Comparative Study between Transnasal Sphenopalatine Ganglion Block versus Nebulized Dexmedetomidine for Treatment of Postdural Puncture Headache after Inguinal Hernia Repair: A Randomized Controlled Trial

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Abstract

Background: In ambulatory surgery, repair of inguinal hernia is one of the most frequently performed surgical operations. Post-dural puncture headache (PDPH) is a condition that is frequently associated with inadvertent dural puncture and neuraxial anaesthesia.

Objectives: This trial objective was to estimate the efficacy of trans-nasal the sphenopalatine ganglion block (SPGB) compared to nebulized dexmedetomidine (DEX) in the treatment of PDPH.

Patients and methods: This prospective, double-blinded, randomized controlled trial was done on 96 adult patients diagnosed to have PDPH after unilateral inguinal hernia repair. Patients having a visual analogue scale (VAS) score of ≥ 4 were enrolled and allocated into 2 equal groups randomly, group one received trans-nasal SPGB 4% lignocaine and group II received nebulized DEX. Standard intraoperative monitoring was done for blood pressure, electrocardiography, respiratory rate, heart rate, arterial oxygen saturation, and capnography.

Results: VAS at 12, 18, 24 and 36h was markedly lower in group one in comparison to group two ($P<0.05$), whereas at baseline, 15 min, 30 min, 1h and 6h was insignificantly different between both groups. The number of patients that needed rescue analgesia postoperatively at 12, 18, 24 and 36h was markedly lower in group one in comparison to group two ($P<0.05$), whereas at baseline, 15 min, 30 min, 1h and 6h was insignificantly varying between both groups.

Conclusion: Trans-nasal SPGB was helpful in post-dural puncture headache treatment after inguinal hernia repair, as evidenced by lower pain levels, less postoperative rescue analgesia, and a greater satisfaction rate in comparison to nebulized DEX.

Keywords: Nebulized Dexmedetomidine; Sphenopalatine Ganglion Block; Transnasal; Inguinal Hernia Repair; Postdural Puncture Headache.

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Introduction

In ambulatory surgery, the inguinal hernia repair is one of the commonest surgical operations performed. Inguinal herniorrhaphy can be performed using a variety of anaesthetic procedures, including spinal anaesthesia, general anaesthesia, and local infiltration anaesthesia **(Haladu et al., 2022; Demir et al., 2022).**

Unintentional dural puncture and neuraxial anaesthesia are frequent complications associated with post-dural puncture headache (PDPH). The PDPH incidence is directly proportionate to the needle diameter, with a 29G Quincke measuring less than 2 percent and a 16G Tuohy measuring 70 % **(Vallejo and Zakowski, 2022).** Hydration along with the use of analgesics, caffeine, hydrocortisone, theophylline. and gabapentin, comprise the conservative treatment. However, this approach is not consistently effective, necessitating the implementation of an interventional procedure **(Li et al., 2022).**

Although the PDPH frequency has declined in recent years due to the design progress and the spinal needles smaller size, it continues to be a prevalent complication in patients post-partumly, with an incidence of 0.5–2 percent after spinal anaesthesia was done **(Girma et al., 2022)**.

Management of PDPH is a challenge, and anesthesiologists are always searching for methods that may provide rapid and long-lasting relief from this disastrous consequence since the gold standard definitive treatment is the epidural blood patch (EBP) which itself might unintentionally result in dural puncture that was the root of the problem as well as the conservative therapy for PDPH may not be able to cure symptoms **(Malik and Singh, 2019)**.

An alternative between the autologous epidural blood patch (AEBP) and conservative treatment is the sphenopalatine ganglion block (SPGB) **(Albaqami et al., 2022).** The pterygopalatine fossa is the site in which the sphenopalatine ganglion exists, which is a neuronal part possesses both parasympathetic and sympathetic components of the autonomic nervous system, in addition to somatic sensory roots. Access to it is possible by trans-nasal or transcutaneous methods **(Ho et al., 2017).** The SPGB was utilized successfully in the practice of pain clinic for treatment of atypical facial pain, chronic headaches, and even trigeminal neuralgia **(Slullitel et al., 2018)**. The non-invasive trans-nasal method is a simple technique to be done and has the potential to be beneficial for PDPH. It involves the parasympathetic tonus blocking over the cerebral vessels, which restores the vasculature to its normal diameter and alleviates the headache and this procedure is both low-cost and low-risk. **(Takmaz et al., 2021)**. Minor nose pain and brief bleeding are the complications associated with the trans-nasal procedure **(Stalls et al., 2019).**

The highly selective α2-adrenoreceptor agonist, Dexmedetomidine (DEX) induces anxiolysis, analgesia, minimal respiratory depression, and sedation. Additionally, it was revealed to reduce the inflammatory response and stress associated with surgical operations and anaesthesia **(Lee, 2019)**. The nociceptive neuron firing suppression and the Substance-P release inhibition are the results of the α2-receptors stimulation in substantia gelatinase of the posterior horn. Additionally, the locus coeruleus region stimulation, that is recognised as a marked nociceptive transmission modulator, ceases the transmission of pain signals, leading to analgesia **(Bao and Tang, 2020)**. It has been used via the inhalational and intranasal routes for different purposes, as post-operative analgesia, sedation and premedication **(Wu et al., 2016; Baumgartner et al., 2023)**. Furthermore, the existing literature indicates that DEX induces

cerebrovascular vasoconstriction, which results in cerebral blood flow (CBF) reduction in both people and animals **(Baumgartner et al., 2023)**. Consequently, the utilization of DEX may serve as a beneficial supplement in specific circumstances that necessitate cerebral vasoconstriction in conjunction with analgesia, such as PDPH. The safety and efficacy of SPGB and nebulized dexmedetomidine in the treatment of PDPH have been the subject of limited research, and additional investigations are required **(Cohen et al., 2018; Li et al., 2022)**.

The trial objective was to assess the efficacy of trans-nasal SPGB in comparison with nebulized DEX in the PDPH treatment.

Patients and methods

This prospective, double-blinded, randomized controlled study was conducted on 96 adult patients aged 25 to 70 years, with American Society of Anesthesiologists physical status (ASA) I-II, diagnosed to have PDPH after inguinal hernia repair on one side from January 2023 to February 2024.

The informed written consent was taken from the patients before enrolling in our trial. The study was done within the guidelines approved in the committee of institutional ethics in Benha University Hospitals through the period from March 2022 to March 2023. This manuscript adheres to the CONSORT guidelines.

Exclusion criteria were patients with severe hypertensive disorders, fibrillation of atrium, an insufficient temporal window, a chronic migraine history, headache, convulsions, cerebrovascular accident, or any contraindicated condition to spinal anaesthesia, such as injection site infection, coagulopathy, or a history of allergy to local anaesthetics.

Additionally, patients who declined to enrol in the trial were excluded. Allergies to local anaesthetics, chronic pain, an opiate addiction history, and a body mass index (BMI) > 40 kg/m^2.

Randomization and blindness

Randomization was performed by a computer-generated system. The patient's consent was obtained, and the list was concealed in sealed envelopes that were numbered and opened sequentially. PDPH patients having a visual analogue scale (VAS) score of ≥ 4 were enrolled and assigned randomly to 2 equal groups: group 1 got transnasal SPGB 4 percent lignocaine, while group 2 received nebulized DEX.

The drugs were provided by a nurse who was not enrolled in the research, and the participants were unaware of their group assignment. The group allocation was concealed from the anaesthetist who evaluated the individuals following the intervention.

No premedication was given to patients before entering the operation room. arterial oxygen saturation (SpO_2), capnography, heart rate (HR), respiratory rate (RR), non-invasive blood pressure, and Electrocardiography were all monitored during the intraoperative period (the capnograph carbon dioxide sample line was placed near to the nostrils).

The performance of subarachnoid block was done in the sitting posture after the attachment of standard monitors, an 18G intravenous access was inserted, and premedication with a preload of 15 mL/kg Lactated Ringer's solution intravenously and IV midazolam 0.03 mg/kg. The block was accomplished under firm aseptic circumstances with a 25-gage disposable Quincke spinal needle at the L4/5 or L3/4 spinal intervertebral space through paramedian approach after skin infiltration with 3 mL of 2% lidocaine local anaesthetic. Subsequently, an injection of anaesthetic medications intrathecally [25 µg fentanyl + 12.5 mg hyperbaric bupivacaine 0.5 percent (2.5 mL)] was administered over a 10-second period with no barbotage following CSF free-flow. An anaesthetist who was not affiliated with

this investigation administered the block to each participant.

Trans nasal sphenopalatine ganglion block technique

The patients were placed in sniffing position while supine, and intra-nasal phenylephrine was administered to both nares to reduce bleeding before to the SPGBs. We administered two puffs of 10% xylocaine to each nostril.

A long, cotton-tipped applicator was put into both nares after being soaked with 2% viscous lidocaine until it was firmly placed in the nasopharynx posteriorly. After being left in place for 15-20 minutes, they were withdrawn and re-saturated with 2% viscous lidocaine.

They were then re-placed in the same location for an additional 20 minutes. The VAS pain evaluation of patients was taken, and they were in sitting position. prescription of oral analgesics was done before discharging the patients to address any pain recurrence following the conclusion of the SPGB. They were advised to consume caffeinated beverages, maintain hydration, and come back to the hospital for EBP, a SPGB repeat, or if there was recurred and intolerable headache.

Nebulized dexmedetomidine

Patients were administered 1 µg/kg DEX (Dexmedetomidine HCl 100 µg/mL, Precedex™, Pfizer Inc.) via ultrasonic nebulization twice daily with 4 mL of 0.9 percent saline, commencing at the time of PDPH diagnosis and continuing for 30 hours. The VAS and Lybecker classification score were employed to assess the intensity of the headache at 0, 15, 30, and 1, 6, 12, 18, 24, and 30 hours **(Birajdar et al., 2016; Lybecker et al., 1995)**. a rescue analgesic was administered in the form of paracetamol 1g IV, and the rescue analgesia necessity was observed in all patients after 6 hours. The analgesic request was evaluated at 0 (baseline), 15, 30, and 1, 6, 12, 18, 24, and 30 hours. The 2 groups underwent a conservative management, which included rest in bed in the supine position, good hydration, with infusion of 30 mL/kg/day lactated Ringer solution continuously.

The patient global impression of change (PGIC) scale was employed to evaluate patient treatment satisfaction after 30 hours following the surgery. The PGIC scale is a 7-point self-reported measure that reflects the evaluation of treatment efficacy and the overall improvement extent. The change is rated by patients as "minimally improved", "no change", "very much improved", "much improved", minimally worse", "far worse", or "very much worse" **(Lipton et al., 2022)**. Nasal pain, throat numbness, nausea, and vomiting were assessed as side effects.

Sample size:

Estimation of the sample size was done using G. power 3.1.9.2 (Universität Kiel, Germany). The sample size determination was done by the fact that the group A mean pain score (conservative management) decreased gradually until a value of less than 4 after 3 hours, and was subsequently constant at that level. In contrast, median pain score in group B (conservative management) was ≤4 throughout the period of study after the block was performed. Moreover, the severity of PDPH was assessed in the two groups by the VAS score. The mean values at 24 h was markedly lower in the DEX group in comparison to the controls (3.52 vs. 5.8, respectively) according to previous studies **(Kumrawat et al., 2020; Mowafy and Ellatif, 2021)**. Ten cases were added to overwhelmed dropout depending on the following considerations: allocation ration 1:1, 0.05 α error and 90% study power. Hence, 96 patients were allocated.

Statistical analysis

Statistical analysis was conducted using SPSS v28 (IBM©, Armonk, NY, USA). Histograms and Shapiro-Wilks test were utilized to assess the data distribution normality. The unpaired student t-test was used to compare between two groups in quantitative data. The Mann Whitney-test

was utilized for analysis of quantitative non-parametric data in the form of interquartile range (IQR) and median. Qualitative variables were presented as frequency and percentage (%) and were analysed utilizing the Chi-square test or Fisher's exact test when appropriate. Chi-square (x^2): The hypothesis that the row and column variables are independent, without indicating strength or direction of the relationship. Pearson chi square and likelihood-ratio chi-square. Chi-square test: For comparison between two groups as regards qualitative data. A p value ≤ 0.05 is considered significant.

Results

In our trial, eligibility of 129 patients was evaluated, 19 patients did not assemble our criteria and 14 patients rejected participation in the trial. The remaining 96 patients were randomly assigned into 2 groups (each contains 48 patients). All included patients were analyzed statistically and followed-up. **(Fig.1).**

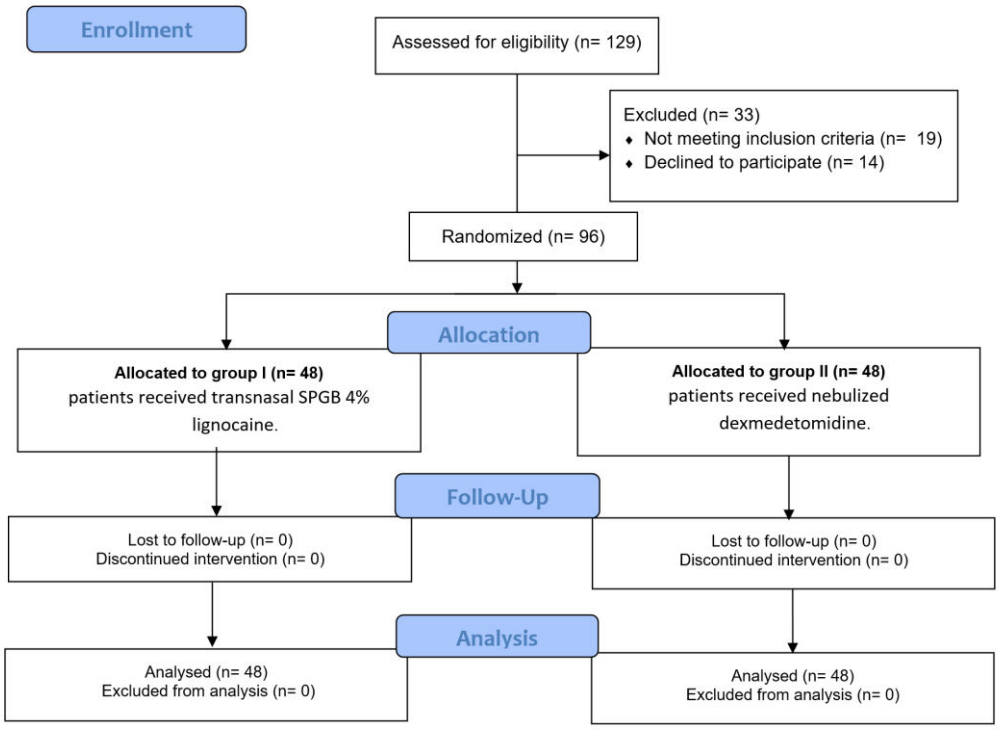

Fig.1. CONSORT flowchart of the included patients

(Table.1) displays that there was no significant difference between the included groups concerning the baseline characteristics (sex, age, height, weight, BMI, and ASA).

Table 1. The characteristics baselines of the included groups

Variables		Group I (n=48)	Group II (n=48)	P value
Age (years)		47.02 ± 12.84	48.4 ± 12.1	0.596
Sex	**Male**	27 (56.25%)	30 (62.5%)	0.533
	Female	21 (43.75%)	18 (37.5%)	
Weight (Kg)		67.96 ± 7.68	68.98 ± 6.79	0.492
Height (m)		1.6 ± 0.04	1.6 ± 0.05	0.686
BMI (Kg/m^2)		25.5 ± 3.17	25.99 ± 2.73	0.424
ASA	**ASA I**	33 (68.75%)	35 (72.92%)	0.653
	ASA II	15 (31.25%)	13 (27.08%)	

Data presented as frequency (%) or mean ± SD, BMI: body mass index, ASA: American society of anesthesiologists.

VAS at 12, 18, 24 and 36h was markedly lower in group one in comparison with group two (P<0.05), whereas at baseline, 15 min, 30 min, 1h and 6h was not markedly different between the 2 groups. (**Table.2).**

Table 2. Assessment of postoperative pain by visual analogue scale (VAS) of the included groups

Variables		Group I (n=48)	Group II (n=48)	P value
VAS	**Baseline**	6 (5 - 7)	6 (5 - 7)	0.451
	15 min	4 (3 - 5)	4 (3 - 5)	0.114
	30 min	3 (3 - 5)	4 (3 - 5)	0.597
	1h	3 (3 - 4)	4 (3 - 4)	0.094
	6h	3 (3 - 4)	3 (3 - 4)	0.622
	12h	2 (1.75 - 3)	3 (3 - 5)	**<0.001***
	18h	2 (2 - 3)	3 (2 - 4)	**0.013***
	24h	2 (2 - 3)	3 (2 - 4)	**<0.001***
	30h	2 (1 - 3)	3 (2 - 3.25)	**<0.001***

VAS: visual analogue scale, Data presented as median (IQR). *: Statistically significant as P value <0.05.

Number of patients required postoperative rescue analgesia at 12, 18, 24 and 36h was markedly lower in group one in comparison with group two (P<0.05), whereas at baseline, 15 min, 30 min, 1h and 6h was no marked difference between the 2 groups. (**Table .3).**

Table 3. Number of patients needed postoperative rescue analgesia of the studied groups

Variables		Group I (n=48)	Group II (n=48)	P value
Number of patients	**Baseline**	48 (100%)	48 (100%)	0.451
	15 min	28 (58.33%)	34 (70.83%)	0.114
	30 min	22 (45.83%)	26 (54.17%)	0.597
	1h	20 (41.67%)	29 (60.42%)	0.094
	6h	14 (29.17%)	16 (33.33%)	0.622
	12h	8 (16.67%)	20 (41.67%)	**<0.001***
	18h	9 (18.75%)	16 (33.33%)	**0.013***
	24h	5 (10.42%)	14 (29.17%)	**<0.001***
	30h	4 (8.33%)	12 (25%)	**<0.001***

Data presented as frequency (%), *: statistically significant as P value <0.05.

Regarding the adverse events, incidence of throat numbness at 15 min and 30 min was markedly higher in group I in comparison with group II (P<0.001, 0.006), without marked difference between both groups at 1h, and not reported in both groups at 6, 12, 18, 24 and 30h. Nasal discomfort at 15 min, 30 min and 1h was not markedly different between the two groups, and not reported in both groups at 6, 12, 18, 24 and 30h. Nausea and vomiting after 15 min and 30 min was markedly different between the two groups, and not reported in both groups at 1, 6, 12, 18, 24 and 30h. (**Table.4).**

Table 4. The adverse events of the included groups

Variables		Group I (n=48)	Group II (n=48)	P value
Nasal discomfort	**15 min**	12 (25%)	10 (20.83%)	0.627
	30 min	7 (14.58%)	4 (8.33%)	0.523
	1h	2 (4.17%)	1 (2.08%)	1.00
	6h	0 (0%)	0 (0%)	---
	12h	0 (0%)	0 (0%)	---
	18h	0 (0%)	0 (0%)	---
	24h	0 (0%)	0 (0%)	---
	30h	0 (0%)	0 (0%)	---
Throat numbness	**15 min**	30 (62.5%)	6 (12.5%)	**< 0.001***
	30 min	14 (29.17%)	3 (6.25%)	**0.006***
	1h	2 (4.17%)	0 (0%)	0.495
	6h	0 (0%)	0 (0%)	---
	12h	0 (0%)	0 (0%)	---
	18h	0 (0%)	0 (0%)	---
	24h	0 (0%)	0 (0%)	---
	30h	0 (0%)	0 (0%)	---
Nausea and vomiting	**15 min**	4 (8.33%)	2 (4.17%)	0.677
	30 min	2 (4.17%)	1 (2.08%)	1.00
	1h	0 (0%)	0 (0%)	---
	6h	0 (0%)	0 (0%)	---
	12h	0 (0%)	0 (0%)	---
	18h	0 (0%)	0 (0%)	---
	24h	0 (0%)	0 (0%)	---
	30h	0 (0%)	0 (0%)	---

Data presented as frequency (%), *: statistically significant as P value <0.05.

(Table.5) shows that satisfaction was markedly higher with better improvement in group one in comparison to group two (75% vs. 41.67%, P=0.001).

Table 5. Satisfaction of the studied groups

Variables	Group I (n=48)	Group II (n=48)	P value
Improved	36 (75%)	20 (41.67%)	0.001*
Not improved	12 (25%)	28 (58.33%)	

Data presented as frequency (%), *: statistically significant as P value <0.05.

Discussion

The PDPH in patients who undergo dural puncture due to any cause is a convincing issue for both professionals and patients. The PDPH pathophysiological mechanism remains not clear; nevertheless, a variety of ideas have been proposed **(Barati-Boldaji et al., 2023)**. It is presumed that cerebral vasodilation is the origin of the headache, as it is a compensatory measure for the reduced CSF volume that results from the surgery. Furthermore, the reduced CSF volume presence may result in the importance of traction over meningeal tension and pain-sensitive regions in the upright posture **(Shahriari and Sheikh, 2017)**.

After dural puncture, PDPH may manifest within hours or days. In spite of prophylaxis, PDPH persists and creates substantial disease. PDPH can be intolerable if it is chronic and severe. As a result, it is imperative to prevent and treat PDPH. According to the hypothesis of Monro-Kellie, the fundamental mechanism

of PDPH is as follows: Intracranial pressure is maintained by the summation of 3 components: the brain volume, CSF volume and intracranial circulating blood volume **(Al-Hashel et al., 2022)**. When the volume of any change in these components, a compensation process is employed to maintain the equilibrium. Specifically, if any component volume drops, the other 1or 2 components volume rises (or vice versa) **(Kassim et al., 2022).**

The SPGB is minimally invasive, with minimal side effects, and produces good and rapid analgesia. When used as first-line treatment in the management of PDPH, it produces analgesia quicker than that produced by conservative measures. Its use can avoid the requirement for an EBP, an invasive procedure associated with complications. SPGB can be performed by transnasal, transoral, sub-zygomatic and lateral infratemporal approaches. Transnasal is the easiest, least invasive approach which can be done at bedside. Hence, we opted for this route in our study. The efficacy of SPGB in relieving pain secondary to PDPH has been well proven and it is considered as a safe procedure as the contraindications are local nasal infections and base of skull fracture only **(Furtado et al., 2018)**.

Dexmedetomidine is a highly selective, centrally acting α-2 agonist with hypnotic, analgesic, anxiolytic, sympatholytic, and anti-sialogogue effects. These α-2 receptors are present in abundance in the substantia gelatinosa of the dorsal horn and locus coeruleus area, both of which are nociceptive transmission modulators. The role of nebulised dexmedetomidine has been established in paediatric premedication, in minor dental procedures as anxiolytic and analgesic, and bronchoscopy and the treatment of PDPH **(Gu et al., 2019)**. Dexmedetomidine a high bioavailability through nasal mucosa (65%) and buccal mucosa (82%). α-2 receptors are found in large concentrations in locus coeruleus and vascular smooth vessels. Hence, it produces anxiolysis, analgesia, sympatholysis, and cerebral vasoconstriction. This could explain the mechanism of its action in PDPH **(Kumar et al., 2024)**.

Our research has shown that SPGB effectiveness is more than DEX in the PDPH treatment within the first 30 hours. The VAS was markedly decreased in the SBPG group in comparison with the DEX group. Furthermore, the analgesia was required in lower number of patients in the SBPG group compared to the DEX group. Nasal pain, nausea, and vomiting did not express any notable differences between the SBPG and DEX groups. However, throat numbness was considerably different.

To the best of our knowledge, no study was comparing the SPGB efficacy vs DEX for PDPH. In a prior trial, 20 patients with PDPH were treated with 2 percent of Lignocaine for SPGB & 1 g of Inj. Paracetamol as rescue analgesia. The findings of their investigation indicated that SPGB could be a viable initial therapy option for PDPH in order to promptly alleviate severe pain. Throughout the duration of the trial, SPGB was determined to offer sufficient pain alleviation with an NRS of less than 4. The major patients in the SPGB group did not need rescue analgesia for a period of six hours **(Puthenveettil et al., 2018)**.

Kumawat *et al.* enrolled that the patients were allocated into 2 groups: group A, which received injection paracetamol 1g intravenous (conservative management) for PDPH, and group B, which received SPGB for PDPH. The study results verified that SPGB is a superior initial treatment for PDPH and provides faster relief of pain in comparison to conventional management. Various reports in the literature had demonstrated the instant headache relief after SPGB **(Kumrawat et al., 2020)**.

In retrospective research by Cohen *et al.*, The SPG block resulted in a 54.55 % recovery rate from headaches

within half an hour, and 63.64 % of patients had no symptoms at one hour **(Cohen et al., 2009)**. In a case report by Furtado *et al.*, headache developed in patients of intracranial hypertension as a result of an excessive amount of lumbo-peritoneal drainage. Conservative management was initiated; nevertheless, it was unsuccessful in alleviating discomfort. The patient experienced instant and long-lasting relief for 24 hours following the SPG block **(Furtado et al., 2018)**.

Verma *et al.* studied when compared SPGB with pregabalin for the treatment of PDPH. They reported that individuals who received SPGB experienced instant pain alleviation and a substantial decrease in their VAS score. This may be due to the fact that SPGB employs 4 percent lignocaine, a local anaesthetic that is more rapidly acting, and the pain alleviation was immediate. Further, they noted that the group SP had a considerably lower requirement for rescue analgesia at 1 hour (p=0.0008) **(Verma et al., 2022).**

Takmaz *et al.*, retrospective research was conducted on 26 non-obstetric patients diagnosed with PDPH and were either unable to continue with conservative therapy due to side effects or were unresponsive to it. After 24 hours of the procedure, over 50% of the patients (42.3%) reported no discomfort, and all patients (100%) had a VAS score of less than 3. After the SPGB operation, throat numbness, nasal discomfort, and nausea were noted as adverse effects. However, these AEs were entirely alleviated 24 hours later. In accordance with the PGIC scale scores after 48 hours of the procedure (73.1% of patients) **(Takmaz et al., 2021)**.

Cohen *et al.* issued the first article on the SPGB using for PDPH treatment. They stated complete and/or immediate headache relief in 11 of 13 patients having moderate-to-severe PDPH **(Cohen et al., 2009)**. The SPGB efficacy in improving PDPH was inspected in case reports, after this experience with obstetric patients had been successful **(Kent and Mehaffey, 2016; Furtado et al., 2019; Gonçalves et al., 2018; Dubey and Dubey, 2018; Furtado et al., 2018)**. **Cohen *et al.*** did a retrospective study of obstetric patients and the outcomes were compared between the 42 patients undergoing SPGB for PDPH treatment and the 39 patients submitted to EDBP. The outcomes discovered that pain relief was faster, with no complications, in patients experiencing SPGB and that the technique was cheap, safe, and well-tolerated **(Cohen et al., 2018).**

Regarding DEX, we found that VAS at 12, 18, 24 and 36h was markedly lower in group one in comparison with group two ($P<0.05$), whereas at baseline, 15 min, 30 min, 1h and 6h was not markedly different between the two groups. Satisfaction was notably higher with better improvement in group I in comparison with group II (75% vs. 41.67%, P=0.001).

Mowafy *et al.* used nebulized DEX that significantly decreases the severity of PDPH with marked enhancement in pain scores 24 h following treatment (both the VAS and Lybecker scores were markedly lower in the DEX group than the controls) with complete headache relief before the 3rd day **(Mowafy and Ellatif, 2021)**. It is in alignment with Kumar *et al.* who stated a successful utilization of nebulized DEX in 5 PDPH patients following caesarean section who did not respond to conservative treatment. Marked improvement was found in the scores of pains (VAS) in all patients and resolution was reported in PDPH completely by the 3rd day without side effects noted **(Kumar et al., 2019).**

In order to prevent laryngospasm, cough, nasal irritation, or vocal cord discomfort, the method of nebulization is more preferable than the intra-nasal route. Additionally, it is more preferable to the IV route in order to prevent the potential deleterious effects of hypotension and

bradycardia that may result from the administration of DEX as an IV fluid bolus. Consequently, DEX nebulization may be advantageous in the patients under investigation **(Kumar et al., 2020)**.

Our study had some limitations as it is a single-centre study with relatively small sample size. and the potential for selection bias. Consequently, furthermore blinded randomized researches are needed to validate our findings.

Conclusion

In comparison to nebulized DEX, trans-nasal SPGB was good in post-dural puncture headache treatment after inguinal hernia repair, as evidenced by lower pain levels, less postoperative rescue analgesia, and a greater satisfaction rate.

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References

- **Al-Hashel J, Rady A, Massoud F, Ismail, II. (2022).** Post-dural puncture headache: a prospective study on incidence, risk factors, and clinical characterization of 285 consecutive procedures. BMC Neurology, 22(1): 261-270.
- **Albaqami MS, Alwarhi FI, Alqarni AA. (2022).** The efficacy of sphenopalatine ganglion block for the treatment of postdural puncture headache among obstetric population. Saudi Journal Anaesthiology, 16(1): 45-51.
- **Bao N, Tang B. (2020).** Organ-protective effects and the underlying mechanism of dexmedetomidine. Mediators Inflammtion, 2020: 613-615.
- **Barati-Boldaji R, Shojaei-Zarghani S, Mehrabi M, Amini A, Safarpour AR. (2023).** Post-dural puncture headache prevention and treatment with aminophylline or theophylline: a systematic review and meta-analysis. Anesthiology Pain Medicine (Seoul), 18(2): 177-189.
- **Baumgartner K, Groff V, Yaeger LH, Fuller BM. (2023).** The use of dexmedetomidine in the emergency department: A systematic review. Academic Emergency Medicine, 30(3): 196-208.
- **Birajdar SB, Allolli DN, Javed M. (2016).** Study of incidence of postdural puncture headache (PDPH) in pregnant women with different body mass index undergoing caesarean section under spinal anaesthesia. Indian Journal of Clinical Anaesthesia, 3(3): 443-445.
- **Cohen S, Levin D, Mellender S, Zhao R, Patel P, Grubb W, et al. (2018).** Topical sphenopalatine ganglion block compared with epidural blood patch for postdural puncture headache management in postpartum patients: A retrospective review. Regional Anesthesia & Pain Medicine, 43(8): 880-884.
- **Cohen S, Sakr A, Katyal S, Chopra D. (2009).** Sphenopalatine ganglion block for postdural puncture headache. Anaesthesia, 64(5): 574-5.
- **Demir HB, Atalay A, Uc C, Fırat Ö, Ersin S. (2022).** Tension-free inguinal hernia repair with transversus abdominis plane (TAP) block in elderly high-risk patients. ANZ Journal of Surgery, 92(10): 2500-2504.
- **Dubey P, Dubey PK. (2018).** Intranasal lignocaine spray for sphenopalatine ganglion block for postdural puncture headache. Saudi Journal of Anaesthesia, 12(2): 364-365.
- **Furtado I, Lima IFd, Pedro S. (2018).** Ropivacaine use in transnasal sphenopalatine ganglion block for post dural puncture headache in obstetric patients-case series. Brazilian Journal of Anesthesiology, 68(4): 421-424.
- **Furtado IF, Pinto MM, Amorim P. (2019).** Sphenopalatine ganglion block may be an efficient treatment of headache after lumboperitoneal shunt placement: A case report. Anesthesia & Analgesia journal, 12(11): 401-402.
- **Girma T, Mergia G, Tadesse M, Assen S. (2022).** 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 (Lond), 78: 103-729.

- **Gonçalves LM, Godinho PM, Durán FJ, Valente EC. (2018).** Sphenopalatine ganglion block by transnasal approach in post-dural puncture headache. Journal of Clinical Anesthesia, 48: 50-9.
- **Gu W, Xu M, Lu H, Huang Q, Wu J. (2019).** Nebulized dexmedetomidine-lidocaine inhalation as a premedication for flexible bronchoscopy: a randomized trial. The Journal of Thoracic Disease, 11(11): 46-63.
- **Haladu N, Alabi A, Brazzelli M, Imamura M, Ahmed I, Ramsay G, et al. (2022).** Open versus laparoscopic repair of inguinal hernia: an overview of systematic reviews of randomised controlled trials. Surgical Endoscopy, 36(7): 4685-4700.
- **Ho KWD, Przkora R, Kumar S. (2017).** Sphenopalatine ganglion: block, radiofrequency ablation and neurostimulation - a systematic review. Journal of Headache and Pain, 18(1): 118-120.
- **Kassim Z, Kamar RM, Zakariah MF, Chui Geok IS. (2022).** Transnasal sphenopalatine ganglion block for postdural puncture headache in obstetric patients: A Malaysian experience report. The Journal of Taibah University Medical Sciences 17(5): 805-809.
- **Kent S, Mehaffey G. (2016).** Transnasal sphenopalatine ganglion block for the treatment of postdural puncture headache in obstetric patients. Journal of Clinical Anesthesia, 34: 194-6.
- **Kumar A, Kumar A, Sinha C, Anant M, Singh JK. (2019).** Dexmedetomidine nebulization: an answer to post-dural puncture headache? International Journal of Obstetric Anesthesia, 40: 155-156.
- **Kumar A, Sinha C, Singh K, Anant M, Kumar A, Kumari P. (2024).** Comparative evaluation of nebulised dexmedetomidine vs fentanyl for the treatment of post-dural puncture headache (pdph) in parturients after caesarean section under spinal anaesthesia: A randomised controlled study. Indian journal of anaesthesia, 68(2): 159-164.
- **Kumar NRR, Jonnavithula N, Padhy S, Sanapala V, Naik VV. (2020).** Evaluation of nebulised dexmedetomidine in blunting haemodynamic response to intubation: A prospective randomised study. Indian journal of anaesthesia, 64(10): 874-879.
- **Kumrawat P, P K, P S. (2020).** A Comparative Study of Sphenopalatine Ganglion Block versus Conservative Management for the Treatment of Post-dural Puncture Headache. Journal of Evidence-Based Medicine and Healthcare, 7: 657-660.
- **Lee S. (2019).** Dexmedetomidine: present and future directions. Korean journal of anesthesiology, 72(4): 323-330.
- **Li H, Wang Y, Oprea AD, Li J. (2022).** Postdural puncture headache-risks and current treatment. Current Pain and Headache Reports, 26(6): 441-452.
- **Lipton RB, Singh RBH, Revicki DA, Zhao S, Shewale AR, Lateiner JE, et al. (2022).** Functionality, satisfaction, and global impression of change with ubrogepant for the acute treatment of migraine in triptan insufficient responders: A post hoc analysis of the achieve i and achieve ii randomized trials. Journal of Headache and Pain, 23(1): 50-70.
- **Lybecker H, Djernes M, Schmidt JF. (1995).** Postdural puncture headache (PDPH): onset, duration, severity, and associated symptoms. An analysis of

75 consecutive patients with PDPH. Acta Anaesthesiologica Scandinavica, 39(5): 605-12.

- **Malik S, Singh SK. (2019).** A novel NAG (nerve and ganglion) dual block for PDPH: an observational study in seven patients of refractory post dural puncture headache (PDPH) using combined greater occipital nerve (GON) and sphenopalatine ganglion (SPG) Blocks. Journal of Anaesthesia & Critical Care Case Reports, 5(1): 14-17.
- **Mowafy SMS, Ellatif SEA. (2021).** Effectiveness of nebulized dexmedetomidine for treatment of post-dural puncture headache in parturients undergoing elective cesarean section under spinal anesthesia: a randomized controlled study. Journal of Anesthesia, 35(4): 515-524.
- **Puthenveettil N, Rajan S, Mohan A, Paul J, Kumar L. (2018).** Sphenopalatine ganglion block for treatment of post-dural puncture headache in obstetric patients: An observational study. Indian journal of anaesthesia, 62(12): 972-977.
- **Shahriari A, Sheikh M. (2017).** Post-spinal headache: A new possible pathophysiology. Anesthesia and Pain Medicine, 7(1): 34-54.
- **Slullitel A, Santos IS, Machado FC, Sousa AM. (2018).** Transnasal sphenopalatine nerve block for patients with headaches. Journal of Clinical Anesthesia, 47: 80-81.
- **Stalls C, Zatochill M, Petersen TR, Falcon RJ, Al Haddadin C, Southwell B, et al. (2019).** Transnasal sphenopalatine ganglion block for postdural puncture headache in an adolescent: A case report. A A Pract, 13(5): 185-187.
- **Takmaz SA, Karaoğlan M, Baltacı B, Bektaş M, Başar H. (2021).** Transnasal sphenopalatine ganglion block for management of postdural puncture headache in non-obstetric patients. Journal of Nippon Medical School, 88(4): 291-295.
- **Vallejo M, Zakowski M. (2022).** Post-dural puncture headache diagnosis and management. Best Practice & Research Clinical Anaesthesiology, 36: 2-4.
- **Verma A, Rajkumar M, Kochhar A, Gupta M, Singh R, Kumar K. (2022).** Comparative evaluation of sphenopalatine ganglion block versus pregabalin for treatment of postdural puncture headache following surgery under subarachnoid block. Anaesthesia: 34-43.
- **Wu X, Hang LH, Wang H, Shao DH, Xu YG, Cui W, et al. (2016).** Intranasally administered adjunctive dexmedetomidine reduces perioperative anesthetic requirements in general anesthesia. Yonsei Medical Journal, 57(4): 998-1005.