First Case of Occipital Neuralgia Treated by Fascial Hydrodissection

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Patient: Female, 81-year-old
Final Diagnosis: Occipital neuralgia
Symptoms: Headache
Medication: —
Clinical Procedure: Hydrodissection
Specialty: Anesthesiology • Family Medicine • General and Internal Medicine • Neurology

Objective: Unknown etiology
Background: The injection technique “hydrodissection” has been used to isolate the nerves from their surrounding structures, such as the fascia, to treat nerve entrapment. However, no study has reported the use of hydrodissection for the treatment of occipital neuralgia. This report presents the first case of occipital neuralgia treated by ultrasound-guided hydrodissection of the fascia.

Case Report: An 81-year-old woman presented to the Emergency Department with severe, paroxysmal, stabbing pain headache lasting 4 days. Under a diagnosis of occipital neuralgia, we performed ultrasound-guided hydrodissection of the right semispinalis capitis, obliquus capitis inferior, and sternocleidomastoid muscles, wherein the trigger points were palpated using a low-dose anesthetic agent (9 mL saline and 1 mL 1% lidocaine). Her headache disappeared immediately after treatment. Subsequently, the headache would recur every few days; however, the pain intensity had decreased, and the patient could tolerate it. The same hydrodissection procedure was performed on days 2, 6, and 10 after the initial visit using 2000 mg acetaminophen and 120 mg loxoprofen per day, and the headache episodes disappeared. Treatment was discontinued 23 days after the initial visit; the patient was followed up for 4 weeks, and no headache recurrence was observed.

Conclusions: We found that fascial hydrodissection was an effective treatment option for occipital neuralgia attributed to myofascial pain syndrome. The risk of local anesthetic poisoning was very low. Fascial hydrodissection is recommended as a new treatment for occipital neuralgia. Treatment with hydrodissection may be applicable to other neuralgia types.

Keywords: Anesthesia, Local • Neuralgia • Pain Management • Saline Solution • Ultrasonography

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**Background**

Occipital neuralgia is a type of neuropathic pain caused by irritation or injury of the greater occipital, lesser occipital, and third occipital nerves [1]. Given that only one epidemiologic dataset has been reported, the incidence and prevalence of occipital neuralgia are not extensively known [2]. The clinical features of occipital neuralgia include unilateral or bilateral headaches involving the greater, lesser, and third occipital nerve regions; these headaches are recurrent and paroxysmal [3]. Occipital neuralgia has a significant impact on patient quality of life owing to the great intensity and sharp stabbing nature of the pain [4]. Occipital neuralgia is also characterized by the presence of trigger points along the course of the nerve [5,6]. Patients are usually prescribed multimodal medical management for occipital neuralgia, which comprises physical therapy (such as neck rest and massage), medications (such as non-steroidal anti-inflammatory drugs, antiepileptics, and antidepressants), nerve blocks, botulinum toxin injections, pulsed radiofrequency, nerve stimulation, and surgical treatments [7,8]. One of the diagnostic criteria of occipital neuralgia proposed by the International Headache Society is temporary relief from headache following the use of a nerve block; thus, nerve blocks are used for both diagnosing and treating neuralgia [9]. The pathophysiology of occipital neuralgia is unknown [10]. In recent years, the relationship between myofascial pain syndrome and nerve compression has attracted attention in the pathophysiology of neuralgia. A technique called “hydrodissection” has been reported, wherein the surrounding structures, such as the fascia, are separated from the nerve by injecting a combination of local anesthetic and saline or 5% dextrose [11]. The mechanism of action of hydrodissection involves the release of pressure by the injected solution on the structures surrounding the nerve [11]. However, only a few case reports of successful treatment with hydrodissection are available. Accumulation of evidence is needed to evaluate the efficacy of hydrodissection for neuropathic pain. In particular, to the best of our knowledge, no study to date has reported such treatment for occipital neuralgia. Therefore, the purpose of this study was to verify the effectiveness of hydrodissection for occipital neuralgia. We report the first case of successful treatment of occipital neuralgia using ultrasound-guided hydrodissection of the fascia.

**Diagnostic criteria for occipital neuralgia** (adapted from the Headache Classification Committee of the International Headache Society [9]).

| Diagnostic criteria for occipital neuralgia |
|-----------------------------------------|
| A) Unilateral or bilateral pain in the distribution(s) of the greater, lesser, and/or third occipital nerves and fulfilling criteria B-D |
| B) Pain has at least two of the following three characteristics: |
| 1. recurring in paroxysmal attacks lasting from a few seconds to minutes |
| 2. severe in intensity |
| 3. shooting, stabbing, or sharp in quality |
| C) Pain is associated with both of the following: |
| 1. dysesthesia and/or allodynia apparent during innocuous stimulation of the scalp and/or hair |
| 2. either or both of the following: |
| a. tender points over the affected nerve branches |
| 2. trigger points at the emergence of the greater occipital nerve or in the distribution of C2 |
| D) Pain is eased temporarily by local anesthetic block of the affected nerve(s) |
| E) Not better accounted for by another 3rd edition of the International Classification of Headache Disorders (ICHD-3) diagnosis |

**Case Report**

An 81-year-old woman visited our Emergency Department (ED) with a chief concern of headache lasting 4 days. She had a history of dyslipidemia, hypertension, and overactive bladder and was using rosuvastatin 2.5 mg, olmesartan 20 mg, fesoterodine 4 mg, and bilastine 20 mg. She had no history of smoking and occasionally consumed alcohol. She had no history of substance abuse. She was unemployed at the time, lived alone, and was independent in activities of daily living. The pain was stabbing and electric shock-like in nature, and the patient rated her pain 10/10 on the numeric pain rating scale. The headache was paroxysmal, and each episode lasted approximately 1 h. The location of the headache coincided with the area innervated by the right greater and lesser occipital nerves. Head computed tomography (CT) performed on the day before her initial visit to our department revealed no abnormalities. The patient had visited the ED 3 times (3, 2, and 1 days before her initial visit) and received a diagnosis of occipital neuralgia by the physician in charge of the ED. This was treated with a nerve block by injecting 2 mL of 1%...
Lidocaine in the area innervated by the greater and lesser occipital nerves, with the physician using the landmark method. Immediately after the injection, the pain improved from a numeric pain rating scale score of 10 to a score of approximately 3; however, severe pain recurred after a few hours. During the initial examination, the patient’s vital signs were stable, and there was no skin rash. The patient had headache in the right occipital, temporal, and parietal regions, which coincided with the dominant regions of innervation by the right greater and lesser occipital nerves, and allodynia was observed when the same areas were stimulated. Hard trigger points were palpated 1 cm caudal to the occipital ridge, 2.5 cm lateral to the midline, and 2 cm caudal to the right mastoid process, and strong, reproducible tenderness was noted. Ultrasonography revealed that the right semispinalis capitis and sternocleidomastoid muscles were present directly under each trigger point. Based on the history and physical examination, the patient’s headache was found to be in the region of the greater and lesser occipital nerves, and allodynia was observed when the same areas were stimulated. The headache was characterized by intense, recurrent, paroxysmal, and sharp pain. Tenderness was noted at the origin of the greater and lesser occipital nerves, and local anesthetic blockade of both areas provided temporary pain relief. Head CT showed no evidence of cerebral hemorrhage, cerebral infarction, subarachnoid hemorrhage, or other organic disease causing the headache. Therefore, the diagnosis of occipital neuralgia was confirmed (Table 1); however, we considered it inadequately treated. We thought that the occipital neuralgia was probably caused by occipital nerve compression due to myofascial pain. Hydrodissection was considered, as we had prior experience in treating neuralgia attributed to myofascial pain syndrome with hydrodissection [12]. Subsequently, ultrasound-guided

**Figure 1.** Ultrasonographic images showing the position and hydrodissection process between the right semispinalis capitis and obliquus capitis inferior muscles. (A, B) During hydrodissection (out-of-plane technique). Arrow shows the location of the needle. The dotted line indicates the range of solutions injected. (1) C2 spinous process; (2) semispinalis capitis muscle; and (3) obliquus capitis inferior muscle.

**Video 1.** Ultrasonographic movie showing hydrodissection process between the right semispinalis capitis and obliquus capitis inferior muscles.
Hydrodissection of the interfascicular space between the right semispinalis capitis and obliquus capitis inferior muscles was performed with 5 mL of 0.75% ropivacaine, resulting in immediate and complete resolution of the headache in the area innervated by the right greater occipital nerve (Figure 1, Video 1). Next, ultrasound-guided hydrodissection of the deep layer of the right sternocleidomastoid muscle was performed using a low-dose anesthetic agent (a mixture of 9 mL saline and 1 mL 1% lidocaine), resulting in immediate resolution of the headache in the area innervated by the right lesser occipital nerve. Oral acetaminophen 2000 mg/day and loxoprofen 120 mg/day were prescribed for recurrent episodes. Subsequently, 2 and 6 days following her initial visit, hydrodissection of the fascia of the right semispinalis capitis and obliquus capitis inferior muscles was performed using a low-dose anesthetic agent (a mixture of 9 mL saline and 1 mL 1% lidocaine) outpatient in the Department of General Internal Medicine. In addition, 10 days after the initial examination, hydrodissection of the deep layer of the right sternocleidomastoid muscle was performed using the same low-dose anesthetic agent in the same department. From the initial visit to 10 days later, the patient’s clinical condition progressed as follows: the headache in the right lesser occipital nerve region disappeared completely, while headache in the right greater occipital nerve region, with a numeric pain rating scale score of 2, recurred every few days but was tolerable. Subsequently, the frequency of attacks decreased further, and the analgesic medication was discontinued 23 days following the initial examination. No recurrence of the headache was observed at 4 weeks following analgesic discontinuation. No adverse events due to hydrodissection occurred. Figure 2 provides a summary of our interventions.

Written informed consent was obtained from the patient for publication of this report. Ethics approval for this study was provided by the ethics committee of Rakuwakai Marutamachi Hospital, and the study was conducted in accordance with the guidelines of the Declaration of Helsinki.

**Discussion**

To the best of our knowledge, this was the first case of successful treatment of occipital neuralgia using ultrasound-guided hydrodissection of the fascia. The characteristic history of headache, presence of tender points on examination, and no presence of abnormalities on head CT met the diagnostic criteria for myofascial pain syndrome and occipital neuralgia (Table 1) [13]. Therefore, this case study suggests an association between myofascial pain syndrome and occipital neuralgia. The patient originally experienced severe shoulder stiffness, which may have triggered her symptoms.
In general, the greater occipital nerve runs through the muscular layer of the semispinalis capitis and obliquus capitis inferior muscles. A nerve block is performed by targeting the nerve in this region either using the landmark method or under ultrasound guidance [14-16]. In contrast, the lesser occipital nerve is one of the terminal branches of the superficial cervical plexus in addition to the great auricular, transverse cervical, and supracleavicular nerves emerging from behind the dorsal border of the sternocleidomastoid muscle. Techniques for superficial cervical plexus block are used to target this region [17-19]. Using these techniques, hydrodissection for occipital neuralgia can be performed, as in the present case. One of the mechanisms of action of hydrodissection for nerve pain is nerve de-compression [11]. In our patient’s case, the initial nerve block performed using the landmark method resulted in immediate recurrence of neuralgia upon fading of the effect of the local anesthetic, whereas the symptoms improved quickly after ultrasound-guided fascial hydrodissection with nearly no recurrence of symptoms thereafter. This clinical course provides further evidence that myofascial pain syndrome can cause neuralgia. In addition, cadaver studies have shown that even a small amount of drug injected into the interfascicular space can spread widely and penetrate deeper structures [20]. The nerve block performed using the landmark method provided temporary analgesia because the anesthetic could not completely penetrate into the interfascicular space that was compressing the nerve, whereas hydrodissection provided long-term analgesia since it was able to separate the nerve from the surrounding fascia, which allowed the anesthetic agent injected under ultrasound guidance to reach the targeted area. Since the purpose of treatment in this case was to relieve pressure on the nerve, local anesthetics were not necessary. The low-dose anesthetic agent used in this case is relatively safe with a low risk of local anesthetic poisoning since it is mostly composed of saline solution. Moreover, we can ensure that the anesthetic is injected between the fascia and avoid accidental puncture of the occipital artery, which runs near the greater occipital nerve, using ultrasound guidance [14-16]. In Japan, insurance policies do not allow sole injection of saline; hence, we mixed a small amount of lidocaine with saline to allow the anesthetic to completely penetrate into the interfascicular space that was compressing the nerve, whereas hydrodissection provided long-term analgesia since it was able to separate the nerve from the surrounding fascia, which allowed the anesthetic agent injected under ultrasound guidance to reach the targeted area. Since the purpose of treatment in this case was to relieve pressure on the nerve, local anesthetics were not necessary. The low-dose anesthetic agent used in this case is relatively safe with a low risk of local anesthetic poisoning since it is mostly composed of saline solution. Moreover, we can ensure that the anesthetic is injected between the fascia and avoid accidental puncture of the occipital artery, which runs near the greater occipital nerve, using ultrasound guidance [14-16]. In Japan, insurance policies do not allow sole injection of saline; hence, we mixed a small amount of lidocaine with saline to allow the anesthetic to completely penetrate into the interfascicular space that was compressing the nerve, whereas hydrodissection provided long-term analgesia since it was able to separate the nerve from the surrounding fascia, which allowed the anesthetic agent injected under ultrasound guidance to reach the targeted area.

This report is groundbreaking in that it presented hydrodissection as an effective new method for the treatment of occipital neuralgia. Moreover, the presented treatment can be applied to other types of neuralgia. An increasing number of reports, similar to our case study, have examined the role of the fascia in myofascial pain syndrome. Thus, fascial hydrodissection should be considered in suspected cases of nerve pain due to myofascial pain syndrome [21-24].

A possible limitation of this case report is the short follow-up period. Since occipital neuralgia could recur even following treatment, a longer follow-up period assessing the long-term efficacy of fascial hydrodissection is warranted [25,26].

Conclusions

Fascial hydrodissection is a useful treatment method for occipital neuralgia caused by myofascial pain syndrome. Hydrodissection is a relatively safe procedure with a low risk of local anesthetic poisoning, given that saline or a low-dose anesthetic agent is considered adequate as the injection solution. Fascial hydrodissection is recommended as a new treatment for occipital neuralgia. Treatment with hydrodissection may be applicable to other neuralgia types.

Department and Institution Where Work Was Done

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Declaration of Figures’ Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

References:

1. Wamsley CE, Chung M, Amirlak B. Occipital neuralgia: Advances in the operative management. Neurol India. 2021;69:5219-27
2. Koopman JS, Dieleman JP, Huygen FJ, et al. Incidence of facial pain in the general population. Pain. 2009;147:122-27
3. Hayes WI, Hoffmann C, Jacobson P, et al. Patient case report: Memantine for the treatment of occipital neuralgia. Clin Neuropharmacol. 2020;43:198-200
4. Pascual-Leone A, Pascual-Leone A. Occipital neuralgia: Another benign cause of “thunderclap headache”. J Neurol Neurosurg Psychiatry. 1992;55:411
5. Szperka CL, Gelfand AA, Hershey AD. Patterns of use of peripheral nerve blocks and trigger point injections for Pediatric headache: Results of a survey of the American Headache Society Pediatric and Adolescent section. Headache. 2016;56:1597-607
6. Shaladi A, Crestani F, Saltari R, Piva B. [Percutaneous electrical nerve stimulation of peripheral nerve for the intractable occipital neuralgia]. Recenti Prog Med. 2008;99:295-301 [in Italian]
7. Antony AB, Mazzola AJ, Dhalival GS, Hunter CW. Neurostimulation for the treatment of chronic head and facial pain: A literature review. Pain Physician. 2019;22:447-77
8. McNutt S, Hallan DR, Rizk E. Evaluating the evidence: Is neurolysis or neurectomy a better treatment for occipital neuralgia? Cureus. 2020;12:e11461
9. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. Cephalalgia. 2018;38:1-211
10. Noh SM, Kang HG. Cervical myelitis presenting as occipital neuralgia. Int J Neurosci. 2018;128:682-83
11. Lam KHS, Hung CY, Chiang YP, et al. Ultrasound-guided nerve hydrodissection for pain management: Rationale, methods, current literature, and theoretical mechanisms. J Pain Res. 2020;13:1957-68
12. Kaga M, Ueda T. Effectiveness of hydro-dissection of the piriformis muscle plus low-dose local anesthetic injection for piriformis syndrome: A report of 2 cases. Am J Case Rep. 2022;23:e935346
13. Gerwin RD. Diagnosis of myofascial pain syndrome. Phys Med Rehabil Clin N Am. 2014;25:341-55
14. Shim JH, Ko SY, Bang MR, et al. Ultrasound-guided greater occipital nerve block for patients with occipital headache and short term follow up. Korean J Anesthesiol. 2011;61:50-54
15. Binici O, Kuyrukuyildiz U, Sahin M, et al. Ultrasound-guided bilateral greater occipital nerve block for mass excision. Turk J Anaesthesiol Reanim. 2015;43:437-39
16. Akyol F, Binici O, Kuyrukuyildiz U, Karabakan G. Ultrasound-guided bilateral greater occipital nerve block for the treatment of post-dural puncture headache. Pak J Med Sci. 2015;31:111-15
17. Herring AA, Stone MB, Frenkel O, et al. The ultrasound-guided superficial cervical plexus block for anesthesia and analgesia in emergency care settings. Am J Emerg Med. 2012;30:1263-67
18. Beals T, Haines L. Ultrasound-guided superficial cervical plexus blockade for acute spasmatic torticollis in the ED. Am J Emerg Med. 2017;35:376.e1-2
19. Lee H, Jeon Y. Treatment of herpes zoster with ultrasound-guided superficial cervical plexus block. J Dent Anesth Pain Med. 2015;15:247-49
20. Kimura H, Kobayashi T, Zenita Y, et al. Expansion of 1 mL of solution by ultrasound-guided injection between the trapezius and rhomboid muscles: A cadaver study. Pain Med. 2020;21:1018-24
21. Stecco A, Gesi M, Stecco C, Stern R. Fascial components of the myofascial pain syndrome. Curr Pain Headache Rep. 2013;17:352
22. Stecco A, Meneghini A, Stern R, Stecco C, Imamura M. Ultrasonography in myofascial neck pain: Randomized clinical trial for diagnosis and follow-up. Surg Radiol Anat. 2014;36:243-53
23. Fede C, Angelini A, Stern R, et al. Quantification of hyaluronan in human fasciae: Variations with function and anatomical site. J Anat. 2018;233:552-56
24. Courseault J, Kessler E, Moran A, Labbe A. Fascial hydrodissection for chronic hamstring injury. Curr Sports Med Rep. 2019;18:416-20
25. Garcia Tercero RM, Hernández NL, Heras JG, et al. Ultrasonographic diagnosis of recurrent occipital neuralgia caused by venous plexus enlargement. Ultrasound Int Open. 2018;4:e335-36
26. Jung SJ, Moon SK, Kim TY, Eom KS. A case of occipital neuralgia in the greater and lesser occipital nerves treated with neurectomy by using transcranial Doppler sonography: technical aspects. Korean J Pain. 2011;24:48-52