

Manual therapy and ear pain: a report of four cases

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Purpose: *To report and discuss four cases of ear pain which were treated successfully with manual therapy.*

Methods: *Report of four cases.*

Results: *Four patients with ear pain were referred for chiropractic consult. They were all treated with a combination of manual therapy and exercise with resolution of their ear symptoms.*

Conclusions: *The mechanism of idiopathic ear pain that may be amenable to manual therapy is not fully known. Further research is needed to investigate the etiology of this disorder and to determine whether manual therapy and exercise are viable options in some patients with idiopathic ear pain. In the meantime, it may be advantageous for otolaryngologists to seek input from physicians skilled in assessment and treatment of the musculoskeletal system in cases ear pain for which an otolarygologic etiology cannot be found.*

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KEY WORDS: earache; musculoskeletal manipulations; temporomandibular joint; pain

Objectif : *Signaler et discuter de quatre cas d'otalgie qui ont été traités avec succès grâce à la thérapie manuelle.*

Méthodes : *Signalement de quatre cas.*

Résultats : *On a conseillé à quatre patients souffrant d'otalgie de consulter un chiropraticien. Ils ont tous été traités avec un ensemble de thérapies manuelles et d'exercices ayant conduit à la disparition des symptômes d'otalgie.*

Conclusions : *Le mécanisme d'otalgie idiopathique qui peut être traité par la thérapie manuelle n'est pas entièrement connu. Des recherches supplémentaires sont nécessaires afin d'étudier l'étiologie de ce trouble et de déterminer si la thérapie manuelle et l'exercice sont des options viables chez des patients souffrant d'otalgies idiopathiques. Il peut également être bénéfique pour les oto-rhino-laryngologistes de consulter des médecins compétents en matière d'évaluation et de traitement des systèmes musculosquelettique dans les cas où aucune étiologie oto-rhino-laryngologique ne peut être trouvée pour l'otalgie.*

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MOTS CLÉS : otalgie; manipulations musculosquelettiques; articulation temporomandibulaire; douleur

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Introduction

Otalgia is said to be common although specific incidence and prevalence is not known. It has a number of potential causes. Otalgia is generally separated into two types. Primary otalgia is that which arises from ear pathology, the most common of which is otitis media, but which also includes otitis externa (often referred to as “swimmer’s ear”) and Eustachian tube dysfunction.¹ Less commonly, primary otalgia may be attributed to primary neoplasms and benign tumors.² However, up to 50% of cases are classified as secondary otalgia which involves referred pain from other areas, including chronic infection which spreads to other tissues such as the skull base, dental abnormalities, sinus, pharyngeal or salivary gland infections, temporal arteritis, or cervical or temporomandibular joint dysfunction.¹⁻³ It has also been reported to arise from disorders of the cervical spine.⁴ It is not clear how frequently ear pain involves musculoskeletal dysfunction that may be amenable to manual therapy, however it is the experience of the authors that a variety of problems in the musculoskeletal system can cause or contribute to ear pain. Very little information about this can be found in the literature.

The purpose of this paper is to report and discuss four cases of patients who complained of ear pain with a normal otolaryngologic examination whose pain improved or resolved with a manual therapy/ exercise approach.

Case reports

The study protocol was reviewed by the Health Insurance Portability And Accountability Act (HIPAA) compliance officer of the facility at which the data were gathered and was deemed to be in compliance with HIPAA regulations. Informed consent was received from each patient.

Case 1

This was a 26-year-old woman who complained of bilateral ear pain which had developed insidiously one month previously. She had seen an otolaryngologist who did not find any intra-aural pathology that would explain the symptoms and referred the patient for chiropractic consult. The pain was restricted to the intraural area bilaterally and was rated on a Numeric Rating Scale as 6/10. She denied tinnitus, hearing loss and loss of balance. She also denied hyperacusis, blurred vision, diplopia, dysarthria, dysphagia, vertigo or other bulbar symptoms. There were no particular exacerbating or remitting factors. Past med-

ical history was otherwise unremarkable and she was not taking any medications. She had no previous history of ear problems. She had no history of cervical trauma and had never seen a chiropractor before. Review of systems was unremarkable. She was married with no children. She did not smoke or drink alcohol and walked and used an elliptical machine for exercise. Family history was remarkable for hypertension and heart disease in her father.

Blood pressure was 120/80 on the left. Oral temperature was 98.1 degrees Fahrenheit. Pulse was 80 per minute. Respirations were 16 per minute. Heel, toe and tandem walking were within normal limits. Romberg’s position was held with eyes closed without difficulty. Examination of cranial nerves II through XII was within normal limits. Pupils were equal, round and reactive to light and accommodation. Funduscopic examination was unremarkable. Sensory examination to pin in the upper and lower extremities revealed no abnormalities. Motor strength was 5/5 bilaterally throughout. Muscle stretch reflexes were 2+ and symmetric throughout. Plantar responses were downgoing bilaterally. Rapid alternating movements, heel to shin movements and finger to nose movements were carried out without dysmetria or tremor. There was no evidence of pronator drift. Joint play palpation of the temporomandibular joint (TMJ)⁵ revealed mild loss of joint play bilaterally. There was tenderness of the lateral pterygoid muscles bilaterally but mandibular gait⁵ was normal. Segmental palpation of the cervical zygapophyseal joints⁶⁻⁹ revealed restriction of motion and pain at approximately C1-2 bilaterally. This did not reproduce her ear pain. Myofascial trigger points were noted in the sternocleidomastoid (SCM) muscles bilaterally, palpation of which reproduced the patient’s ear pain. No pain or perceived increased resistance to manual traction was noted upon palpation of the ears.

She was diagnosed with bilateral TMJ dysfunction, upper cervical joint dysfunction and SCM trigger points and was treated with manual mobilization of the TMJ,¹⁰ manipulation directed to the C1-2 segments using a non-thrusting muscle energy technique¹¹ (the patient expressed fear of “cracking” in the cervical spine) and ischemic compression and post-isometric relaxation to the SCM’s. She was also given TMJ exercises⁵ as well as a cervical brace exercise.¹² After five treatments she reported herself on a written 0-100% scale to be 90% improved. Pain intensity was rated as 2/10. She had 2 exacerbations over

the following month, each of which was treated with resolution. She was then followed up two years later and remained pain-free with no further exacerbations.

Case 2

This was an 18-year-old woman who complained of left ear pain. This had begun 3 months previously when she awoke in the morning with it. She had seen an otolaryngologist who did not find any intra-aural pathology that explained the symptoms and referred the patient for chiropractic consult. The pain was well localized to the intraural area and was rated on a Numeric Rating Scale as 7–8/10. The pain was constant but worsened when she used her cellular phone. She described a “gushing” sound but no hearing loss. She denied hyperacusis, blurred vision, diplopia, dysarthria, dysphagia, vertigo or other bulbar symptoms. Past medical history was remarkable for a recent bout of mononucleosis from which she had fully recovered. She was not taking any medications. She had no previous history of ear problems. She had no history of cervical trauma and had never seen a chiropractor before. Review of systems was unremarkable. She was single with no children. She did not smoke or drink alcohol and did not exercise regularly. Family history was remarkable for hypertension and cancer in both parents.

Blood pressure was 120/64 on the left. Oral temperature was 97.8 degrees Fahrenheit. Pulse was 76 per minute. Respirations were 16 per minute. Heel, toe and tandem walking were within normal limits. Romberg’s position was held with eyes closed without difficulty. Examination of cranial nerves II through XII was within normal limits. Pupils were equal, round and reactive to light and accommodation. Funduscopic examination was unremarkable. Sensory examination to pin in the upper and lower extremities revealed no abnormalities. Motor strength was 5/5 bilaterally throughout. Muscle stretch reflexes were 2+ and symmetric throughout. Plantar responses were downgoing bilaterally. Rapid alternating movements, heel to shin movements and finger to nose movements were carried out without dysmetria or tremor. There was no evidence of pronator drift.

Examination of the TMJ and its related muscles was unremarkable but there was pain and perceived increased resistance to manual traction of the left ear which reproduced the patient’s ear pain. Segmental palpation of the cervical zygapophyseal joints^{6–9} revealed perceived re-

striction of motion and pain at approximately C1–2 and C2–3 on the left. This pain was at the point of palpation and did not reproduce the ear pain. She was diagnosed with idiopathic ear pain and upper cervical joint dysfunction and was initially treated with manipulation of the left ear. Upper cervical manipulation was deferred in order to monitor her response to treatment of the ear. She was taught self-mobilization maneuvers for the ear, which involved manually mimicking the practitioner-applied manipulative maneuver but with low-velocity oscillatory movements rather than high-velocity maneuver. After the initial treatment the patient verbally reported that her pain was “much better.” She was then treated twice more with manipulation of the ear and high-velocity, low-amplitude diversified manipulation directed to the C1–2 and C2–3 segments on the left. She was advised to continue the self-mobilization maneuvers for the ear. After 3 treatments she was completely pain free. There was no pain or abnormal sounds in the ear. She was followed up 10 months later and remained symptom-free.

Case 3

This was a 52-year-old woman who complained of bilateral ear pain. This had developed insidiously 3 months previously. She had a previous history of recurrent ear infections. She saw an otolaryngologist, who noted that, while he usually found fluid in her ears when she had an infection, no fluid was found. He referred the patient for chiropractic consult. The pain was located intraurally bilaterally and was rated 6/10 in intensity. There were no particular exacerbating factors and she found temporary relief by pulling on her tragus and applying heat packs. She denied hyperacusis, blurred vision, diplopia, dysarthria, dysphagia, vertigo or other bulbar symptoms. Past medical history was remarkable for a previous history of symptomatic lumbar spine stenosis, fusion surgery at C5–6 and C6–7, migraine headaches, hypertension, hypercholesterolemia, hysterectomy and esophageal ulcer. Her medications included Cymbalta, tizanidine, symvastatin, gabapentin, topiramate, nortriptyline and hydrochlorothiazide. She had no previous history of ear problems. She had no history of cervical trauma and had never seen a chiropractor before. Review of systems was remarkable for night sweats for the previous several months that her primary care practitioner had attributed to menopause. She was married with one child. She did

not smoke or drink alcohol and did not exercise regularly. Family history was remarkable for cancer, heart disease, hypertension, and type 2 diabetes in her father and heart disease in her mother.

Blood pressure was 122/70 on the left. Oral temperature was 97.6 degrees Fahrenheit. Pulse was 84 per minute. Respirations were 12 per minute. Heel, toe and tandem walking were within normal limits. Romberg's position was held with eyes closed without difficulty. Examination of cranial nerves II through XII was within normal limits. Pupils were equal, round and reactive to light and accommodation. Funduscopic examination was unremarkable. Sensory examination to pin in the upper and lower extremities revealed no abnormalities. Motor strength was 5/5 bilaterally throughout. Muscle stretch reflexes were 2+ and symmetric throughout. Plantar responses were downgoing bilaterally. Rapid alternating movements, heel to shin movements and finger to nose movements were carried out without dysmetria or tremor. There was no evidence of pronator drift. Segmental palpation of the cervical zygapophyseal joints⁶⁻⁹ was unremarkable. Examination of the TMJ and its related muscles was unremarkable. There was perceived increased resistance to manual traction on palpation of the ears bilaterally and this reproduced the patient's ear pain. Myofascial trigger points were noted in the SCM muscles bilaterally, which referred pain into the face but did not exactly reproduce the patient's pain. She was diagnosed with idiopathic otalgia and SCM trigger points and treated with manipulation of the ears along with ischemic compression and postisometric relaxation to the SCM muscles. She was also taught self-mobilization maneuvers for the ear. She was treated six times, after which she reported that she only had occasional mild ear pain, but the severe pain was gone. Pain rating was 0/10. There was no pain upon joint play palpation of the ears. The SCM muscles were non-tender to palpation. She was contacted by phone five weeks later and reported that she remained pain-free.

Case 4

This was a 77-year-old man who complained of right sided ear pain, neck pain and headache. This had developed insidiously 9 months previously. He saw his primary care doctor as well as an otolaryngologist, neither of whom

found evidence of intra-aural or other pathology. They both referred the patient for chiropractic consult. The pain was most severe deep within the right ear but he also reported pain in the right side of the cervical spine and the right parietal area. The pain was rated 5/10 in intensity. It was especially severe in the morning but there were no particular movements, positions or activities that aggravated the pain. He noted some decreased hearing acuity since the onset of the pain but denied blurred vision, diplopia, dysarthria, dysphagia, vertigo or other bulbar symptoms. He had a previous history of gout and coronary bypass surgery 17 years previously. Medications included atenolol, losartin, clopidogrel, lisinopril, rosuvastatin and allopurinol. He had no previous history of ear problems. He had no history of cervical trauma and had never seen a chiropractor before. Review of systems was remarkable for occasional lightheadedness when he arose from a seated position quickly.

Blood pressure was 140/60 on the left. Oral temperature was 97.0 degrees Fahrenheit. Pulse was 48 per minute. Respirations were 24 per minute. Heel, toe and tandem walking were within normal limits. Romberg's position was held with eyes closed without difficulty. Examination of cranial nerves II through XII was within normal limits. Pupils were equal, round and reactive to light and accommodation. Funduscopic examination was unremarkable. Sensory examination to pin in the upper and lower extremities revealed no abnormalities. Motor strength was 5/5 bilaterally throughout. Muscle stretch reflexes were 2+ and symmetric throughout with the exception of the ankle jerks which were absent bilaterally. Plantar responses were downgoing bilaterally. Rapid alternating movements, heel to shin movements and finger to nose movements were carried out without dysmetria or tremor. There was no evidence of pronator drift. Segmental palpation of the cervical zygapophyseal joints⁶⁻⁹ revealed perceived restriction of motion and pain at approximately C2-3 bilaterally. This palpation did not reproduce his ear pain. Restricted opening range of the TMJ was noted and there was painful loss of joint play on the right. The right lateral pterygoid was painful on palpation. Pain and perceived increased resistance to manual traction was also noted in the right ear and this reproduced the patient's ear pain. He was diagnosed with idiopathic ear pain, right C2-3 joint dysfunction and right TMJ dysfunction and

was treated with manipulation of the right ear, mobilization directed to the C2–3 joints bilaterally, manual mobilization of the right TMJ¹⁰ and postisometric relaxation of the right lateral pterygoid muscle. He was also taught self-mobilization maneuvers for the right ear and exercises for the TMJ.⁵ He was treated five times after which he reported that his ear pain was resolved (rated 0/10). He still had some residual cervical and parietal area pain, but this was mild. Range of motion and joint play in the TMJ was nearly normal and there was no pain on palpation of the right ear. He had not yet been followed up by the time of this writing.

Discussion

The differential diagnosis in patients with ear pain includes primary otalgia, which can arise from infectious processes, inflammatory processes, direct trauma, perforation of the tympanic membrane and Eustachian tube dysfunction and secondary otalgia, which can result from referred pain from neoplasm, cranial neuralgias, TMJ dysfunction, cervical joint pain, SCM triggers points, gastroesophageal reflux or Eagle's syndrome (symptomatic elongation of the styloid process or calcification of the stylohyoid ligaments).¹ Therefore, a thorough workup of the patient with ear pain, including a careful neurologic examination and assessment of the cervical spine and TMJ and its related muscles⁵ is essential. All patients reported here were referred by otolaryngologists after having had primary otalgic causes ruled out. In cases of ear pain presenting to the non-surgical spine specialist it is advisable to seek otolaryngologic consult prior to proceeding with manual therapy treatment.

Pain from the cervical spine may refer to the ear. Feinstein et al¹³ found that when 6% saline solution was injected into the intervertebral tissues at the C1 level, a referred pain pattern was created that included the ipsilateral ear. Some authors⁴ have reported that the C1 dermatome includes the ear while others¹⁴ include the ear in the C3 dermatome. The discrepancy may be reflective of the general inaccuracy of dermatome maps when it comes to radicular pain.¹⁵ The superior aspect of the outer ear is innervated by the trigeminal nerve.¹ This area can still be a source of referred pain from the cervical spine, however, as nociceptive afferents from both the upper cervical spine and the trigeminal nerve synapse at a common area

in the cervical spinal cord known as the trigeminocervical nucleus.¹⁶ Simons et al¹⁷ describes the referred pain pattern of trigger points in the SCM as including the ear. Finally, the TMJ is reported to commonly cause referred pain into the ear.^{3,18,19}

Little has been previously published regarding manual treatment and otalgia. Cowin and Bryner²⁰ reported a patient with hearing loss, tinnitus, otalgia, vertigo, unsteadiness and disorientation who was treated over a period of seven years with “fixed stylus, compression-wave adjustments” to the cervical spine with reported positive results. Kaye²¹ reported a patient with left-sided otalgia along with headache, neck pain and upper extremity pain who was treated with diversified manipulation to the lower cervical and upper thoracic spine, home stretching and trigger point injections followed by strength training exercise with resolution of all symptoms.

The method of manipulation of the ear reported here has not previously been described. Channell²² described two osteopathic techniques. The first, called the Galbreath Technique, is an attempt at lymphatic drainage by applying inferior and medial pressure across the mandible. The second is the Muncie Technique, which attempts to correct Eustachian tube dysfunction by applying a pumping action with the index finger in the vicinity of the palatine tonsil. Channell reports a case of a patient with vertigo who was successfully treated with a modification of the Muncie technique,²² however, no studies on either technique are presented. The technique used in the cases reported here was one in which the thumb is placed just inside the intertragic notch, with the proximal interphalangeal joint of the index finger contacting just inside the lobule (figure 1). A gentle lateral movement is applied and the patient is asked whether this produces pain. The practitioner also attempts to assess the degree of resistance to the movement (the reliability and validity of this assessment is unknown). If manipulation is deemed indicated, a high-velocity, low-amplitude thrust is performed in a straight lateral direction. An audible release typically occurs. The patient can then be taught self-mobilization in the same direction, applying low-velocity, low-amplitude oscillatory maneuvers.

The mechanism of the perceived benefit of this manipulation is unknown. With Eustachian tube dysfunction there occurs an inability of the middle ear to equalize

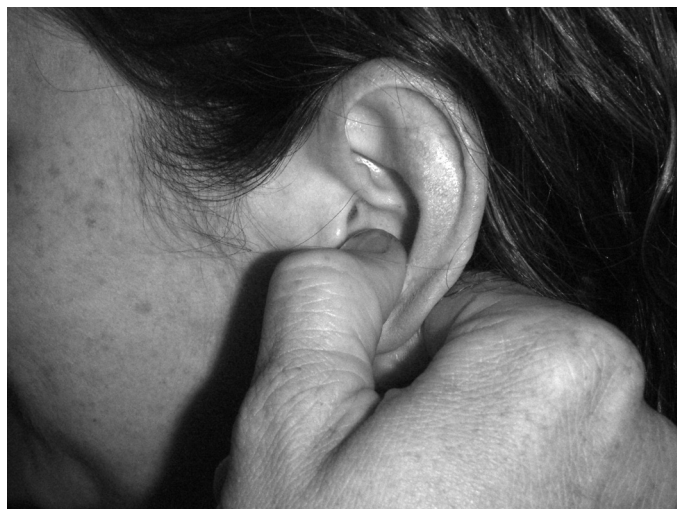


Figure 1 *Method of ear manipulation*

pressure with the atmosphere, resulting in distortion of the mucosa of the middle ear and tympanic membrane.¹ This can cause otalgia with or without otitis media. As several muscles are involved in opening and closing the Eustachian tube (salpingopharyngeus, levator veli palatini, tensor veli palatini, and tensor tympani), it is possible that disruption of the tone of these muscles can lead to Eustachian tube dysfunction and that manipulation of the ear restores normal tone. Alternately, as the middle ear ossicles are synovial joints,²³ it is possible that these joints can become painful, as do other synovial joints, and that ear manipulation affects these joints in a similar way that spinal manipulation affects zygapophyseal joints.^{24,25} However it is unknown whether external manipulation of the ear has any effect on these muscles or joints.

Mobilization or manipulation was applied to the upper cervical spine in three of these four cases. The decision to apply this treatment was based on, first, the presence of painful joint dysfunction⁷ at the involved levels and, second, previous literature that suggested the possible role of referred pain from the cervical spine in the causation of in some cases of secondary otalgia. However, joint palpation in these cases did not exactly reproduce the ear pain in any case, thus there is no way to determine whether the cervical findings were directly involved in any individual case. Also because the treatment of these cases was multi-modal, there is no way to determine the extent to which any individual treatment modality may or may

not have contributed to the perceived beneficial outcome. In addition, there is no way to determine on the basis of a case report whether the perceived beneficial outcome occurred as a result of the management strategy applied or whether it occurred by natural history. Further research is needed to confirm or deny the theoretical model by which the treatment may have beneficial, as well as to determine whether the findings reported here are generalizable.

The treatment in these cases was done at a primary spine care center at which chiropractors and physiotherapists provide all examination and treatment and for which 80% of its patients are referred by medical doctors. A number of these patients are those with ear and face pain who are referred by otolaryngologists. This referral relationship arose as a result of communication by the clinical director of the spine center with local otolaryngologists through Grand Rounds presentations and personal communication regarding the role of the cervical spine and other aspects of the neuromusculoskeletal system may play in symptoms referable to the ear, mouth and face. It is the experience of the authors that otolaryngologists see a considerable number of such patients for which an otolaryngological etiology cannot be identified. Despite this, it is uncommon for chiropractors to be consulted in these cases. In the 2010 edition of the "Practice Analysis of Chiropractic" which is published by the National Board of Chiropractic Examiners and which documents the frequency with which US chiropractors evaluate and treat various health conditions, "otalgia" and "ear pain" were not even listed. "Cranial nerve disorders" were seen "rarely" and "significant ear pathology" and "eye, ear, nose or throat tumor" were seen "virtually never." "TMJ syndrome," on the other hand, was seen "sometimes." In our opinion, a chiropractor or chiropractor-physiotherapist team may be a useful resource for these practitioners for those patients who report pain in the ear and face for which a primary otalgic explanation cannot be found. It may be useful for chiropractors to communicate with otolaryngologists in order to provide a resource for these patients.

Conclusion

Otalgia may have a variety of causes. One of these can be musculoskeletal disorders involving the cervical spine, TMJ and its related muscles and ear, which may be amenable to manual therapy and exercise. It may be advantageous for otolaryngologists and primary care physicians

to have at their disposal clinicians who are skilled at the examination and manual treatment of cervical spine and the musculoskeletal system in general, who can provide input regarding the possible involvement of these tissues.

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