARMITAGE EN. The paramedian approach to lumbar epidural analgesia. *Anaesthesia*, 1976; 31: 1287-8.
6. BARRETTO C, HOOK R, SEAH CH. Use of the Tuohy needle in paramedian approach for peridural block. A study using epiduroscopy in autopsy subjects. *Anaesthesia and Analgesia*, 1977; 56: 582-4.
7. BLOMBERG RG., JAANIVALD A., WALTER S. Advantages of the paramedian approach for lumbar epidural puncture and catheter technique. *Anaesthesia*, 1989; 44: 742-746.
8. JAUCOT J. Paramedian approach of the peridural space in obstetrics. *Acta Anaesthesiologica Belgica*, 1986; 37: 187-92.
9. GRIFFIN RM, SCOTT RPF. A comparison between the midline and paramedian approaches to the extradural space *Anaesthesia*, 1984; 39: 584-6.
10. BROMAGE PR. Ageing and epidural dose requirements. Segmental spread and predictability of epidural analgesia in youth and extreme age. *British Journal of Anaesthesia*, 1969; 41: 1016-22.
11. BROMAGE PR. A comparison of the hydrochloride and carbon dioxide salts of lidocaine and prilocaine in epidural analgesia. *Acta Anaesthesiologica Scandinavica*, 1965; (Suppl. XVI): 55-69.
12. FORTUNA A, BRUSAROSCO FF. Clinical evaluation of Citanest in peridural anaesthesia. *Acta Anaesthesiologica Scandinavica*, 1965; (Suppl. XVI): 223-30.
13. PHILIP BK. Effect of epidural air injection on catheter complications. *Regional Anaesthesia*, 1985; 10: 21-3.
14. ROLBIN SH, HEW E, OGILVIE G. A comparison of two types of epidural catheters. *Canadian Journal of Anaesthesia*, 1987; 37: 459-61.