Headache
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ISSN 0017-8748
doi: 10.1111/j.1526-4610.2008.01192.x
Published by Wiley Periodicals, Inc.

Expert Opinion

Greater Occipital Nerve and Other Anesthetic Injections for Primary Headache Disorders

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Key words: occipital nerve block, supraorbital nerve block, supratrochlear nerve block, migraine, cluster headache, occipital neuralgia

(*Headache* 2008;48:1122-1125)

In his 1948 headache book,[1] Harold Wolff described 3 types of occipital neuralgia. "The first and most common is characterized by a long-lasting (day, weeks, or months), more or less sustained aching of low or moderate intensity. It is commonly bilateral but may be unilateral. It is associated with stiffness of the muscles of the neck, tender points, often with muscle nodules, and with head tilting. . . . and results from the sustained contraction of skeletal muscle. It may be reduced in intensity or eliminated by procaine injection into the tender regions."

"A second type of occipital headache is characterized by recurrent attacks of high intensity pain with complete freedom from pain between attacks. The headache is of 2 to 36 hours' duration, is usually unilateral in onset, but may spread to the opposite side. It is throbbing. . . . The headache is commonly associated with anorexia, nausea, and vomiting, and is occasionally preceded by visual scotomas and paresthesias of the extremities. It is promptly and dramatically modified by ergotamine tartrate. . . . Procaine injection into the region of the occipital artery may eliminate the headache. The interval between attacks and the intensity of attacks is modified by adjustments of life situations and changes in attitude."

"A third type of occipital headache is due to inflammation, injury, or pressure on the occipital nerves, upper cervical spinal roots or dorsal horn or root ganglions. . . ."

Sixty years later, Wolff's descriptions are still insightful. He even reported a novel treatment, occipital nerve block, for acute migraine (although misdiagnosed as occipital neuralgia).

CLINICAL HISTORY

A 40-year-old woman presents to the office with a 3-day unilateral migraine unresponsive to multiple outpatient treatments. She reports severe photophobia and symptoms of allodynia. On examination, she has bilateral brush allodynia. Ipsilateral greater occipital, supraorbital, and supratrochlear nerve blocks are given. Within 30 s of the last injection, the patient reports relief of headache pain, allodynia contralateral to the injection side, and relief from the photophobia. She has no migraines for the next 2 weeks.

Questions.—What types of headaches benefit from occipital nerve blocks? What is the technique, what do you inject, and what are the potential adverse

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events of occipital nerve block? Are supraorbital and supratrochlear nerve blocks effective for acute migraine? What about trigger point injections for headaches?

EXPERT OPINION

Over the last several years, it has become increasingly clear that greater occipital nerve block (GONB) is effective in treating several primary headache disorders including migraine and cluster headache.[2] GONB has been traditionally used to diagnose and treat occipital neuralgia. However, the effect of the GONB in primary headache disorders undermines the GONB as a diagnostic tool, a feature that is part of the International Headache Society criteria for occipital neuralgia.

The Uses of GONB.—Studies have found GONB effective in migraine,[3-6] cluster headache,[2,7] and posttraumatic headache,[8] and in 2 cases of hemiplegic migraine auras.[9] Several studies have shown benefit from GONB in occipital neuralgia, although we suspect most of those patients were misdiagnosed. In one study, GONB was ineffective in chronic tension-type headache,[10] but in another study was beneficial in postconcussive headaches. The effects in migraine appear to last less than 60 days.[11] The onset of the benefit occurs within 2 min of the onset of the anesthesia, and is accompanied by relief of trigeminal and extratrigeminal allodynia, and photophobia.[12,13]

GON Anatomy and Technique.—Two different injection techniques are used to perform occipital nerve blocks; both appear to be effective. For the proximal injection technique, anesthetic is injected in the muscle where the GON exits from muscle, 3 cm below and 1.5 cm lateral to the inion.[14] As a result of this procedure, the paraspinal muscles near the suboccipital region are also infiltrated with anesthetic, amounting to paraspinal muscle injection that may well be a trigger or tender point injection in addition to the planned nerve block. These 2 effects may lead to scientific uncertainty, and either may lead to clinical benefits for the patient. This technique was used by Afridi. In this study, GON anesthesia did not correlate significantly with clinical benefit, suggesting the effect on the muscle may be important.[3] Larger volumes, perhaps 2-4 cc of 1% or 2% lidocaine, are used.

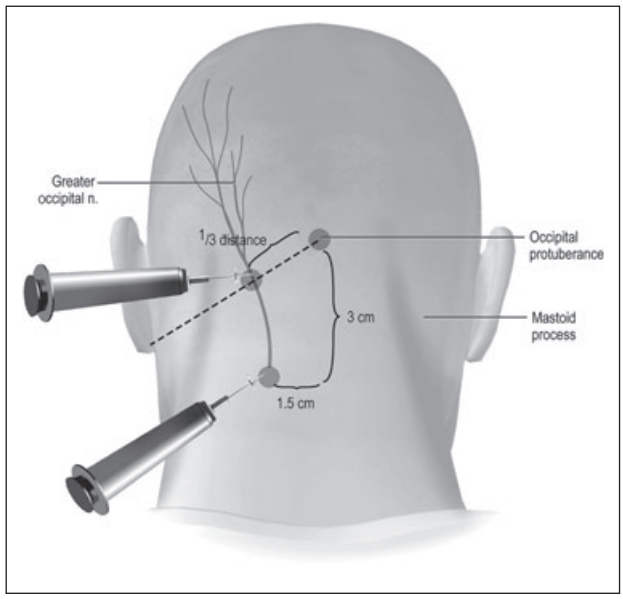

Figure.—Figure modified from Ashkenazi et al, *Wolff's Headache and Other Head Pain*, 8/e (in press) by permission of Oxford University Press, Inc.

An alternative technique more distal injection is given over the occipital ridge, intercepting the nerve more distally than in the first technique in a region with no muscle. We recommend palpating the occipital artery one-third of the way from the inion to the mastoid process and injecting just medial to the occipital artery, and then 1 cm lateral and medial to this point. In studies, we use 0.5 cc for one injection and 0.25 cc for the lateral sites, thus minimizing the dose of anesthetic and the possibility that systemic absorption of local anesthetic is responsible for the observed clinical effect (Fig.).

Potential Adverse Events.—Overall, GONB is extraordinarily safe. Injection site pain may occur and for 5 min dizziness and lightheadedness may occur. Reversible coma has been reported in patients with skull defects, presumably because the anesthetic infiltrates to the meninges. The use of local steroids has been associated with alopecia and hypopigmentation.[13,15] Sometimes, patients report as much as a few days of local tenderness after the injection. Most papers use 23-27-G needles; we use 0.5-1-inch 30-G needles.

Supraorbital and Supratrochlear Nerve Blocks.—These blocks have been reported to successfully treat migraine. Caputi studied the effect of

these blocks (some patients also received GON blocks) on 27 migraineurs with 85% reporting improvement at 4 weeks,[6] responding as measured by a 1-month total pain index (area under the curve calculation).

The supraorbital nerve exits the supraorbital canal from a generally palpable exit foramen under the orbital ridge in the midpupillary line. The supratrochlear nerve similarly exits a foramen 1 cm medial to the supraorbital nerve, near the medial edge of the eyebrow. Each nerve is accompanied by a small artery. We recommend not injecting within the canal, which can lead to bruising. We inject small volumes (0.2 cc) at each site in the eyebrow, superior to the canals. Do not use injectable steroids, in order to avoid inducing subcutaneous liponecrosis and alopecia with a poor cosmetic effect.

Trigger, Tender Point, or Paraspinal Injections.—Mellick has reported benefits for 417 headache patients in the Emergency Department that were treated with injections into the paraspinal muscles at C7.[16] He injected 1.5 mL of bupivacaine 2-3 cm lateral to the C7 spinous process. He found complete relief in 65% and partial relief in 20%. Our practice is to inject up to 8 cc of 0.05% bupivacaine mixed with 2% lidocaine on paraspinal, suboccipital, or trapezius tender points or trigger points based upon the patient's pain and examination. A total of 0.5-1 cc are injected per site, with the dose divided between 3 triangularly oriented sites reached without removing the needle out from under the skin. In small, thin people a 0.5-cc 30-G needle suffices; in larger individuals we use a 1-cc needle. When the trapezius is injected near the apex of the lung, we pinch the muscle to isolate the muscle and decrease the chance of a pneumothorax.[17]

What to Inject.—Short- or long-lasting local anesthetics may be injected. The 2 most commonly used anesthetics include lidocaine, whose half-life is 1.5-2 h, and bupivacaine, whose half-life is 3.5 h. Many injections mix the local anesthetic with an injectable steroid. In migraine, there is no short-term benefit to using steroids.[3,18] However, the long-term benefit is unknown. On the other hand, rare long-term steroid complications have been reported. Steroid injections may be locally damaging and foreign bodies have been noted years after the steroid injections.[3] In migraine, we prefer to *not* use injectable steroids and, if desired, follow the anesthetic injections with oral steroids. Although there is evidence for a beneficial effect of long- plus short-acting steroid injection in the GON *without* local anesthetic, we also do not use injectable steroids in cluster headache.[19]

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