

Frequency of Post Dural Puncture Headache with Median Versus Para-Median Approach of Spinal Anaesthesia in Patients Underwent Cesarean Section

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ABSTRACT

Objective: To compare the frequency of post dural puncture headache with median versus para-median approach of spinal anaesthesia in females undergoing cesarean section.

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Anesthesiology and Obstetric departments, Combined Military Hospital, Badin Pakistan, from Oct 2018 to Apr 2019.

Methodology: Total 128 females undergoing cesarean section, fulfilling the inclusion criteria were included randomly in two equal groups. Group-A received spinal anaesthesia with 25 G Quincke spinal needle by median approach while Group-B received by paramedian approach. Post-dural puncture headache was assessed by using visual analogue scale. Pain of any severity was taken as positive. All patients were followed by researcher for presence or absence of post-dural puncture headache.

Results: Post dural puncture headache occurred in 21(32.81%) patients with median approach versus 4(6.25%) patients complained headache after para-median approach with p -value=0.0001, frequency was statistically significant.

Conclusion: This study concluded that more frequency of headache after dural puncture in median approach compared to para-median approach in cesarean section patients.

Keywords: Cesarean section, Headache, Median approach, Para-median approach, Spinal anesthesia.

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INTRODUCTION

The greater awareness of maternal and fetal complications and more advanced technology of monitoring increased the incidences of cesarean section. Worldwide in year 2007, approximately 15% of all births and 33% in US during 2009 were by cesarean sections,¹ but present prevalence of cesarean section, with a mean of 45.2% worldwide.² Anesthetic technique of choice in majority of cesarean sections is spinal anesthesia. It is safe, easy to perform, reliable. It avoids depressant effects of anesthetic agents, decrease chances of failed endotracheal intubation and prevents the gastric aspiration. Mother can experience birth of her child as she remains awake and she can start early breast feeding.³

Post dural puncture headache (PDPH) is the major complication of neuraxial anesthesia. Risk is increased in obstetric patients for this complication because of widespread use of spinal anaesthesia. After epidural anesthesia, inadvertent dural puncture is

more common cause of headache than with spinal anesthesia because of widespread use of small gauge and pencil-point needles for spinal anaesthesia.

PDPH once developed takes some time to resolve, not spontaneously and it causes morbidity in obstetric patients, mother unable to take care of her baby and herself and may extend the length of hospital stay or can lead into chronic headache. Primary goal of anaesthesiologist should be the prevention. Although, inadvertent dural puncture with epidural anaesthesia and post dural puncture headache (PDPH) are unavoidable complications, however PDPH incidence can be reduced, if procedure-related factors addressed properly. Therefore, anesthesiologists need to be familiar with prevention and treatment.⁴

Causes reported to influence the frequency of PDPH are gender, age, pregnancy, history of headache, history of headache after dural puncture, size and shape of the needle, bevel orientation, number of attempts, approach (median or para-median), local anesthetic drug and clinical expertise of the anaesthesiologist.⁵ Although the mechanism producing the headache is unclear,⁶ however there are two possible

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mechanisms that may produce headache after dural puncture. First, traction on the pain-sensitive intracranial structures in the upright position due to decrease in cerebrospinal fluid (CSF) pressure, secondly, compensatory vasodilatation after loss of CSF.⁷

Commonly used approaches to give spinal anesthesia are midline and para-median approach. In midline approach, the needle passes through supraspinous, interspinous ligament, ligamentum flavum and then pierce dura while in para-median technique needle bypassing supraspinous and interspinous ligaments and directly hits the ligamentum flavum and then dura matter.^{8,9} The frequency of PDPH was 4% with para-median and 28% with midline technique on 3rd post-operative day.¹⁰

The rationale of this comparative cross-sectional study is to determine the frequency of headache after dural puncture in patients underwent cesarean section under spinal anaesthesia. Literature is evident that para-median is better than median approach. The objectives of the study were to provide the clinicians with better approach for spinal anesthesia which will reduce the morbidity and make patients more comfortable post-operatively.

METHODOLOGY

The comparative cross-sectional study was conducted at Anesthesiology and Obstetric Departments, Combined Military Hospital Badin Pakistan, from October 2018 to April 2019, after formal approval from hospital ethical committee (Ltr no. A/2018/01, dated 4-10-2018). Total sample size was 128 (64 in each group) with 5% level of significance, power of study 80% and taking frequency of headache after dural puncture as 19.6% with median approach and 5.9% with para-median approach.¹⁰

Inclusion Criteria: Patients of age 16-40 years, with gestational age 37-41 weeks and in Parity 0-5, having American Society of Anaesthesiology (ASA) status-1 and 2, underwent spinal anesthesia for lower segment cesarean section(LSCS) were included in the study.

Exclusion Criteria: Women with twin pregnancy, with any systemic disease or spine deformity, not willing for spinal anesthesia were excluded along with the patients presenting with history of recurrent headache or previous PDPH and women with perioperative excessive blood loss and requiring blood transfusions and patients with coagulation disorders.

Enrolled patients underwent LSCS under spinal anesthesia with 25 G Quincke spinal needle, randomly

assigned in group A and B (64 in each group), Group A women were undergone by median approach while Group B were undergone by para-median approach. All patients preloaded with 15ml/kg body weight with Lactated Ringer’s solution. Spinal anaesthesia was performed by the same anaesthetist in all patients in sitting position, at L3-4 intervertebral space, kept the spinal needle bevel position lateral and later cephalic hyperbaric bupivacaine 15mg used for subarachnoid block. BMI was measured before undergoing anesthesia. All patients were followed by the researcher himself for presence or absence of PDPH.

Headache was assessed by using visual analogue scale on 2nd and 3rd post-operative day and also saw the other signs of PDPH i.e. frontal and occipital headache, positional aggravation (increased by sitting or standing and relieved by lying down), neck rigidity and diplopia.

All data including parity, age, BMI, gestational age and mode of procedure (elective/emergency)) was entered on a specially designed proforma.

Data was analyzed using SPSS version 20.0. Mean and standard deviation were calculated for parity, age, BMI, gestational age and pain score. Percentage and frequency were calculated for mode of cesarean and headache due to dural puncture. The PDPH of the two groups were compared for any difference by applying Chi Square test and *p*-value was considered as significant when *p*-value ≤0.05.

RESULT

Total 128, maximum number of the patients 83(64.84%) were between 16-30 years of age (27.91±5.63 years). The mean age of patients in median group was 28.09±5.52 years while in para-median group was 27.77±5.88 years, while mean gestational age was 38.57±1.31weeks and patients with parity was 3.07±1.07 and BMI was 28.50±2.23 kg/m² (Table-1).

Table-1: Demographic Distribution (n=128)

	Group A(n=64)	Group B(n=64)
	Mean±SD	Mean±SD
Age in years	28.09±5.52	27.77±5.88
Gestational Age in weeks	38.69±1.33	38.50±1.29
Parity	3.14±1.07	3.03±1.05
BMI	28.61±2.31	28.42±2.18

In Group A 29 patients (45.31%) undergone as elective procedures and only 7 developed PDPH and 35 Patients(54.69%) undergone as emergency cases & 15 developed PDPH, while in Group B 27(41.9%) females undergone as elective cases & 37(57.81%)

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females as emergency cases and 3-1 patients developed PDPH respectively. (Table-II) Mean VAS score was 3.45 ± 1.23 .

In terms of low incidence of headache due to dural puncture, para-median technique is quite better than midline technique.²⁰

Table-II: Patients distribution according to mode of Cesarean and PDPH (n=128)

Mode of cesarean	Group A(n=64)			Group B(n=64)			p-value
	Patients No:(%age)	PDPH(n=6)		Patients No:(%age)	PDPH(n=64)		
		Yes(%)	No(%)		Yes(%)	No(%)	
Elective	29(45.31)	07(10.94)	22(34.37)	27 (42.19)	03(4.69)	24(37.5)	0.203
Emergency	35(54.69)	15(23.44)	20(31)	37 (57.81)	01(1.56)	36(56.25)	≤0.0001

Females undergone cesarean section, the frequency of PDPH with median group was 21(32.81%) versus para-median group was 4(6.25%) with $p \leq 0.0001$ p-value, frequency was statistically significant as shown in Table-III.

Table-III: Frequency of PDPH with Median versus Para-Median approach in Females underwent Cesarean Section (n=128)

		Group A(n=64)	Group B(n=64)
		Number of Patients (%age)	Number of Patients(%age)
Post-dural puncture headache	Yes	21(32.81)	04(6.25)
	No	43(67.19)	60(93.75)

Females undergone cesarean section observed for the development of PDPH on 3rd post-op day the frequency of headache due to dural puncture was 28% with median approach and 4% with para-median approach.¹⁰ A study carried out by Behery MA *et al.* at Al Azhar University, Cairo, Egypt and concluded that PDPH incidence was 19.6% with midline approach and 5.2% with para-median approach ($p \leq 0.018$).¹¹ In accordance to the study conducted at Lahore General Hospital by Nisar A *et al.* the frequency of PDPH has shown completely opposite results i.e. 4.0% in median versus 8.0% in para-median approach (p -value ≤ 0.0678).¹²

Janik *et al.* stated that older patients, undergone transurethral prostate surgery under SA had higher rate of headache after dural puncture with the para-median approach (12%) than with the midline technique (8.8%).²¹ Li *et al.* compared the frequency of PDPH and the technical difficulty between two approaches of spinal anesthesia, they concluded that the first attempt success rate with midline approach was greater than with para-median approach. The headache incidence after single dural puncture with median and para-median approaches was 4.33% and 0.97% respectively,²² these are quite low frequency as compared to this study, however in skillful hands para-median approach significantly reduce the frequency of PDPH.

DISCUSSION

Spinal anesthesia is an alternative of general anesthesia, it is safe when the operative site on the perineum or on lower extremities, it routinely practices for cesarean delivery.¹¹⁻¹³ The headache due to dural puncture is the widespread complication of SA and considerable morbidity noted in 32% of patients, sometimes the quality of life of patients compromise.¹⁴ To decrease the incidence of this complication different modes have been applied but it still occurs despite taking best preventive measures.¹⁵

The study showed that the frequency of headache due to dural puncture with median group was 21(32.81%) versus para-median group was 4(6.25%), in contrast, Mosaffa F *et al.* and Sadeghi A *et al.* reported the frequency of headache due to dural puncture with midline technique was 9.3% while with para-median it was 10.7% and . 9.4% vs 9.8% respectively,¹⁶ though it was not statistically significant ($p \leq 0.875$).¹⁷

In terms of PDPH para-median was better than midline approach, incidences were 4% vs. 28% respectively (p -value ≤ 0.05), stated by Ahmed Ghaleb in his study in year 2010,¹⁸ while Bansal T *et al.* concluded in their study that there is no difference in the term of PDPH in obstetric patients between median and paramedian approach with 5% and 1% incidence.¹⁹

In young age female population, patients with history of headache and PDPH the frequency of headache or post spinal headache is more common. There is some correlation between history of motion sickness and headache after SA, however migraine headaches have no known relationship with increased frequency of PDPH.

PDPH usually occurs 72 hours after the spinal anaesthesia but most often it occurs within the first 48 hours and it can last up to seven days, the observation in this study was that most of the patients complained about headache on 2nd post-op day. Females have

greater risk for headache after SA, during pregnancy, and after vaginal delivery. The frequency of headache due to dural puncture was highest in younger population (age between 18 and 30 years) and declines by age 60 years and older and children younger than 13 years. Increased dural fiber elasticity in younger women as compared to more firm dura in older patients, may be at a greater risk because that maintains a patent dural defect. Patients with lower body mass index the incidence of PDPH was greater while rate of PDPH decreased in women who were obese or higher BMI, because there greater intra-abdominal pressure helping in decreasing the loss of CSF. Other important factor was the expertise of the operator.

RECOMMENDATIONS

We recommend that spinal anesthesia with paramedian approach in patients undergoing LSCS should routinely be used in our general practice for preventing headache after dural puncture and in turn reduce the morbidity of our population.

CONCLUSION

This study concluded that there was more frequency of headache due to dural puncture with midline technique compared to para-median technique of spinal anaesthesia in females underwent cesarean section.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AA & D: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

AK & SKN: Data acquisition, data analysis, critical review, approval of the final version to be published.

AS: Concept, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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