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Middle Ear Myoclonus: A New Technique For Suppression Of Spontaneous Clicking Tinnitus

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Abstract

Middle ear myoclonus is one of the causes of clicking tinnitus and can be psychologically distressing. Current management of intractable clicking includes medication or tenotomy. Two cases with spontaneous intrusive irregular clicking are presented where relief and a sense of control were obtained using non-invasive self – administered zygomatic pressure. This technique may be useful in selected patients before resorting to medication or tenotomy.

Keywords: myoclonus, middle ear, objective tinnitus, zygomatic manoeuvre.

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Tinnitus is classified as subjective and objective. Objective tinnitus describes a sound produced in the head which can be heard by someone other than the patient. It is less common than subjective tinnitus and is further subdivided into rhythmic and non-rhythmic categories. Objective tinnitus with a rhythmic nature may be due to glomus tumours, vascular anomalies such as vascular loop, or palatal myoclonus associated with central pathology: brainstem or cerebellar vascular, infectious, demyelinating disease, tumours, trauma, iatrogenic surgical complications or aneurysms.[1] Causes of non-rhythmic objective tinnitus can be classified as muscular or vascular. High frequency clicking sounds may originate from the Eustachian tube, middle ear and temporo-mandibular joint. Infrequently, cases of middle ear muscle myoclonus are associated with hemifacial spasm due to 7th cranial nerve compression by aberrant vessel or other pathology[2]. In some patients, clicking is precipitated by loud noise. Generally the underlying cause of spontaneous middle ear myoclonus is not known and management is undefined. We report two cases of idiopathic irregular middle-ear clicking, presumed myoclonus, with successful suppression using bilateral zygomatic pressure.

Technique: At the onset of irregular clicking, the patient places the heel of the palm of the hands on the lateral aspect of the zygomatic bone with fingers interlacing over the nose, not blocking the airway[3] . Gentle but firm sustained pressure is exerted by the patient, in a medial direction through the heel of both hands (Figure 1). Required pressure is estimated to be equivalent to just under a kilogram. Pressure is applied for 30 seconds until the clicking stops. Contraindications include recent maxillary trauma or surgery, craniofacial malignancy and infection.

Case 1

A 20-year-old electrician with bilateral severe congenital hearing loss had a one-year history of left-sided irregular clicking tinnitus. The episodes of clicking with variable rate occurred every few weeks, continuing relentlessly for days, lasting up to a maximum of three weeks. He described the clicking as similar to an electrical box, sometimes driving him to search for malfunctioning electrical equipment. Neuro-otological examination excluded palatal myoclonus. Tympanometry and computerised tomography of petrous temporal bones showed no abnormality. Light zygomatic pressure produced relief instantly and at review, he reported brief recurrences responded well. Frequency of episodes decreased to every other month.

Case 2

A 56-year-old man presented with a 6 year history of left sided fluttering tinnitus of variable volume and rhythm, 5 times per month, lasting a quarter of an hour. This occurred some time after onset of sudden right-sided audiovestibular failure several years ago. He was known to have multiple vascular risk factors. Magnetic resonance imaging of internal auditory meatus was normal. He was greatly disturbed by the fluttering sound as he perceived it to be an ominous sign, possibly heralding sudden hearing loss in his remaining ear and he reported feeling powerless with extreme anxiety despite repeated reassurance over the years and the patient's innumerable attempts at Valsalva manoeuvre. Pure tone audiometry showed right dead ear and left

Figure 1. Photograph of case 1 self-administering the zygomatic manoeuvre (frontal view)

Figure 2. Photograph of case 1 self-administering the zygomatic manoeuvre (side view)

mid high frequency sensorineural hearing loss. He was shown how to perform the technique in the clinic and subsequent follow-up after 2 months confirmed control of clicking tinnitus, consequently he was feeling much less anxious.

DISCUSSION

This is a simple, cheap and apparently rapidly effective self-administered technique which gives a usefully therapeutic sense of control to the patient. The patient controls the amount of pressure exerted and may repeat it if clicking returns. This technique of applying zygomatic pressure is a modified version of a similar technique administered to patients by osteopathic practitioners for the purpose of relieving maxillo-facial pain[3]. In our experience, pressure applied to the antero-lateral aspect of the zygomatic bone instead of the lateral aspect reduced effectiveness. It is hypothesised that manual pressure is transmitted through the zygoma via the posterior articulation with the greater wing of the sphenoid bone, possibly causing minuscule movement of the slightly mobile cartilaginous amphiarthroses of the skull. This could potentially alter muscle length relieving spasm of the tiny tensor tympani (arising from the great wing of the sphenoid, osseous canal and cartilaginous part of the auditory tube). When the same manoeuvre was attempted in cases where clicking tinnitus was induced by loud noise, there was no response presumably due to continuing reflex contraction of the stapedial muscle.

Schwartze[4] first attributed clicking tinnitus with visible movement of the eardrum to tensor tympani muscle contractions in 1864. Clicking tinnitus of variable rate and volume, caused by middle-ear myoclonus (tensor tympani or stapedial muscles) is less prevalent than subjective tinnitus. Repeated middle ear clicks are probably under-reported by patients and clinicians and often discounted due to its transient nature, reduced volume and degree of distress compared to subjective tinnitus and the difficulty of description. Nevertheless clicking tinnitus can be distressing for some sufferers. A careful history is crucial to elicit the diagnostic features. Additional audiological tests in our cases were negative. Palatal myoclonus must be excluded; it is usually heard by the patient synchronously in both ears whereas middle ear myoclonus is more commonly a unilateral finding[5], but in some cases may alternate ears. Unlike some cases of rhythmic palatal myoclonus, tinnitus originating from the middle ear cannot be heard by observers without auscultation.

Crucial diagnostic features of middle ear clicking are irregularity, asynchronicity with the heart-rate, variable volume, symptom-free intervals of minutes, hours or months, but clicking may continue in some cases for years. The character of the tinnitus has been variously described as blowing, drum-like thumping, fluttering like a butterfly, whooshing or gushing. The rate has been quoted as 70-180 per minute[6]. Low-pitched vibrating or buzzing sounds are caused by stapedial muscle spasm[2] whilst tensor tympani contraction produces clicking[7], or confusingly it may be perceived as continuous high frequency tinnitus[8].

Management of clicking tinnitus in the literature included medication, physical, surgical, auditory and psychological methods. Pharyngeal muscle tone alteration, swallowing, Valsalva, grommet insertion[5] are not effective. Botulinum toxin injection, otic ganglion blockade, hypnosis, psychotherapy, acupuncture, biofeedback have been attempted. Medication such as muscle relaxants, sedatives, carbamazepine have been used with variable results[8,9]. Tinnitus coping strategies of counselling, relaxation and anxiety reduction are standard practice. Success with white noise generators has been found in clicking tinnitus[6]. Tensor tympani and stapedial tenotomy[5,8] have been successful in resistant cases.

We present 2 cases selected from a larger number of cases seen by the primary author who has seen the manoeuvre successfully used by patients but more research is required to support these anecdotal accounts and a formal study is being planned. This is the first report of successful suppression of irregular clicking middle ear myoclonus (non-sound induced) using zygomatic pressure. If replicated, this technique may be useful in a subgroup of selected patients for both acute physical and psychological relief and long-term control of distressing spontaneous irregular clicking before resorting to medication or tenotomy.

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