Original Article

Comparison of Outcome of Median and Paramedian Spinal Anaesthesia in Patients Undergoing Elective Lower Abdominal General

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ABSTRACT

Objective: To evaluate the risk of postdural hypotension and postdural pulsus paralysis (PDPH and PDPB, respectively) in patients following elective lower abdomen general operations under spinal anesthesia.

Study Design: Randomized Controlled Trial study

Place and Duration of Study: This study was conducted at the Department of Anesthesia DHQ, Gujranwala from December 27, 2021 to June 27, 2022

Methods: After approval of hospital ethical committee a total of 216 cases (108 cases in each group) were enrolled after taking informed consent. Their basic demographical details, contact details and type of surgery was noted. All procedures were done by single anesthesiologist to ensure the no bias. Patients were randomly divided into 2 groups using lottery method.

Results: The mean age of patients in median and para median groups were 37.20 ± 12.31 years and 38.38 ± 11.59 years. In Median group, there were 37(34.26%) male and 71(65.74%) female cases while in Para median group there were 44(40.74%) male and 64(59.26%) female cases. The frequency of PDPH was statistically lower in Para medina group (3.7%) as compared to Median group (18.5%), p-value < 0.05. The frequency of PDPB was also statistically lower in Para median group (4.6%) as compared to Median group (13.9%), p-value < 0.05.

Conclusion: The incidence of PDPH and PDPB was found less in para median group as compared to median spinal anesthesia in patients undergoing elective lower abdominal general surgeries.

Key Words: General surgery, spinal anesthesia, median, para median approach, pain

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INTRODUCTION

Isolating local anesthetics like cocaine (the only naturally occurring local anesthetic) was the initial step in developing regional anesthesia. In 1898, in Germany, August Bier conducted the first surgery using spinal anaesthetic, making it the first regional anesthetic procedure to be used. Surgery involving the lower extremities, the genitourinary tract, the reproductive organs, or the abdominal cavity are among the most frequent surgical procedures for which spinal anesthetic is employed.[1]

Up to 25% of patients undergoing a lumbar puncture report experiencing symptoms of postdural puncture headache (PDPH), which are thought to be caused by intracranial hypotension due to decreased cerebrospinal fluid (CSF) pressure.[2]

The pain usually subsides on its own, but it may become highly bothersome for the patient and the anesthesiologists if it persists for too long.[2] The headache is typical changes with position and in a throbbing pattern also accompanied by photophobia and vision blurring. Unfortunately, the incidence of PDPH is higher in parturients compared to other patients.[3,4]

The paramedian approach involves inserting the needle 1 centimeter laterally and 1 centimeter caudally from the caudal margin of the superior spinous process in the sagittal plane.[4] When using this method, the needle will initially make contact with the ligamentum flavum rather than the interspinous or supraspinous ligaments.[4]

A study was done on different surgical procedure, and reported that in paramedian approach, 48 (4%) of the patients complained headache while in median approach, 20% cases reported spinal headache. In median approach, 10% patients complained of back pain while in paramedian approach, 2% patients complained of back pain. One more study was done on different surgical procedures and reported that the overall incidence of Postdural puncture

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backache (PDPB) was higher in the median Group (18/50, 36%) than in the Paramedian Group (8/50, 16%) (P = 0.023).[4]

The current study is designed with a rationale to compare outcome of median and paramedian spinal anesthesiain patients undergoing elective lower abdominal general surgeries in our setup. Although local and global data is available on these techniques but back pain is different in reported studies for both techniques.[2,4] Local studies were also done but they had different outcome[5] and studied population was also different, was done on C-section or elderly population was taken[6-7].

Hence this study focused on elective lower abdominal general surgeries in adult cases. After the results of this study appropriate preoperative prophylactic preventive (medication, needle preference, needle bevel direction, etc.) and therapeutic options may done to reduce the related discomfort and complications.

METHODS

The study aimed to evaluate the risk of postdural hypotension and postdural pulsus paralysis (PDPH and PDPB, respectively) in patients undergoing elective lower abdomen general surgeries under spinal anesthesia.

This randomized controlled trial was conducted in the Department of Anesthesia at DHQ, Gujranwala, over six months from December 27, 2021, to June 27, 2022. A total of 216 cases were included, with 108 patients in each group. The sample size was estimated based on the percentages of back pain in the median group (10%) and in the paramedian group (2%), with 80% power of the test and a 5% level of confidence. Patients were selected using a non-probability consecutive sampling technique.

Patients aged 18–59 years, of both genders, with an American Society of Anesthesiologists (ASA) physical status of Class I or II, who were undergoing elective lower abdominal general surgeries, were included in the study. Patients with a preoperative diagnosis of cluster headache, migraine, stress headache, or tension headache, a history of bleeding diatheses, traumatic deformity or congenital abnormalities of the lumbar spine, refusal of spinal anesthesia, or pregnancy were excluded.

Following approval from the hospital's ethical committee, all eligible patients were recruited from the Department of Anesthesia at DHQ, Gujranwala, after obtaining informed consent. Demographic details, contact information, and type of surgery were recorded. To minimize bias, all procedures were performed by a single anesthesiologist. Patients were randomly assigned to two groups using the lottery method.

Before the procedure, all patients were equipped with a wide-bore IV catheter and standardized monitoring. Spinal anesthesia was administered in the sitting position using a 25-gauge Quinke needle. Surgery was initiated after successful anesthesia administration. Postoperatively, patients received 100ml of Provas IV every 8 hours and 4mg of Nelbine IV as needed.

Follow-up visits were scheduled at 12-hour intervals. Some patients experienced no pain, while others had mild, moderate, or severe pain. Patients with pain were reassured and advised to increase fluid and caffeine intake. They were also prescribed 3 liters of Ringer's lactate per day and 2 tablets of Panadol Extra three times a day. Patients who did not recover were advised to undergo an epidural patch or sphenopalatine block.

Patients were monitored for postdural puncture backache (PDPB) for one month and postdural puncture headache (PDPH) for 24 hours. PDPH was measured using a visual analogue scale (VAS) ranging from 0 to 10, where 0 indicated no pain and 10 represented the worst pain. PDPH was considered significant if the pain score was ≥4/10 within 24 hours post-procedure. PDPB was also measured using the VAS after one month, and it was recorded if the pain score was ≥4/10.

Data collected during the study were entered and analyzed using SPSS version 24. The Chi-square test was applied to compare the occurrence of PDPH and PDPB between the two groups. All results were recorded on an attached proforma.

RESULTS

The mean age of patients in median and para median groups were 37.20 ± 12.31 years and 38.38 ± 11.59 years. The mean weight of all cases was 77.32 ± 15.67 kg, the mean height was 1.69 ± 0.10 m and mean BMI was 27.17 ± 5.71. In Median group, there were 37(34.26%) male and 71(65.74%) female cases while in Para median group there were 44(40.74%) male and 64(59.26%) female cases. According to ASA classification, in median group there were 66(61.11%) cases who had ASA-I and 42(38.89%) cases had ASA-II while in Para median group, there were 58(53.70%) cases who had ASA-I and 50(46.30%) cases had ASA-II.

Table No. 1: Demographics of patients at enrollment

	Study group	
	Median	Para median
n	108	108
Age (years)	37.20 ± 12.31	38.38 ± 11.59
Gender		
Male	37 (34.3%)	44 (40.7%)
Female	71 (65.7%)	64 (59.3%)
Weight (kg)	75.53 ± 14.99	79.11 ± 16.19
Height (m)	1.68 ± 0.10	1.70 ± 0.09
BMI	26.78 ± 5.56	27.56 ± 5.85
ASA		
I	66 (61.1%)	58 (53.7%)
II	42 (38.9%)	50 (46.3%)

Table No.2: Comparison of outcome in both study group

		Groups		Total	P-value
		Median	Para median		
N		108	108	216	
Post dural puncture Headache	Yes	20(18.5%)	4(3.7%)	24(11.1%)	0.001
	No	88(81.5%)	104(96.3%)	192(88.9%)	
Post dural puncture Backache	Yes	15(13.9%)	5(4.6%)	20(9.3%)	0.019
	No	93(86.1%)	103(95.4%)	196(90.7%)	

The frequency of post dural puncture headache was statistically lower in Para medina group (3.7%) as compared to Median group (18.5%), p-value < 0.05. The frequency of post dural puncture backache was also statistically lower in Para median group (4.6%) as compared to Median group (13.9%), p-value < 0.05.

DISCUSSION

Karl August bier is widely regarded as the forefather of spinal anesthesia. After seeing patients with postspinal headache, he theorized that the leakage of cerebrospinal fluid (CSF) caused by the use of large bore needles was to blame. The onset is usually within 2 days, and the regression is usually complete within a few days. The pain in the bifrontal and occipital regions, as well as the accompanying nausea, vomiting, neck stiffness, tinnitus, diplopia, dizziness, and severe headache, seem to worsen while the sufferer is seated or standing.[8] Excessive CSF leakage from the dural hole can lower intracranial pressure, causing tension on the pain-sensitive dura and compensatory venodilation. Using small-gauge (25–29) and noncutting bevel needles may reduce postspinal headache and low backache, but they have drawbacks such as high failure rates, cost, limited availability, and the need for an introducer.[9]

In addition, a paramedian strategy to administering a subarachnoid block has been shown to reduce the incidence of postspinal headache compared to a median approach in a trial of pregnant women undergoing spinal anesthetic for a cesarean delivery.[10] This is because the paramedian method involves a valve mechanism that prevents cerebrospinal fluid (CSF) from leaking out of the dura and into the epidural area. Low back pain is a typical post-spinal-anesthesia-in-the-median-approach complaint. The length of this discomfort ranges from three days to a week, but it may also be chronic and continue more than three months. Inflammation, reflex spasm of the paraspinous muscles, and myalgia may occur when a needle penetration causes stress to the ligaments.[11]

There is a wide variation in reported PDPB rates, from 2% to 29%. Paraspinal muscle relaxation and/or localized tissue damage are hypothesized to have a role in the pathophysiology of PDPB by excessively stretching the spinal ligaments. Local anesthetics are injected into the lumbar subarachnoid space to achieve spinal anesthesia.[12]

The subarachnoid space may be reached from a seated or lateral posture by median or paramedian methods. To perform the median approach, a needle is placed below the spinous process of the chosen upper vertebrae.[13] Patients receiving spinal anesthetic using a large-bore spinal needle may be at a higher risk for postdural puncture brain damage (PDPB), according to a review of the available literature. No studies have looked at whether or not the method of anesthesia has an influence on PDPB. It is possible that the median approach method contributes to PDPB by further straining the spinal ligaments.[14]

In the present research, participants in the Para medina group had significantly less headaches (3.7% vs 18.5%, $p < 0.05$) after undergoing a dural puncture. The Para median group also had a significantly decreased incidence of back pain after dural puncture (4.6% vs 13.9%, $p < 0.05$). A recent research compared the frequency and severity of PDPB in operations performed using median and paramedian approaches. Group M had a greater overall incidence of PDPB (18/50, 36%) than Group P (8/50, 16%) ($P = 0.023$). Eight patients in Group M and six individuals in Group P reported back discomfort twenty-four hours following surgery. Sixteen Group M patients and five Group P patients reported discomfort seven days after surgery ($P = 0.007$). After one month, five Group M patients and one Group P patient reported discomfort. After three months, just one person in each group had reported feeling any discomfort. During the course of the investigation, there were no discernible variations in NRSs across the groups. Thus, the findings of this investigation support the hypothesis that paramedian spinal anesthesia decreases the occurrence of PDPB in the immediate postoperative phase.[4]

Another research evaluated low back discomfort following lithotomy with and without spinal anesthesia using a midline or paramedian route. The specialist who administered the spinal anesthetic used both the midline and paramedian methods. Needle type Quincke 25G, inserted at 1 cm inferior and 1 cm lateral to the spinous process (midline and paramedian, respectively). An anesthesiology assistant assessed patients' levels of back pain 24 hours, 72 hours, and 7 days following

surgery using a numeric rating scale. A total of 139 participants were analyzed, and the results show that... Back discomfort was experienced by 21% of the midline group and 25.4% of the paramedian group after 24 hours. The variations between them were negligible. Within the first twenty-four hours, just the total number of attempts mattered. Patients who had spinal anesthesia more than twice had a 4.7-fold increased risk of experiencing back discomfort compared to those who underwent spinal anesthesia just once (OR 4.70, CI 1.79-10.18; p = 0.001). Therefore, the incidence of back discomfort after spinal anesthetic did not vary significantly between the midline and paramedian techniques. However, the chance of developing low back discomfort was higher for those who tried it twice or more than once[15].

Another research looked at the frequency of postoperative headache and low back pain after spinal anesthesia for lower abdominal surgery. Post-spinal headache was seen in 4% of patients after a paramedian approach, but in 20% of patients after a median one. There was a 2% and 10% backache occurrence in both groups. Both the incidence of postspinal headache and backache were shown to be statistically significantly lower in patients treated with the paramedian method (P value < 0.05). This means that the paramedian technique results in a lower rate of low back pain and headaches after spine surgery than the median approach.[8]

Another investigation into the relative risks of paramedian and median approaches to spinal anesthesia was conducted in 2016. Group M (median) and Group P (paramedian) are the two groups into which eighty patients with ASA I-III were divided. The results indicated that Group P had significantly more applications of spinal anaesthetic and longer periods of anesthesia than Group M did (p < 0.05). There were 52 immediate problems and 23 delayed complications. Both groups had similar rates of hypotension (21%), the most frequent early consequence, and post-spinal headache (8.7%; Group P, six patients; Group M, one patient). Therefore, it can be concluded that short-continuation surgical cases requiring spinal anesthetic did not vary significantly in terms of complication rates across technical techniques[16].

CONCLUSION

It is concluded that incidence of PDPH and PDPB was found less in para median group as compared to median spinal anesthesia in patients undergoing elective lower abdominal general surgeries. Hence, para median may be useful in future for lessen in pain and reduction of analgesia consumption.

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