Neurology Asia 2026; 31(2) : 643 – 648

Greater occipital nerve blockage in patients with chronic migraine complicated by medication overuse

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Abstract

Objective: To examine the effects of Greater Occipital Nerve (GON) blockade on attack treatment and emergency department visits in patients with chronic migraine (CM) complicated by medication overuse headache (MOH). *Method:* A total of 103 patients aged 18-55 years who presented to our neurology outpatient clinic were prospectively included in our study. Bilateral GON blockade (10 mg 0.5% bupivacaine per session) was administered for 4 sessions at 2-4 week intervals, followed by continued treatment for all patients at 1-2 month intervals for 9 months. A pain diary, Visual Analog Scale (VAS), and Migraine Disability Assessment Scale (MIDAS) scores were assessed at 9-month follow-up. *Results:* The mean age of the 103 patients was 37.0 ± 9.8 years, and 79.6% were female. A reduction in monthly headache days to fewer than 5 days was observed in 64.1% of cases. Furthermore, a significant reduction was recorded in analgesic use. Similarly, emergency admission and intramuscular treatment rates, as well as VAS/MIDAS scores, showed a significant decrease ($p<0.05$).
Conclusion: GON blockade appears to be a promising supportive option for patients with CM complicated by MOH.

Keywords: Chronic migraine, medication overuse headache, greater occipital nerve blockade, VAS score, MIDAS score.

INTRODUCTION

Migraine is a neurological disorder characterized by recurrent severe headaches, nausea, vomiting, photophobia, and phonophobia.It is common worldwide and significantly impacts quality of life.[1] Chronic migraine (CM), according to the classification of the International Headache Society (IHS), is defined as experiencing headaches 15 or more days per month for at least three months, with at least eight of these headaches having migraine characteristics. CM is associated with significant morbidity and functional disability.[2] Medication overuse headache (MOH) is a secondary headache that occurs as a result of frequent and regular use of acute headache medications (e.g., triptans, nonsteroidal anti-inflammatory drugs (NSAIDs), ergotamine, opioids or combined analgesics).[3,4] In the International Classification of Headache Disorders (ICHD), it is defined as the presence of a preexisting primary headache 15 or more days per month with the regular use of one or more acute medications for more than three months, and the absence of another diagnosis that could explain the condition.

MOH increases the frequency and severity of the underlying primary headache, creating a difficult-to-treat pathological cycle. The primary approach to managing MOH is to discontinue the overused medication; however, this process can be challenging for patients due to withdrawal symptoms and a temporary increase in headache.[5]

Both pharmacological and non-pharmacological approaches have been tested in the treatment of CM and MOH.[6] In recent years, peripheral nerve blocks, particularly Great Occipital Nerve (GON) blockade, have emerged as a promising method for the management of chronic headaches and migraines.[7,8] The GON is a nerve that extends from the posterior

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Date of Submission: 13 October 2025; Date of Acceptance: 2 January 2026
https://doi.org/10.54029/2026kdn

neck to the scalp and is thought to play a role in headache pathophysiology. GON blockade involves temporarily blocking nerve conduction by injecting local anesthetic and/or steroids into the nerve, which can contribute to headache control through its modulatory effects on the craniovascular system.[9]

There is evidence in the literature that GON blockade reduces headache frequency and severity, improves quality of life, and increases functional capacity in CM patients.[10-12] However, GON blockade application protocols (drug selection, dose, injection frequency, and steroid use) vary among centers, and the impact of these variations on clinical outcomes is unclear. Furthermore, the effect of GON blockade on parameters such as attack treatment and emergency department visit frequency in CM patients with MOH has not been adequately investigated.

This study aimed to examine the effects of GON blockade on the frequency of attacks and emergency department visits in CM patients with MOH, and to highlight the efficacy and reliability of our application protocol. Study findings may contribute to optimizing the treatment approach and reducing the burden on healthcare services in this patient group.

METHOD

Patients aged 18-55 diagnosed with CM complicated by MOH according to the IHS diagnostic criteria, who had previously attempted to reduce their medication use through conventional behavioral therapy and at least two different prophylactic treatments (antidepressants, anticonvulsants, beta-blockers, etc.), were included in our study. These patients completed a questionnaire containing questions about sociodemographic and headache characteristics. Afterward, informed consent was obtained, prior to GON blockade.

GON blockade was administered bilaterally, without steroids, at a total dose of 10 mg of 0.5% bupivacaine hydrochloride at the pressure-sensitive point around the proximal third of the imaginary line connecting the mastoid and occipital prominences. Patients then underwent four regular sessions at 2-4 week intervals, followed by sessions at 1-2 month intervals based on their pain and specific circumstances. Patients were provided with a pain diary for nine months, and a survey was completed at the end of this period. The Visual Analog Scale (VAS) was used to assess pain intensity, and the Migraine Disability Assessment Scale (MIDAS) was used to assess disability.

Statistical analysis

Patient data collected within the scope of the study were analyzed with the IBM Statistical Package for the Social Sciences (SPSS) for Windows 26.0 (IBM Corp., Armonk, NY). Statistical analyses were conducted on an intention-to-treat (ITT) basis (n=101) to minimize bias from patient dropout. For patients who discontinued treatment early, the Last Observation Carried Forward (LOCF) method was applied; their last recorded VAS and MIDAS scores before discontinuation were used as the final endpoint data in the analysis. Frequency and percentage for categorical data and mean and standard deviation for continuous data were given as descriptive values. For the comparison of pre- and post-treatment data, the 'Paired Sample T-test' was used for normally distributed continuous variables, the 'Wilcoxon Signed-Rank Test' for non-normally distributed ordinal variables (VAS, MIDAS scores), and the 'McNemar Test' for categorical variables. The results were considered statistically significant when the *p-value* was less than *0.05*.

RESULTS

Demographic characteristics and emergency department admission rates were analyzed for all enrolled patients (n=103). Efficacy analyses, specifically Visual Analog Scale (VAS) and Migraine Disability Assessment Scale (MIDAS) scores, were performed on n=101 patients who had available follow-up data. The mean patient age was 37.0 ± 9.8 years, and 79.6% (n=82) were female. Of the patients treated with GON blockade, 35.0% (n=36) discontinued treatment prematurely. Reasons for early discontinuation included ineffectiveness (58.3%, n=21) and transportation problems (38.9%, n=14), while side effects were the primary reason for premature discontinuation in only 2.8% (n=1) of patients. The decrease in the mean number of painful days per month after GON blockade was notable, with 64.1% (n=66) of patients reporting fewer than five painful days per month. Monthly analgesic use also decreased significantly; 20.4% (n=21) discontinued analgesics completely, while 49.5% (n=51) reported using fewer than five analgesics per month for headaches.

The sociodemographic characteristics of the patients and the data related to GON blockade are elaborated in Table 1. A significant decrease

Table 1: Sociodemographic characteristics and variables related to GON blockage application (n:103)

		Min-Max	Median	Mean±SD/n-%
Age		19.0 - 55.0	36.0	37.0 ± 9.8
Gender	Female			82 79.6%
	Male			21 20.4%
Average number of painful days per month 9 months after GON	Less than 5			66 64.1%
	5 to15			26 25.2%
	More than 15			11 10.7%
Post-GON painkiller use (Unit/Month)	None			21 20.4%
	Less than 5			51 49.5%
	5 to 15			22 21.4%
	More than 15			9 8.7%
Completing treatment	Not completed			36 35.0%
	Completed			67 65.0%
Reason for early termination of treatment	Treatment failure			21 58.3%
	Side effects of treatment			1 2.8%
	Transportation difficulty			14 38.9%
Side effects after GON treatment	(-)			87 85.3%
	(+)			15 14.7%
Side effects after GON treatment	Short-term headache			9 60.0%
	Long-term swelling			1 6.7%
	Long-term numbness			5 33.3%
	Long-term headache			3 20.0%
	Syncope			1 6.7%
Patient satisfaction with GON treatment (0-5)		0.0 - 5.0	4.0	3.6 ± 1.5
Patient's GON / drug treatment preference	GON treatment			64 62.1%
	None			15 14.6%
	Drug treatment			15 14.6%
	None			9 8.7%

in the rate of emergency visits was observed after GON blockade compared to pre-treatment levels ($p<0.01$). Furthermore, a significant decrease in the mean VAS and MIDAS scores was observed compared to pre-treatment levels ($p<0.01$). (Table 2)

Table 3 summarizes the descriptive statistics and statistical comparison of MIDAS scores. Analysis of MIDAS scores revealed a significant reduction in migraine-related disability following GON blockade. The median MIDAS score decreased significantly from 3.0 pre-treatment to 2.0 post-treatment ($p < 0.001$). Similarly, the mean score improved from 3.17 ± 0.88 to 1.80 ± 0.92, demonstrating a strong clinical benefit. The Wilcoxon signed-rank test confirmed that this improvement was statistically significant, indicating a substantial therapeutic benefit in terms of functional improvement and reduction in days of activity loss.

DISCUSSION

This study found that in patients with CM complicated by MOH treated with GON blockade, a significant reduction was observed in the number of pain days, the use of acute medications, and the number of emergency room visits 9 months after initiation of treatment.

Table 2: Number of emergency applications for GON blockage, follow-up results on VAS, and MIDAS

	Before GON Treatment		After GON Treatment		p
	n	%	n	%	
How many times a month does he go to the emergency room or receive IM treatment? (n:103)					
None	32	31.1%	65	63.1%	
Less than 3 days	28	27.2%	28	27.2%	
3 to 5 days	31	30.1%	7	6.8%	***<0.001*** [N]
More than 5 days	12	11.7%	3	2.9%	
VAS score severity (n:101)					
Mild – Moderate (6 included)	4	4.0%	53	52.5%	
Severe (7-8 included)	47	46.5%	42	41.6%	***<0.001*** [N]
Unbearable (9-10)	50	49.5%	6	5.9%	
MIDAS score (n:101)					
None (Less than 5 days lost)	4	4.0%	49	48.5%	
Mild (6-10 days Lost)	17	16.8%	30	29.7%	
Moderate (11-20 days lost)	36	35.6%	16	15.8%	***<0.001*** [N]
Severe (More than 21 days lost)	44	43.6%	6	5.9%	

[N] Mc Nemar test

Furthermore, significant improvements were recorded in patients' pain intensity (VAS) and quality of life (MIDAS) scores following the treatment period. These findings are consistent with studies in the literature supporting the effectiveness of GON blockade in migraine management.[10-12] However, our study addresses an important gap in the literature by focusing on patients with CM complicated by MOH. Our observations suggest that GON blockade may accompany the reduction of migraine attacks and support the process of relieving patients from analgesic overuse. Many similar studies have demonstrated the significant effectiveness of GON blockade on primary headaches.[13,14] However, in our study, the fact that approximately 66% of patients experienced fewer than five painful days and more than 70% used analgesics less than five per month suggests that this method may be an important step in the management of MOH. Discontinuation of the overused medication is the cornerstone of MOH treatment; however, the withdrawal period is often complicated by severe rebound headaches, leading to relapse. Consistent with previous reports, GON blockade may be acting as a 'bridge therapy' to facilitate this difficult withdrawal process by mitigating rebound headaches[8,10], rather than the clinical improvement being solely a result of medication cessation.

The significant reduction in emergency room visits after GON blockade also demonstrates a potential ability of this method to alleviate the burden on the healthcare system. The fact that 62% of patients preferred GON blockade to medication also demonstrates the clinical

Table 3: MIDAS scores before and after GON blockade treatment (n:101)

	Mean ± SD	Median (IQR)	P-value*
Pre-Treatment (GON)	3.17 ± 0.88	3.0 (3-4)	
Post-Treatment (GON)	1.80 ± 0.92	2.0 (1-2)	**< 0.001**

*Wilcoxon signed-rank test

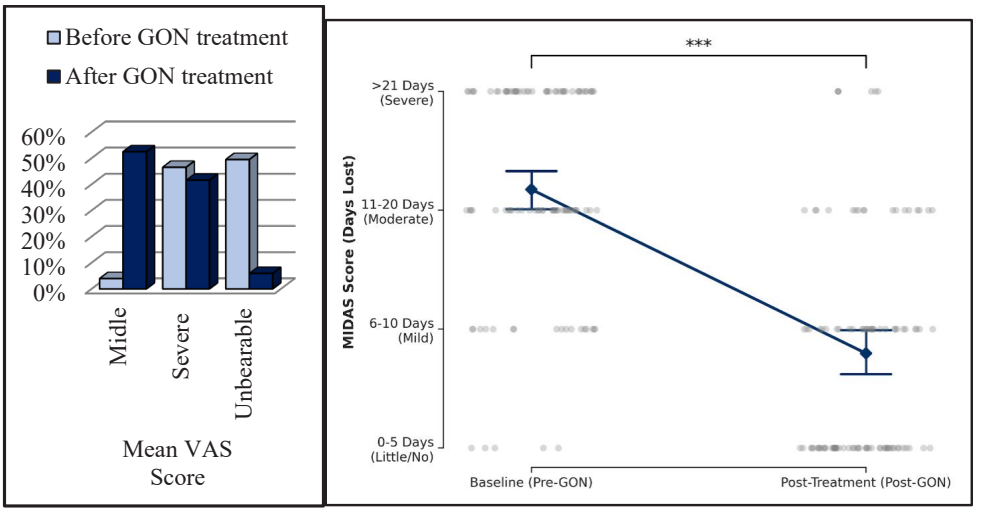

Figure 1. Comparison of VAS and MIDAS scores before and after GON blockage

acceptability and patient satisfaction with this method. The observed side effects, were primarily limited to short-term and tolerable symptoms, demonstrating that GON blockade is a safe option. Indeed, many studies examining GON blockade have similarly noted its good tolerability.[13-15] However, a 35% (n:36) early discontinuation rate is noteworthy. Future studies can optimize this treatment modality by addressing effectiveness with different injection techniques as well as logistic arrangements.

Our study has several major limitations. First, the lack of a placebo-controlled group and the self-controlled design prevent definitive causal conclusions regarding efficacy compared to a randomized controlled trial. Second, the confounding effect of medication withdrawal is a significant factor; improvements may be partly attributed to cessation of overuse rather than the GON blockade alone. Third, because there is currently no consensus in the literature on the optimal frequency of GON blockades, our protocol adjusted injection intervals after the initial four sessions based on patient logistics (e.g., transportation constraints) and clinical status. While treatment continuity was maintained, this variation introduces protocol non-standardization as a potential confounder. Finally, the open-label nature of the study may have introduced placebo effects.

In conclusion, in this study, significant reductions were observed in the number of pain days, analgesic use, emergency room visits, and pain intensity in patients with CM complicated by MOH 9 months after adnministration of GON blockade. Furthermore, a significant improvement was recorded in quality of life. These findings suggest that GON blockade may be a helpful supportive measure in the management of the vicious cycle in patients with chronic migraine headache complicated by MOH and alleviating the burden on the healthcare system.

DISCLOSURE

Ethics: This study recieved approval from our institution's ethics committee approval with protocol number 2023/21-03, and informed consent has been obtained from all participants.

Data availability: The data supporting this study's findings are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Financial support: None

Conflict of interests: None

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