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# COMPARATIVE STUDY BETWEEN LIDOCAINE 2%, LIDOCAINE 5% AND BUPIVACAINE 0.5% IN TRANSNASAL SPHENOPALATINE GANGLION BLOCK FOR THE TREATMENT OF POSTDURAL PUNCTURE HEADACHE

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## ABSTRACT

**BACKGROUND:** Postdural puncture headache (PDPH) is a complication commonly related to neuraxial anesthesia and dural puncture, with an incidence proportional to the diameter of the needle, ranging from 2% with a 29G to 10% with a 27G and 25% with a 25G. The development of fine gauge spinal needles and needle tip modification, has enabled a significant reduction in the incidence of postdural puncture headache. PDPH presents as a dull throbbing pain with a frontal-occipital distribution. PDPH is thought to be due to a cerebrospinal fluid leak that exceeds the production rate, causing downward traction of the meninges and parasympathetic mediated reflex vasodilatation of the meningeal vessels. The sphenopalatine ganglion (SPG) is an extracranial neural structure located in the pterygopalatine fossa that has both sympathetic and parasympathetic components as well as somatic sensory roots. Sphenopalatine ganglion block (SPGB) has been used for the treatment of migraine, cluster headache and trigeminal neuralgia and can be performed through transcutaneous, transoral or transnasal approaches. Obstetric patients are considered at increased risk for this condition because of their sex, young age, and the widespread use of neuraxial blocks. SPGB is minimally invasive, carried out at the bedside without using imaging and has apparently rapid onset than EBP with better safety profile. The most common side effects of SPGB are all temporary, including numbness in the throat, low blood pressure and nausea.

**OBJECTIVES:** We evaluated the efficacy and safety of lidocaine 2%, lidocaine 5% and bupivacaine 0.5% in transnasal sphenopalatine ganglion block for the treatment of post dural puncture headache on 30 patients.

**PATIENTS AND METHODS:** This prospective, randomized and controlled clinical study was conducted at Sohag University Hospital after its approval by the Ethics and Research Committee of Sohag Faculty of Medicine. Written informed consent was obtained from each patient before participation.

**RESULTS:** Our study showed that there were non significant differences between the three studied groups regarding age, gender, body mass index, type of operation, onset, site of headache, associated symptoms, relieving factors and exaggerated follow up. There was a nonsignificant difference between the three studied groups regarding changes in visual analogue score for severity of headache. There were nonsignificant differences between the three studied groups regarding presence of bleeding and results of treatment of postdural puncture headache.

**CONCLUSION:** SPGB is an effective initial modality for managing severe headache in patients with PDPH.

**KEYWORDS :** Pain Pathways And Physiology, Postdural Puncture Headache, Transnasal Sphenopalatine Ganglion Block, Lidocaine, Bupivacaine

## INTRODUCTION

Post-dural puncture headache (PDPH) classically presents as a postural headache following therapeutic or diagnostic interventions of the epidural or spinal space. The incidence of PDPH is estimated to be between 30-50% following diagnostic or therapeutic lumbar puncture, 0-5% following spinal anaesthesia and up to 81% following accidental dural puncture during epidural insertion in the pregnant woman[1].

A history and examination should be performed taking account of the timing of the headache in relation to the neuraxial procedure, the nature of the headache as well as other symptoms and signs. In the case of a headache following a spinal procedure, PDPH is more likely following dural puncture with a larger gauge 'cutting' tipped needle or after multiple attempts at spinal block which might result in a number of dural tears, increasing the chance of a CSF leak[2].

The occurrence of PDPH resulted from ADP or spinal anesthesia is completely unavoidable. Therefore, health caregivers need familiar with all potential therapeutic strategies, and treat them following different treatment protocols that are divided into four steps: conservative treatment (1st step), aggressive medical treatment (2nd step), conventional invasive management (3rd step), and aggressive invasive management (4th step)[3].

The sphenopalatine ganglion is a parasympathetic ganglion, located in the pterygopalatine fossa. Transnasal SPGB has been successfully used to treat chronic conditions such as migraine, cluster headache, and trigeminal neuralgia, and may be a safer alternative to treat PDPH: It is minimally invasive and carried out at the bedside without using imaging. Besides that, it has apparently a faster start than EBP, with better safety profile[4].

The aim of the work is to evaluate the efficacy and safety of lidocaine 2%, lidocaine 5% and bupivacaine 0.5% in transnasal sphenopalatine ganglion block for the treatment of post dural puncture headache.

## PATIENTS AND METHODS

This prospective, randomized and controlled clinical study was conducted at Sohag University Hospital after its approval by the Ethics and Research Committee of Sohag Faculty of Medicine. Written informed consent was obtained from each patient before participation.

Thirty patients in each group were enough to detect a 25% difference in the VAS score (0-10) between the study groups. There are three groups in the study:

1. Thirty patients received Lidocaine 2%
2. Thirty patients received Lidocaine 5 %
3. Thirty patients received Bupivacaine 0.5%

### INCLUSION CRITERIA:

1) ASA physical status I and II.
2) Dural puncture has been performed.
3) Headache has developed within 5 days of the dural puncture.
4) Headache is not better explained by another diagnosis.

### EXCLUSION CRITERIA:

1) Coagulopathy
2) Severe hypertension

3) Previous history of migraine
4) Local nasal infection
5) History of allergy to lidocaine / bupivacaine
6) Patients who refuse to participate

## METHODS:

Initial patient's assessment included detailed history and physical examination to settle the diagnosis and exclude other causes of patient's complaint.

All patients received Paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs), oral caffeine, hydration, and bed rest; as conventional treatment. In patients for SPG block, the patient was pretreated with nasal decongestant to each nostril to minimize bleeding. Patient layed supine in the sniffing position. Pulse oximeter, electrocardiography (ECG) and noninvasive blood pressure (NIBP) monitors were applied for all patients.

The patient needs to be in a supine position with the neck extended. The extension can be facilitated with a pillow or a folded sheet under both shoulders. A long applicator with a cotton swab at the tip is soaked with 2% lidocaine, viscous lidocaine or 0.5% bupivacaine. It is then inserted parallel to the floor of the nose until resistance is encountered. The swab will be at the posterior pharyngeal wall superior to the middle turbinate. The applicator should be retained in the nostril for 5-10 minutes and then removed.

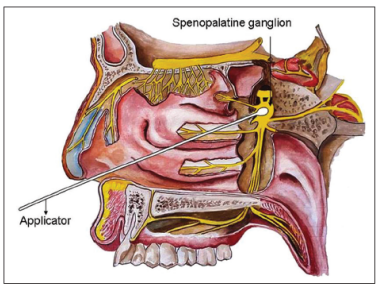


**Figure (1): Diagrammatic representation of sphenopalatine ganglion block**

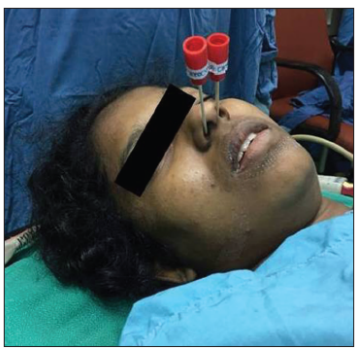

**Figure (2): Patient receiving sphenopalatine ganglion block**

The procedure was similarly repeated in the other nostril, The swab does not come into direct contact with the ganglion, however the local anesthetic infiltrates around it in that position. The connective tissue and mucous membrane covering facilitates the spread and penetration of the drug, after which the patient should experience significant improvement or resolution of their headache. Repeat SPGB if the headache were to return and were not tolerable. The numeric rating scale the visual analog scale VAS score (NRS, 0-10) was used to quantify level of pain.

## MEASUREMENTS

- Demographic data; patient characteristics including age, weight, and repeated puncture attempt, and history of spinal anaesthesia and PDPH.
- Onset of headache after dural puncture, site, associated symptoms (visual disturbance, nausea, vomiting, neck rigidity....), and exaggerating and relieving factors.
- The visual analogue scale VAS (0-10) score to assess pain severity at presentation and within 1st 30 min ,6 hr, 12 hr, 24 hr and 48 hr after treatment.
- Incidence of complications.
- VAS ≤3 equals satisfactory improvement .

For Patients with VAS more than 4, conservative treatment , 2nd time block and epidural blood patch are offered.

## STATISTICALANALYSIS:

Data were entered checked and analyzed using Epi-Info version 6 and SPP for Windows version 8. Data were summarized using the arithmetic mean, standard deviation, analysis of variance (ANOVA of F test) and chi-squared test.

The threshold of significance is fixed at 5% level (p-value). The results was considered:

- Significant when the probability of error is less than 5% ($p < 0.05$).
- Non-significant when the probability of error is more than 5% ($p > 0.05$).
- Highly significant when the probability of error is less than 0.1% ($p < 0.001$).

The smaller the p-value obtained, the more significant are the results.

## RESULTS

There were non significant differences between the three studied groups regarding age, gender and body mass index ($p > 0.05$) (table 1). Statistically, there were no significant differences between the three studied groups regarding changes in visual analogue score ($p > 0.05$) (table 2).

In group 1, the mean VAS dropped gradually and reached a value of 4.7 after 6 h and thereafter was increased reaching a value of 5.3 after 24 hours, then dropped to 4.9 at 48 hours. Statistically, there was statistically a high significant difference in comparison with visual analogue score (table 3).

In group 2, the mean VAS dropped gradually and reached a value of 3.7 after 48 hours. Statistically, there was statistically a high significant difference in comparison with visual analogue score (table 4).

In group 3, the mean VAS dropped to 4 after 6 hours, then increased to 4.2 at 12 hours, then dropped gradually and reached a value of 3.7 after 48 hours. Statistically, there was statistically a high significant difference in comparison with visual analogue score (table 5).

There were nonsignificant differences between the three studied groups regarding presence of bleeding ($p > 0.05$) (table 6) and treatment of postdural puncture headache ($p > 0.05$) (table 7).

**Table (1): Demographic data**

| | Group 1 (n = 30) | Group 2 (n = 30) | Group 3 (n = 30) | F | p |
|---|---|---|---|---|---|
| **Age (years)** | | | | | |
| Mean ± SD | 27.7 ±6.6 | 26.7 ± 5.3 | 28.8 ± 6.3 | 0.9 | 0.4 (NS) |
| Range | 19-39 | 19-39 | 19-39 | | |
| **Gender** | | | | | |
| Male | 3 (10%) | 5 (16.7%) | 4 (13.3%) | X2 = 0.5 | 0.7(NS) |
| Female | 27 (90%) | 25(83.3%) | 26 (86.7%) | | |
| **BMI** | | | | | |
| Mean ± SD | 27.1 ±1.5 | 26.9 ± 1.3 | 26.6 ± 1.4 | F = 1.09 | 0.3 (NS) |
| Range | 25-29 | 25-30 | 25-30 | | |

**Table (2): Changes in Visual Analogue Score (VAS)**

| VAS | Group 1 (n = 30) | Group 2 (n = 30) | Group 3 (n = 30) | F | p |
|---|---|---|---|---|---|
| **30 minutes** | | | | | |
| Mean ± SD | 6.2 ± 2.2 | 5.9 ± 1.96 | 5.7 ± 1.8 | 0.43 | 0.65 (NS) |
| Range | 2-10 | 3-10 | 3-10 | | |
| **6 hours** | | | | | |
| Mean ± SD | 4.7 ± 2.2 | 4.2 ± 2 | 4 ± 1.9 | 0.9 | 0.39 (NS) |
| Range | 2-10 | 2-8 | 2-9 | | |
| **12 hours** | | | | | |
| Mean ± SD | 5.1 ± 2.7 | 4.2 ± 2.6 | 4.2 ± 2.6 | 1.2 | 0.3 (NS) |
| Range | 2-10 | 2-9 | 1-10 | | |
| **24 hours** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Mean ± SD | 5.3 ± 3.7 | 4 ± 3.4 | 4.1 ± 3.3 | 1.15 | 0.3 (NS) |
| Range | 0-10 | 0-10 | 0-10 | | |
| **48 hours** | | | | | |
| Mean ± SD | 4.9 ± 4 | 3.7 ± 3 | 3.7 ± 3.7 | 1.03 | 0.35 (NS) |
| Range | 0-10 | 0-10 | 0-10 | | |

**Table (3): Changes in VAS in group 1**

| | VAS Mean ± SD (range) | p |
|---|---|---|
| **30 minutes** | 6.2 ± 2.2 (2-10) | < 0.001 (HS) |
| **6 hours** | 4.7 ± 2.2 (2-10) | < 0.001 (HS) |
| **12 hours** | 5.1 ± 2.7 (2-10) | < 0.001 (HS) |
| **24 hours** | 5.3 ± 3.7 (0-10) | < 0.001 (HS) |
| **48 hours** | 4.9 ± 4 (0-10) | < 0.001 (HS) |

p < 0.001 was highly significant in comparison with VAS (hours)

**Table (4): Changes in VAS in group 2**

| | VAS Mean ± SD (range) | p |
|---|---|---|
| **30 minutes** | 5.9 ± 1.96 (3-10) | < 0.001 (HS) |
| **6 hours** | 4.2 ± 2 (2-8) | < 0.001 (HS) |
| **12 hours** | 4.2 ± 2.6 (2-9) | < 0.001 (HS) |
| **24 hours** | 4 ± 3.4 (0-10) | < 0.001 (HS) |
| **48 hours** | 3.7 ± 3 (0-10) | < 0.001 (HS) |

p < 0.001 was highly significant in comparison with VAS (hours)

**Table (5): Changes in VAS in group 3**

| | VAS Mean ± SD (range) | p |
|---|---|---|
| **30 minutes** | 5.7 ± 1.8 (3-10) | < 0.001 (HS) |
| **6 hours** | 4 ± 1.9 (2-9) | < 0.001 (HS) |
| **12 hours** | 4.2 ± 2.6 (1-10) | < 0.001 (HS) |
| **24 hours** | 4.1 ± 3.3 (0-10) | < 0.001 (HS) |
| **48 hours** | 3.7 ± 3.7 (0-10) | < 0.001 (HS) |

p < 0.001 was highly significant in comparison with VAS (hours)

**Table (6): Complications**

| **Bleeding** | **Group 1 (n = 30)** | | **Group 2 (n = 30)** | | **Group 3 (n = 30)** | | **$X^2$** | **p** |
|---|---|---|---|---|---|---|---|---|
| | **No** | **%** | **No** | **%** | **No** | **%** | | |
| No | 25 | 83.3 | 21 | 70 | 23 | 76.7 | 1.49 | 0.4 (NS) |
| Yes | 5 | 16.7 | 9 | 30 | 7 | 23.3 | | |

**Table (7): Results of treatment of postdural puncture headache**

| | **Group 1 (n = 30)** | | **Group 2 (n = 30)** | | **Group 3 (n = 30)** | | **$X^2$** | **P** |
|---|---|---|---|---|---|---|---|---|
| | **No** | **%** | **No** | **%** | **No** | **%** | | |
| Failed | 7 | 23.3 | 6 | 20 | 5 | 16.7 | 0.42 | 0..8 (NS) |
| Successful | 15 | 50 | 19 | 63.3 | 19 | 63.3 | 1.47 | 0.47 (NS) |
| Temporary | 8 | 26.7 | 5 | 16.7 | 6 | 20 | 0.93 | 0.62 (NS) |

## DISCUSSION

Postdural puncture headache (PDPH) is a consequence of spinal and epidural anaesthesia, especially with use of large gauge cutting needles or with multiple attempts. The conservative measures for treatment of PDPH include adopting supine position, hydration, abdominal binders, analgesics, caffeine, sumatriptan and laxatives[5].

Epidural blood patch causes Neurological complications include motor and sensory deficits, meningitis, hearing loss, Horner's syndrome and subdural haematoma. EBP could itself cause another accidental dural puncture. Some patients may require a second EBP if the first one fails. SPGB may be a safer alternative in the treatment of PDPH[6].

Sphenopalatine ganglion is an extracranial parasympathetic ganglion about 5 mm in size located in the pterigopalatine fossa, posterior to the middle nasal turbinate and anterior to the pterigoid canal. Sphenopalatine ganglion block (SPGB), a noninvasive intervention with minimal adverse effects and high efficacy, had been tried as a treatment modality of PDPH. SPGB produces symptomatic relief by blocking the parasympathetic induced vasodilation[7].

We evaluated the efficacy and safety of lidocaine 2%, lidocaine 5% and bupivacaine 0.5% in transnasal sphenopalatine ganglion block for the treatment of post dural puncture headache. This prospective, randomized and controlled clinical study was conducted at Sohag University Hospital after its approval by the Ethics and Research Committee of Sohag Faculty of Medicine. Written informed consent was obtained from each patient before participation.

Thirty patients in each group were enough to detect a 25% difference in the VAS score (0-10) between the study groups. There are three groups in the study:

1. Thirty patients received Lidocaine 2%
2. Thirty patients received Lidocaine 5 %
3. Thirty patients received Bupivacaine 0.5%

Our study showed that there were nonsignificant differences between the three studied groups regarding age, body mass index, type of operation, onset, site of headache, associated symptoms, relieving and exaggerating factors.

**Puthenveettil et al.**[8] recruited a total of 20 patients were recruited into this study. Patients were allocated to either of the two groups. Group A patients received paracetamol 1 g 8 hour intravenously for a day. If adequate pain relief was not achieved, diclofenac 75 mg 12 hourly was added. Patients in group B received SPGB with 2% lignocaine. The patients in both the groups were comparable with respect to the distribution of age, height, weight and American Society of Anesthesiologists' physical status.

On comparing the time taken to obtain clinical effect, SPGB provided a quicker and better relief than conservative measures. Adequate pain relief was obtained with 2% lignocaine, as well as ropivacaine when used to perform sphenopalatine block in obstetric patients with PDPH. These patients had pain relief for 12–24 h. The longer duration of analgesia achieved could be attributed to the use of longer acting local anaesthetic such as ropivacaine. Pain relief following SPGB for management of acute headache had shown promising results. However, the mechanism could be mechanical stimulation of sphenopalatine ganglion as well, since saline placebo also resulted in pain relief[3].

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, subzygomatic 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.

Over 17 years, 81 patients were included (42 in the SPGB group and 39 in the EBP group). These patients were comparable between the two groups, especially regarding the headache severity. The SPGB appears to be as effective as EBP with a shorter onset. Indeed, approximately 40% of patients included in the SPGB group recovered from headache within 30 minutes and 71.4% within 1 hour (vs. 20.5% and 30.8%, respectively in EBP group). Moreover, after one week, headache was relieved for all patients[5].

**Patel et al.**[9] presented the retrospective data of 72 patients collected over 17 years in the form of a poster. They divided the 72 patients who had PDPH into 2 groups. The 33 patients in one group received an SPG block and the 39 patients in second group received EBP. They followed up the patients in both groups after the intervention at 30 m, 1 h, 24 h, 48 h, and 1 week. At the end of 1 h, the SPB block patients had good pain relief compared to the EBP group. However, after 24 hours there was no significant difference observed in either group. More complications were observed in the EBP group. At 24-48 hours, both treatments were similarly effective; however, SPGB was associated with greater headache relief at 30 and 60 minutes post-treatment. The superior pain relief with SPGB was observed at the earliest time points: 55 percent of those receiving SPGB had recovered from headache at one-half hour post-treatment compared with 21 percent in the EBP treatment group. At one hour post-treatment, 64 percent of SPGB recipients had recovered vs. 31 percent in the EBP treatment group. At 24 hours, 48 hours and one week post-treatment, no differences were seen in pain relief. However, EBP recipients experienced higher complication rates, including nine patient emergency-room visits, three complaints of backache radiating to the leg, one vasovagal reaction and one complaint of temporary hearing loss.

**Furtado et al.**[10] four cases presented obstetric patients with symptoms compatible with PDPH who underwent a safe and successful SPGB, within 24-48 h after puncture. In all cases the SPGB led to a complete pain relief, NRS 0, in one hour span. In Case 1 there was no pain recurrence. In Case 2, the pain recurred after 12 h, although less intense, and a second block also provided complete pain relief. In Case 3 and 4, SPGB had a prolonged efficacy of 48 h. Both patients 3 and 4 performed an EBP after 48 h with only partial symptomatic relief. As expected, and according to the natural disease course, all patients were asymptomatic within 7 days of dural puncture.The pain relief of 12-48 h was the expected for the pharmacokinetic characteristics of ropivacaine. Heterogeneity of treatment, due to patient management by different professionals, limited SPGB repetition and education in all patients.

**Kent and Mehaffey**[1] performed SPG blocks in 3 patients with confirmed PDPH in the emergency room using 2% viscous lidocaine. All 3 patients had good relief after the intervention. They suggested that the procedure can be safely and accurately performed in the emergency room which will reduce the visit time, provide good pain relief, and the EBP can be deferred.

Patient 1 was an 18 years old woman, her VAS score was 8/10 while sitting at that time. She consented for SPGB. Her immediate post-SPGB VAS score was 1/10 while sitting. On the 24 hours phone call follow up, we learned that her headache had returned approximately 12 hours after the SPGB was completed. Her 24 hours VAS score was 4/10. Her 48 hours VAS score was 0/10. She did not require an AEBP.

Patient 2 was a 28 years old woman with a postural headache and blurry vision. She was given intravenous caffeine, promethazine, and ondansetron. Her initial VAS score was 9/10 while sitting. She consented for SPGB. Her immediate post-SPGB VAS score was 4/10while sitting. She was satisfied with the amount of relief and discharged home. On the 24 hours phone call follow up, we learned that her headache had returned to 8/10 approximately 14 hours after the SPGB was performed. She then presented to an outside ED and elected to receive an AEBP. The patient had complete resolution of her headache following the AEBP.

Patient 3 was a 33 years old woman she presented to the ED with a postural puncture headache. Initial VAS score was 9/10 while sitting. She consented for SPGB. Her immediate post-SPGB VAS score was 1/10 while sitting. She was discharged from the ED but returned the following morning complaining that her pain had returned after 11 hours of complete relief. Her VAS score was 5/10. She elected to receive an AEBP. The patient had complete resolution of her headache following the AEBP.

**Kent and Mehaffey**[11] published their experience with 3 parturients diagnosed with PDPH who were offered an SPG block transnasally. All 3 patients had good pain relief and none of them required an EBP.

Patient 1 was a 24 years old woman, she quickly developed a PDPH, which she rated as a 9/10 in intensity while sitting. She was discharged with oral analgesics, which provided little relief, and she returned 5 days later with the same PDPH intensity, 9/10 while sitting. She consented for SPGB, and immediately following the procedure, her sitting NRS score was 0/10, so she was discharged. The 24 and 48 hours follow up NRS scores were both 0/10 as well.

Patient 2 was a 29 years old woman, later she developed a PDPH on the way home from the hospital on postdelivery day 1 for which she presented to the emergency department (ED) on postdelivery day 4 for treatment. Upon admission to the ED, her NRS score while sitting was 8/10. She was consented for SPGB, and immediately following the procedure, her sitting NRS score was 0/10. On the 24 hours phone follow up, we learned that her headache had returned approximately 18 hours after the SPGB was performed but only to an intensity 3/10 when sitting. She elected not to receive an EBP because her 48-hour NRS score 2/10 and tolerable.

Patient 3 was a 21 years old woman, subsequently she developed a PDPH. she later presented to the ED on postdelivery day 4 with an NRS score of 9 while sitting. She underwent an EBP, which relieved her headache for approximately 2 days to an NRS of 2. Five days following the EBP, she again presented with the same postural headache, NRS of 9 while sitting. She underwent an SPGB. Her immediate post SPGB NRS score was 0/10 while sitting. Both the 24 and 48 hours NRS scores were 0/10.

In our study, there was a nonsignificant difference between the three studied groups regarding changes in visual analogue score for severity of headache. But, in group 1, the mean VAS dropped gradually and reached a value of 4.7 after 6 h and thereafter was increased reaching a value of 5.3 after 24 hours, then dropped to 4.9 at 48 hours. Statistically, there was statistically a high significant difference in comparison with visual analogue score.

In group 2, the mean VAS dropped gradually and reached a value of 3.7 after 48 hours. Statistically, there was statistically a high significant difference in comparison with visual analogue score.

In group 3, the mean VAS dropped to 4 after 6 hours, then increased to 4.2 at 12 hours, then dropped gradually and reached a value of 3.7 after 48 hours. Statistically, there was statistically a high significant difference in comparison with visual analogue score.

**Puthenveettil et al.**[8] found that preprocedural pain scores were comparable between the groups with a *P* value of 0.528. In group A, no patients had adequate pain relief (NRS <4) in 30 min after initiation of the study, whereas in group B, (89.99%) had adequate pain relief during that time. In group A, the median pain score was ≥4 up to 2 h and from 4–24 h the median pain score remained <4. In group B after the block was performed, the median pain score was <4 up to 4 h and then rose to 4 at 6 h and subsequently it was maintained at <4 throughout the study period. While comparing the median pain score, it was seen that from 30 min to 4 h, group A had significantly higher pain score, whereas from 6 to 8 h, group A patients had significantly lower pain score than group B. Though the trend remained the same from 8 to 12 h, the difference was not statistically significant. Median was also used to analyse pain score, other than mean, as most of patients in Group B had a pain score of zero.

On comparing the mean pain scores between the two groups, the mean pain score in group A dropped gradually and reached a value <4 after 4 h and thereafter was maintained at that level, whereas in group B after the block was performed, the median pain score was ≤4 throughout the study period. Onset of analgesia was significantly quicker in group B as compared to group A [4.1 ± 1.1 vs. 206 ± 90.6 min, $P < 0.001$].

In our study, there were nonsignificant differences between the three studied groups regarding presence of bleeding and results of treatment of postdural puncture headache.

**Puthenveettil et al.**[8] concluded that SPGB is an effective initial modality for managing severe headache in patients with PDPH. **Antunes et al.**[12] suggested that patients presenting with PDPH should be considered primarily for bilateral SPGB. Patients may have a rescue EBP if needed.

## CONCLUSION

SPGB is an effective initial modality for managing severe headache in patients with PDPH. Using SPGB as first line therapy for PDPH could shorten length of stay in hospital and emergency department visit time and therefore lower the cost to the health care system incurred from

PDPH, as well as improve patient satisfaction by offering a less invasive procedure for treatment.

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