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Retrospective Study

Efficacy of Nerve Blocks for Managing Refractory Posttraumatic Headaches

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Background: Nerve blocks (greater occipital, lesser occipital, others) are commonly used, singly or in combination, to treat various forms of refractory headaches, including migraine and cervicogenic headaches. Their efficacy in treating posttraumatic headaches, however, particularly those unresponsive to medications or severely disabling, is not well documented.

Objectives: To characterize the efficacy of nerve blocks in the treatment of posttraumatic headaches.

Study Design: Retrospective chart review.

Setting: A single-specialty outpatient neurology clinic.

Methods: Patients from January 2022 through July 2023 who fulfilled International Headache Society criteria for posttraumatic headache (i.e., new onset headache developing within the first week following head trauma) were included. A rigorous, comprehensive, and unbiased selection process was followed via Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. Headaches were refractory to various treatments, including analgesic agents or headache prophylactic medications. The treatments the study patients received were a combination of nerve blocks, including greater, lesser, and third occipital nerve blocks, and supraorbital and supratrochlear nerve blocks. We used the percentage of pain improvement in order to assess the response to the blocks: minimal improvement (< 50%), moderate improvement (50–75%), and significant improvement (> 75%) pain relief.

Results: Thirty-four patients met the inclusion criteria; 15 were women (44%). The mean (SD) age was 43.11 ± 14 years. Of these 34, 28 stated a significant improvement in headache pain immediately following their injection. Twenty-one patients (75%) rated their response to nerve blocks as a ≥ 90% improvement in headaches. Six patients reported complete resolution of their headache pain. Expressed as percentage headache pain improvement, average pain improvement was 88%. Six patients reported moderate improvement of their headaches.

Thirty-one patients reported an average headache improvement of 73% on Postprocedure Day One. Nineteen of these 31 patients had significant pain improvement from baseline, with 12 of them reaching a ≥ 90% pain improvement. Eight patients reported moderate improvement, while 4 had minimal headache pain improvement.

Twenty-seven patients were available for a 3-month follow-up; they reported an average headache improvement of 73%. Thirteen of these patients reported significant improvement in their headache pain, with 12 of them having a ≥ 90% improvement in their headaches. Twelve patients reported moderate pain improvement, and 2 had minimal or no pain improvement.

Nineteen patients returned for a 6-month follow-up; they reported an average pain improvement of 78%. Twelve patients reported significant pain improvement, with 11 having an improvement of ≥ 90%. Four patients reported moderate pain improvement, and 3 reported minimal or no pain improvement. Some patients experienced a biphasic response with partial headache recurrence at 3 months, followed by complete headache resolution at 6 months.

Limitations: Several patients who received multiple nerve blocks were concurrently prescribed prophylactic medications for headache management. Later score improvements cannot be determined to be solely caused by the nerve blocks.

Conclusion: This retrospective review offers preliminary but compelling evidence that nerve blocks are a highly effective option for patients with posttraumatic headaches who have not benefited from medication or who suffer from severe, incapacitating symptoms.

Key words: Headache, nerve block, posttraumatic headache, concussion, postconcussive syndrome, greater occipital nerve block, lesser occipital nerve block, third occipital nerve block, supraorbital nerve block, supratrochlear nerve block

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Posttraumatic headaches (PTH) are a common and debilitating sequela of head trauma, affecting a significant proportion of individuals. In the peer-reviewed literature, these headaches affect roughly 30%–90% of patients after a mild traumatic brain injury (1). They are often persistent, lasting for months or even years after the initial injury, and can significantly impair quality of life. In a prospective cohort of 189 patients discharged from a hospital post mild traumatic brain injury , Lucas, et al (2) reported 58% of patients experienced new onset, posttraumatic, migraine-like headaches at one year postinjury. The pathophysiology of PTH is complex and multifactorial, involving a combination of peripheral and central mechanisms that contribute to pain onset and persistence. Despite the high prevalence and effect of PTH, current treatment options are often limited in their effectiveness, leaving many patients with uncontrolled pain and functional impairment.

PTH can exhibit various phenotypes, including posttraumatic migraine, cervicogenic, mixed migrainous/cervicogenic, tension, occipital neuralgia, and, more rarely, trigeminal autonomic cephalalgias (3). The semiology of PTH can be very similar to primary headaches not associated with trauma.

In recent years, there has been growing interest in using peripheral nerve blocks as a therapeutic intervention for various types of headaches, including PTH. This intervention, which typically involves injecting local anesthetics, with or without corticosteroids, adjacent to specific nerves, has been associated with rapid and sustained pain improvement in primary headache disorders, including migraines and cluster headaches (4,5). However, their efficacy in PTH is less documented.

Methods

Study Design

This retrospective cohort study was conducted at a neurology specialty clinic in Houston, Texas. All patients were examined by a neurologist, who was also an interventional pain management specialist, or a neurosurgeon; the clinical specialists were board-certified by the American Board of Medical Specialties in their respective areas. In this clinic, diagnostic criteria are standardized among specialists. This retrospective study was exempted from review, as determined by an independent Institutional Review Board (ADVARRA, Austin, Texas). All patients' data extracted were anonymized. We identified 34 patients with refractory chronic posttraumatic headaches. Chronicity was defined as a headache lasting more than 3 months.

Sample Demographics

Inclusion criteria were as follows:

1. Age 18 years or older (no upper age limit)
2. New onset posttraumatic headache developing during the first week following a traumatic head injury
3. Attended at least one follow-up clinic visit
4. Headaches were chronic
5. Headaches occurred at least 3 times per week and were of moderate or severe intensity
6. All patients subject to intervention had a headache present at the time of the procedure
7. Headaches occurred either in isolation or were associated with a persistent postconcussion syndrome.

Exclusion criteria are as follows:

1. Younger than 18 years old
2. Headaches that did not meet the International Headache Society diagnostic criteria for posttraumatic headaches

3. Inadequate documentation regarding follow-up and treatment response
4. Glasgow Coma Scale score < 13.
5. Posttraumatic amnesia lasting > 24 hours
6. Altered level of awareness for > 24 hours
7. Imaging abnormalities such as intracranial hemorrhage or brain contusion
8. Pre-existing diagnosis of chronic migraines
9. Loss of consciousness exceeding 30 minutes.

Mild Traumatic Brain Injury Diagnosis

The US Department of Veterans Affairs/Department of Defense criteria were utilized to identify mild traumatic brain injury (6). Specifically, the criteria used at our clinics are as follows:

1. Evidence of a traumatically induced physiological disruption of brain function (i.e., alteration of mental status) resulting from an external force
2. A score of 13–15 on the Glasgow Coma Scale
3. Momentary loss of consciousness lasting up to 30 minutes, or an alteration of consciousness/mental state lasting momentarily up to 24 hours; alternatively, we require posttraumatic amnesia for less than 24 hours or the presence of transient (or potentially persistent) posttraumatic neurological deficits
4. No abnormalities identified in standard structural imaging.

Incidentally, these diagnostic parameters also meet the criteria guidelines provided by the following expert groups:

A. The Ontario Neurotrauma Foundation (7)
B. The Mayo Clinic's criteria for symptomatic traumatic brain injury (8)
C. The 5th International Conference on Concussion in Sport (9).

Diagnosis of Persistent Postconcussion Syndrome

The diagnosis of Persistent Postconcussion Syndrome has also been marked by inconsistencies across various expert definitions (2,10). Many peer-reviewed studies have transitioned from the diagnostic symptomatology found in the International Classification of Diseases (ICD)-10 or the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV, favoring the Rivermead Postconcussion Symptoms Questionnaire for symptom selection (11). Typically, patients are diagnosed with postconcussion syndrome when, following head trauma, they exhibit at least 3 symptoms from the following list: headaches, dizziness, fatigue, irritability, impaired memory, impaired concentration, and insomnia. However, the classification methods have variability, and an ongoing debate exists regarding the inclusion of symptom severity in the diagnostic criteria.

In our practice, we have established the presence of at least 4 symptoms from the aforementioned list to enhance diagnostic specificity. Additionally, we require a diagnosis of a mild neurocognitive disorder attributable toa traumatic brain injury, as defined in the DSM-5 criteria and objective abnormalities on neurophysiological tests (12). This disorder must manifest immediately post-traumatic brain injury or upon the return of consciousness and persist beyond the acute postinjury phase. Our approach is closely aligned with the DSM-5 criteria.

Technical Description of the Procedures

All patients signed a full consent after discussing the risks, benefits, expected outcomes, side effects, and alternatives to the intervention. We performed third occipital nerve blocks at a suboccipital location using ultrasound guidance along with blocks of the greater and lesser occipital nerves at the occiput and blocks of the supratrochlear and supraorbital nerves. We used a combination of nerve blocks due to a prior peer-reviewed publication suggesting that such an approach may have a higher therapeutic response for our patient population, a conclusion further supported by the expert opinion of the interventionalist(s) in this study, who concurred with the publication's findings regarding improved outcomes (13).

Procedure Description for the Third Occipital Nerve Block under Ultrasound Guidance

We used ultrasound in order to see the posterior cervical muscles; a high-intensity ultrasound probe was oriented obliquely along the line connecting the transverse process of C1 with the posterior spinous process of C2. Specifically, the ultrasound transducer was initially aligned with the C2 spinous process and moved laterally and rotated obliquely across the long axis of the obliquus capitis inferior muscle. The semispinalis muscle was identified above it (Fig. 1). In this manner, the fascia surrounding the obliquus capitis inferior muscle was identified as the injection target. Deeper to the plane, the pulse from the vertebral artery was sometimes seen. The right third occipital nerve was injected at this location with an "in-plane" and a medial

to lateral approach and sometimes, lateral to medial approach. Upon reaching the target, 1.5 mL of a solution containing equal volumes of bupivacaine 0.5%, and lidocaine 1% with 4 mg of dexamethasone were injected after negative aspiration.

Procedure Description for the Greater and Lesser Occipital Nerve Blocks at the Occiput and the Supraorbital and Supratrochlear Nerve Blocks

After completing the subnuchal blocks, injections were performed of the lesser occipital nerves and more distal branches of the greater occipital nerves at the occiput, bilaterally. For these injections, the arteries accompanying the greater occipital nerves at the occipital skull were identified by ultrasound and the greater occipital nerve branches were then blocked at those targets, most often medial or occasionally lateral to the artery (Fig. 2). For this purpose, after negative aspiration, one mL of the same solution was injected at each target. The lesser occipital nerve bundles were not seen on ultrasound but were blocked using standard anatomical landmarks. After negative aspiration, one mL of a similar solution was injected at each target.. The supraorbital and supratrochlear nerves were blocked at their respective anatomic locations above the orbital ridge using standard anatomical landmarks without ultrasound with 0.3 mL of equal volumes of marcaine and lidocaine. All patients were always instructed to keep a headache diary, documenting headache intensity on a 0 to 10 Numeric Rating Scale.

Data Collection

The data reviewed and analyzed included age, gender, type and location of injection, and percentage of pain improvement at various follow-up time points. All injections were done by a single physician who is board certified in pain medicine using the same method each time.

Pain Scores

All patients met the criteria for posttraumatic headache and were experiencing at least moderate head pain at the time of the procedure.

Patients were asked about their headache intensity on a 0 to 10 Numeric Rating Scale before and within an hour following their block. Follow-up was always attempted in all patients on the following day to inquire about potential complications and to record their self-reported headache intensity. Follow-up appointments were conducted at 3 months and 6 months postprocedure; headache intensities were recorded at those appointments. We consider a "good" response as an analgesic effect lasting more then 24 hours postprocedure, a "partial" response as pain relief lasting less than 24 hours, and no response as an absence of pain relief (13). The percentage of pain improvement was collected during the same follow-up visits.

Data Analysis

Using the statistical program embedded in Excel (Microsoft Excel, version 24.0, 2024), basic descriptive statistics, frequency (percentage) for categorical data, and mean ± SD for continuous data were tabulated for patient demographic characteristics. To compare the effectiveness of total versus partial nerve blocks at 6 months, we used the Wilcoxon rank-sum test (Mann-

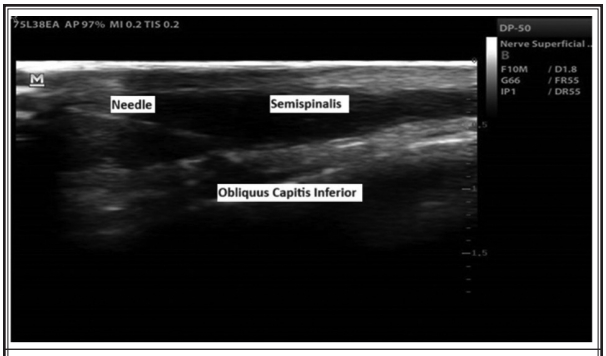


Fig. 1. *Ultrasound image obtained with a high frequency probe showing "in-plane" needle insertion targeting the fascia between the semispinalis and obliquus capitis inferior muscles.*

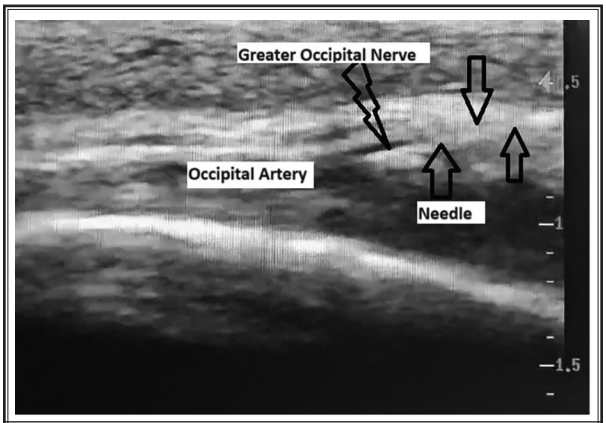


Fig. 2. *Ultrasound image obtained with a high frequency probe showing "in-plane" needle insertion with the tip resting adjacent to the occipital artery.*

Whitney U test) due to the small sample sizes and non-normal distribution of improvement rates.

Results

Baseline Patient Demographics

Our study had 34 patients aged between 18 to 72 (mean age, 43.11), with 19 (56%) being men. 19 patients were Hispanic (56%), 7 were white (21%), 7 were African American (21%), and one was Asian (3%). Twenty-three patients received "total" nerve blocks, characterized as bilateral third occipital nerve (TON), greater occipital nerve (GON), lesser occipital nerve (LON), supraorbital nerve (SO), and suprathroclear nerve (ST) nerve blocks. The remaining 11 had partial nerve blocks, either unilaterally or bilaterally, depending on pain distribution. Demographic information and types of blocks are covered in Table 1.

Patient Response to Nerve Blocks

All patients described their headache on a 0 to10 Numeric Rating Scale, with 10 being the worst pain imaginable. All 34 patients experienced some degree of improvement 5 to 60 minutes following the injections, with an average improvement of 88% (range 50%–100%) in pain scores. Of this cohort of 34 patients, 31 were reached the following day for safety monitoring and recording of the procedure's efficacy. An average 73% improvement in pain was reported the following day (range 20%–100%). Three patients did not respond to the procedure; one requested a repeat of the procedure at the 3-month follow-up (Table 2).

Three- and 6-Month Follow-up

At 3 months, 27 patients were available for follow-up, reporting an average headache improvement of 73%. Thirteen reported significant improvement, with 12 of them having a ≥ 90% improvement in their headaches. At 6 months, 19 patients were available for follow-up; they reported an average pain improvement of 78%. Twelve patients had significant improvement in their headaches, with 11 patients reporting ≥ 90% improvement (Table 2). Six reported moderate improvement, and three had minimal improvement (Table 2). Four patients reported an initial decrease in improvement and then complete headache resolution at 3 or 6-months follow-up. Three patients requested repeat injections and were discontinued from recording responses. Longitudinal patient data is in Table 3 and is summarized in Fig. 3.

Table 1. *Baseline patient demographics and clinical characteristics.*

Characteristics	Patients (n = 34)
Gender	
Women	15 (44%)
Men	19 (56%)
Ethnicity	
Hispanic or Latino	19 (56%)
White	7 (20.5%)
Black or African American	7 (20.5%)
Asian	1 (3%)
Proportion of Nerve Blocks	
Total Bilateral TON, GON, LON, SO, ST	23 (68%)
Partial - mixed unilateral/bilateral TON, GON, LON, SO, ST	11 (32%)

TON, third occipital nerve; GON, greater occipital nerve; LON, lesser occipital nerve; SO, supraorbital nerve; ST, suprathroclear nerve.

Table 2. *Patient response following nerve injections*

	Significant (≥ 75%) Pain Improvement	Moderate (≥ 50% and < 75%) Pain Improvement	Minimal or No (< 50%) Pain Improvement	Lost to Follow-up
Immediately Following Injection				
"Total" Nerve Blocks	21	2	0	0
Partial Nerve Blocks	10	1	0	0
Next Day				
"Total" Nerve Blocks	10	6	4	3
Partial Nerve Blocks	9	2	0	0
Three Months				
Total Nerve Blocks	10	7	2	4
Partial Nerve Blocks	5	3	0	3
Six Months				
Total Nerve Blocks	8	3	3	9
Partial Nerve Blocks	4	1	0	6

Comparison of Total vs Partial Nerve Blocks at 6 Months

For a more detailed comparison at 6 months, 14 patients who received total nerve blocks and 5 patients who received partial nerve blocks were evaluated. The mean improvement for the total nerve blocks group was 85.36% (SD, 17.15), while the partial nerve blocks group had a mean improvement of 94.00% (SD. 5.48). The Wilcoxon rank-sum test showed a *P* value of 0.433, indicating no statistically significant difference in the mean improvement between the 2 groups. This result should be interpreted with caution due to the small number of patients in each group. Additionally, partial nerve blocks were typically conducted when headaches were more localized, making it uncertain if partial nerve blocks would be as efficacious in patients with holocephalic pain.

Table 3. *Longitudinal patient data following nerve blocks.*

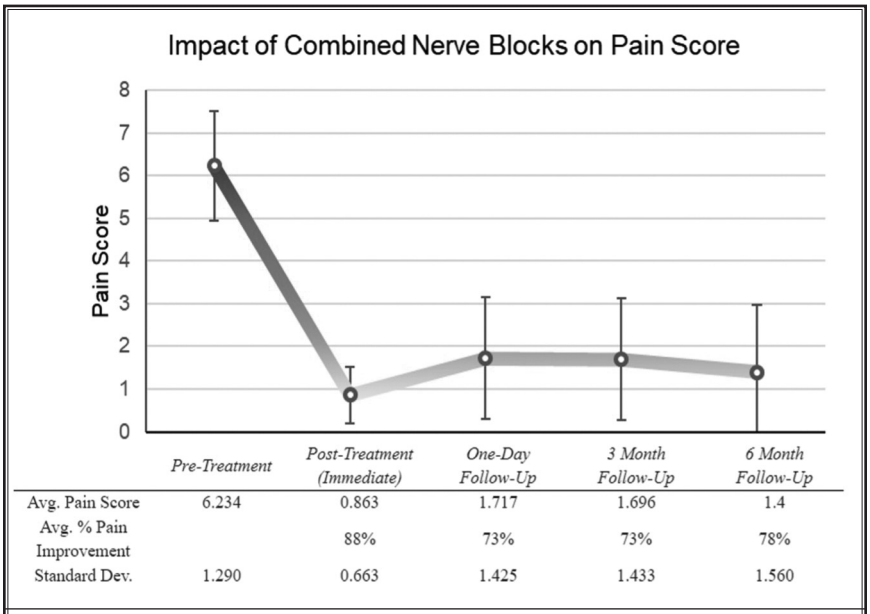
Gender	Ethnicity	Age	Performed Procedure	Starting Pain	Immediate Improvement (From Baseline)	Next Day	3 Months	6 Months
M	Black or African American	63	Total nerve Block	7	86%	80%	50%	Repeat
W	Hispanic or Latino	49	Total nerve Block	6	75%	60%	50%	Repeat
W	Black or African American	28	Total nerve Block	6	92%	50%	65%	No Ans
W	Black or African American	72	Total nerve Block	7	79%	50%	75%	No Ans
W	White	46	Total nerve Block	6	92%	80%	No Ans	No Ans
M	Hispanic or Latino	37	Total nerve Block	8	75%	No Ans	No Ans	No Ans
M	White	34	Total nerve Block	7	71%	No Ans	No Ans	No Ans
W	Hispanic or Latino	54	Total nerve Block	8	75%	No Ans	Repeat	Excluded
W	Hispanic or Latino	21	Total nerve Block	6	92%	50%	50%	100%
W	Hispanic or Latino	44	Total nerve Block	7	93%	40%	90%	100%
M	White	67	Total nerve Block	6	100%	100%	90%	100%
M	Hispanic or Latino	48	Total nerve Block	6	50%	20%	100%	100%
W	Black or African American	37	Total nerve Block	6.5	92%	80%	100%	100%
M	Black or African American	44	Total nerve Block	5	80%	95%	100%	100%
W	Hispanic or Latino	33	Total nerve Block	6	92%	90%	80%	90%
W	Hispanic or Latino	50	Total nerve Block	7	93%	50%	95%	90%
W	Hispanic or Latino	18	Total nerve Block	8	88%	70%	70%	70%
M	Hispanic or Latino	49	Total nerve Block	6	100%	80%	70%	70%
M	Hispanic or Latino	48	Total nerve Block	7	93%	95%	75%	50%
M	Hispanic or Latino	35	Total nerve Block	7	93%	40%	40%	40%
W	Hispanic or Latino	29	Total nerve Block	6	100%	100%	90%	40%
M	White	51	Total nerve Block	5.5	91%	30%	0%	0%
M	Hispanic or Latino	35	Total nerve Block	7	79%	100%	50%	Repeat
M	Hispanic or Latino	25	Partial nerve Block	7	93%	90%	50%	80%
M	White	27	Partial nerve Block	7	93%	50%	100%	100%
M	Hispanic or Latino	42	Partial nerve Block	5.5	73%	80%	90%	100%
W	Black or African American	54	Partial nerve Block	5.5	91%	50%	50%	60%
W	White	69	Partial nerve Block	4.5	89%	80%	70%	No Ans
W	Hispanic or Latino	36	Partial nerve Block	5	90%	90%	90%	No Ans
M	Asian	35	Partial nerve Block	5	90%	90%	90%	No Ans
M	Black or African American	32	Partial nerve Block	6	100%	90%	Repeat	Excluded
M	Hispanic or Latino	46	Partial nerve Block	6	100%	80%	No Ans	No Ans
M	White	39	Partial nerve Block	7	86%	95%	90%	90%
M	Hispanic or Latino	69	Partial nerve Block	7	100%	100%	No Ans	No Ans

Safety

The records were reviewed to evaluate for any adverse effects from the procedure or complications. No immediate or delayed postprocedure side effects were reported.

Discussion

In this retrospective study, we examined the records of a patient cohort with chronic posttraumatic headaches that were refractory to conventional medical treatments. We found a remarkable postprocedure improvement in headache symptoms for both total and partial nerve blocks. All patients experienced some degree of improvement within 24 hours, with an average improvement in headache intensity of 73%. At the 6-month follow-up, only one patient did not experience lasting benefits from the injections.



	Pre-Treatment	Post-Treatment (Immediate)	One-Day Follow-Up	3 Month Follow-Up	6 Month Follow-Up
Avg. Pain Score	6.234	0.863	1.717	1.696	1.4
Avg. % Pain Improvement		88%	73%	73%	78%
Standard Dev.	1.290	0.663	1.425	1.433	1.560

Fig. 3. *Average pain score response over a 6-month postprocedure course.*

These preliminary results suggest that multiple nerve blocks could be an effective long-term intervention for managing posttraumatic headaches and highlight the need for further clinical trials to compare the outcomes of total nerve blocks against partial blocks or other alternatives (i.e., botulinum toxin, anti-calcitonin gene-related peptide antibodies, etc.).

Total vs Partial Nerve Blocks

An interesting aspect of our study was the comparison between patients receiving total nerve blocks (bilateral TON, GON, LON, SO, and ST nerve blocks) and those receiving partial nerve blocks (either unilaterally or bilaterally depending on pain distribution). While the mean improvement for the total nerve blocks group was 85.36%, the partial nerve blocks group had a higher mean improvement of 94.00%. However, this difference was not statistically significant (P = 0.433), suggesting that both interventions are similarly effective over a 6-month period. This result should be interpreted with caution due to the small number of patients in each group. Moreover, partial nerve blocks were typically performed when headaches were more localized, raising the question of their efficacy in patients with holocephalic (whole head) pain. Further research is needed to explore the efficacy of partial nerve blocks in patients with more diffuse headache patterns.

Refractory primary headaches, including migraine and tension-type headaches, are well-known to respond to greater and lesser occipital nerve blocks (14). These blocks are also known to be efficacious as an abortive treatment in acute clinical settings. There are a wide variety of interventional options in the literature pertaining to acute and prophylactic interventional management of primary headaches, such as pulsed or thermal radiofrequency (15), and peripheral nerve stimulation (16).

The application of nerve blocks in the context of PTH has been explored but the literature is limited. Hecht and colleagues (17) reported that in a cohort of 10 patients with varying severities of head trauma, with new-onset PTH, 8 (80%) reported pain improvement that exceeded the expected duration of analgesia provided by the local anesthetic . The other 2 patients (20%) in this series experienced partial improvement lasting less than 24 hours (17). A case series on pediatric occipital blocks in patients with mild traumatic brain injury reported a significantly decreased frequency of headaches and decreased Rivermead Postconcussion Syndrome Questionnaire scores, a common instrument used for quantifying the severity of postconcussion symptoms (13). Multiple (average, 2; range, 1–5) pediatric nerve blocks performed on 28 patients was followed

by better outcomes than single blocks in children with chronic PTH (13). While this series suggests better outcomes for patients receiving multiple injections, such a result in an adult population has yet to be investigated.

Gawel, et al (18) found that 72% of patients with a PTH (63 of 87) reported "significantly" better outcomes as much as 6 months postprocedure (18). In a 12-patient cohort study, Tobin and colleagues (19) reported an average pain improvement of 86%, with the effect lasting about 4.4 weeks.

The mechanism involved in chronic PTH is uncertain. Recent insights point to central sensitization as a possible underlying process for persistent pain (3). Likewise, the precise mechanism of nerve block efficacy remains unknown. The convergence of the cervical and trigeminal systems (cervico-trigeminal pathways) suggests that changes to one system may affect the other (20). It has been proposed that the benefits of nerve blocks may be due to the structural reorganization of neurons in the brain, with pain improvement arising from decreased afferent neurotransmission along nociceptive pathways (20). The importance of interrupting the "pain cycle" is well-recognized among pain experts, a process potentially tied to neuromodulation for chronic pain.

The question of how many nerve blocks are necessary for an adequate response remains unanswered. A broad clinical survey reported a wide variation in practice, with the number of nerves injected in a single session ranging from one to 10 (21). Such a diversity was also reflected in the 2010 practice pattern survey (22). For instance, in one survey, 100% of respondents injected the greater occipital nerves, while 69% included the lesser occipital nerves, 50% the supraorbital, and 34% the supratrochlear nerves (21). Dubrovsky, et al (13) reported a more significant immediate headache improvement following multiple nerve blocks in pediatric patients. This suggests the potential for better outcomes with multiple nerve blocks (perhaps for holocephalic pain), though definitive data from randomized controlled trials are not available.

A consideration in our study was the duration of pain improvement following nerve blocks. While many patients experienced significant improvement, a few required repeat blocks to maintain the effect (Table 2). For patients who had significant but temporary pain improvement (> 50%), radiofrequency ablation or repeat blocks were offered as alternative treatments in these cases. In a few instances, radiofrequency ablation was performed on these patients, resulting in extended periods of pain improvement. Studies by Abd-Elsayed, et al (23,24) and Hoffman, et al (25) demonstrated the efficacy of radiofrequency ablation in treating various types of headaches, including neuralgias and chronic headaches, suggesting it may also be a viable option for selected patients with PTH.

Safety and Efficacy

Our cohort did not experience any adverse effects from the blocks, which further supports the safety and tolerability of these interventions. The observed improvements in our study suggest that nerve blocks, particularly total nerve blocks, can be a valuable option for patients who are not responsive or intolerant to pharmacological agents.

Limitations and Future Directions

Our study has several limitations. Our retrospective analysis revealed that several patients who received multiple nerve blocks were concurrently prescribed prophylactic medications for headache management. Although they exhibited marked improvement following their intervention, even when previously showing resistance to medications alone, we cannot conclusively determine whether the benefits observed following the blocks were attributable to the blocks alone or to a synergistic effect between the blocks and the headache prophylactic medications. Finally, our sample was small and lacked a comparative design arm or a placebo control group, underscoring the need for future randomized controlled clinical trials. Additionally, the partial nerve blocks were primarily administered for localized headaches; it remains uncertain if this approach would be effective for patients with holocephalic pain, highlighting the need for further studies in this area.

Conclusion

In conclusion, our study suggests that multiple nerve blocks, whether total or partial, result in marked improvements in headache severity that far exceed the expected duration of the local analgesic effects. Despite the mentioned limitations, the results suggest a successful therapeutic response of these procedures for chronic PTH. The blocks are safe and well-tolerated and can be a good option for patients that are not responsive or intolerant to pharmacological agents. Future randomized double-blind comparative or placebo-controlled studies are necessary to further evaluate the extent of their effectiveness.

Author Contributions

CF, AH, and MP conceived the ideas of the study. CF, AH, and MP performed data collection. CF, AH, JJ, and MP performed data analysis and interpretation. CF is the primary author. CF, AH, JJ, XF, RN, and MP provided revisions to the scientific content. CF, AH, JJ, FA, NA, XF, SP, RN, and MP provided stylistic grammatical revisions. FA, NA, XF, RN, and MP provided access to crucial research components. MP was the principal investigator.

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