

## REVIEW ARTICLE

# AN OSTEOPATHIC APPROACH TO OCCIPITAL NEURALGIA AND TINNITUS

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## KEYWORDS:

Occipital neuralgia

Tinnitus

## ABSTRACT:

Eye pain and ringing in the ear are non-specific symptoms commonly evaluated by primary care physicians and specialists alike. The differential diagnosis for these symptoms is broad and includes musculoskeletal, ophthalmologic and neurologic considerations. Careful consideration of the differential diagnosis should include acute, potentially life-threatening pathologies such as glaucoma or intracranial masses, as well as common pathologies, including cervicalgia, headache variants (migraine, tension) and acoustic neuroma.

This report describes a patient with eye pain caused by occipital neuralgia and tinnitus. Correcting the somatic dysfunctions found in the head, cervical, thoracic and rib regions with osteopathic manipulative treatment resolved the occipital neuralgia and the tinnitus for this patient. Thus, osteopathic manipulative treatment should be considered for conservative management of occipital neuralgia and tinnitus.

## INTRODUCTION

A 63-year-old female presented to the clinic with new sharp, stabbing, intermittent left eye pain that was non-radiating, had occurred every 2-3 days over the past 2 months and was rated 9/10 on the pain scale. She has a history of glaucoma and had seen her ophthalmologist 2 months prior, who determined that her eye pain was not secondary to glaucoma. Restasis eye drops, artificial tears and Tylenol did not improve her symptoms.

She had previously been treated with osteopathic manipulative treatment (OMT) 3 months before for right temporomandibular joint (TMJ) dysfunction, sphenobasilar symphysis (SBS) compression and right tinnitus. At current presentation, her cervicalgia had returned, with pain rated 9/10. The right ear tinnitus had restarted 3 weeks prior. She was not experiencing TMJ symptoms at this visit and denied any numbness, tingling or weakness of the extremities. Cervical magnetic resonance imaging (MRI) within the previous 3 months showed no nerve impingement or cord edema but did show a central disc osteophyte complex at C5-C6 with mild narrowing of the central canal. There was mild bilateral neural foraminal stenosis at this level. She had scattered areas of mild neural foraminal stenosis at multiple levels in the cervical spine. There was no report of any

nerve impingement and there was no cord edema. Additionally, the patient's cervical MRI from 2018 revealed a normal impression of her brain with and without contrast.

### Past Medical History:

- Chronic low back pain without sciatica
- Depression
- Fibromyalgia
- Gastroesophageal reflux disease without esophagitis
- Glaucoma
- Hypertension
- Obesity
- Tinnitus of right ear

### Past Surgical History:

- Bilateral cataract surgery

The patient reported daily use of caffeine, no drug or alcohol use and no prior tobacco use.

The patient reported no known drug allergies.

### Medications:

- Linaclotide: 72 mcg once daily
- Fluoxetine hydrochloride: 40 mg once daily

## CORRESPONDENCE:

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- Lifitegrast ophthalmic solution 5%: .2 mL once daily
- Artificial tears ophthalmic solution 1%–0.3%: as directed
- Cetirizine hydrochloride: 10 mg as needed
- Pravastatin sodium: 40 mg once daily at bedtime
- Probiotic capsule: once daily
- Hydrochlorothiazide: 12.5 mg once daily
- Cyclosporine ophthalmic solution .05%: twice daily
- Voltaren gel: as needed

A review of systems revealed itching of the eyes, eye pain, neck pain, tinnitus, lower extremity edema and headache. Patient denied chest pain, shortness of breath, palpitations, changes in urination, fever, chills, night sweats, changes in weight, dizziness, numbness/tingling/radiation or weakness of the upper and lower extremities, or unsteady gait.

#### Physical Exam:

- Vitals:
  - Height: 5'3" (160 cm)
  - Weight: 194 lbs (88 kg)
  - BMI: 34.4
  - BP: 132/75
  - T: 98.3°F (36.83°C)
- General: Alert, no acute distress
- Head: Normocephalic, atraumatic
- Eyes: Extraocular movements intact. Pupils round, equal and reactive to light. No scleral or conjunctival injection.
- Ears: Gross examination of the ears revealed normal-appearing pinna, and otoscopic exam revealed intact tympanic membranes bilaterally with good cones of light and normal-appearing middle ear architecture, no retraction or bulging of the tympanic membranes, and no visible fluid.
- Neck: Supple, without cervical lymphadenopathy
- Neurologic: Cranial nerves II–XII intact, deep tendon reflexes +2/4 upper and lower extremities bilaterally.

#### Osteopathic Structural Exam:

Muscle strength 5/5, upper extremities and lower extremities bilaterally. Occipitoatlantal (OA) joint was flexed, side bent right, rotated left. Frontonasal suture was restricted. Patient had a sphenobasilar synchondrosis compression of the head. Both temporal bones were restricted in motion. Suboccipital region had increased muscle tension.

Pressure applied over left greater occipital nerve at occiput reproduced left eye pain. Scalenes, sternocleidomastoid and upper trapezius were hypertonic bilaterally. There were lateral

fascial strains to both eyes. C2 flexed, rotated, side bent right. T3 flexed, rotated, side bent right. T6 flexed, rotated and side bent left. There was inhalation dysfunction with right rib 1, as well as right ribs 3–5.

#### Diagnoses:

1. Occipital neuralgia
2. Cervicalgia
3. Tinnitus
4. Somatic dysfunction of the head, cervical, thoracic and rib regions

#### Patient treatment course

The following osteopathic manipulative treatments were applied:

Head: Soft tissue and Still technique to the OA. Cranial techniques were used in the following order: bilateral temporal bone release, frontal lift, frontonasal suture release, parietal lift, bilateral V-spread at the occipitomastoid suture and CV4. These techniques restored cranial motion and resolved the sphenobasilar synchondrosis compression. Myofascial release to treat bilateral fascial eyestrain is seen in Figure 1.

- Cervical: Soft tissue, balanced ligamentous tension, Still technique and muscle energy technique
- Thoracic: Soft tissue, articular technique and muscle energy technique
- Ribs: Soft tissue, articular technique and muscle energy technique

The patient reported immediate resolution of ocular pain, cervical pain and tinnitus after treatment.

**Home instructions:** Continue scalene and upper trapezius stretches from previous visits. Apply ice to suboccipital region twice a day for 10 minutes to relieve pain and inflammation.

**Follow-up:** At 1 month, the patient reported complete resolution of both right ear tinnitus and left eye pain. Her neck pain was improved with pain rated as 5/10. She reported that she had been stretching and icing as instructed.

#### FIGURE 1:

Myofascial periorbital release—fascial diagnosis. This can be an indirect or direct technique, performed bilaterally. Photo is not actual patient.



## Discussion

The patient described above presented to her osteopathic manipulative medicine specialist with a chief complaint of left eye pain, neck pain and ringing in her right ear. These non-specific symptoms are commonly evaluated both by primary care physicians and other specialists. The differential diagnosis for these symptoms is broad and includes musculoskeletal, ophthalmologic and neurologic considerations. Initial evaluation of patients with similar eye pain, neck pain and ringing in the ear should include a detailed history and physical exam. Careful consideration of the differential diagnosis should include acute, potentially life-threatening pathologies, such as glaucoma or intracranial masses, as well as common pathologies, including cervicalgia, headache variants (migraine, tension) and acoustic neuroma.

## OCCIPITAL NEURALGIA AND TINNITUS CLINICAL PRESENTATION

Occipital neuralgia is a cause of facial pain, with an incidence of 8.28% (30/362 cases).<sup>1</sup> Occipital neuralgia typically presents as head and neck pain that originates in the suboccipital region and radiates along the greater or lesser occipital nerve. The pain can be continuous, intermittent, shocking or shooting. A unilateral pattern of aching, burning and/or throbbing has also been described.<sup>2</sup> Although rare, occipital neuralgia can also include ocular pain, described by patients as pain behind the eye.<sup>2</sup> Pressure applied to the suboccipital region reproduces eye pain.<sup>2</sup> Relief from nerve blockade is both diagnostic and therapeutic.<sup>2-4</sup> Fujii and colleagues found the prevalence of tinnitus in a Japanese cohort between the ages of 45 and 79 years to be 11.9%,<sup>5</sup> while an earlier study by Levine and colleagues found that tinnitus was present in up to 80% of all adults.<sup>6</sup> Tinnitus is the “conscious, usually unwanted perception of sound that arises or seems to arise involuntarily in the ear of the affected individual.”<sup>7</sup> There are many types of tinnitus, including otic (abnormal hearing, directly related to the ear), somatosensory (positional changes of head and neck improve tinnitus) and pulsatile (compression of vascular structures from tight jaw and neck muscles).<sup>6,7</sup> Ultimately, the uncomfortable ringing in the ears disrupts patients’ lives and is a common chief complaint in the clinic.

## OCCIPITAL NEURALGIA AND TINNITUS PATHOPHYSIOLOGY

The brain has an intrinsic motion that can be quantified and visualized with amplified MRI (aMRI).<sup>8</sup> Cranial bones move in response to changes in intracranial pressure volume, and total cranial compliance can be limited by cranial bone mobility at the cranial sutures.<sup>9</sup> The benefits of osteopathic cranial techniques depend on varying force applied to bones and sutures,<sup>10</sup> and cranial osteopathy has been shown to improve symptomatic tinnitus,<sup>11,12</sup> Bell’s palsy<sup>13</sup> and residual pain from whiplash injury.<sup>14</sup> Restoring cranial bone motion supports inherent cerebral motion,<sup>10</sup> leading to improvement in symptomatic tinnitus.

The petrous portion of the temporal bone contains the exit of the Eustachian tube, and the petrous portion blends with the mastoid portion of the temporal bone.<sup>11</sup> The temporal bone forms the medial wall of the middle ear cavity and the external meatus.<sup>11</sup> The temporal bone also makes direct contact with the sphenoid anteriorly and superiorly, as well as the occiput posteriorly. The temporal bones affect other cranial bones during development,<sup>15</sup> and internal rotation of the temporal bones maintains partial or complete closure of the Eustachian tube.<sup>16</sup> Changes in orientation to the temporal bones can lead to tinnitus<sup>16</sup> and hearing loss.<sup>17</sup> Cobb and colleagues examined cranial bone changes of 9 achondroplasia patients, including “towering” petrous ridges, narrowed skull base and shortened carotid canals. Increased rotation of temporal bone structures, including the cochlea, out of the horizontal plane was determined to be the cause of their hearing loss.<sup>17</sup> Applied force to the zygoma can cause temporal bone restriction,<sup>18</sup> and this force can be from muscular compensation. Transient temporal bone restrictions include internal or external rotation of the temporal bones, contracted muscles altering the orientation of the zygoma and ultimately affecting the orientation of the temporal bones, and neighboring cranial strain patterns such as sphenobasilar synchondrosis compression. These somatic dysfunctions can be treated with OMT.

The greater occipital nerve (GON) is a key player in occipital neuralgia.<sup>2,3</sup> The GON originates from the C2 and C3 dorsal rami<sup>19</sup> and travels through both the semispinalis capitis muscle and the trapezius muscle, then the aponeurosis. The GON widens in diameter as it extends laterally, which could predispose the nerve to entrapment at the level of the occiput, leading to occipital neuralgia.<sup>20</sup> Still, there is evidence that the GON can be compressed at 6 different points.<sup>21</sup> Interestingly, there is a greater incidence of the GON piercing the cranial fascia that connects the trapezius muscle with the sternocleidomastoid (SCM) than of the GON proceeding through the trapezius muscle.<sup>22</sup> This could imply if the compression is closer to the cranium, localized pain in the suboccipital region would be more severe. Although compartment syndrome is an extreme example, when nerves are compressed such that the tissue pressure falls below adequate perfusion pressures, they are not adequately perfused, compromising function.<sup>23</sup>

Muscles and fascia can be responsible for entrapping peripheral nerves.<sup>24,25</sup> Hypertonicity of the trapezius and neighboring neck muscles can exacerbate occipital neuralgia. OMT targeted at these regions can decrease perception of pain, relax hypertonic muscles by decreasing alpha motor neuron activity, and inhibit an active muscle’s contraction (by increasing tension on the Golgi organ complex).<sup>26</sup>

Moreover, the structure and function of the SCM and mastoid process of the temporal bone are interconnected.<sup>27</sup> Because the SCM attaches at the mastoid process of the temporal bone, a tight SCM can mechanically pull the mastoid process, influencing temporal bone rotation and ultimately leading to tinnitus.

The cranial techniques used to treat the tinnitus and occipital neuralgia included CV4, frontal lift, parietal lift, frontonasal suture release, bilateral temporal bone release and bilateral V spread

at the occipital mastoid suture. These techniques restore cranial motion and free restricted sutures.

The anatomical connections of the greater occipital nerve, neck muscles, back muscles, jaw and cranial bones suggest that OMT of the thoracic, rib, cervical and head regions may provide additional relief for patients experiencing occipital neuralgia and tinnitus.

## OCCIPITAL NEURALGIA AND TINNITUS MANAGEMENT

Relief from nerve block is both diagnostic and therapeutic<sup>2-4</sup> for occipital neuralgia. Other interventions for refractory symptoms include medications, physical therapy, nerve stimulation, botulism toxin and surgery.<sup>3,4</sup> Unfortunately, these therapies can be invasive and time consuming for the patient. Additionally, tinnitus can be treated with lidocaine<sup>28</sup> or mindfulness-based techniques.<sup>29</sup> For this case, treatment of somatic dysfunctions with OMT improved the patient's neck pain, eye pain and ringing in her ear. Osteopathic family physicians should consider somatic dysfunction as a culprit to tinnitus and occipital neuralgia pain.

## CONCLUSION

The patient in this case presented with history and physical exam consistent with the diagnoses of occipital neuralgia and tinnitus. The anatomical connections of the greater occipital nerve, neck muscles, back muscles and cranium suggest that OMT may provide relief for patients experiencing occipital neuralgia and tinnitus. OMT was effectively used in this case to resolve this patient's symptoms and improve her quality of life. Further research is needed on the efficacy of OMT treatments for auricular and ocular complaints.

## AUTHOR DISCLOSURE(S)

No relevant financial affiliations or conflicts of interest. If the authors used any personal details or images of patients or research subjects, written permission or consent from the patient has been obtained. This work was not supported by any outside funding.

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