

Tinnitus: A simple management approach

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Tinnitus is a very common symptom and is classified as the perception of a sound in the absence of an external auditory stimulus.

Approximately 15% of the adult population report some degree of tinnitus with less than 2% of people describing it as a distressing symptom. In general terms it becomes more common as we age, and this is essentially related to worsening hearing. Some degree of tinnitus can even be regarded as physiologic. A number of studies have shown that a vast number of people will experience tinnitus when placed into an anechoic environment or have used occlusive ear plugs.

Traditionally tinnitus has been classified as either subjective or objective. Subjective tinnitus is a sound that cannot be detected externally, and is by far the most common form, while objective tinnitus is a sound that an examiner can hear. Most of what we think of as objective tinnitus is related to transmission of sound to an otherwise normal ear, and is not always audible to the examiner. Therefore I would classify this as conductive tinnitus.

Subjective Tinnitus

People can often describe the sensation coming from one or both ears, can be described as a ringing, hissing, machinery or cicada type sound among many others. It can be soft and intermittent but can also be constant, and very intrusive to the extent that it can affect concentration, sleep and even to the extent of causing suicidal ideation.

As this is a subjective symptom, quantification of its severity is based on a patient's description of its effect on their daily functioning and quality of life. There are a number of well validated questionnaires that can be used in this regard. [Insert THI]

The way to think about this is that following a degree of damage to the sensorineural pathways (most often to the cochlear hair cells) an additional signal is generated within the auditory system that is perceived as a sound. From a modelling perspective it has many similarities to central neuropathic pain.

It is my opinion that it is almost impossible to experience tinnitus without some degree of damage to the hearing mechanism. This includes those who have been shown to have "normal hearing" on routine audiology.

This model provides a helpful starting point to explain to patients the origin of their tinnitus. One of the common mistakes in initial management is to tell patients that there is nothing wrong and that it is entirely in their head. During the initial assessment it is important to spell out that the initial aim is to rule out any serious underlying causes (which are very rare) and then to minimise the intrusiveness of tinnitus. It is very important to say that there are many things that can be done, but it is also

important to state that the quest to completely get rid of the tinnitus is counterproductive. The goal is to make it inobtrusive.

The natural history of most cases of tinnitus is that the patient gets used to the sound or habituates to it. Once an underlying serious cause is excluded nothing further need to be done. It is in those with more severe tinnitus and associated symptoms that a range of management options should be considered.

Pathophysiology

There is no absolute explanation for all subjective tinnitus but it is likely generated by neurons of the ascending auditory pathways and/or by neural structures that are not normally activated by sound following some form of injury. The commonest is temporary and follows exposure to loud noise. This is the ringing sound experienced after being in a night club or at a concert. Occasionally severe noise exposure, especially of an impulsive nature can leave one with permanent tinnitus. Age, genetic susceptibility, accumulated noise exposure, infections, trauma, Meniere's Disease, Otosclerosis (especially with cochlear involvement), and more serious pathology such as a vestibular schwannoma can all be causes of auditory damage and thus tinnitus. Toxins and some medications can also be responsible. The commonest of these are aspirin and other NSAIDS, aminoglycosides, loop diuretics, cisplatin, anti-depressants, anti-psychotics and anti-epileptics. Almost all medications have at some stage been associated with tinnitus but usually this is coincidental. Other very common exacerbating agents are caffeine and alcohol.

As described above an initial injury leads to generation of the tinnitus which is then modified by central connections to the limbic system and trigeminal nucleus that influence neck and jaw problems. This has been described as the "Generator-Preceptor" model of tinnitus. The modern approach to tinnitus often parallels the management of chronic pain and as a way of explanation can be likened to phantom limb pain following amputation.

Investigations

Following a thorough examination a formal audiogram is the most important initial investigation. With unilateral tinnitus and or asymmetry in the sensorineural thresholds imaging of the central auditory pathways is important to rule out the presence of any central pathology. Essentially if there are no contra-indications an MRI scan of the brain and cerebellopontine angles and internal auditory canals is the best modality. With symmetric symptoms imaging is not required, but review of basic haematology, biochemistry and thyroid function tests are worthwhile.

Management of Subjective Tinnitus

My clinic based explanation to patients is as follows:

Damage has occurred to the sensorineural system that leads to the formation of alternate neural pathways that also eventually reach the auditory cortex. Therefore the brain perceives a sound, but it is not an hallucination. These aberrant neural pathways travel through areas of the brain such as the trigeminal nucleus involved in regulation of the temporo-mandibular joint and musculature of the

head and neck area. It also travels through the limbic system, regulating physiologic and emotional stress and the area of the brain that is activated by stimulants such as caffeine. Therefore any abnormalities in these areas can act as non-ear exacerbating factors to the tinnitus.

Then management of the tinnitus can then be approached in a systematic way.

As stated most people with tinnitus get used to the sound or habituate to it, and therefore do not require any specific treatment.

If it is a troubling symptom then this requires a multifaceted, multidisciplinary approach. I split this into ear and non-ear modalities.

Otologic (Ear):

Sound therapy and masking. Essentially this means introducing a broad band sound at a low intensity which stimulates the normal auditory pathways and thus inhibits the alternate (tinnitus) pathways. This is commonly manifested in people who only notice their tinnitus when there is no or minimal background sound.

Simple ways of doing this is to use the radio off the station or leave a fan on in the room. There are also a number of apps available for example ‘white noise’ or ‘sleep pillow’, and audio files available to play at a very low volume. Essentially one should have the volume of the white noise just below that of the tinnitus and over a period of time reduce the volume of the masking noise. This is designed to help the habituation process.

Improving hearing.

This can be as simple as removing wax from the ear.

Often the hearing is essentially normal or near normal, and if this is the case not much can be done in this area. Occasionally there may be a medically or surgically correctable cause of the hearing loss such as a perforated tympanic membrane that can be addressed.



[Picture perforated tympanic membrane: A photo of a large perforation of the right tympanic membrane.]

In significantly intrusive tinnitus with anything more than mild hearing loss consideration of hearing aids need be made, even if patients do not identify that their hearing is a problem. In this situation the hearing aids act by increasing the volume of ambient noise and takes some "hearing stress" off the ear. Often patients will feel that it is their tinnitus causing a degree of hearing loss but it is the other way around. It is interesting that even when the hearing aids are removed that the degree of tinnitus is still improved. There are also hearing aids that have inbuilt masking devices that some patients find helpful. The combination of severe tinnitus and severe hearing loss is difficult to manage, as a standard hearing aid is unable to amplify sound adequately to impart a benefit. It is in these cases where cochlear implantation can make a significant improvement to quality of life. This allows direct stimulation of the cochlear nerve itself vastly improving hearing and in almost all cases significantly improving tinnitus. Both surgical techniques and device design continues to evolve allowing successful implantation with a reasonable level of residual hearing.



[Picture of CI422+-+Straight+Electrode+Front, cochlear_anatomical_diagram, CP810_sound_processor+CR110_Remote_Assistant. These pictures show the internal device that is inserted into the cochlear itself. The external component is worn like a hearing aid and attaches to the internal component magnetically. With complements to Cochlear Corporation]

Additional Devices

There are a number of proprietary devices, such as the Neuromonics device, that have been shown to be effective in selective cases. The aim is to use a specific sound program to assist in habituation of the tinnitus and sensibly focuses on the aberrant central connections that have been established. These devices can be expensive so in my hands are used as a last resort.

Prevention

Acoustic trauma can be a further exacerbating factor. Limiting significant noise exposure is important. A condition called hyperacusis, or sensitivity to noise can accompany tinnitus. In this setting it is important to protect the ear from loud noise but to avoid blocking out normal environmental noise as this can further exacerbate the sensitivity to noise.

Non-ear (extra-auditory)

It is important to identify any problems around the temporomandibular joint such as teeth grinding at night. Also neck and upper limb stiffness or disease can exacerbate the severity of the tinnitus. Obviously a wide range of pathologies and treatments are available which include dental devices soft tissue massage, physiotherapy, chiropractic techniques and acupuncture. Whilst some of these could be classified as alternative, anything that can minimise the feedback loop to the accessory tinnitus pathways is helpful.

Psychological management. Often explanation of the symptoms and the underlying cause and exacerbating factors with the exclusion of significant pathology is all most patients are seeking.

As mentioned there is thought to be a connection with alternate neural tinnitus pathways and the limbic system. Therefore any physiologic or emotional stress has the capacity to exacerbate tinnitus.

Managing stressful situation at home and work is important, but often easier said than done. It is also important to manage physiologic stress. One of the commonest is lack of sleep and of course any other systemic disease process.

This situation often then leads to a vicious feedback loop where as the tinnitus becomes more intrusive and distressing further activation of the limbic system leads to further exacerbation of the limbic system. In extreme cases patients can present with severe anxiety and depression and even in a suicidal state.

Of all the treatments for subjective tinnitus, tinnitus retraining therapy is the only modality apart from boosting hearing that has definitively shown a positive effect. A large component of this is cognitive behavioural therapy and aims to minimise the link between the tinnitus and the central activation of the limbic system. Whilst there are few centres dedicated to specific TRT, such as St Vincent's Hospital, Sydney, most psychologists with an interest in cognitive behavioural therapy can make a big difference.

Many herbal medications have been suggested in the treatment of tinnitus. Of all these gingko biloba has been shown anecdotally to improve symptoms in some patients. I usually offer this as a trial for a couple of months as it has a very low risk profile.

Occasionally pharmacologic treatments are considered as short to medium term circuit breakers to improve sleep, and minimise anxiety.

Special Cases

Sudden Sensorineural Hearing Loss

Sudden onset of tinnitus and hearing loss or a blocked ear. This can occasionally represent what is termed the sudden sensorineural hearing loss syndrome. Often patients notice the tinnitus and a full or blocked feeling but do not appreciate that their hearing is also down. This condition in most cases is thought to be related to a viral reactivation phenomena and rapid institution of steroid therapy can help salvage some of the hearing loss. This presentation is one where an urgent referral to an ENT surgeon and formal audiology is required. Occasionally steroid injection into the middle ear can help salvage hearing and an MRI scan is usually required as a vestibular schwannoma can occasionally present in this way. When the patient is left with a marked unilateral hearing loss devices such as a bone anchored hearing aid, or a BiCros hearing aid can be used to reroute an auditory signal presented to the deaf ear across to the normal hearing ear. If the severe hearing loss is accompanied by significant tinnitus cochlear implantation has recently been shown to be a very efficacious management option.

Vestibular Schwannoma

When a patient presents with asymmetric hearing loss or single sided tinnitus then imaging of the brain and cerebellopontine angle is indicated to exclude the unlikely presence of central pathology, the most common of which is a vestibular schwannoma (acoustic neuroma). These are benign tumours arising from the vestibulo-cochlear nerve. They are the commonest tumour of the cerebello-pontine angle at 80% and represent about 9% of all intracranial tumours. The natural history of growth is critically important in the formulation of a management paradigm. It has become apparent that a large cohort of tumours either do not grow or grow very slowly. It has estimated that there is an incidence as high as 0.5% on cadaveric studies, The inference is that a significant number of tumours never become clinically apparent. Treatment algorithms include conservative surveillance, microsurgical removal employing either hearing conservation or hearing destructive approaches and radiotherapy. We now take into account quality of life outcomes, as well as hearing and facial nerve conservation rates.

The critical decision to be made is when to intervene. One of the most important questions to answer revolves around 1) what aspect of the tumours existence most disables the patient and 2) does early intervention realistically improve or arrest the progression of this disability without introducing the morbidity of the treatment itself. The two most easily quantifiable variables are

hearing scored via PTA and SD, and facial nerve outcomes using the House Brackman (HB) scale from normal I, to complete paralysis, VI. The increased use of QOL, both specific, such as hearing disability scores, and generalised such as SF-36, are broadening the information for analysis, and hopefully allowing us to make more informed decisions and recommendations for appropriate management.

The conservative watch and wait approach has now been widely canvassed in the literature. Most of the recommendations for this mode of management revolve around the older patient, or those with significant co-morbidities.

To operate early, with the aim of hearing preservation in many cases will lead to worse patient outcomes.

Therefore, in general terms hearing preservation microsurgery in the management of vestibular schwannomas is not a primary indication for intervention, as conservative management gives the best rate of hearing preservation.

Conservative Management

The 'failure rate' of conservative therapy is now 15%. It is important to note that even for those tumours who fail initial conservative treatment quality of life outcomes are not worse than if treated at initial presentation.

Certainly there remains a strong role for surgery in the management of vestibular schwannomas, but just because a tumour is there does not mean that it must be removed.

When to proceed to surgery

Documented growth: Usually greater than 2-4mm per year. Intervening when the tumour is less than 15mm in the CPA gives the best results.

Brainstem compression

Significant vestibular disturbance: occasionally even for small tumours.

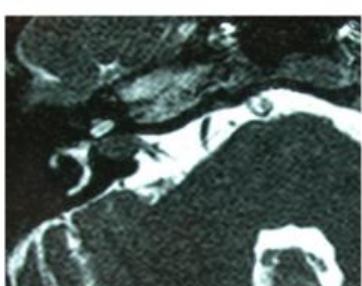
Surgery

The principles are to widely remove bone at the base of the skull in order to identify and protect neural structures.

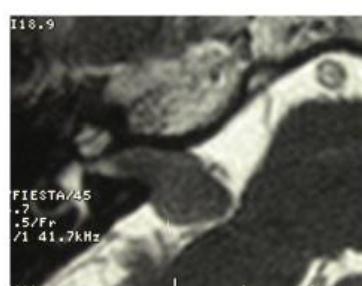
Optimal outcomes are achieved by a highly experienced, multi-surgeon team. The results of micro-surgical removal are now very good, but it remains a major intracranial procedure not to be taken lightly, and audiologic and vestibular rehabilitation is very important.

Radiotherapy

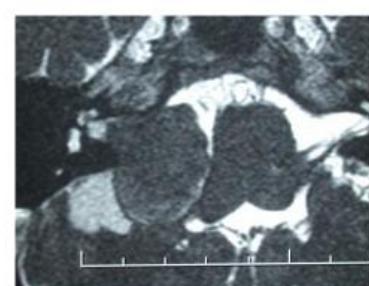
Steriotactic radiotherapy is an option for small tumours with documented growth, in patients in whom surgery is contra-indicated, and in cases where residual tumour shows regrowth.



Intracanalicular tumour



Small CPA component



Marked brainstem compression

T2 MRI scans showing progressive sizes of right sided vestibular schwannomas. These scans show a filling defect representing the tumour. Most intracanalicular tumours are initially managed with a repeat scan at 6-12 months. If there is no or minimal growth repeat yearly MRI scans are employed. Those with a small CPA component that are not compressing the brainstem can also be initially

watched if appropriate. Those with marked brainstem compression are those that are considered primarily for microsurgical excision.

Meniere's Disease

Meniere's disease is a disorder affecting inner ear homeostasis, classically manifested by episodic vertigo lasting hours, fluctuating hearing loss, tinnitus and aural fullness. Rarely sudden drop attacks can develop. True Meniere's Disease is a rare but debilitating condition, and essentially represents a situation where the inner ear is hypersensitive to a wide range of triggers. Multifactorial management is essential with minimisation of emotional and physiologic stress and reduction of dietary salt the first step. 80% of cases can be managed with these simple measures. More interventional options exist, all the way up to the transection of the vestibular nerve, but rehabilitation of hearing and vestibular function are equally as important.

Conductive Tinnitus (often classified as objective tinnitus)

When a patient describes the sound of tinnitus resembling pulsation, clicking or related to breathing or swallowing a mechanical or structural lesion is more likely and must be ruled out.

In general terms this can be divided into pulsatile, muscular or related to the Eustachian tube.

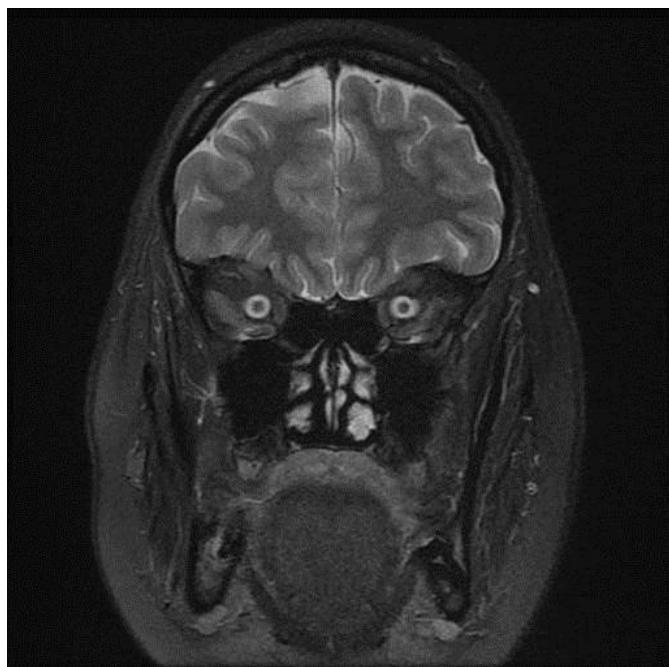
The commonest underlying cause of pulsatile tinnitus is the most benign and relates to a degree of Eustachian tube dysfunction. This often occurs after a head cold and is related to pulsations being transmitted down a partially blocked Eustachian tube to the middle ear. In severe cases the middle ear fills with fluid causing an effusion which can also become infected causing an acute otitis media.



[Picture of acute otitis media. Picture showing a bulging tympanic membrane representing acute otitis media.]

Clicking and crackling on swallowing are also described and reflect the tube starting to re-open. This is usually self limiting and is often helped by using topical nasal therapies, and if it completely resolves requires no further investigations. A rarer form of tinnitus is called patulous Eustachian tube and patients describe a sensation of autophony and hearing their own breathing. Diagnosis is made by observing excursions of the tympanic membrane with unilateral nasal breathing.

When the description involves bilateral symptoms then hyperdynamic syndromes must be considered. These include exercise , pregnancy, thyrotoxicosis, anaemia, anxiety, hypertension and Paget's disease. Another diagnosis to consider in bilateral pulsatile tinnitus is benign intracranial hypertension, although this can also cause unilateral symptoms.



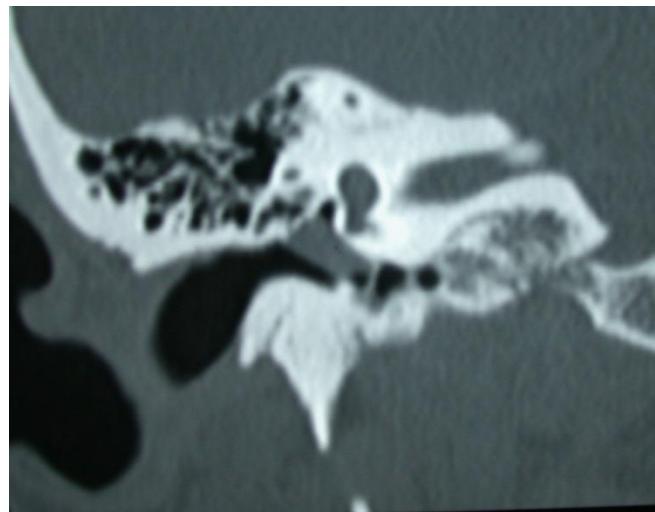
[picture benign intracranial hypertension: A T2 image showing expansion of the CSF space around the optic nerve bilaterally representing benign intracranial hypertension.]

True pulsatile tinnitus originates from vascular structures within the head, skull base, neck , and thoracic cavity, and it is transmitted to the cochlea by bony or vascular structures. It is due either to increased blood flow or stenosis, and can be classified as arterial or venous.

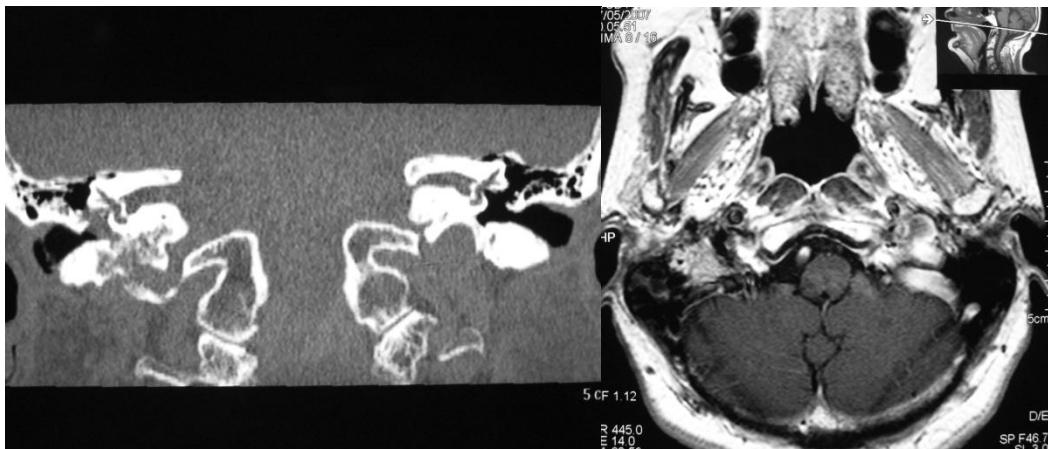
Arterial

Cardiac causes and carotid artery disease can usually be identified on auscultation and/or via cardiac echo and carotid and vertebral artery duplex studies.

A mass identified behind the tympanic membrane and/or the presence of a conductive hearing loss suggests a paraganglioma (glomus tumour) arising from the middle ear or extending up from the jugular foramen, otosclerosis, an aberrant blood vessel coursing through the middle ear or a meningoencephalocele.



[picture of glomus tympanicum, A image of a red mass behind the tympanic membrane. The coronal CT scan shows that the tumour is isolated to the middle ear cleft]

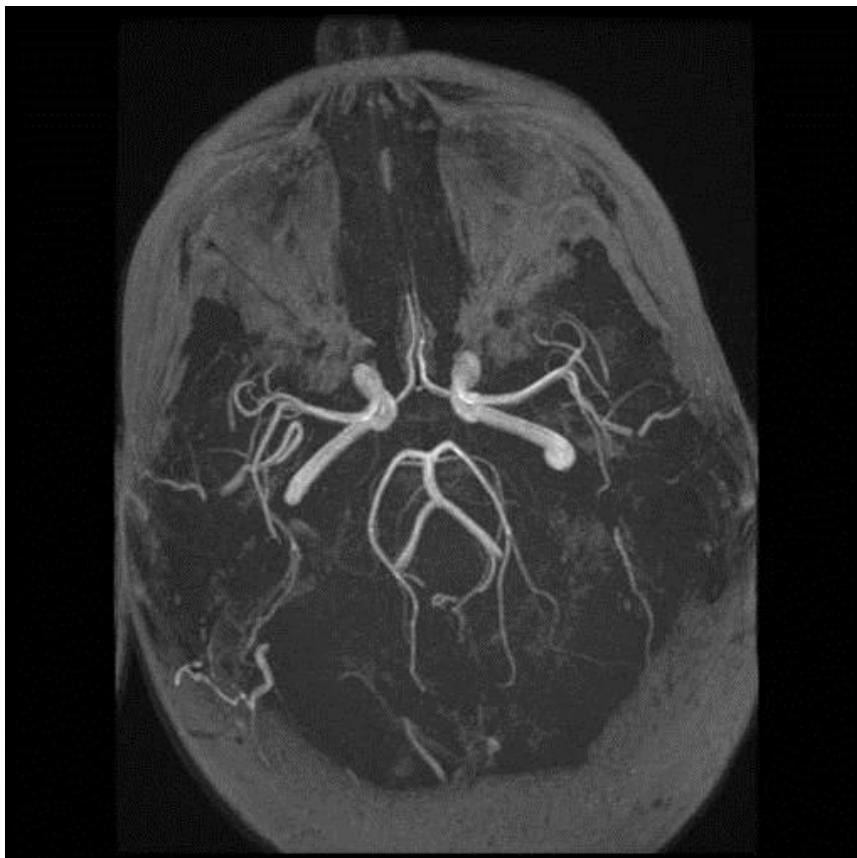


[picture: glomus_jugulare_ct_coronal and glomus_jugulare_mri_axial. The same clinical presentation is more commonly the result of a tumour extending into the middle ear from the jugular foramen. The coronal CT scan shows moth eaten appearance of the bone, the result of the paraganglioma (glomus) tumour extending from the jugular foramen and filling the middle ear cleft. The MRI scan with gadolinium shows the highly vascular tumour centred on the jugular foramen on the right. The tumour shows flow voids within it that represents a salt and pepper appearance.]
Removing even this relatively small tumour may well result in sacrifice of the lower cranial nerves so often a watch and wait approach is initially employed. If there is rapid growth and or the tumour itself causes damage to the lower cranial nerves, interventional treatment is then considered. Slow loss of function allows the body to better compensate for this neural damage.]



[picture of meningoencapholcele. A coronal CT scan showing dehiscence of the tegmen with soft tissue density material resting on the head of the malleus, representing a meningoencephalocle]

With a normal otoscopic examination the pathology is more likely related to an arteriovenous fistula or arterovenous malformation, a tortuous ICA, dissection or aneurysm formation of the extra or intracranial segment of the ICA and fibromuscular dysplasia.



[pictures of avf: A MRA image showing a connection between the arterial and venous circulation]

Venous

The sound that the patient often describes is more like a machinery or continuous hum. Benign raised intracranial pressure, abnormalities of the jugular bulb, abnormalities, stenosis of the transverse or sigmoid sinuses, abnormalities of other draining veins of the skull base, and other causes of raised intracranial pressure are possibilities.



[picture MRV transverse sinus 2. A MRV showing significant narrowing of the transverse sinus. Causes include post infectious thrombosis with partial recanalization and prominent arachnoid granulations. Most cases are identified by MRV. When symptoms are severe consideration of direct venography is made, allowing more accurate diagnosis and measurement of trans-stenotic pressure gradients. Rarely stenting of the lesion via an endovascular approach is employed.]

Clues as to the cause of the tinnitus can be gained as suggested by otoscopy and auscultation of the chest, neck and skull is important. If occlusion of the internal jugular vein minimises the sound then a venous cause is more likely.

Investigations

Usually both a CT scan of the skull base and MRI, MRA, MRV are required. If there is an abnormality of the middle ear a CT scan is usually the first line investigation otherwise a MRI is ordered primarily. These extensive investigations are important to rule out an arteriovenous fistulas (AVF), arteriovenous malformations (AVM), vascular tumours of the skull base and vascular stenoses as these pathologies can lead to serious sequelae.

Treatment

Treatment is obviously specific to underlying pathology, but endovascular approaches are usually used for dural AVFs, and stenting in selected cases of venous sinus stenosis is effective. Vascular tumours are often amenable to safe removal, especially if arising from the middle ear, but may involve significant collateral damage to the lower cranial nerves for those arising from the jugular foramen so a period of conservative observation is usually employed. Aberrant ICA and abnormalities of the IJV and jugular bulb are almost always also treated conservatively. Otosclerosis is imminently treatable either surgically via a stapedectomy, or with a hearing aid. and rarer conditions such as a meningoencephalocele require surgical repair to prevent the risk of meningitis.

Treatment of BIH often involves weight loss and a trial of acetazolamide in concert with a neurologist. It is rare that more interventional management is required.

Not infrequently all these investigations are unremarkable and the diagnosis of Idiopathic or essential tinnitus is then made. Similarly to subjective tinnitus discussed above, often reassurance that there is no serious pathology is all that patients are searching for.

Special Cases

Conductive hyperacusis of the superior semicircular canal dehiscence syndrome. In this rare condition patients often describe hearing extreme transmissions of footsteps to the ear, and even the sensation that they can hear their eyeballs move. It is also associated with noise and pressure related disequilibrium. It is due to a connection between the membranous labyrinth of the superior semicircular canal and the dura, due to lack of a bony covering in this area. It is diagnosed on CT scanning of the petrous temporal bone in the plane of the superior semicircular canal and measuring abnormalities in a VEMP test (vestibular evoked myogenic potentials). Treatment is usually conservative, but in severe cases we consider surgical resurfacing of the dehiscent superior semicircular canal.



[Picture SSCDS. This CT scan of the petrous temporal bone is taken in longitudinal plane of the superior semicircular canal. Complete uncovering of the membranous labyrinth can be seen. Radiologic diagnosis must be confirmed on VEMPs]

Muscular Causes

Myoclonic contractions of the tensor veli palatini, levator veli palatini, salpingopharyngeus, and superior constrictor, and stapedius muscles are another uncommon cause of tinnitus. It is usually a clicking sound ranging between 10 and 240/min, which can occasionally be confused with a pulsatile sensation. Very rarely this can be associated with an underlying neurologic disorder so MRI imaging of the brain and brainstem is recommended. Again explanation and reassurance is the most important treatment, with interventional management occasionally employed. First line therapy now involves botox injection into the muscle belly, with surgical section left as the last resort.

Summary

Tinnitus in all its forms is common, with a serious underlying cause very rare. Thorough assessment and explanation of the symptoms are very important and counselling patients that there are a number of effective treatments available to manage their condition are available. For those with severely intrusive tinnitus a multidisciplinary approach is essential .

Appendix

1.

Suggested handout to patients for subjective tinnitus

Key Points: Advice to Patients

Tinnitus is the perception of noise generated somewhere within the auditory system that can take many forms. It is very common, affecting up to 1 in 5 people, and can rarely become a severe and disabling problem.

The most important fact to realise is that there are many things that we can do to gain control over tinnitus.

A full medical assessment often involving blood tests, a formal hearing test and scans is an important component of treatment, to exclude the more serious causes of tinnitus.

It is also important to realise that the auditory (hearing) pathways are hard wired to the limbic system (emotion centre) of the brain as well as to areas responsible for the jaw, neck and other areas of the head and neck.

Rarely, primary ear disease, and even more rarely intra-cranial disease, can be responsible. Once these have been excluded a stepwise approach to management is employed.

Initial therapy

- Exclusion of significant underlying pathology
- Avoidance of triggering factors: ear infections, dental and temporomandibular problems, cervical neck disease
- Ensure adequate rest and relaxation, manage stress.
- Hearing rehabilitation: hearing aids and assistive listening devices

- Sound therapy: white noise such as the radio off the station is a good initial trial: A lot can be said of the old fashioned advice to live close to the sea
- Tinnitus retraining (a type of cognitive behavioural therapy): highly effective. A medicare rebate can be gained if the patient's GP enrolls them into a mental health care plan.
- Alternative therapies: Of herbal remedies, gingko biloba is the only one with any benefit, albeit minimal. Massage and acupuncture can be very useful adjuncts.
- Very rarely, short to medium term sedatives can be helpful. In selected cases the involvement of a psychiatrist and use of anxiolytic medications are required to gain initial control.

Specialised devices

- Sound generators
- Combination sound generator and hearing aids
- Neuromonics device: a relatively expensive but effective therapy in selected cases, especially in those with normal or near normal hearing.

Contacts and resources

Australian tinnitus association

Phone: 02 8382-3331

www.tinnitus.asn.au,

Neurosensory

St Vincents Public Hospital

Level 4 Victoria Street

DARLINGHURST NSW 2010

Phone: 1300 13 4327

American tinnitus association

www.ata.org

British tinnitus association

www.tinnitus.org.uk

2. There are a number of well validated questionnaires to assess the severity of subjective tinnitus. The tinnitus handicap inventory is one commonly used.

Tinnitus Handicap Inventory

1. Because of your tinnitus is it difficult to concentrate?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
2. Does the loudness of your tinnitus make it difficult for you to hear people?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
3. Does your tinnitus make you angry?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
4. Does your tinnitus make you feel confused ?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
5. Because of your tinnitus do you feel desperate?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
6. Do you complain a great deal about your tinnitus?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
7. Because of your tinnitus do you have trouble falling to sleep at night?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
8. Do you feel that you cannot escape your tinnitus?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
9. Does your tinnitus interfere with your ability to enjoy social activities (such as going out to dinner, to the movies)?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No

10. Because of your tinnitus do you feel frustrated?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
11. Because of your tinnitus do you feel that you have a terrible disease?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
12. Does your tinnitus make it difficult for you to enjoy life?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
13. Does your tinnitus interfere with your job or household duties?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
14. Because of your tinnitus do you find that you are often irritable?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
15. Because of your tinnitus is it difficult for you to read?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
16. Does your tinnitus make you upset?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
17. Do you feel that your tinnitus problem has placed stress on your relationship with members of your family and friends?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
18. Do you find it difficult to focus your attention away from your tinnitus and on other things?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
19. Do you feel that you have no control over your tinnitus?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No

20. Because of your tinnitus do you often feel tired?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
21. Because of your tinnitus do you feel depressed?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
22. Does your tinnitus make you feel anxious?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
23. Do you feel that you can no longer cope with your tinnitus?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
24. Does your tinnitus get worse when you are under stress?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No
25. Does your tinnitus make you feel insecure?	<input type="radio"/> Yes <input type="radio"/> Sometimes <input type="radio"/> No

Scoring the severity of tinnitus.

Total THI Score = (number of 'Yes' responses x 4) + (number of 'Sometimes' responses x 2)

0-16: Slight or No Handicap

18-36: Mild Handicap

38-56: Moderate Handicap

58-76: Severe Handicap

78-100: Catastrophic Handicap