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SYSTEMATIC REVIEWS

Sphenopalatine ganglion block for postdural puncture headache: A review of current evidence

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Abstract

BACKGROUND

Postdural puncture headache (PDPH) is a significant complication of neuraxial procedures. Although conservative treatments and the invasive epidural blood patch (EBP) are currently standard approaches, the sphenopalatine ganglion (SPG) block is emerging as a promising, less-invasive alternative. The pathophysiology of PDPH involves cerebrospinal fluid leakage, resulting in reduced intracranial pressure and compensatory cerebral vasodilation, which is partially mediated by SPG stimulation. The SPG block aims to interrupt this vasodilation using local anesthetics, thereby alleviating headache symptoms.

AIM

To provide a comprehensive overview of current evidence regarding the use of the SPG block in treating PDPH, explores the anatomical and physiological basis of this intervention, describes various administration techniques for administering the block, and critically assesses the efficacy and safety data from clinical studies.

METHODS

A systematic literature search was conducted on PubMed and the Cochrane Database to identify systematic reviews and meta-analyses published up to April 2025, using the keywords "sphenopalatine ganglion block" and "post-dural puncture headache".

RESULTS

The SPG block is a simple, noninvasive, and effective bedside procedure. Clinical studies have demonstrated that it provides rapid pain relief, with high success rates and an onset of action typically within 10-30 minutes. The most used te-

chnique is the transnasal approach, which is associated with minimal and transient adverse effects such as nasal discomfort and bitter taste.

CONCLUSION

Although EBP remains the preferred treatment for severe PDPH, the SPG block is a viable alternative for mild-to-moderate cases, often allowing patients to postpone or avoid EBP. Comparative studies suggest that SPG block has a quicker onset than EBP, though in some cases, it provides shorter duration relief. Overall, the SPG block is a safe, effective, and readily accessible treatment for PDPH. Its minimally invasive nature and high success rate in providing rapid pain relief make it an excellent first-line alternative to more invasive procedures. Further large-scale, standardized randomized controlled trials are required to optimize protocols and fully integrate the SPG block into mainstream clinical practice.

Key Words: Sphenopalatine ganglion block; Post-dural puncture headache; Postdural puncture headache; Epidural blood patch; Neuraxial procedures; Nerve block

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Core Tip: Postdural puncture headache (PDPH) is a debilitating complication of spinal anesthesia. Although the epidural blood patch remains the established gold standard invasive treatment, the sphenopalatine ganglion block has emerged as a promising minimally invasive alternative. Sphenopalatine ganglion block operates by interrupting the parasympathetic pathways responsible for cerebral vasodilation, which underlies PDPH. It provides rapid pain relief in majority of cases, with minimal side effects. Its ease of application and high success rate make it an excellent alternative, allowing patients to avoid or delay more invasive procedures such as epidural blood patch, particularly in cases of mild to moderate PDPH.

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INTRODUCTION

Postdural puncture headache (PDPH) is a frequent and often debilitating complication following dural puncture during procedures intentional procedures (*e.g.*, spinal anesthesia, lumbar puncture) or unintentional ones (*e.g.*, epidural anesthesia). The pooled prevalence of PDPH among parturients undergoing cesarean section with spinal anesthesia is 23.47% (95% confidence interval: 10.53%-36.42%)[1]. Multiple studies report an incidence ranging from 2% to over 40%[2]. Risk factors for PDPH include female sex, young age, low body mass index, and a history of PDPH. According to the third edition of the International Classification of Headache Disorders, PDPH is defined as a headache with onset within 5 days after lumbar puncture[3]. This condition results from cerebrospinal fluid (CSF) leakage through the dural puncture and is often accompanied by symptoms such as neck stiffness or auditory disturbances. This headache is typically self-limiting and characterized by its postural nature, severe, bifrontal or occipital, worsening when upright and relieved when recumbent[4]. A considerable proportion of patients experience substantial disability and psychological distress, with 42.5% reporting severe disability and nearly 83% experiencing depression, anxiety, or stress related to their condition[5]. Because PDPH significantly impacts the quality of life and prolongs hospitalization, active management is required. Initial treatment includes conservative measures such as bed rest, hydration, paracetamol, and caffeine, whereas second-line management involves invasive interventions such as the epidural blood patch (EBP). Although EBP remains the gold standard, it is invasive, carries inherent risks, and has variable success rates, emphasizing the need for effective, less invasive alternatives.

A promising emerging intervention is the sphenopalatine ganglion (SPG) block (SPGB)[6,7]. The SPG, a peripheral parasympathetic ganglion located in the pterygopalatine fossa, serves as a hub for cranial autonomic innervation and has been implicated in the pathophysiology of cluster headache and trigeminal neuralgia[8]. Application of a local anesthetic to the SPG is thought to modulate cerebral blood flow and counteract the compensatory vasodilation underlying PDPH pain, thereby offering a novel therapeutic mechanism. Recent evidence supports its use for EBP-resistant PDPH[9]. The SPGB has recently been repurposed for PDPH management, with encouraging outcomes reported in case series and randomized controlled trials (RCTs). The proposed mechanisms of PDPH relief include inhibition of parasympathetic outflow, reduction of cerebral vasodilation, and modulation of nociceptive signaling from the meninges. This review aims to achieve two objectives: First, to systematically review and compare findings from meta-analyses on the efficacy of established PDPH, particularly EBP and pharmacotherapy; and second, to determine the role of SPGB within an evidence-based treatment algorithm by evaluating its efficacy and safety based on data from meta-analyses.

MATERIALS AND METHODS

Anatomy and pathophysiological rationale

The rationale for SPGB derives from the anatomy of the ganglion and the pathophysiology of PDPH. The SPG is a triangular parasympathetic structure situated in the pterygopalatine fossa, connected to the trigeminal and autonomic systems, and located posterior to the middle nasal turbinate and anterior to the pterygoid canal[10]. Also known as the pterygopalatine, Meckel, or nasal ganglion, it modulates cerebral vasodilation through parasympathetic fibers[11]. The Monro-Kellie doctrine provides the foundation for understanding PDPH: The total intracranial volume of brain tissue, blood, and CSF is fixed[12]. Persistent CSF leakage following dural puncture disrupts this equilibrium, triggering compensatory cerebral vasodilation to maintain intracranial volume as the parenchyma cannot expand to compensate. This vasodilation is the principal cause of pain. As the primary mediator of this vasodilatory response, the SPG is a logical target for intervention. Blocking its output with a local anesthetic is theorized to reduce vasodilation and thereby alleviate headache. Parasympathetic activity mediated by neurons with synapses in the SPG contributes to this vasodilatation, and interruption of these pathways through SPGB helps relieve the associated headache[11].

Technique variations

The SPG can be approached using several techniques[9,11,13,14], each with distinct advantages and considerations (Table 1). The choice of technique depends on the operator's experience, available equipment, and the clinical scenario, particularly whether a simple topical application or a more precise, image-guided injection is required. The comparative efficacy, duration of relief, and safety profiles among these techniques remain active areas of investigation and will be discussed in detail throughout this review.

Table 1 Sphenopalatine ganglion blockade techniques

Technique	Ref.	Approach	Description	Key advantages	Key limitations/considerations
Trans nasal	Schaffer *et al*[13], 2015	Topical	A cotton-tipped applicator, catheter, or atomizer is used to apply a local anesthetic (*e.g.*, lidocaine) to the nasal mucosa; an anesthetic is applied to the posterior pharyngeal wall mucosa; the goal is to diffuse the medication to the underlying sphenopalatine ganglion (SPG)	It is noninvasive and simple; quick to perform at the bedside; there is a low risk of serious complications; easily repeatable	Drug diffusion is inconsistent; shorter duration of the effect; the anesthetic dose is not precisely controlled; uncomfortable for patients
Transoral	Piagkou *et al*[11], 2012	Invasive	The needle is advanced through the hard palatine's greater palatine foramen; the needle enters the pterygopalatine fossa; local anesthetic is injected directly into SPG; it is often performed under fluoroscopic guidance	This allows for the precise injection of a known volume; provides a more consistent and prolonged effect	Invasive: Risk of vascular injury and hematoma; risk of infection
Suprazygomati	Alseoudy *et al*[9], 2024	Invasive and ultrasound-guided	The needle is advanced superior to the zygomatic arch; the needle is guided to the pterygopalatine fossa to deliver anesthesia; the procedure is performed under real-time ultrasonographic guidance	Real-time visualization can improve the accuracy and safety of the procedure; it avoids radiation exposure	This requires significant ultrasound expertise and equipment; this is technically more challenging; risk of orbital injury
Infrazygomatic	Anthony Cometa *et al*[14], 2021	Invasive and fluoroscopy-guided	The needle is advanced inferior to the zygomatic arch through the masseter muscle; fluoroscopic imaging is used to guide the needle into the pterygopalatine fossa; imaging confirmed correct needle placement before anesthetic administration	Direct visualization of the needle position using fluoroscopy; it confirms accurate needle placement	It involves radiation exposure for both patients and operators; it is invasive and carries the risk of vascular injury and hematoma; it can damage the surrounding nerves

SPG: Sphenopalatine ganglion.

Methods of literature review

Search strategy and selection criteria: A systematic search was conducted in PubMed and the Cochrane Database of Systematic Reviews for articles published from inception to April 1, 2025. The search strategy used a combined MeSH and free-text terms: ("post-dural puncture headache" OR "PDPH") AND ("meta-analysis" OR "systematic review") AND ("epidural blood patch" OR "caffeine" OR "gabapentin" OR "sphenopalatine ganglion block"). The inclusion criteria were as follows: (1) Meta-analyses or systematic reviews of RCTs and/or observational studies; (2) Adult patients with PDPH; (3) Intervention, including any treatment for PDPH; and (4) Reported outcomes of headache cure or relief. For this review, only studies in which the population was restricted to adults (≥ 18 years) with a confirmed diagnosis of PDPH were included. Eligible studies had to report at least one of the following outcomes: Pain relief/intensity, time to symptom resolution, need for additional interventions, or adverse effects. An additional requirement was that the treated

headache had to be a confirmed PDPH, not another headache type.

Data extraction and quality assessment: Two independent reviewers extracted data. Information on interventions, comparators, and effect estimates was obtained for the meta-analyses of conventional treatments. For studies addressing the SPGB, all available data on efficacy, safety, and techniques were extracted for qualitative analysis.

RESULTS

The initial search identified 58 records of systematic reviews and meta-analyses. Of these, 51 were excluded for various reasons, including lack of a specific PDPH population, outcomes not relevant to the review, unclear intervention reporting, or absence of efficacy or safety data. Seven systematic reviews and meta-analyses were deemed eligible for the qualitative synthesis. After a comprehensive review of 58 PubMed results, seven articles were selected for further analysis**.** The study selection process is summarized in the Preferred Reporting Items for Systematic Reviews and Meta-analyses flow diagram (Figure 1). This assessment offers a thorough overview of the current evidence for managing PDPH by integrating findings from recent high-level systematic reviews and meta-analyses. To establish the evidence base, Table 2[3,15-20] presents a chronological summary of the key systematic reviews and meta-analyses of PDPH management. These reviews cover both pharmacological and interventional strategies for the prevention and treatment of PDPH. To further detail the specific outcomes of these studies, Table 3 provides a comprehensive breakdown of their efficacy and key findings, enabling direct comparison of the conclusions drawn by various authors[3,15-20]. Table 4 presents the consolidated efficacy summary of major PDPH interventions.

Result summary

The synthesis of evidence indicates a comprehensive approach for PDPH management, presenting several efficacious strategies for both prevention and treatment. In terms of prophylaxis, pharmacological agents such as propofol, ondansetron, and aminophylline have demonstrated effectiveness, while fibrin glue has emerged as a promising non-pharmacological alternative. For the treatment of established PDPH, EBP remains the definitive, gold-standard intervention. Nevertheless, effective alternatives are available, including pharmacological options, such as caffeine, aminophylline/theophylline, and gabapentin/pregabalin. Among the interventional treatment modalities, peripheral nerve blocks have shown considerable value. Greater occipital nerve block (GONB) offers reliable and longer-lasting relief, whereas SPGB is notable for its capacity to provide rapid and substantial immediate pain relief, making it an excellent initial intervention for prompt patient comfort. We acknowledge, however, that the analgesic effect of SPGB is often transient, typically lasting up to six hours, and current evidence does not establish its superiority over other nerve blocks such as GONB. SPGB is promising for immediate management; its transient nature may necessitate subsequent intervention with a longer-acting treatment. Ultimately, the evidence supports a tailored, multi-modal strategy, selecting from these options based on the clinical context and specific objective of prevention or treatment.

DISCUSSION

Positioning the SPGB in the PDPH management algorithm

According to the 2023 Multisociety International Consensus Statement, establishing a standardized treatment protocol for PDPH is essential to improve outcomes[2]. The consensus emphasized the importance of risk assessment and the use of non-cutting spinal needles to reduce the PDPH incidence. Treatment should begin with conservative measures, such as hydration and multimodal analgesia, progressing to an EBP for severe or refractory cases. The consensus did not recommend the routine use of the SPGB for PDPH because of insufficient evidence, resulting in a grade I recommendation with low certainty. Traditionally, PDPH management followed a stepwise approach, starting with conservative measures and escalating to EBP.

Recent case reports, case series, and small trials have indicated a favorable role of SPGB and GONB in the management of PDPH. We conducted a comparative evaluation of SPGB and other treatment modalities to objectively assess the accumulation of evidence. We conducted a comparative evaluation of SPGB and other treatment modalities to objectively assess the accumulation of evidence. Previously systematic review by Albaqami *et al*[21] estimated that SPGB is a highly effective treatment for PDPH in the obstetric population. Albaqami *et al*'s analysis[21] specifically reported that 60.3% of patients achieved significant and complete relief without the need for further intervention. Another study demonstrated a significant reduction in the requirement for rescue analgesia, as well as a notable increase in the time interval before the demand for rescue analgesia, when compared to the placebo group[22]. Peripheral nerve blocks, including SPGB and GONB, offer an intermediate option; further evidence is required to establish their precise role relative to standard interventions. Recent publications advocate reevaluating the PDPH treatment algorithm to incorporate GONB and SPGB as potential methods to reduce EBP use[17,20]. Given its technical simplicity, fast onset, and ease of bedside application, SPGB offers a notable practical advantage.

Our review presents a more favorable assessment of SPGB compared with the 2023 Consensus Statement, which issued a grade I recommendation against its routine use due to limited evidence[2]. This difference likely reflects the inclusion of more recent meta-analyses, such as the 2023 meta-analysis study by Dwivedi *et al*[20], which provided higher-grade evidence for short-term efficacy and faster relief compared to conservative treatment. Although the consensus correctly

Table 2 Chronological summary of key systematic reviews and meta-analyses on postdural puncture headache management

Ref.	Type of review	Key focus	Included studies (*n*)	Key interventions	Main conclusion and finding
Basurto Ona *et al*[15], 2015	Cochrane review	Pharmacological treatment	13 RCTs	Caffeine, gabapentin, and theophylline	Evidence for the benefits of these drugs is limited owing to small, biased studies, although some drugs have shown promise
Barati-Boldaji *et al*[16], 2023	Meta-analysis	Aminophylline/theophylline	15 studies	Aminophylline, theophylline	They showed potential for treatment but not for prevention
Chang *et al* [17], 2021	Meta-analysis	GON block (treatment)	7 studies	Greater occipital nerve block	GONB is effective for short-term PDPH pain relief
Giaccari *et al* [18], 2021	Systematic review	Nerve blocks (treatment)	19 studies	SPG block, GONB, LON block	Peripheral nerve blocks are promising and safe options
Zhao *et al*[19], 2023	Bayesian network meta analysis	Pharmacological prevention	22 RCTs	Propofol, ondansetron, and amin	Propofol, ondansetron, and aminophylline were the most effective in reducing PDPH incidence
Dwivedi *et al* [20], 2023	Meta-analysis	SPG block (treatment)	9 RCTs	Trans-nasal SPG Block	The SPG block was effective for immediate pain relief compared to the controls, but the effect was short-lived
Alatni *et al*[3], 2024	Systematic review	Multi-modal (treatment and prevention)	38 studies	Pharmacologic, nerve blocks, EBP	Various effective strategies were summarized, and EBP was affirmed as the gold standard

RCT: Randomized controlled trial; GONB: Greater occipital nerve block; PDPH: Postdural puncture headache; SPG: Sphenopalatine ganglion; EBP: Epidural blood patch.

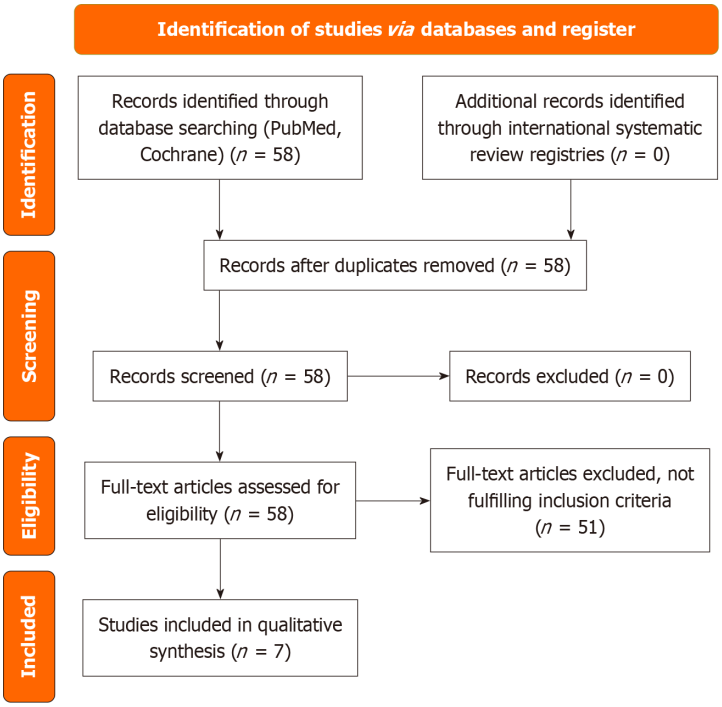


Figure 1 Flow diagram according to Preferred Reporting Items for systematic reviews and meta-analyses guidelines.

notes the lack of large-scale, definitive trials, our interpretation of the cumulative emphasized the practical value of SPGB as a rapid, low-risk bridging intervention, especially when other options are unavailable. Reconciling these perspectives highlights the need for the large, high-quality RCTs to strengthen the evidence base.

SPGB: Bridge, not a destination

The primary advantage of the transnasal SPGB lies in its rapid onset and minimally invasive nature. Dwivedi *et al*[20] confirmed its superiority over conservative treatments for immediate pain relief, making it an excellent option for urgent symptom control when invasive procedures are not feasible. Its ease of administration allows quick use across various clinical settings, even where anesthesia support for EBP may not be limited. However, its main limitation is the short

Table 3 Detailed efficacy and findings from included reviews

Ref.	Key focus	Main conclusion and finding	Key interventions with positive outcomes	Key interventions with no significant effect
Basurto Ona *et al* [15], 2015	Pharmacological treatment	However, evidence for the benefits was limited due to the small sample size and bias in the studies; some drugs were promising in reducing pain scores	Caffeine: Reduced PDPH persistence compared to placebo; gabapentin: Better VAS scores *vs* placebo/ergotamine; hydrocortisone: Better VAS scores than conventional treatment/placebo; theophylline: Better VAS scores than acetaminophen/conservative treatment	Sumatriptan and ACTH: No relevant effect on pain scores
Barati-Boldaji *et al*[16], 2023	Aminophylline/theophylline (Tx and prevention)	Therapeutic use significantly reduced pain scores (moderate evidence); prophylactic use did not significantly reduce the PDPH risk (very low evidence)	Aminophylline/theophylline: Effective for pain relief compared to placebo or conventional therapy	Aminophylline: Not effective for prevention
Chang *et al*[17], 2021	GON block (treatment)	GONB was effective for short-term pain relief at 1, 6, and 24 hours and reduced intervention failure	Greater occipital nerve block (GONB): Effective for pain relief; steroid co-administration may extend this effect	N/A
Giaccari *et al*[18], 2021	Nerve blocks (treatment)	Peripheral nerve blocks (SPG, GON, and LON) were effective, safe, and significantly reduced pain scores	SPG, GON, LON blocks: Effective analgesic options	N/A
Zhao *et al* [19], 2023	Pharmacological prevention (obstetric)	Propofol, ondansetron, and aminophylline were the most effective in reducing PDPH incidence; propofol and ondansetron also reduced PONV	Propofol (PPF), ondansetron (OND), and aminophylline (AMP) are effective; gabapentin/pregabalin (GBP/PGB): Effective at 48 hours	Dexamethasone, hydrocortisone: No superiority over placebo; no therapy reduced headache severity
Dwivedi *et al*[20], 2023	SPG block (treatment)	SPG block was effective for immediate, short-term pain relief (up to 6 hours) *vs* conservative treatment and lignocaine puffs	Transnasal SPG block: Effective for short-term relief	It was not superior to the sham or GON blocks; effects were not sustained beyond 6 hours
Alatni *et al*[3], 2024	Multi-modal (Tx and prevention)	Various effective strategies have been summarized, and EBP remains the gold standard; nerve blocks are effective and less invasive	Oral pregabalin and intravenous (IV) aminophylline are effective for the treatment and prevention of migraine headaches; IV Mannitol, IV hydrocortisone, neostigmine + atropine, SPG/GON blocks: Effective; fibrin glue, smaller needles: Effective prevention; EBP: Gold standard	Neuraxial morphine, epidural dexamethasone: Questionable for prevention

VAS: Visual analogue scale; GONB: Greater occipital nerve block; PDPH: Postdural puncture headache; ACTH: Adrenocorticotropic hormone; N/A: Not applicable; SPG: Sphenopalatine ganglion; LON: Lesser occipital nerve; PPF: Propofol; OND: Ondansetron; AMP: Aminophylline; GBP: Gabapentin; PGB: Pregabalin; PONV: Postoperative nausea and vomiting; EBP: Epidural blood patch.

duration of efficacy. The same analysis found that its benefits often dissipate after 6 hours, and SPGB was not superior to sham blocks or GONB in sustained pain relief. Thus, SPGB should be regarded as a bridging therapy rather than a definitive cure. It provides short-term symptom control while awaiting the effect of pharmacological treatments (*e.g.*, aminophylline, gabapentin) or arranging a more durable intervention.

Comparison with other key interventions

***Vs* pharmacological therapy:** Drugs such as aminophylline (for treatment) and propofol or ondansetron (for prevention) provide systemic and longer-lasting effects once therapeutic levels are achieved, but their onset is delayed. SPGB offers immediate relief but with a limited duration. These modalities are complementary: SPGB can manage the acute symptoms while awaiting the full effect of pharmacotherapy.

***Vs* GONB:** Evidence from Chang *et al*[17] suggests that GONB may be a more effective and longer-lasting intervention than SPGB. GONB provided significant pain relief sustained for up to 24 hours and reduced the need for rescue interventions. When combined with corticosteroids, its efficacy may improve further. Therefore, GONB appears to offer a more durable solution if choosing between peripheral nerve blocks, whereas SPGB may be preferable for its sheer speed and ease if long-term control is not the immediate goal.

Table 4 Consolidated efficacy summary of major postdural puncture headache interventions

Ref.	Intervention	Primary use	Efficacy for PDPH prevention	Efficacy for PDPH treatment	Key findings and notes	Common/notable side effects
Alatni *et al*[3], 2024; Barati-Boldaji *et al*[16], 2023	Aminophylline/theophylline	Treatment and prevention	Mixed (not recommended): A meta-analysis found no significant benefit of prophylaxis (very low evidence)	Effective (recommended): Significantly reduced pain scores (moderate evidence); this effect is enhanced when combined with dexamethasone	Considered a primary pharmacological option for treating established PDPH; the efficacy of prevention is not well supported	No significant adverse events were reported in the studies
Basurto Ona *et al* [15], 2015	Caffeine	Treatment	It is not typically used for prevention	Effective (recommended): Reduces the persistence of PDPH and the need for rescue interventions compared to placebo	A classic and well-established treatment for PDPH	Well tolerated; no major side effects were reported in the review
Alatni *et al*[3], 2024; Basurto Ona *et al* [15], 2015; Zhao *et al* [19], 2023	Gabapentin/pregabalin	Treatment and prevention	Effective (potential): Pregabalin has a preventive effect; gabapentin/pregabalin reduced incidence at 48 hours	Effective (recommended): Superior to placebo and ergotamine + caffeine in reducing pain scores over several days	Oral pregabalin has been highlighted as being particularly effective for both treatment and prevention	Generally well tolerated; sedation was mentioned but not quantitatively synthesized
Zhao *et al* [19], 2023	Ondansetron (OND)	Prevention	Effective (recommended): Significantly reduces the cumulative incidence of PDPH	Not assessed for treatment in these reviews	It also significantly reduces the incidence of postoperative nausea and vomiting (PONV)	It may induce migraine headaches in patients with a history of migraine (case reports)
Zhao *et al* [19], 2023	Propofol (PPF)	Prevention	Most effective (recommended): Ranked as the most effective prophylactic drug for reducing incidence	Not assessed for treatment in these reviews	Also significantly reduces the incidence of postoperative nausea and vomiting (PONV)	Sedation, diplopia, and tinnitus were mentioned in individual studies
Basurto Ona *et al* [15], 2015; Zhao *et al* [19], 2023	Corticosteroids (dexamethasone, hydrocortisone)	Treatment and prevention	Not effective: Dexamethasone did not show superiority in prevention (hydrocortisone did not show any significant prophylactic effects)	Effective for treatment: Hydrocortisone (IV) combined with conventional treatment led to better pain scores	Hydrocortisone is effective for treatment but not for prevention; the utility of dexamethasone remains questionable	No clinically significant adverse events were reported
Chang *et al*[17], 2021	Greater occipital nerve block (GONB)	Treatment	N/A	Effective (recommended): Provides significant short-term pain relief (1 hour, 6 hours, 24 hours) and reduces intervention failure	A feasible, less invasive alternative to EBP; steroid coadministration may prolong analgesic effects	No major adverse events were reported. Minor local discomfort
Dwivedi *et al*[20], 2023	Sphenopalatine ganglion block (SPGB)	Treatment	N/A	Effective (short-term): Superior to conservative care for immediate pain relief (up to 6 hours); not superior to sham or GONB	The effects are immediate but short-lived; it was not superior to the other nerve blocks	Nasal discomfort, throat numbness, and unpleasant taste (minor and transient)
Alatni *et al*[3], 2024	Epidural blood patch (EBP)	Treatment	N/A	Highly effective (gold standard): The ultimate solution for patients failing medical therapy	It rapidly decreases headache intensity; approximately 20% may require a second procedure; it is more invasive than pharmacological or nerve block options	Risks associated with neuraxial procedures (*e.g.*, infection, repeat dural puncture)
Alatni *et al*[3], 2024	Fibrin glue	Prevention	Effective (promising): Significantly reduced PDPH incidence and duration in the reviewed	N/A	A novel preventive strategy has been noted for its promising safety and	Not explicitly stated; however, the reviewed evidence noted a good safety

	evidence	affordability	profile

PDPH: Postdural puncture headache; OND: Ondansetron; PPF: Propofol; PONV: Postoperative nausea and vomiting; N/A: Not applicable; GONB: Greater occipital nerve block; EBP: Epidural blood patch; SPG: Sphenopalatine ganglion; SPGB: Sphenopalatine ganglion block.

***Vs* EBP:** EBP remains the gold standard for definitive PDPH treatment due to its high success rate and lasting effect. SPGB cannot replace EBP in refractory cases, but serves as a valuable option for patients who are not candidates for EBP (*e.g.*, due to coagulopathy, infection, or patient refusal). It also provides temporary comfort during the waiting period before EBP administration.

Clinical implications and future directions

The introduction of SPGB and GONB has expanded the therapeutic options for PDPH management. Nevertheless, clinical decision-making should remain patient-centered and evidence-based. The 2023 Consensus Statement does not support the routine use of SPGB due to insufficient evidence (grade I, low certainty). While SPGB offers rapid relief for acute pain and has a minimally invasive nature, its efficacy remains less established than that of EBP. For sustained symptom control, GONB or EBP remains a superior treatment modality. SPGB or GONB should primarily be considered when EBP is contraindicated or unavailable. These nerve blocks should complement, not replace, first-line evidence-based treatments and should be performed by trained clinicians. Future studies employing standardized SPGB techniques and outcome measures may strengthen its evidence base and clinical acceptability.

Limitations

This systematic review has several limitations stemming from the available literature and methodological variability. Limited High-Quality Studies: Evidence supporting SPGB for PDPH mainly comes from small trials and case series, with few large RCTs, limiting the strength of the recommendation.

Methodological heterogeneity: Studies varied in diagnostic criteria, SPGB techniques, comparison groups, and outcome measures, limiting synthesis and comparability.

Short-term focus: Most studies assessed only short-term outcomes, with limited data beyond 6 hours compared with EBP or GONB.

Publication bias: Positive findings may be overrepresented, while negative or null results are underreported.

Limited safety data: Although only minor adverse effects have been reported, systematic long-term safety evaluations are lacking.

These limitations underscore the need for larger, standardized RCTs to better inform PDPH management. Additionally, the quality of individual review articles was not formally assessed, as this review focused on synthesizing collective findings rather than appraising each study.

CONCLUSION

SPGB represents a valuable adjunct in PDPH management due to its rapid and minimally invasive nature. It serves primarily as a bridging therapy for acute symptom control rather than a first-line, standalone, or definitive treatment. SPGB's greatest utility lies in providing immediate relief while awaiting the effects of pharmacological interventions or when EBP is contraindicated. Among peripheral nerve blocks, current evidence favours GONB for its longer-lasting benefits. Future head-to-head RCTs comparing SPGB, GONB, and standard pharmacological treatments are essential to define their optimal sequencing and integration into the PDPH treatment algorithm.

FOOTNOTES

Author contributions: Mahanty PR, Sen B, Anand R, Nag DS, Pahadi N, Lodh D, and Upadhyaya T contributed to the design manuscript, writing of manuscript; data extraction, editing the manuscript and review of literature, and statistical analysis of the research; Mahanty PR, Sen B, Anand R, Nag DS contributed to the discussion the manuscript.

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