Open Access

Original Article

Comparison of Post Dural Puncture Headache Among Patients Administrated Spinal Anesthesia with 25 Gauge and 27 Gauge Needles Undergoing Elective Cesarean Section

Syeda Amna Tahir, Fakhra Fakhr, Raja Azhar Mahmood, Wajeeh Ur Rehman*

Shalamar Institute of Health Sciences, Lahore Pakistan, *Shalamar Hospital, Lahore, Pakistan

ABSTRACT

Objective: To compare the outcome of 25 Gauge and 27 Gauge needles in terms of Post Dural Puncture Headache in patients undergoing spinal anesthesia at Gynae Surgical Wards.

Study Design: Quasi experimental study.

Place and Duration of Study: The study was conducted at the Gynae Surgical Wards of the Shalamar Hospital in Lahore, Pakistan from Sep 2022 to Apr 2023.

Methodology: 58 patients who met the study's inclusion requirements were recruited through non-probability, convenient sampling. They were split into two groups 29 patients in Group-A and 59 patients in Group-B. After obtaining informed consent, patients in Group-A received spinal anesthesia with a 25-gauge needle, whereas Group-B received spinal anesthesia with a 27-gauge needle. The data was collected using Proforma. At 24, 48, and 72 hours following the procedure, Post Dural Puncture Headache was assessed and data was analyzed using SPSS.

Results: The mean age of the subjects in Group-A was 26.21±3.016 years and the mean age of subjects in Group-B was 25.07±3.722 years. 21 patients out of 29 in Group-A (72.4%) developed PDPH. While only 9 Patients out of 29(31%) developed PDPH in Group-B. There is an association between needle gauge and headache (*p*-value 0.002).

Conclusion: The use of a 27G needle for administering spinal anesthesia should be preferred over a 25G needle, as the frequency of PDPH was found to be lower with the former.

Keywords: Cesarian Section, Paresthesia, Post Dural Puncture Headache Sagittal Sinus Thrombosis, Spinal anesthesia, Sub Dural Hematoma.

How to Cite This Article: *Tahir SA, Fakhr F, Mahmood RA, Rehman WU. Comparison of Post Dural Puncture Headache Among Patients Administrated Spinal Anesthesia with 25 Gauge and 27 Gauge Needles Undergoing Elective Cesarean Section. Pak Armed Forces Med J 2024; 74(Suppl-2): S220-S225. DOI: https://doi.org/10.51253/pafmj.v74iSUPPL-2.10697*

INTRODUCTION

Spinal anesthesia is a preferred option for cesarean sections as it offers advantages over other techniques. It is considered safer than general anesthesia.[1,2] It is a technique that offers effective pain relief during and after surgery, requiring minimal post-operative care. However, it is important to note that like any medical procedure, it is not without potential complications.[3] Post Dural Puncture Headache is the main complication. Post-dural puncture headache (PDPH) is a type of headache that can occur after a dural puncture and can significantly affect the patient's well-being after surgery. It is characterized by a headache that worsens when the patient is upright and lasts for more than 24 hours.[4] Experiencing post-dural puncture headache (PDPH) can result in heightened patient morbidity and an elevated likelihood of readmission as well.[5,6]

The factors that prove to influence the incidence of Post Dural Puncture Headache include factors, patient's age, needle tip and gauge, number of lumber puncture attempts by the anesthesiologist, clinical experience and any previous history of headache.[7] The parturients gender and young age make her particularly susceptible to PDPH. Like there is the highest risk of PDPH in patients ranging from 20-30 and incidence decreases after the age of 40. August Bier first identified PDPH and hypothesized that cerebral spinal fluid (CSF) depletion might be its underlying cause. Reduced CSF pressure brought on by CSF loss in the epidural space as a result of the dural puncture site is the theorized cause of the headache, even if the exact mechanism causing this condition is yet unknown. For diagnosis CSF flow is to checked. There is a rare chance of serious complications like seizures, subdural hematoma, and sagittal sinus thrombosis. Bilateral subdural hematomas have been known to be fatal in some scenarios.[4-6]

Mandal *et al*. conducted a study on hundred full-term pregnant women aged between 18-36 years undergoing elective Caesarean Section. Patients were

Correspondence: Dr Syeda Amna Tahir, Shalamar Institute of Health Sciences, Lahore Pakistan

Received: 01 Aug 2023; revision received: 12 Mar 2024; accepted: 30 Apr 2024

divided into two groups. Results showed that the overall incidence of PDPH in 100 CS patients was 17% and a significantly higher incidence was noticed in-Group-A than in Group-B (26% vs 10%,). They concluded that the use of a 27G spinal needle was a good choice for the reduction of PDPH.[8]

Rahman *et al*. conducted a study at Shaheed Shurawardy Medical College Hospital to compare the occurrence of Post Dural Puncture Headache (PDPH) after caesarian section under spinal anesthesia. The study involved 60 adult patients, divided into two groups of 30 patients each. Group I received a 25G Quincke spinal needle, while Group II received a 27G Quincke spinal needle. Overall, seven patients (11.6%) developed PDPH, with an incidence of 16.7% (5/30) in Group I and 6.7% (2/30) in Group II.[9]

This study will give information about several clinical questions regarding this topic. It is assumed that the frequency of headache after 27 gauge will be less than 25 gauge. To the best of the researcher's knowledge, this study will be a baseline study to compare the outcome of both needles to how a 27 Gauge is better than a 25 Gauge needle and lower the chance of Post Dural Puncture Headache.

METHODOLOGY

Quasi experimental study was conducted from Sep 2022 to April 2023 after the approval of IRB (IRB no 440) at Gynae Surgical Wards of Shalamar Hospital, Lahore, Pakistan. All the patients of ASA Status 1(without any history of metabolic or any other disease). Administered with 27 Guage and 25 Gauge data was collected using proforma. 58 patients were selected in this study using the formula Two proportion. Non-probability, Purposive Sampling was used and a qualitative study was conducted at the Gynae Surgical Ward of Shalamar Hospital, Lahore, Pakistan.

Inclusion Criteria: Patients with Post Dural Puncture Headache aged between 20 to 45 years, without any metabolic disease (ASA Status I) and with Previa gravidae were included in the study.

Exclusion Criteria: Whereas Patient with multiple gravidae or Placenta accreta, coagulopathy, Twin pregnancy or patients who have a previous history of PDPH, Patients having any type of headache like migraine, carcinoma, any systemic disease and with infection at the site were excluded.

The consent was taken from patients by giving them brief information about the research program. Data was collected at the Shalamar Hospital, Lahore. An interview was given by patients. The acquired data on the Headache was interpreted. Amount of anesthetic agent was recorded. Type of spinal anesthesia (hyperbaric and Plain). Gauge of needs and medications was recorded for further evaluations. Two groups A and B were formed. Group-A patients were given Anesthesia with 25 Gauge needle. Group-B patients were given Anesthesia with 27 Gauge needle.

Severity of headache was assessed on Visual Analogue Scale:10

Grade 0: No Pain

Grade 1: Mild

Grade 2: Moderate to Severe

Grade 3: Severe

Garde 4: Worst

The data was entered and analyzed using SPSS 25. Numerical data like Age and visual analogue scale will be presented in the form of Mean±S.D whereas qualitative data like needle gauge, etc. was presented in the form of Frequency (Percentage). After fulfilling parametric assumptions, to determine the association between 25 Gauge & 27 Gauge needle chi-square test was applied. A *p*-value of 0.05 or less was considered as significant. Approval of the institutional ethical committee was obtained at the synopsis level of the project. Confidentiality was assured and ensured. The dignity of participants was respected at all examinations.

RESULTS

In this study the Mean age of the subjects administered anesthesia with 25 Gauge was 26.21±3.016 years and mean age of subjects treated with 27 Gauge was 25.07±3.722 years. The age difference was not statistically significant (p-value 0.206).

The overall incidence of PDPH is 51.7%, with 21 patients from Group-A developing PDPH after receiving anesthesia with a 25-gauge needle and only 9 patients from Group-B developing PDPH after receiving anesthesia with a 27-gauge needle.

There is no association needle and fear at the time of injection (*p*-value 0.105). It is worth noting that 12 patients (41.4%) in Group-A experienced anxiety during the injection. There is an association between with spinal needle gauge and reasons of fear (*p*-value 0.039). Patient's responses included fear of lower back pain, phobia of injections, spinal cord damage, and inability to block limbs. There is an association between spinal needle gauge and experiencing headache at the time of injection (*p*-value 0.002). The results show that 7 patients from Group-B developed headache at the time of injection while in Group-A 19 patients developed headache. There is an association between spinal needle gauge and response to response to experience of any head ache at the time of injection (*p*-value<0.001). The results showed that 5 patients in Group-B had mild pain and 2 had moderate pain. While only 2 patients in Group-A experienced mild pain, 13 experienced moderate pain, and 4 experienced severe pain. There is an association between spinal needle gauge and for how long the patient suffered from Post Dural Puncture Headache (PDPH) after spinal anesthesia (*p*-value<0.001). The table shows that in Group-B, 20 patients experienced no pain, 7 patients experienced pain for one hour, and only 2 patients experienced pain for one day. The results of Group-A show that only two patients experienced pain after one hour, while 19 patients experienced pain for one day. There is association spinal needle gauge and intensity of pain (*p*-value<0.001). The results are showing that 20 patients (69.0%) don't have pain after administration of spinal anesthesia with 27-gauge needle while 8 patients (27.6%) out of 29 respond in no.

There was association between needle gauge and after operation able to only lie down (*p*-value 0.016).

Table-I: Comparison of Both Gauges According to Different Symptoms and Complications (n=58)

	Spinal Needle used for Anesthesia		
	27 gauge	25 gauge	
Headache develop	9(31%)	21(72.4%)	30(51.7%)
Did you feel any fear at the time of the injection	6(21.4%)	12(41.4%)	18(31.6%)
If yes then why			
Lower back pain	3(50.0%)	11(91.7%)	14(77.8%)
Phobia of injection	2(33.3%)	0(0.0%)	2(11.1%)
Injection can damage spinal cord	1(16.7%)	0(0.0%)	1(5.6%)
What will happen if anesthesia does not block my limbs	0(0.0%)	1(8.3%)	0(5.6%)
Did you experience any head ache at the time of injection	7(24.1%)	19(65.5%)	26(44.8%)
Severity of Headache at the time of injection			
Mild	5(17.2%)	2(6.9%)	7(12.1%)
Moderate	2(6.9%)	13(44.8%)	15(25.9%)
Severe	0(0.0%)	4(13.8%)	4(6.9%)
For how long you suffered from Post Dural Puncher Headache (PDPH) after spinal anesthesia			
One hour	7(24.1%)	2(6.9%)	9(15.5%)
One day	2(6.9%)	19(65.5%)	21(36.2%)
Other Complications			
Vertigo		1(16.7%)	1(16.7%)
Vertigo & Fever		2(33.3%)	2(33.3%)
Heavy head		2(33.3%)	2(33.3%)
Relax when limb suspended		1(16.7%)	1(16.7%)

Table-II: Table is Showing the Comparison of Spinal Needle used for Anesthesia group According to Activity of Daily Living(n=58)

	Spinal Needle used for Anesthesia	**27 gauge (n=29)**	**25gauge (n=29)**	**Total (n=58)**
Ability to Lie down	First Day	10(37.0%)	5(18.5%)	15(27.8%)
	First & Second Day	15(55.6%)	15(55.6%)	30(55.6%)
	First to third Day	0(0.0%)	6(22.2%)	6(11.1%)
	Second Day	2(7.4%)	1(3.7%)	3(5.6%)
Ability to Walk around	First & Second Day	1(3.8%)	2(25.0%)	3(8.8%)
	First to Third Day	2(7.7%)	0(0.0%)	2(5.9%)
	Second Day	5(19.2%)	2(25.0%)	7(20.6%)
	Third Day	15(57.7%)	4(50.0%)	19(55.9%)
	Second & Third Day	3(11.5%)	0(0.0%)	3(8.8%)

There was no association between spinal needle gauge and after operation able to walk around (*p*-value 0.253). (Figure-1)

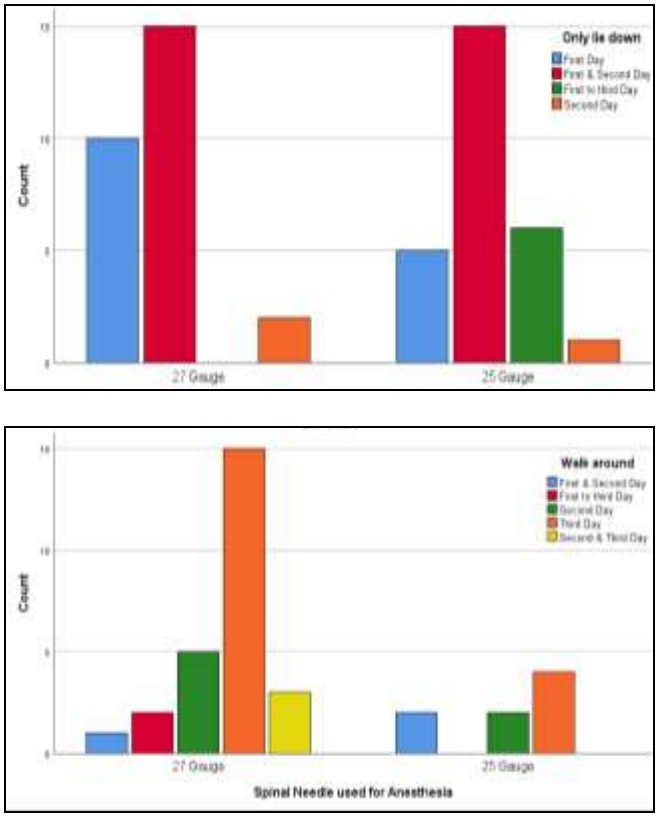

Figure-1: Comparison of Reduction in Pain and its Duration After Spinal Needle According to Anesthesia Administration Group

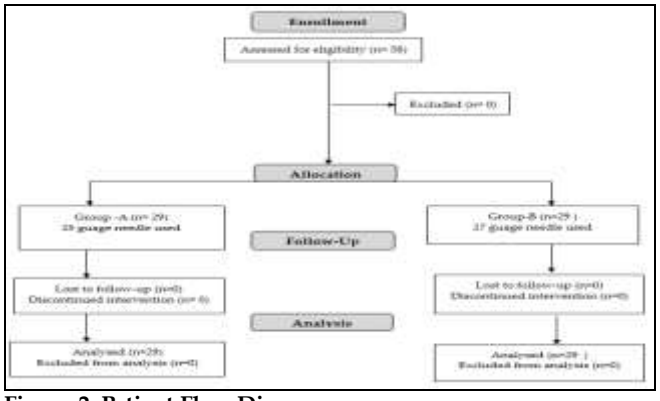

Figure-2: Patient Flow Diagram

DISCUSSION

Spinal anesthesia involves the administration of a local anesthetic, such as Bupivacaine, directly into the subarachnoid space as a technique for inducing anesthesia[11]. In 1898, August Bier introduced the technique of spinal anesthesia. It is widely utilized as the primary regional technique in caesarean sections. Spinal anesthesia is valued for its fast-acting and effective pain relief, muscle relaxation, and cost-effectiveness. It does not require advanced equipment for administration.[12-15] However, it carries the risk of complications, one being Post Dural Puncture Headache (PDPH). PDPH occurs when there is a greater loss of cerebrospinal fluid (CSF) than its production after a dural puncture. This leads to decreased CSF pressure, causing dilation of intracranial veins and increased brain volume in an upright position. The reduced CSF pressure also stimulates pain-sensitive structures, resulting in post-spinal headache[16-18]. The size and number of dural punctures affect the amount of CSF leakage and the likelihood of PDPH. It takes about two weeks for dural puncture sites to fully heal and seal.

Post-dural puncture headache (PDPH), according to the International Headache Society, is a headache that occurs within 5 days after a dural puncture[19]. It is marked by a dull headache that affects both sides of the head, starting from the front and extending to the back. It intensifies within 15 minutes of being upright or engaging in activities like sneezing, coughing, or straining. However, it typically eases within 15 minutes of lying down. Other symptoms of PDPH may include neck stiffness, dizziness, sensitivity to light (photophobia), decreased cerebrospinal fluid, cerebral venous thrombosis hematoma, ringing in the ears (tinnitus) and vomiting.[19-20]

We compare the outcome of 25 Gauge and 27 Gauge needles in terms of Post Dural Puncture Headache in patients undergoing spinal anesthesia at Gynae Operation Theatre. We evaluated 58 females. They were divided into two groups. Patients in Group-A were given anesthesia with 25 Gauge. While Group-B was given anesthesia with 27 Gauge. Our results shows that there is association between needle gauge and headache. 21 patients in Group-A (72.4%) developed PDPH. While only 9 Patients (31%) developed PDPH in Group-B. Symptoms may develop on first day after having anesthesia or second day after spinal injection and can last for 3 days so we follow the patients for better results.

The occurrence of post-dural puncture headache (PDPH) in pregnant patients who sustain dural membrane trauma during neuraxial anesthesia varied between 0.13% and 6.5% in a study conducted by Haller *et al*. 2018.[21] According to a study conducted by Jasra *et al*. in 2020, the frequency of post-dural

puncture headache (PDPH) was found to be 2.5% among patients who received anesthesia with a 27 Gauge needle[22]. In contrast, patients who were administered anesthesia with a 25 Gauge needle had a frequency of PDPH of 15%.[22] In a study conducted by Mandal et al. in 2019, the results indicated that patients in Group-A who received spinal anesthesia with a 25 Gauge needle had an incidence of PDPH of 26%. On the other hand, patients in Group-B who received spinal anesthesia with a 27 Gauge needle had an incidence of PDPH of 10%.[8] The results are different from our study due to age of patients. As it is said that incidence of PDPH decreases with increasing age and our study has more patients from 20's and least from 30-40's.

The incidence of PDPH was 23.68% (9/38) and 5.4% (2/37) patients who received spinal anesthesia with 25G and 27G needles respectively developed PDPH in the research Summayah *et al*. 2017.[23] Symptoms may start on first day of administrating anesthesia or second day after spinal injection and can last for 3 days. This research strengthens our study as its results are close to our results.

CONCLUSION

Based on our findings, it is concluded that the use of 27-gauge spinal needles for performing spinal anesthesia during Cesarean sections offers clear advantages over the 25-gauge needles in terms of reducing the frequency and severity of post-dural puncture headaches (PDPH). Out of the patients studied, only 9 experienced PDPH. Therefore, we strongly recommend the routine use of 27-gauge spinal needles for spinal anesthesia during Cesarean sections.

Conflict of Interest: None.

Author's Contribution

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

SAT & FF: Substantial contributions to study design, acquisition of data, manuscript writing and approval of the final version to be published.

RAM & WUR: Substantial contributions to acquisition of data, manuscript writing and 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.

REFRENCES

1. Sung T-Y, Jee YS, You H-J, Cho C-K. Comparison of the effect of general and spinal anesthesia for elective cesarean section on maternal and fetal outcomes: a retrospective cohort study. Anesthesia and Pain Medicine 2021; 16(1): 49-55.
2. Shitemaw T, Jemal B, Mamo T, Akalu L. Incidence and associated factors for hypotension after spinal anesthesia during cesarean section at Gandhi Memorial Hospital Addis Ababa, Ethiopia. PloS one 2020; 15(8): e0236755.
3. Pirenne V, Dewinter G, Van de Velde M. Spinal Anesthesia in Obstetrics. Best Practice & Research Clinical Anaesthesiology. 2023.
4. Lee SI, Sandhu S, Djulbegovic B, Mhaskar RS. Impact of spinal needle type on postdural puncture headache among women undergoing Cesarean section surgery under spinal anesthesia: A meta-analysis. Journal of Evidence-Based Medicine. 2018; 11(3): 136-144.
5. Demilew BC, Tesfaw A, Tefera A, Getnet B, Essa K, Aemro A, et al. Incidence and associated factors of postdural puncture headache for parturients who underwent cesarean section with spinal anesthesia at Debre Tabor General Hospital, Ethiopia; 2019. SAGE open medicine 2021; 9: 20503121211051926.
6. Patel R, Urits I, Orhurhu V, Orhurhu MS, Peck J, Ohuabunwa E, et al. A comprehensive update on the treatment and management of postdural puncture headache. Current pain and headache reports 2020; 24: 1-9.
7. Chekol B, Yetneberk T, Teshome D. Prevalence and associated factors of post dural puncture headache among parturients who underwent cesarean section with spinal anesthesia: A systemic review and meta-analysis, 2021. Annals of Medicine and Surgery 2021; 66: 102456.
8. Mandal AP, Gyani P, Kumar S, Kumar R. Comparative Evaluation of Different Needle Gauge of Needle for Spinal Anesthesia in Cesarean Section for Post-Operative Complication. Academia Anesthesiologica International 2019; 4(2).
9. Rahman MA, Alam AM, Mandal MA, Kamruzzaman M, Kabir MA, Begum SA, et al. Incidence of Postdural Puncture Headache after Caesarean Section Comparison Between 25G and 27G Quincke Variety of Spinal Needle. KYAMC Journal. 2017; 7(2): 762-769.
10. Delgado DA, Lambert BS, Boutris N, McCulloch PC, Robbins AB, Moreno MR, et al. Validation of digital visual analog scale pain scoring with a traditional paper-based visual analog scale in adults. Journal of the American Academy of Orthopaedic Surgeons Global research & reviews 2018; 2(3).
11. Girma T, Mergia G, Tadesse M, Assen S. Incidence and associated factors of post dural puncture headache in cesarean section done under spinal anesthesia 2021 institutional based prospective single-armed cohort study. Annals of Medicine and Surgery 2022; 78: 103729.
12. Li H, Wang Y, Oprea AD, Li J. Postdural Puncture Headache—Risks and Current Treatment. Current Pain and Headache Reports 2022; 26(6): 441-452.
13. Jin Z, Ding O, Islam A, Li R, Lin J. Comparison of liposomal bupivacaine and conventional local anesthetic agents in regional anesthesia: a systematic review. Anesthesia & Analgesia 2021; 132(6): 1626-1634.
14. Ferede YA, Nigatu YA, Agegnehu AF, Mustofa SY. Incidence and associated factors of post dural puncture headache after cesarean section delivery under spinal anesthesia in University of Gondar Comprehensive Specialized Hospital, 2019, cross sectional study. International Journal of Surgery Open. 2021; 33: 100348.
15. Kwak K-H. Postdural puncture headache. Korean journal of anesthesiology 2017; 70(2): 136-143.
16. Vallejo MC, Zakowski MI. Post-dural puncture headache diagnosis and management. Best Practice & Research Clinical Anaesthesiology 2022; 36(1): 179-189.

17. Thejaswini H, Honnanavar K, Rao R. Comparison of incidence of PDPH between two different gauges of whitacre spinal needles in patients undergoing caesarean section. IJMA 2019; 2(2): 140-144.
18. Moore AR, Wieczorek PM, Carvalho JC. Association between post–dural puncture headache after neuraxial anesthesia in childbirth and intracranial subdural hematoma. JAMA neurology 2020; 77(1): 65-72.
19. Guglielminotti J, Li G. Exposure to general anesthesia for cesarean delivery and odds of severe postpartum depression requiring hospitalization. Anesthesia and analgesia 2020; 131(5): 1421.
20. Russell R, Laxton C, Lucas D, Niewiarowski J, Scrutton M, Stocks G. Treatment of obstetric post-dural puncture headache. Part 1: conservative and pharmacological management. International journal of obstetric anesthesia 2019; 38: 93-103.
21. Haller G, Cornet J, Boldi M-O, Myers C, Savoldelli G, Kern C. Risk factors for post-dural puncture headache following injury of the dural membrane: a root-cause analysis and nested case-control study. International journal of obstetric anesthesia. 2018; 36: 17-27.
22. Jasra HA, Ahmad H, Khalid S, Aftab4 S, Khalid H, janjua S. Post Dural Puncture Headache- A Comparison of 25 G and 27 G Quincke Spinal Needles in Patients Undergoing Elective Caesarean Section under Spinal Anaesthesia. JHBS M&DC 2020; 1(3): 4.
23. Sumaya Syed, Nargis Q, Shazia N, Khalida M, SH M, Hussain BA, et al. Comparison of post-dural puncture headache-incidence and severity in obstetric patients after spinal anesthesia for cesarean section with 25G and 27G Quincke needle. Int J Res Med Sci 2017; 5(2): 596-600.

.....