Journal of Pioneering Medical Sciences
Received: March 07, 2025 | Accepted: April 10, 2025 | Published: July 05, 2025
Volume 14, Issue 06, Pages 81-85

DOI https://doi.org/10.47310/jpms2025140612

A Cautionary Tale: Unveiling Suboccipital Muscle Atrophy Following Occipital Nerve Blocks for Chronic Cluster Headaches – Two Case Reports

Hassan A. Moria[1*] and Amirah M. Alatawi[2]
[1]Anesthesia and Critical Care, Department of Surgery, Faculty of Medicine, University of Tabuk, Tabuk, Saudi Arabia
[2]Department of Community and Family Medicine, Faculty of Medicine, University of Tabuk, Tabuk, Saudi Arabia

Author Designation: [1,2]Associate Professor

*Corresponding author: Hassan A. Moria (e-mail: Hmoria@ut.edu.sa).

©2025 the Author(s). This is an open access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0

Abstract Occipital Nerve Blocks (ONBs) are a common treatment for chronic cluster headaches; however, data on their long-term complications remain limited. This case report highlights a rare complication of suboccipital muscle atrophy after repeated ONBs in patients with chronic cluster headaches. Both patients, unresponsive to multiple pharmacological treatments, exhibited typical cluster headache symptoms such as severe periorbital pain, lacrimation and rhinorrhea, while brain and cervical spine imaging appeared normal. Each received ONBs with bupivacaine and triamcinolone, resulting in temporary relief for several months. However, after a second ONB cycle, both patients developed suboccipital muscle atrophy, which was confirmed by ultrasound. These cases suggest a potential link between repeated ONBs and suboccipital muscle atrophy, emphasizing the need for clinicians to be mindful of this rare complication. Alternative interventional strategies or preventive measures may be warranted in managing chronic cluster headaches to mitigate this risk.

Key Words Chronic Cluster Headache, Occipital Nerve Block, Suboccipital Muscle Atrophy, Case Report

INTRODUCTION

Cluster headaches are a rare but debilitating primary headache disorder characterized by severe unilateral pain in the periorbital region. While Occipital Nerve Blocks (ONBs) are widely used for symptomatic relief, the long-term safety of repeated ONBs remains under researched. Here, we present two cases of chronic cluster headache complicated by suboccipital muscle atrophy after repeated ONBs. Although ONBs are effective in managing headache symptoms, there is no direct evidence from these studies to suggest that they cause muscle atrophy in the suboccipital region. This report aims to raise awareness of this potential complication and to guide clinicians in managing similar cases.

CASE REPORTS

Patient Information

Case 1: A 33 year-old male patient presented with a two-year history of chronic cluster headaches that were refractory to various pharmacological treatments, including verapamil, prednisolone and galcanezumab. His headaches were characterized by severe right periorbital stabbing pain. His attacks lasted 1.5 hours, occurred 2 to 3 times daily and were marked by right periorbital pain rated with a Numerical Rating Pain Scale score of 10/10. He also experienced associated rhinorrhea and lacrimation but denied any aura, orthostatic headache or hemiparesis.

Case 2: A 24 year-old male patient presented with an 11 month history of chronic cluster headaches that were unresponsive to verapamil, prednisone and galcanezumab. His attacks lasted 45 minutes, occurred 1-2 times daily and were marked by right periorbital pain rated 10/10 in intensity. They were accompanied by lacrimation and agitation and were not aggravated by changes in position, such as standing or lying supine.

Clinical Findings

Outside of their headache attacks, both patients demonstrated no abnormal findings upon neurological examination. However, after their second ONB cycle, suboccipital muscle atrophy was clinically noted and

Table 1: Case timelines

Timeline	Case 1	Case 2
Relevant past medical history and interventions	Chronic cluster headaches for 2 years; refractory to treatments (verapamil, prednisolone and galcanezumab)	Chronic cluster headaches for 11 months; refractory to treatments (verapamil, prednisone topiramate and galcanezumab)
Initial presentation	Severe right periorbital pain (10/10), lasting 1.5 hours, 2–3 times daily, with rhinorrhea and lacrimation; no aura, orthostatic headache or hemiparesis	Severe right periorbital pain (10/10), lasting 45 minutes, 1–2 times daily, with lacrimation and agitation; not positionally aggravated
Initial intervention	Prophylactic (verapamil and prednisolone) and abortive (home oxygen) treatments; attempted galcanezumab without success	Prophylactic (verapamil and prednisolone ,topiramate) and abortive (home oxygen) attempted galcanezumab without success
First occipital nerve block performed	Ultrasound-guided nerve block using 5 mL of 0.25% bupivacaine with 40 mg of triamcinolone	Ultrasound-guided nerve block using 5 mL of 0.25% bupivacaine with 40 mg of triamcinolone
Reported cessation of attacks	Complete cessation of attacks within 4 days, lasting for 4 months	Complete cessation of attacks within 4 days, lasting for 4 months
Second occipital nerve block performed	Same dose and procedure; headache relief for 4 months	Same dose and procedure; headache relief for 4 months
Complications	Muscle atrophy noted 3 weeks post-procedure, confirmed clinically and with ultrasound	Muscle atrophy noted 3 weeks post-procedure, confirmed clinically and with ultrasound
Subsequent interventions noted	Opted for sphenopalatine ganglion radiofrequency ablation (RFA); reduced headache frequency and no further muscle atrophy progression.	Transitioned to RFA; reduced headache frequency and no further muscle atrophy progression
Current status	Continued improvement in headache frequency and musculoskeletal monitoring; satisfied with RFA	Continued improvement in headache frequency and musculoskeletal monitoring; satisfied with RFA

confirmed via ultrasound measurements. Table 1 presents the progression of events and treatments for both cases.

Diagnostic Assessment

The diagnostic evaluation included a comprehensive neurological examination, routine blood tests, noncontrast head Computed Tomography (CT) and contrast-enhanced Magnetic Resonance Imaging (MRI) of the brain. All investigations returned normal findings. Diagnoses of chronic cluster headache in both patients were established based on clinical criteria. Suboccipital muscle atrophy was diagnosed based on clinical examination, including physical assessment of muscle bulk and strength and confirmed via ultrasound imaging.

Therapeutic Intervention

Both patients received initial management involving both prophylactic and abortive strategies, including a daily 240 mg dose of verapamil, a tapering regimen of 40 mg of oral prednisolone and home oxygen therapy for acute attacks. However, despite these efforts, the patients' headaches remained poorly controlled over the subsequent two months.

As sumatriptan was unavailable locally, galcanezumab (Emgality) was introduced. Both patients failed to respond to 300 mg subcutaneous doses of galcanezumab, leading to the decision to proceed with an ONB. The ONB was performed under ultrasound guidance and using a combination of 5 mL of 0.25% bupivacaine and 40 mg of triamcinolone. The patient reported complete cessation of headache attacks within the first 4 days and sustained relief lasting 4 months.

Following the recurrence of cluster headaches, Both patients requested and underwent a second cycle of the same ONB (5 mL of 0.25% bupivacaine and 40 mg of triamcinolone). This intervention provided a comparable duration of headache relief, lasting approximately four months. However, three weeks after this second ONBs,

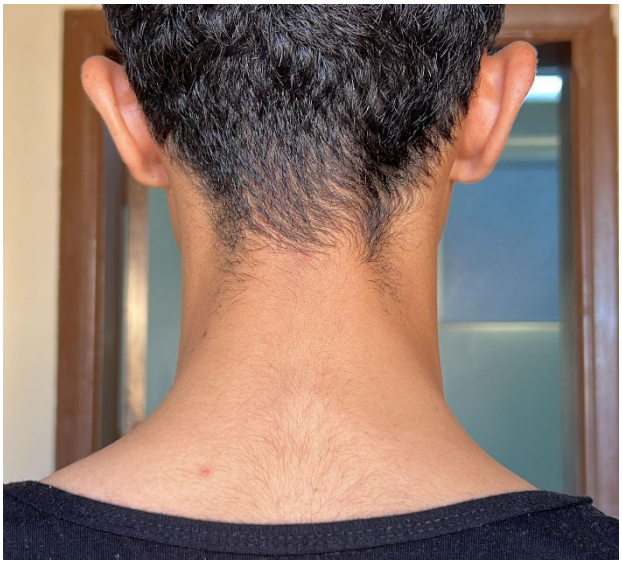

Figure 1: For case 1

suboccipital muscle atrophy was observed upon physical examination and subsequently confirmed through ultrasound imaging (Figure 1).

Given this complication, Both patients opted to discontinue further ONBs. Instead, sphenopalatine ganglion radiofrequency ablation (RFA) was performed to achieve prolonged headache control.

Follow-up and Outcomes

Both patients tolerated the sphenopalatine ganglion RFA without significant side effects and reported an improvement in headache frequency over the following months. Although there was no further progression of muscle atrophy. The patient continues to be monitored for headache recurrence and any potential long-term musculoskeletal complications.

DISCUSSION

An ONB is a commonly used therapeutic intervention for cluster headaches [1]. For instance, Gul *et al.* [2] investigated the efficacy of Greater Occipital Nerve Blockade (GONB) in chronic migraine patients, demonstrating its potential as a therapeutic option. Their findings align with broader research indicating that GONB can significantly reduce headache frequency and intensity, enhancing patients' quality of life. ONBs can provide rapid alleviation of headache symptoms lasting from days to months [3]. In patients with chronic cluster headaches, high-volume anesthetic suboccipital nerve blocks have shown long-term efficacy, with many patients experiencing complete pain relief for several weeks [4].

Most studies have focused on pain relief and headache frequency reduction rather than muscular changes [5]. None of the studies specifically addressed suboccipital muscle atrophy as a consequence of ONBs. Instead, the primary focus has been on headache relief and the improvement of quality of life, disability and comorbid conditions such as depression and anxiety [6].

Furthermore, there is limited data on the long-term complications associated with repeated ONBs. To address this gap in the literature, this case report highlights a rare complication of suboccipital muscle atrophy after repeated ONBs in patients with chronic cluster headaches. This atrophy may contribute to altered neck function and increased pain sensitivity, necessitating further investigation into the safety and efficacy of this treatment modality over extended periods. Clinicians should closely monitor patients for signs of muscle weakness or functional impairment following multiple ONBs to better understand the potential risks of the treatment [7,8].

The potential for muscle atrophy raises questions about the overall management strategy for patients with chronic cluster headaches, particularly regarding the balance between immediate pain relief and long-term consequences. Involving patients in discussions about potential side effects and long-term implications can foster a collaborative treatment approach that may enhance adherence to recommended therapies while addressing individual preferences and concerns [9].

The occipital nerve blocks in our case were administered utilizing ultrasound guided techniques targeting the vicinity of the greater occipital nerve rather than direct intramuscular injection (nerve lies sandwiched between the Obliquus Capitis Inferior Muscle (OCIM) and Semispinalis capitis muscle (SsCIM). We recognize that intramuscular steroid injections have been reported to cause localized muscle atrophy; however, we did not intend to administer the injection into the muscle itself.

Injection into the perineural space during an occipital nerve block, especially with repeated steroid use, may lead to muscle atrophy due to steroid diffusion. While direct reports of muscle atrophy are limited, A study describes a patient who developed full-thickness soft tissue atrophy after receiving a Greater Occipital Nerve (GON) block with corticosteroids for headache treatment. The atrophy was observed in the subcutaneous and muscular layers, suggesting that steroid diffusion beyond the intended target area may have contributed to the tissue changes [10].

Occipital Nerve Blocks (ONBs) are widely recognized for their effectiveness in treating various headache disorders but they carry potential risks and complications. One common complication is infection and bleeding at the injection site, which, like any percutaneous procedure, poses a risk. A review of complications associated with ONBs and other neurostimulation techniques emphasized the importance of proper sterilization and technique to minimize such risks [11]. Fortunately, the overall incidence of infection remains low and most cases can be managed with standard medical interventions.

Another serious complication of ONBs is local anesthetic toxicity, which occurs when the anesthetic is accidentally injected into a blood vessel, leading to systemic absorption. Intra-arterial injections can result in severe complications, including seizures, cardiac arrhythmias and cardiovascular collapse [9]. Although such incidents are rare, they highlight the need for vigilance, particularly when performing the block in patients with underlying cardiovascular conditions.

A less frequent but more dangerous complication is accidental subarachnoid injection, which can lead to brainstem anesthesia and severe neurological outcomes, including respiratory depression and loss of consciousness [9]. The use of real-time imaging guidance, such as ultrasound, has proven effective in significantly reducing the occurrence of such complications by ensuring proper needle placement.

In addition to these common risks, there are also rare complications associated with ONBs. One such complication is transient facial nerve palsy, which occurs when the anesthetic spreads beyond the occipital region, affecting the facial nerve. This condition is usually temporary, with most patients recovering fully within a few days to weeks [12]. Although rare, clinicians should remain alert for signs of facial weakness or paralysis following the procedure.

Another rare but significant complication is myonecrosis. This can occur when the anesthetic is inadvertently injected into muscle tissue, leading to localized tissue necrosis. While the incidence is low, it can cause considerable pain and discomfort, requiring additional medical intervention [9].

Patient Perspective

Patients undergoing Occipital Nerve Blocks (ONBs) for chronic cluster headaches often express significant relief from the debilitating pain associated with their condition. Many describe the rapid alleviation of symptoms as transformative, allowing them to engage in daily activities that were previously impossible. However, the occurrence of adverse effects, such as suboccipital muscle atrophy, can alter this perception.

For the patients in this case report, the onset of muscle atrophy was an unexpected and distressing development. Initially, the patient experienced marked improvement in headache frequency and severity, validating the decision to pursue repeated ONBs. Over time, however, the emergence of neck discomfort and reduced neck mobility led to new challenges, replacing the original problem with another, unanticipated one.

This experience highlights the importance of comprehensive patient education about potential side effects, even those considered rare or theoretical. For patients, being informed about both the benefits and risks of ONBs allows for better engagement in shared decision-making. Additionally, many patients express a desire for more robust long-term follow-up protocols to monitor and address any emerging complications.

The balance between immediate pain relief and long-term outcomes remains critical to patient satisfaction. Encouraging open communication between clinicians and patients ensures that treatment plans align with the patient's values and expectations, while fostering trust in the therapeutic process. Ultimately, incorporating patient perspectives into research and clinical practice can lead to a more nuanced understanding of the trade-offs associated with ONBs and help tailor management strategies to individual needs.

CONCLUSIONS

This case report highlights a rare but significant complication of suboccipital muscle atrophy following repeated occipital nerve blocks (ONBs) in two patients with chronic cluster headaches. Given the need for a comprehensive evaluation of the long-term effects of repeated ONBs in chronic cluster headache management, careful monitoring for neuromuscular complications is essential.

Although muscle atrophy is not extensively documented in the literature, our findings suggest that steroid diffusion during occipital nerve blocks can contribute to localized soft tissue complications, including muscle atrophy. These observations underscore the importance of vigilance in patients receiving repeated ONBs and the need for further research to better understand the potential risks associated with steroid use in this treatment approach.

Patient Perspectives

Both patients acknowledged the improvement in their headache condition following their ONBs but expressed concerns regarding the unexpected onset of muscle atrophy. Despite this, they were satisfied with the transition to RFA and would recommend it to others experiencing similar refractory headaches.

Informed Consent

Informed consent was obtained from both patients concerning the publication of their clinical data and images.

Considerations and Future Research

While ONBs are effective for managing chronic headaches, there is no direct evidence of their long-term efficacy from the aforementioned studies. Future research should examine the long-term effects of ONBs on muscle tissue, particularly in patients receiving repeated treatments for chronic cluster headaches. This could involve imaging studies or muscle biopsies to assess any structural changes in the suboccipital muscles.

Limitations

Despite these findings, we acknowledge the limitations of our assessment. The absence of electrodiagnostic studies or histological confirmation prevents us from definitively diagnosing muscle atrophy at a microscopic or functional level. Additionally, while ultrasound imaging is a useful tool for detecting structural changes, it does not provide direct evidence of muscle function or cellular integrity. These limitations should be considered when interpreting our findings and future studies incorporating more objective diagnostic modalities would help strengthen conclusions in similar cases.

REFERENCES

[1] Arata, William H. *et al.* "Occipital nerve block for headaches: A narrative review." *Journal of Oral & Facial Pain and Headache,* vol. 38, no. 1, June 2024. https://pmc.ncbi.nlm.nih.gov/articles/PMC11810654/.

[2] Gul, H. L. *et al.* "The efficacy of greater occipital nerve blockade in chronic migraine: A placebo-controlled study." *Acta Neurologica Scandinavica,* vol. 136, no. 2, December 2016, pp. 138-144. https://onlinelibrary.wiley.com/doi/abs/10.1111/ane.12716.

[3] Voigt, Crystal L. and Maurice O. Murphy. "Occipital nerve blocks in the treatment of headaches: safety and efficacy." *The Journal of Emergency Medicine,* vol. 48, no. 1, January 2015, pp. 115-129. https://www.sciencedirect.com/science/article/pii/S0736467914009275.

[4] Rozen, Todd D. "High-volume anesthetic suboccipital nerve blocks for treatment refractory chronic cluster headache with long-term efficacy data: An observational case series study." *Headache: The Journal of Head and Face Pain,* vol. 59, no. 1, August 2018, pp. 56-62. https://headache journal.onlinelibrary.wiley.com/doi/abs/10.1111/head.13394.

[5] Ornello, Raffaele *et al.* "Efficacy and safety of greater occipital nerve block for the treatment of cluster headache: a systematic review and meta-analysis." *Expert Review of Neurotherapeutics,* vol. 20, no. 11, August 2020, pp. 1157-1167. https://www.tandfonline.com/doi/abs/10.1080/14737175.2020.1809379.

[6] Ulusoy, Ersin Kasım and Ömer Faruk Bolattürk. "The effect of greater occipital nerve blockade on the quality of life, disability and comorbid depression, anxiety and sleep disturbance in patients with chronic migraine." *Neurological Sciences,* vol. 41, February 2020, pp. 1829-1835. https://link.springer.com/article/10.1007/s10072-020-04286-9.

[7] Sadrolashrafi, Kaviyon *et al.* "Alopecia and cutaneous atrophy due to occipital nerve block containing steroids." *JAAD Case Reports,* vol. 28, October 2022, pp. 58-60. https://www.sciencedirect.com/science/article/pii/S2352512622003629.

[8] Wilbrink, Leopoldine A. *et al.* "Safety and efficacy of occipital nerve stimulation for attack prevention in medically intractable chronic cluster headache (ICON): a randomised, double-blind, multicentre, phase 3, electrical dose-controlled trial." *The Lancet Neurology,* vol. 20, no. 7, July 2021, pp. 515-525. https://www.thelancet.com/journals/laneur/article/PIIS1474-4422(21)00101-0/abstract.

[9] Elmofty, Dalia. "*Challenging cases and complication management in pain medicine* ." Complications of occipital nerve block, edited by Elmofty, Dalia., United states, Springer International Publishing,, 2017,, pp. 295-298. https://link.springer.com/chapter/10.1007/978-3-319-60072-7_45.

[10] Mutagi, Hirachand *et al.* "Full-thickness local soft tissue atrophy following steroid injection to greater occipital nerve." *Pain practice: the official journal of World Institute of Pain,* vol. 11, no. 6, 2011, pp. 582-583. https://pubmed.ncbi.nlm.nih.gov/22060308/.

[11] Eyigor, Can and Meltem Uyar. "Complications of Occipital Nerve Block and Radiofrequency Lesioning." Complications of Pain-Relieving Procedures: An Illustrated Guide, edited by Erdine, Serdar *et al.*, United states, Wiley, 2022,, pp. 127-135. https://onlinelibrary.wiley.com/doi/abs/10.1002/9781119757306.ch18.

[12] Strauss, Lauren *et al.* "Transient facial nerve palsy after occipital nerve block: a case report." *Headache: The Journal of Head and Face Pain,* vol. 54, no. 10, June 2014, pp. 1651-1655. https://headachejournal.onlinelibrary.wiley.com/doi/abs/10.1111/head.12403.