

Comparison Between Sphenopalatine Ganglion Block And Greater Occipital Nerve Block in the Management of Post-Dural Puncture Headache in Patients Refractory to Oral Therapy

Awais Khalid, Ahmed Mujadid Khan Burki, Ruhullah, Mustafa Bhutta, Muhammad Tayyab, Moin Iqbal

Department of Anaesthesiology, Combined Military Hospital Rawalpindi/National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To compare the efficacy of sphenopalatine ganglion block with greater occipital nerve block in the management of post-dural puncture headache in obstetric patients after cesarean section under spinal anesthesia.

Study Design: Quasi-experimental study

Place and Duration of Study: Department of Anesthesiology, Combined Military Hospital, Rawalpindi, Pakistan, Sep 2024 to Feb 2025.

Methodology: Patients in Group-S (n=70) received the sphenopalatine nerve block (SPNB) and patients in Group-G (n=70) received the greater occipital nerve block (GONB). Primary variables studied were median numeric rating scale (NRS) scores for pain (0-100) (0-No Pain to 100-Maximum pain imaginable) assessed at 1,6,12 and 24 hours between both groups, the total dose of rescue analgesia, the frequency of patients requiring epidural blood patch and patient satisfaction on the Likert scale.

Results: Median NRS scores before intervention between both groups were 45.00 (5.00) in Group-S versus 45.00 (5.00) in Group-G ($p=0.875$). Same scores assessed after 01 hour were 40.00 (5.00) versus 40.00 (5.00) between both groups ($p=0.880$). Assessment after 06 hours showed median scores of 30.00 (5.00) in Group-S versus 30.00 (9.00) in Group-G (0.650). After 12 hours, median scores were 15.00 (5.00) versus 25.00 (0.00) between both groups ($p<0.001$), and assessment after 24 hours showed median scores of 15.00 (0.00) in Group-S versus 20.00 (10.00) in Group-G ($p<0.001$).

Conclusion: It was concluded that sphenopalatine block offers better pain scores and patient satisfaction with reduced need for rescue analgesia, with both blocks offering good results with minimal side effects.

Keywords: Greater occipital nerve block; post-dural puncture headache; sphenopalatine ganglion block.

How to Cite This Article: Khalid A, Burki AMKB, Ruhullah, Bhutta M, Tayyab M, Iqbal M. Comparison Between Sphenopalatine Ganglion Block and Greater Occipital Nerve Block in the Management of Post-Dural Puncture Headache in Patients Refractory to Oral Therapy. *Pak Armed Forces Med J* 2026; 76(5): 675-679. DOI: <https://doi.org/10.51253/pafmj.v76i.Suppl-8.13253>

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INTRODUCTION

Spinal anesthesia remains the preferred approach for anesthetists for surgeries involving the lower abdomen and lower limbs.¹ It has various advantages over general anesthesia, especially in obstetric patients, making it the modality of choice for cesarean section delivery worldwide.² The absence of cognitive impairment, less need for opioids, lower incidence of postoperative nausea and vomiting, better pain management, and early initiation of oral feeding in obstetric patients are valid indications that make it the first-line choice for anesthetists.³ Despite these advantages, the procedure is not without its drawbacks. Post-dural puncture headache is an important complication encountered with increased frequency among obstetric patients compared with the general population. Various factors are associated with increased incidence, including the type of needle

used, pregnancy, age, sex, and body mass index.⁴ The overall reported incidence in low-risk obstetric patients is less than 3%, but it is reported to be as high as 9-11% in high-risk individuals with these risk factors.⁵ The onset of the condition is usually within 72 hours of dural puncture in 90% of cases.⁶ It is pertinent to note that, even without treatment, the majority of cases resolve within five to seven days. However, the literature suggests that patients who remain untreated for prolonged periods have a greater incidence of persistent headaches within 6 months of the procedure.⁷

The mainstay of therapy is fluid administration, pain killers, use of caffeine, and non-steroidal anti-inflammatory drugs (NSAIDs) for mild cases.⁸ Debilitating symptoms with patients unable to perform day-to-day activities require an epidural blood patch, which is presently considered the definitive therapy for the condition.⁹ With the advent of peripheral nerve blocks (PNB), alternate methods for treating PDPH include the sphenopalatine ganglion block and greater occipital nerve block.¹⁰

Correspondence: Dr Awais Khalid, Department of Anaesthesiology, Combined Military Hospital Rawalpindi Pakistan
Received: 04 Mar 2025; revision received: 24 Sep 2025; accepted: 25 Sep 2025

While both have been proposed to treat PDPH in patients, their comparison studies require further evaluation regarding their efficacy and adverse effect profile. Our study aims to compare the efficacy of sphenopalatine ganglion block versus greater occipital nerve block in the management of post-dural puncture headache in obstetric patients after cesarean section under spinal anesthesia.

METHODOLOGY

This quasi-experimental study was carried out at the Department of Anesthesiology, Combined Military Hospital, Rawalpindi, Pakistan, from Sept 2024 to Feb 2025 after approval from the ethical review board vide letter number(668) dated 22 Aug 2024. The minimum sample size to be taken was calculated using the WHO calculator, keeping the confidence interval at 95%, power of test at 80%, with the anticipated mean dose of rescue analgesia required after sphenopalatine ganglion block being 28.034.4 mg versus 45.540.0 mg in the greater occipital nerve block group in 24 hours.¹¹ With a mean difference of 17.55.6 mg, the minimum sample size according to the WHO calculator came out to be 52 for each group. We included 70 patients in each group, one to receive sphenopalatine ganglion block (Group-S, n=70) and the other to receive greater occipital nerve block (Group-G, n=70) according to the inclusion criteria furnished using non-probability consecutive sampling via lottery method.

Inclusion Criteria: All post-cesarean patients, aged > 20 years, presenting with headache within 72 hours of spinal anesthesia administration with a clinical diagnosis by a consultant anesthetist for the headache with a postural nature, extending to the occipital area, improving on lying down and associated with tinnitus, photophobia, nausea and vomiting with numeric rating scale (NRS) scores for pain >40

Exclusion Criteria: Patients with a coagulation defect, history of migraine or chronic headaches, patients with a nasal polyp or nasal septal deviation, patients with an allergy to the local anesthetics (lignocaine), and patients unwilling to be included in the study

The study method included all patients as per the inclusion criteria furnished. The patients were divided into the sphenopalatine ganglion block (SPGB) group (Group-S) (n=70) and the greater occipital nerve block (GONB) group (Group-G) (n=70). Once the patients were divided into the two groups, informed written consent was obtained, and patients in both groups

were informed in detail about the procedure and possible complications.

Patients in Group-S received the SPNB in the supine position in each nostril using a cotton-tipped applicator after a few drops of 2% lignocaine were given in each anterior nares using a spray applicator. The block was administered with the soaked cotton applicator using 1 ml (4mg) of intravenous dexamethasone with 2 ml of 2% lignocaine just anterior to the sphenopalatine ganglion after identifying the pterygopalatine fossa and superior to the middle turbinate, applied for a total of 5 minutes in all patients. If the numeric rating scale (NRS) for pain was above 40 after 30 minutes, the block was repeated. No improvement in pain scores after two attempts was marked as block failure and excluded from the study. Patients in Group-G received the greater occipital nerve block (GONB) using a 20 G needle and 2 ml of 2% Lignocaine and 1 ml (4 mg) of intravenous Dexamethasone. The mastoid process and occipital protuberance were identified on the skull and mandible in all patients, and a line drawn at their lateral two-thirds and medial third was used to identify the occipital artery. The GON was identified medial to the artery, and the mixture was injected bilaterally for the block. NRS scores similar to those in Group-S were recorded, and the block was repeated if NRS scores were above 40 after 30 minutes.

Criteria for block failure and exclusion were the same as Group-S. Patients with NRS scores after block success of more than 40 within 24 hours were given Intravenous Ketorolac 30 mg diluted in 100 ml normal saline over 15 minutes and stopped once pain scores were less than 30, and the total dose was recorded in 24 hours. Patients with persistent headache after 24 hours were referred for an epidural blood patch in both groups, and the frequency was noted. Adverse effects for 24 hours were noted, and patient satisfaction was assessed in all cases using a 7 point Likert scale in successful cases after 24 hours.

Primary variables studied were median numeric rating scale (NRS) scores for p7-point100) (0-No Pain to 100-Maximum pain imaginable) assessed at 1,6,12 and 24 hours between both groups, the total dose of rescue analgesia, the frequency of patients requiring epidural blood patch, and patient satisfaction on the Likert scale. Secondary variables were incidence of adverse effects.

Statistical data, including age, BMI, duration of surgery, and cumulative dose of rescue analgesia in 24

hours, were expressed as Mean $\pm$ SD and compared using the independent samples t-test. Pain scores assessed at specified intervals and Likert satisfaction scores were expressed as median values and compared using the Mann-Whitney U test. Requirement of blood patch and adverse effects were expressed as frequency and percentage and compared using the Chi-square and Fisher exact test as appropriate. The p -value of ≤ 0.05 was considered statistically significant. All statistical calculations were performed using Statistical Package for Social Sciences 26.0.

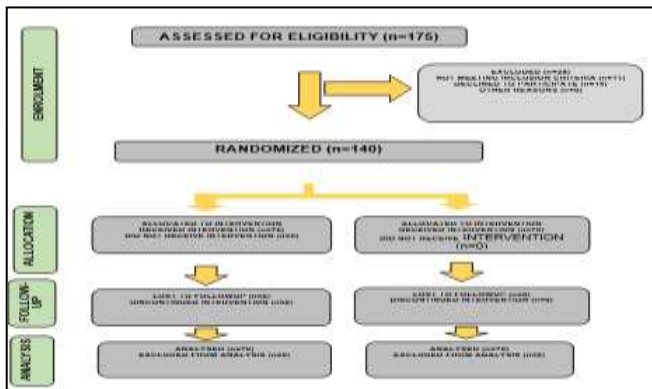


Figure-I: Phases of the Quasi-Experimental Study

RESULTS

A total of 140 patients were assessed in the final study protocol. They were divided into Group-S receiving sphenopalatine ganglion block ($n=70$) and Group-G receiving greater occipital nerve block ($n=70$). Mean age was 28.14 ± 3.45 years in Group-S versus 28.34 ± 3.27 years in Group-G ($p=0.726$). Mean body mass index was 28.81 ± 1.13 kg/m² in Group-S versus 28.80 ± 1.09 kg/m² in Group-G ($p=0.940$). Mean duration of surgery was 50.57 ± 4.67 minutes in Group-S versus 40.86 ± 6.13 minutes in Group-G ($p=0.236$).

Median NRS scores before intervention between both groups were 45.00 (5.00) in Group-S versus 45.00 (5.00) in Group-G ($p=0.875$). Same scores assessed after 01 hour were 40.00 (5.00) versus 40.00 (5.00) between both groups ($p=0.880$). Assessment after 06 hours showed median scores of 30.00 (5.00) in Group-S versus 30.00 (9.00) in Group-G (0.650). After 12 hours, median scores were 15.00 (5.00) versus 25.00 (0.00) between both groups ($p<0.001$), and assessment after 24 hours showed median scores of 15.00 (0.00) in Group-S versus 20.00 (10.00) in Group-G ($p<0.001$).

Mean total dose of rescue analgesia used within 24 hours after the block was 28.64 ± 6.25 mg in Group-S versus 40.86 ± 6.13 mg in Group-G ($p<0.001$). Median satisfaction scores on the Likert scale after 24 hours were 6.00 (1.00) in Group-S versus 5.50 (1.00) in Group-G ($p<0.001$). Blood patch was required in 4 (5.7%) patients in Group-S versus 7 (10.0%) patients in Group-G ($p=0.346$).

Adverse effects reported within 24 hours of block between both groups showed that nausea was seen in 06 (8.6%) patients in Group-S versus 04 (5.7%) patients in Group-G ($p=0.512$). Dizziness was seen in 03 (4.3%) patients in Group-S versus 04 (5.7%) patients in Group-G ($p=0.698$). Bleeding was seen in 02 (2.9%) versus 03 (4.3%) patients between both groups ($p=0.649$), and bitter taste was reported by 08 (11.4%) patients in Group-S versus 00 (0.0%) patients in Group-G ($p=0.004$) (Table-III).

Table-I: Comparison of Baseline Characteristics Between the Study Groups ($n=140$)

Variable	Group-s ($n=70$)	Group-g ($n=70$)	p -value
Mean age (years)	28.143.45	28.343.27	0.726
Body mass index (kg/m ²)	28.811.13	28.801.09	0.940
Duration of surgery (min)	50.574.67	40.866.13	0.236

Table-II: Comparison of Mean NRS Scores Between the Study Groups ($n=140$)

Variable	Group-s ($n=70$)	Group-g ($n=70$)	p -value
Median nrs scores before intervention	45.00 (5.00)	45.00 (5.00)	0.875
Median nrs scores at 01 hour	40.00 (5.00)	40.00 (5.00)	0.880
Median nrs scores at 06 hours	30.00 (5.00)	30.00 (9.00)	0.650
Median nrs scores at 12 hours	15.00 (5.00)	25.00 (0.00)	<0.001
Median nrs scores at 24 hours	15.00 (0.00)	20.00 (10.00)	<0.001
Mean total dose of rescue analgesia used (mg/24 hrs)	28.646.25	40.866.13	<0.001
Median likert scores after 24 hours	6.00 (1.00)	5.50 (1.00)	<0.001
Requirement of blood patch (%)	04 (5.7%)	07 (10.0%)	0.346

Table-III: Comparison of Adverse Effects Between the Study Groups ($n=140$)

Variable	Group-s ($n=70$)	Group-g ($n=70$)	P -value
Nausea	06 (8.6%)	04 (5.7%)	0.512
Dizziness	03 (4.3%)	04 (5.7%)	0.698
Bleeding	02 (2.9%)	03 (4.3%)	0.649
Bitter taste	08 (11.4%)	00 (0.0%)	0.004

DISCUSSION

In the present study, median pain scores were comparable between the two groups before intervention and at 1 and 6 hours; however, Group-S showed significantly lower scores at 12 and 24 hours than Group-G ($p<0.001$). Group-S also required a significantly lower mean dose of rescue analgesia and reported higher patient satisfaction after 24 hours (both $p<0.001$). The requirement for epidural blood patch was lower in Group-S than in Group-G, although the difference was not statistically significant (5.7% vs. 10.0%; $p=0.346$).

The underlying mechanism for PDPH has been proposed to be changes in the pressure of cerebrospinal fluid after dural puncture and persistent leak, resulting in CSF hypotension leading to compensatory meningeal vasodilation and blood volume expansion, resulting in the onset of headache.¹² The associated symptoms of neck stiffness should pain, and backache are linked to the traction of the cervical nerves due to pressure changes.¹³ In case of obstetric cases, studies show that females are 3 times more prone to develop PDPH with the same procedure when compared with their male counterparts, and pregnancy in particular is associated with increased CSF pressure, resulting in more CSF leak, increasing the chances of PDPH.¹⁴ Increased circulating levels of estrogen have also been implicated in increasing CSF hypotension, repeating the mechanism of PDPH.¹⁵

While epidural blood patch remains the definitive treatment for the condition by sealing the dural leak with autologous blood, there is a lot of resistance, especially in females, to go through another invasive procedure of the spine after PDPH.¹⁶ Certain post-operative complications, like massive blood loss and coagulopathy, restrict doing the procedure in some patients as well. The modalities done in our study are both safe, effective, and easy methods to treat PDPH. The block needed for the greater occipital nerve requires a little more expertise when compared with the sphenopalatine ganglion block, but the learning curve is not steep, and both procedures can safely and effectively be done under the supervision of a pain consultant conveniently.¹⁷

The NRS scores were comparatively better in the sphenopalatine group in our study. The same has been reported by studies done by Elsayed *et al.*¹⁸ The adverse effect profile was comparable for both groups concerning procedural complications, but the

frequency of experiencing bitter taste was exclusively seen in the sphenopalatine group, and no patient was distressed enough to warrant non-recommendation of the procedure.⁶ The incidence of blood patch was similar for both groups, but the dose of rescue analgesia in the first 24 hours was halved in the sphenopalatine ganglion block group. Comparable studies have been done both nationally and internationally. The study recommends that both sphenopalatine ganglion block and greater occipital nerve blocks are effective in treating PDPH in patients after cesarean delivery.

LIMITATION OF STUDY

The study was conducted exclusively among obstetric patients undergoing cesarean section under spinal anesthesia, which may limit the generalizability of the findings to other patient populations. The quasi-experimental design and single-center setting may have introduced selection and institutional biases that could influence the observed outcomes. A longer follow-up period and larger, multicenter randomized controlled trials are needed to confirm the comparative effectiveness and long-term safety of both nerve block techniques.

CONCLUSION

Sphenopalatine ganglion block appears to be a more effective approach for the management of post-dural puncture headache than greater occipital nerve block, providing superior pain relief, greater patient satisfaction, and reduced rescue analgesic requirements. Both techniques were associated with favorable clinical outcomes and minimal adverse effects, supporting their use as effective treatment options.

ACKNOWLEDGEMENT

The authors are very grateful to the Department for supporting in the study.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

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

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

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

MT & MI: Conception, 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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