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ORIGINAL ARTICLE

Greater occipital nerve block is an effective treatment method for primary headaches?

Primer baş ağrılarında büyük oksipital sinir blokajı etkin bir tedavi yöntemi mi?

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Summary

Objectives: Headache is one of the most common health problems, and it severely reduces the quality of life. The present study examines the efficacy of greater occipital nerve (GON) block in patients monitored for primary headaches.

Methods: The present study includes 53 patients monitored by the headache outpatient clinic from March 2017 to June 2018, evaluates them for headache type, attack duration, attack frequency, severity of pain, and analgesic intake and compares the initial values with the follow-up values at months 1, 3, and 6.

Results: The study group comprises 36 episodic migraine cases, 12 tension-type headache (TTH) cases, 4 chronic migraine cases, and 1 cluster headache case. In migraine group, VAS scores, attack durations, and the mean value of monthly number of attacks and analgesics taken significantly decrease compared to initial values at the end of the 6-month follow-up period. In TTH group, VAS scores, attack durations, and the mean value of monthly number of attacks and analgesics taken significantly decrease compared to initial values at the end of the 3-month follow-up period. Since only 2 of 12 patients completed the 6-month follow-up, although there was a decrease in the 6-month data, it was found to be statistically insignificant.

Conclusion: Repetitive GON block is an effective treatment method for migraine and TTH.

Keywords: Cluster headache; greater occipital nerve block; migraine; tension-type headache.

Özet

Amaç: Baş ağrısı en yaygın görülen sağlık sorunlarından biri olup, yaşam kalitesini ciddi şekilde bozmaktadır. Bu çalışmada primer baş ağrısı tanısıyla takip edilen hastalarda büyük oksipital sinir blokajı etkinliği değerlendirilmiştir.

Gereç ve Yöntem: Mart 2017-Haziran 2018 tarihleri arasında baş ağrısı polikliniğinde takip edilen 53 hasta baş ağrısı tipi, atak süresi, atak sıklığı, ağrı şiddeti ve ilaç kullanımı açısından değerlendirilmiş ve başlangıç değerleri ile 1. ay, 3. ay, 6. ay takip değerleri kıyaslanmıştır.

Bulgular: Çalışmaya 36 epizodik migren, 12 gerilim tipi baş ağrısı, 4 kronik migren ve 1 küme tipi baş ağrısı dahil edilmiştir. Migren ve gerilim tipi baş ağrısı grubunda VAS değeri, atak süresi, aylık atak ve ilaç sayısı ortalaması, 3 aylık takip süresi boyunca başlangıç değerlerine kıyasla istatistiksel olarak anlamlı ölçüde azalmıştır.

Sonuç: Tekrarlanan büyük oksipital sinir blokajı migren ve gerilim tipi baş ağrısında etkili bulunmuştur.

Anahtar sözcükler: Küme baş ağrısı; büyük oksipital sinir blokajı; migren; gerilim tipi baş ağrısı.

Introduction

Headache reduces quality of life and is one of the health problems with the biggest socioeconomic burden. The World Health Organization places it tenth in the most common health problems, sixth in causes of disability and first in neurological disorders.[1,2]

International Headache Society's 2018 headache classification groups headaches into 3 main categories that is primary headaches, secondary headaches, and painful cranial neuropathies. In this classification, 90% of all headaches consist of primary headaches which include migraine, tension-type headache (TTH), and trigeminal autonomic cephalalgias.[2,3]

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While pharmaceutical agents are a common treatment for primary headaches, it may not be possible to use them from time to time due to a number of factors such as accompanying cardiovascular, cerebrovascular or peripheral vascular diseases, hepatic or renal diseases, pregnancy, or psychiatric conditions. In such cases, peripheral nerve procedures such as nerve block or stimulation may be highly effective.[4]

Depending on the type and anatomical localization of the headaches, greater occipital, supraorbital, infraorbital, supratrochlear, and auriculotemporal nerve blocks can be administered.[5] Greater occipital nerve (GON) is the medial branch of the dorsal primary ramus of the cervical spinal nerve C2, carries the sensory information of the posterior part of the head, and ascends in the inferolateral aspect of the occipital protuberance.[6] The underlying reason for GON block in the treatment of chronic headache is the anatomical connections between the trigeminal and upper cervical sensory nerves at the level of the trigeminal nucleus caudalis.[7]

In this study, we aimed to present the changes in pain course with GON blockade in patients followed up with the diagnosis of primary headache.

Material and Methods

This study was performed retrospectively on the file records of patients monitored by headache outpatient policlinic after the approval of the Ethics Committee at Haydarpaşa Numune Training and Research Hospital. Of patients aged 18 to 65 monitored for primary headache from March 2017 to June 2018, 111 patients who underwent GON block and had no contraindications such as allergic reactions to local anesthesia, surgical site infections, and craniocervical surgery were included in the study. 54 GON block patients were excluded due to failure to complete the 3-month follow-up period, and 4 were excluded for incomplete medical records. As a result, the present study proceeded with 53 medical records. This study used International Classification of Headache Disorders 3 beta diagnostic criteria for the diagnosis of episodic and chronic migraine, TTH, cluster headache, and medication-overuse headache. Visual Analogue Scale (VAS) was used to determine the severity of pain.

GON block procedure involved disinfecting the surgical site with an antiseptic solution followed by external occipital protuberance palpation. 2 ml of 2% lidocaine was bilaterally administered to the sites 2 cm lateral and 2 cm inferior to the occipital protuberance. The patients were monitored for 15 min following the procedure. None of the patients showed post-operative complications, and they were advised to rest during the day and then discharged. The patients underwent GON block once a week for 3 weeks. Those who reported a decrease in the duration, severity or frequency of headache proceeded with GON block once a month each procedure being 1 month apart. Attack frequencies, attack durations, analgesic use, headache localization, and VAS scores of the patients were recorded at week 1, month 1 and month 3 before and after the procedure. GON block continued for a maximum of 6 months based on the clinical responses.

Statistical analyses were performed using IBM Statistical Package for the Social Sciences 21. Descriptive analyses used frequency (n) and percentage (%) for categorical variables, and mean, standard deviation, median, and 25th and 75th percentile for continuous variables. Compliance of the variables with normal distribution was assessed with visual methods (histograms and probability plots) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests). Since dependent variables did not show normal distribution, they were investigated using Wilcoxon test. Statistical significance was accepted to be $p<0.05$.

Results

Fifty three patients in total were included in the study of whom 46 (86.79%) were female and 7 were male. Median age of the patients who were 24 to 65 years of age was 43.06 years. Classification by headache type resulted in 36 episodic migraine, 12 TTH, 4 chronic migraine, and 1 cluster headache cases and 33 of these patients in total had medication-overuse headache. 22 patients were receiving prophylactic treatment; 12 of these patients were taking antidepressants, 3 were treated with calcium channel blockers, 3 were taking beta blockers, and 4 were on antiepileptic medication. For analgesics, 12 were taking triptan and 1 was taking an ergot derivative while the rest preferred nonsteroidal anti-inflammatory drugs. Findings are summarized by headache type in Table 1.

Table 1. Sex, medication overuse, prophylactic treatment, and headache localization by headache type

	Episodic migraine	TTH	Chronic migraine	Cluster
Sex				
Female	32	10	4	0
Male	4	2	0	1
Medication overuse				
Yes	19	10	4	0
No	17	2	0	1
Prophylactic treatment				
Yes	18	1	2	1
No	18	11	2	0
Headache onset localization				
One-sided	17	1	1	0
Whole head	5	3	2	0
Frontal	7	2	1	0
Around the eyes	2	0	0	1
Occipital	4	4	0	0
Temporal	1	2	0	0

TTH: Tension-type headache.

Table 2. Monthly average number of attacks, number of analgesic use, attack durations and pain scores by headache type before the GON blockage

	Number of patients	Number of attacks/month	Number of analgesics/month	Attack duration (hour)	VAS
Episodic migraine	36	12.97	15	22.97	9.31
Tension-type	12	19.42	26.64	19.92	8.75
Chronic migraine	4	15	21.25	30	8.75
Cluster	1	30	30	3	9

GON: Greater occipital nerve; VAS: Visual analogue scale.

Before the GON blockage, monthly average number of attacks, number of analgesic use, attack durations and pain scores by headache type showed that, the episodic migraine group had the highest pain score and the chronic migraine group had the longest attack duration while the 1-patient cluster headache group had the highest number of attacks and analgesics followed by the TTH group (Table 2).

Monthly number of attacks, attack duration, VAS scores and number of analgesics were compared separately for initial values and values at months 1, 3 and 6. Cluster headache and chronic migraine groups were excluded from the study due to inadequate number of patients.

In the migraine group, the mean scores for VAS, attack duration, monthly number of attacks and analgesic use decreased compared to initial values during the follow-up period, and this decrease was found to be statistically significant (Table 3, 4).

In the TTH group, while the mean scores for VAS, attack duration, and monthly number of attacks and analgesic use decreased compared to initial values during the follow-up period and the values at months 1 and 3 were found to be statistically significant, values at month 6 were statistically non-significant since only 2 out of 12 patients completed the 6-month follow-up period (Table 5, 6).

None of the patients showed complications associated with GON block.

Table 3. Initial mean values and mean values at months 1, 3 and 6 for VAS, attack duration, and monthly number of attacks and number of analgesics in the episodic migraine group

	Initial mean value	Mean value Month 1	Mean value Month 3	Mean value Month 6
Number of attacks	12.97±10.255	6.56±6.922	6.67±7.195	3.85±2.544
Number of analgesics	15±86.70	7.63±7.758	7.57±7.758	4.71±2.644
Attack duration	22.97±11.795	13.58±10.994	13.56±10.997	9.08±8.741
VAS	9.31±1.009	5.61±2.476	5.69±2.617	4.38±1.446

VAS: Visual analogue scale.

Table 4. Statistical evaluation of initial values and values at months 1, 3 and 6 for VAS, attack duration, and monthly number of attacks and analgesics in the episodic migraine group

	Initial-p value Month 1	Initial-p value Month 3	Initial-p value Month 6
Number of attacks	0.000	0.000	0.002
Number of analgesics	0.000	0.000	0.001
Attack duration	0.000	0.000	0.003
VAS	0.000	0.000	0.001

VAS: Visual analogue scale.

Table 5. Initial values and values at months 1, 3 and 6 for VAS, attack duration, and monthly number of attacks and analgesics in the TTH group

	Initial mean value	Mean value Month 1	Mean value Month 3	Mean value Month 6
Number of attacks	19.42±11.619	7.50±8.480	7.92±8.196	3.50±2.121
Number of analgesics	26.64±8.857	8.73±8.486	7.73±8.296	3.50±0.707
Attack duration	19.92±19.152	9.75±11.561	6.25±6.398	5.50±6.364
VAS	8.75±2.179	4.58±2.234	3.75±1.765	3±0.0

VAS: Visual analogue scale; TTH: Tension-type headache.

Table 6. Statistical evaluation of initial values and values at months 1, 3 and 6 for VAS, attack duration, and monthly number of attacks and and analgesics in the TTH group

	Initial-p value Month 1	Initial-p value Month 3	Initial-p value Month 6
Number of attacks	0.005	0.008	0.180
Number of analgesics	0.005	0.005	0.180
Attack duration	0.012	0.007	0.180
VAS	0.003	0.002	0.157

VAS: Visual analogue scale; TTH: Tension-type headache.

Discussion

Migraine is the sixth disease that causes disability in the world and causes a decrease in quality of life as it affects people during their most productive period. [1] Medications used for preventive treatment such as beta blockers, calcium channel blockers, and antidepressants show their effects through different neurotransmitter systems, which results in a variety

of side effects, reduces patient compliance, and hinders reaching optimal doses.[8,9] Recently, researchers have searched for a new and better tolerable treatment for migraine, and their search highlighted the GON block, one of the peripheral nerve blockade methods. In our study, more than half of the patients had medication overuse headache, and 22 patients complained of pain despite medical treatment. It was decided to perform GON block in these patients to decrease drug use and increase the quality of life.

GON block was first used by Hadden in 1940. In his study, he pointed out that patients had been using a method where they pressed the exits of the greater or lesser occipital nerves to relieve headaches, and reported that while hot press and massage could be useful, the most effective treatment was infiltrating the peripheral nerve tissue in the tender spots with procaine hydrochloride or alcohol. Furthermore, he observed that most of the patients were relieved of their pain for years after 1 or 2 injections of procaine hydrochloride.[10] Like other studies based on this study, we performed GON block using local anesthetic.

In the following years, the use of GON blockage has increased in addition to medical treatment in primary headaches. In their study, Ashkenazi et al.[11] reported that while local anesthetics were the most preferred agents used in block procedures, other agents such as steroid, epinephrine, clonidine, and fentanyl were also used. They advised against the routine use of steroids during the block procedures in patients with chronic migraine but reported that there were data supporting the use of steroids for cluster headache, and warned that they should be used with caution due to possible side effects. Although some studies used combinations of up to five different drugs, they concluded that there was no evidence showing the superiority of polypharmacy, and that epinephrine, in particular, should not be used routinely.[11] In view of these findings, our study used only lidocaine for the block procedure with the aim of minimizing the possible side effects.

It was shown that GON block with lidocaine and bupivacaine reduced the severity of pain in acute migraine, and that GON block with local anesthetics resulted in pain relief in migraine, TTH, cervicogenic headache, cluster headache, and occipital neuralgia.[12–14] Another study divided the migraine patients into two groups, administered 1 session of GON block in the first group and 3 sessions in the second group, and found the repeated block more effective when the two groups were evaluated in terms of pain frequency, pain duration, and VAS scores.[15] Lidocaine was applied to 28 migraine patients by Çatav et al. [16] It was stated that none of the patients needed medical treatment in the 3rd month after the procedure. Our study pointed out that, when compared to initial values, there was a significant decrease in the number, durations of attacks, and the analgesic use in acute treatment in the migraine group following the recurrent administrations of lidocaine at months 1, 3, and 6.

In a study investigating the effects of multiple nerve blocks on chronic migraine, 37 patients out of 64 underwent only GON block, and a combination of lidocaine-bupivacaine-methylprednisolone was used for the block. This study reported a decrease in monthly number of headaches from 17.7 to 12.7 on average, which was determined to be statistically significant. [17] Another study with 30 migraine patients using the same combination reported a decrease in the weekly number of attacks from 4.15 to 1.56 on average following a 3-month follow-up period and the mean VAS score decreased from 7.33 to 3.45, both of which were found to be statistically significant.[18] In our study, the initial VAS score was 9.31 in episodic migraine patients which decreased to 5.69 at month 3, and to 4.38 in those continuing the treatment for 6 months. This decrease in the VAS score was statistically significant in our study.

A meta-analysis evaluating seven randomized, controlled studies on migraine patients reported that GON block remarkably reduced the severity of pain and use of analgesics; however, it did not significantly change the duration of pain.[13] Supporting the results of this meta-analysis, especially in episodic migraine patients, our study found a decrease in VAS scores and analgesic use; in addition, contrary to the meta-analysis, our study revealed reduced attack durations.

On the other hand, the literature review revealed fewer studies on GON block in TTH than other types of headache. A study on 15 patients reported improvement in only 1 patient, no changes in 11 patients, and worsening pain in 3 patients, and con-

cluded that GON block was not effective in TTH.[19] Another study, including a total of 20 TTH patients, compared the severity of basal pain and severity of pain at minute 30 following the block procedure, and found a 54.82% decrease in pain in the prilocaine injection group compared to saline injection group.[14] Review of 3-month follow-up results of 12 of our patients revealed a decrease by 40.78% in attack frequency and 42.85% in severity of pain compared to initial values; however, only 2 patients successfully completed the 6-month follow-up. Mean values of severity of pain, frequency of attacks, duration of attacks, and number of analgesics used in these 2 patients were lower than the mean values at month 3 and statistically non-significant. In TTH, patient compliance and the complexity of the environmental factors directly affect the headache. Therefore, efficacy of treatment was lower in patients with TTH compared to patients with migraine.

As stated before, there are studies reporting that GON block is also effective in cluster headache. In their study of 14 patients, Peres et al.[20] obtained medium-to-good responses in 9 patients. A double-blind, placebo-controlled study administering GON block on the same part as cluster headache achieved 80% improvement in the treatment group and no improvement in the placebo group.[21] The treatment improved our patient's condition as well as the monthly number of attacks went down from 30 to zero, and VAS score decreased from 9 to 2 by the end of the 6-month follow-up.

There was a significant decrease after GON block in the number and duration of attacks in 19 patients (17 female and 2 male: 2 TTH, 8 episodic migraine, 6 chronic migraine, and 3 cluster headache) who made their follow-up visits at the end of the 1st week (total 2 times GON blockage applied) but did not show up for their 3-month follow-up visits. Especially in patients with cluster headache, there was a significant improvement in the attacks and significant decreases in VAS scores. In our patients with cluster headache, blockage was discontinued after the first applications due to the end of pain attacks. Despite the low number of studies in the literature, it has been argued that GON block could be an alternative bridge therapy to proceed with prophylactic treatment in cluster headache.[16]

GON block is performed based on the anatomical spots.[22] When combined with steroids, there is a 1–14% chance of development of cutaneous atrophy and alopecia in the injection site.[23] In our patient group, only lidocaine was used for injection, and no side effects were observed that would require interruption or discontinuation of treatment.

Conclusion

In compliance with the literature, the present study showed that repetitive GON block with local anesthetics was significantly effective in migraine and TTH groups. In the cluster headache group, while the number of patients was insufficient, the GON blocks especially during the attack period were effective on the severity of pain. Effectiveness of GON block in cluster headache group can be assessed with a higher number of patients and longer follow-up periods.

There were no local or systemic side effects in any patients undergoing GON block, which resulted in less side effects and higher treatment compliance compared to medical treatment. Reducing the number, frequency and severity of headache with the help of an easy-to-apply, rapid-acting, cheap, and minimally invasive procedure suggests that GON block may be used as an effective treatment for treatment-resistant patients such as those with medication-overuse headache.

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