Meniere’s disease

Jonny Harcourt,1 Kevin Barracough,2 Adolfo M Bronstein3

Meniere’s disease is often considered in the differential diagnosis of episodic dizziness, although it is not a common cause of new onset vertigo. Rather it is a disorder of the inner ear, characterised by recurrent attacks of self limiting vertigo. These attacks are associated with unilateral fluctuating low frequency sensorineural hearing loss, a sense of “fullness” in the affected ear (aural fullness), and tinnitus.1 Clinical findings are initially normal between attacks but later there is unilateral hearing loss and tinnitus. Treatment of the condition has not been evidence based in the past, but new treatments look promising.

In this article we discuss what is known about the pathogenic process of Meniere’s disease and consider the clinical presentation of the disease, its clinical course and prognosis, and what clinical features help to discriminate the condition from other diagnoses. We also examine the evidence for treatment.

What is Meniere’s disease?

Meniere’s disease was first described by Prosper Meniere, a French doctor who worked at an institute for “deaf-mutes” in Paris in the early 19th century.

Since the first histological description of the disease in 1938 following the post mortem examinations of two patients with Meniere’s disease, the condition has been presumed to be due to a swelling of the membranous labyrinth of the inner ear, a condition known as endolymphatic hydrops. The pathophysiology of the disease is thought to be due to an excess secretion of endolymph in the cochlear, a failure of resorption into the subarachnoid space, or both. The traditional view is that acute swelling of the membranous labyrinth (both the vestibular system and cochlear duct) could lead to episodic vertigo combined with acute sensorineural hearing loss with tinnitus and aural fullness. Because attacks are self limiting, it is hypothesised that minor rupture of the pressurised labyrinth results in the cessation of each attack. The theory of swelling of the labyrinth was recently given some support by magnetic resonance imaging of patients who had had gadolinium injected into the tympanic cavity; gadolinium is slowly absorbed into the perilymphatic compartment. Subsequent scans showed a distended membranous labyrinth in patients with Meniere’s disease.2

How common is it?

The quoted prevalence for Meniere’s disease varies 100-fold, but a study in 2010 reported a prevalence of 190 per 100 000 population in the United States.1 Thus an average primary care practice of 5000 patients would be expected to see 5 to 10 patients with this chronic condition. Meniere’s disease is generally diagnosed in the fourth to sixth decades of life and consequently the incidence of new onset disease is low. General practitioners may encounter a new case only a few times in their career. As full time general practitioners may expect to encounter 10-20 new cases of vertigo each year,3 it is clear that Meniere’s disease is an uncommon cause of new onset vertigo in primary care.

What are the clinical features and clinical course of Meniere’s disease?

The typical clinical features of Meniere’s disease are recurrent episodes of vertigo associated with cochlear symptoms: hearing loss, tinnitus, and a sense of fullness in the ear (aural fullness). The disease usually affects one ear but in 30% of cases may eventually affect both ears.1 An attack usually starts with cochlear symptoms followed soon after by the onset of vertigo. The vertigo peaks rapidly in intensity, when patients may be forced to lie still, and diminishes over a period of 20 minutes to several hours. Attacks generally last at least 20 minutes but not more than 24 hours.

In the early stages of Meniere’s disease vestibular or cochlear symptoms may occur in isolation. In one case series of 243 patients with the condition, vertigo was the only initial feature in a quarter of cases.4 One third presented with the full triad of vertigo, tinnitus, and hearing loss.4

After some years, however, the complete set of symptoms has usually become established. Therefore patients with a longstanding history of recurrent isolated vertigo over several years but no cochlear symptoms are unlikely to have Meniere’s disease.

Initially the symptoms and hearing loss resolve completely between attacks, but later there is a progressive deterioration of hearing across the whole frequency spectrum and persistent tinnitus. The condition generally “burns itself out” after 5-15 years and the episodes of vertigo cease, but there is a constant mild disequilibrium, tinnitus, and moderate (but not complete) unilateral hearing loss.

One study followed up a group of patients with severe Meniere’s disease who had declined surgery and found
Acute vestibular neuritis

- Head thrust test
- Positive Hallpike manoeuvre
- No positional vertigo
- No torsional nystagmus
- No sustained vertigo
- No horizontal nystagmus

Fig 1: Diagnostic strategy for patients presenting with acute vertigo. From Barraclough and Bronstein12

The possibility of other rarer conditions that may also present with vertigo and cochlear symptoms should also be considered, such as vertebrobasilar transient ischaemic attacks (elderly patients with arterial disease), perilymph fistulas (after trauma or due to a cholesteatoma), or acoustic neuromas (vestibular schwannoma, leading to slowly progressive unilateral hearing loss).

Are there any red flags?

Red flags that should prompt urgent referral in patients with acute vertigo are any central neurological symptoms or signs (brainstem lesion); sudden onset of severe deafness (fistula or cochlear ischaemia); new onset of severe headache particularly occipital (subarachnoid haemorrhage or raised intracranial pressure); and vertical nystagmus (brainstem lesion).

How is suspected Meniere’s disease investigated?

Meniere’s disease is a clinical diagnosis but the presence of transient, unilateral low frequency sensorineural hearing loss evident on an audiogram in patients with episodes of vertigo provides strong evidence for the diagnosis (fig 2). An audiogram may reveal unilateral low frequency hearing loss that (initially) resolves after attacks. Audiometry is helpful to confirm the diagnosis; if it is not available in primary care then referral to a specialist centre would be appropriate.

Furthermore, all patients presumed to have Meniere’s disease should undergo magnetic resonance imaging of the internal auditory meatus to screen for an acoustic neuroma (vestibular schwannoma). Patients with Meniere’s disease typically have considerable unilateral or asymmetrical sensorineural hearing loss, and because an acoustic neuroma can present in the same way, magnetic resonance imaging is mandatory. This investigation may warrant referral to secondary care if access to magnetic resonance imaging is not available in primary care. If patients present with “classic” features of Meniere’s disease then a trial of lifestyle changes and perhaps an analogue of histamine, betahistine, for three months might be considered before referral. Several other tests are used in specialist clinics (box)

How is managed?

Once a probable diagnosis of Meniere’s disease is made, an initial discussion of lifestyle factors and a trial of betahistine for three months would be appropriate for most patients. Interventional treatment could be justified if acute episodes of vertigo continue to occur. The decision on when to

Tests used in specialist clinics

- The bithermal caloric test—an objective test of unilateral peripheral vestibular disease
- The vestibular evoked myogenic potential—a test of either cervical or ocular reflex muscle potentials stimulated by a loud noise in the ear
- The video head-impulse test—objective recording of corrective saccades when rapidly turning the head to the side of vestibular weakness
- Electrocochleography—a direct measurement of the electrical activity of the inner ear usually using a needle through the tympanic membrane
The idea of using aminoglycosides (initially streptomycin) to ablate the inner ear disorder has been around for half a century. The idea was to cause permanent damage to the vestibular end organ and so prevent the experience of vertigo during acute attacks of Meniere’s disease. Aminoglycosides were chosen because of their properties of ototoxicity. Intratympanic injection of gentamicin is the treatment with the strongest evidence base.

Corticosteroids
Corticosteroids have been used historically for end stage Meniere’s disease, although one small randomised controlled trial and one large retrospective study have provided some evidence for the effectiveness (without systemic side effects) of intratympanic dexamethasone in controlling the symptoms of vertigo. The randomised controlled trial had only 11 patients in each arm and nearly half the patients in the control group were lost to follow-up. The retrospective study had 129 patients, but the outcome measure was non-standard and merely involved a self reported desire not to continue to further treatment.

Medical ablation treatment
The idea of using aminoglycosides (initially streptomycin) to ablate the inner ear disorder has been around for half a century. The idea was to cause permanent damage to the vestibular end organ and so prevent the experience of vertigo during acute attacks of Meniere’s disease. Aminoglycosides were chosen because of their properties of ototoxicity. Intratympanic treatment was introduced as a method of delivering inner ear treatment by diffusion from the middle ear, presumably through the round window membrane, thus avoiding damage to the contralateral ear. Gentamicin is used because it is less cochleotoxic than other aminoglycosides. It has been delivered locally with drops or pumps. The largest meta-analysis of this treatment identified 599 patients in high quality trials. The study found that hearing loss had worsened in 17% of patients but that attacks of vertigo were common in 13% of patients. However, many of these factors are known triggers for migraine and it may be that their efficacy is mainly for migraineous vertigo mistaken for Meniere’s disease.

Drug interventions for prevention of attacks
Betahistine
Betahistine, an analogue of histamine, is used to reduce the frequency and severity of attacks at a starting dose of 16 mg three times a day. In a 2010 updated Cochrane review of seven randomised controlled trials of betahistine involving 243 patients, most of the studies reported a reduction of vertigo with betahistine. The authors did conclude that because none of the trials met the highest quality standards, evidence for a strong effect of betahistine in preventing attacks was limited. The drug is, however, cheap and well tolerated and many clinicians give a trial of treatment.

Diuretics
Diuretics have been used to treat Meniere’s disease, the theory being that attacks can be prevented based on the biological model of endolymphatic hydrops. A Cochrane review of diuretics for Meniere’s disease failed to identify any trials that could be used to support their use.

Corticosteroids
Corticosteroids have been used historically for end stage Meniere’s disease, although one small randomised controlled trial and one large retrospective study have provided some evidence for the effectiveness (without systemic side effects) of intratympanic dexamethasone in controlling the symptoms of vertigo. The randomised controlled trial had only 11 patients in each arm and nearly half the patients in the control group were lost to follow-up. The retrospective study had 129 patients, but the outcome measure was non-standard and merely involved a self reported desire not to continue to further treatment.

Medical ablation treatment
The idea of using aminoglycosides (initially streptomycin) to ablate the inner ear disorder has been around for half a century. The idea was to cause permanent damage to the vestibular end organ and so prevent the experience of vertigo during acute attacks of Meniere’s disease. Aminoglycosides were chosen because of their properties of ototoxicity. Intratympanic treatment was introduced as a method of delivering inner ear treatment by diffusion from the middle ear, presumably through the round window membrane, thus avoiding damage to the contralateral ear. Gentamicin is used because it is less cochleotoxic than other aminoglycosides. It has been delivered locally with drops or pumps. The largest meta-analysis of this treatment identified 599 patients in high quality trials. The study found that hearing loss had worsened in 17% of patients but that attacks of vertigo were completely abolished in 71% and 87% had substantial control. The question of what effect ablation has on long term balance is more difficult to answer. The problem with analysing such an outcome is to have an accurate assessment of functional
ADDITIONAL EDUCATIONAL RESOURCES

Resources for healthcare professionals and patients
Meniere’s Society (www.menieres.org.uk/information-and-support/day-to-day/driving-and-the-law)
—advice for patients and doctors on Meniere’s disease and driving
NHS Brain and Spine Foundation (www.nhs.uk/ipgmedia/national/brain%20and%20spine%20foundation/assets/dizzinessandbalanceproblems.pdf)
—information on Cawthorne-Cooksey exercises aimed at patients and doctors
NHS UK. Meniere’s disease (www.nhs.uk/Conditions/Menieres-disease/Pages/Introduction.aspx)
—general information about Meniere’s disease
Meniere’s Society (www.menieres.org.uk)
ENTUK. Meniere’s disease (https://entuk.org/ent_patients/ear_conditions/menieres)
—general information about Meniere’s disease
ENTUK. About tinnitus (https://entuk.org/docs/patient_info_leaflets/09028_tinnitus)
—advice about managing tinnitus

balance before treatment so that a negative impact can be assessed. Generally, function significantly improved with this intervention but some patients will experience chronic balance problems from a lack of compensation to substantial loss of unilateral vestibular function. This occurs in 5-10% of patients with vestibular neuritis or after translabyrinthine surgery for vestibular schwannomas.

Surgery
Labyrinthectomy or vestibular nerve section ablates the vestibular afferent system but may cause chronic disequilibrium. Labyrinthectomy results in deafness, and vestibular nerve section requires intracranial surgery. Such interventions would only be recommended in our practice if chemical ablative treatment had been unsuccessful in controlling regular or severe attacks of persistent vertigo. A saccus decompression or drainage procedure to relieve pressure within the membranous labyrinth was tested in a notorious randomised controlled trial in Denmark in the 1970s.20 Long term follow-up of the patients has failed to show an important benefit from surgery.

Insertion of a ventilation tube (grommet) has been a popular treatment for Meniere’s disease but evidence to support its use is lacking. There are other research techniques using different devices, but as yet there is insufficient evidence to recommend their use.

Can patients with Meniere’s disease drive?
In the United Kingdom, patients with Meniere’s disease are required to inform the Driver and Vehicle Licensing Agency as well as their car insurer. Patients can continue to drive if the condition does not give rise to “sudden and disabling attacks of vertigo;” but if the attacks are disabling then patients are considered unfit to drive until attacks have stopped for a minimum of three months.

State of the art reviews
Renal cell carcinoma

This week our State of the Art review is renal cell carcinoma (RCC) doi:http://doi.org/10.1136/bmj.g4797 RCC is one of the ten most common cancers worldwide. The incidence is higher in men and in developed countries though the reason for this is unclear.

Management of non-metastatic RCC consists of surgical removal of the primary tumour followed by close surveillance. No effective adjuvant therapy exists. Metastatic RCC is hard to cure and is associated with survival rates of about two years. This review summarises the history, genomics, staging, and prognosis of RCC. It provides an overview of the data from randomised phase III studies on the management of the primary tumour, and discusses systemic agents that form the mainstay of treatment for advanced disease. It concludes with an introduction to the new class of immunomodulatory agents that are currently in clinical trials and may form the basis of a new therapeutic approach for patients with advanced RCC.

Contributors: AMB, JH, and KB drafted and revised the manuscript.

Competing interests: JH and AMB have received funding for research from the Meniere’s Society. AMB has received funding for research from the Medical Research Council.

Provenance and peer review: Commissioned; externally peer reviewed.