Vertigo, hearing loss, and tinnitus

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A 39-year-old Caucasian man presented to his general practitioner with an episode of vertigo, right-sided hearing loss and tinnitus. He was treated with betahistine. Two weeks later, he also experienced left-sided hearing loss with tinnitus and was hospitalised. There were no other otological symptoms. His medical history included ulcerative colitis for three years and he was taking sulphasalazine. There were no prior ear problems. Otoneurological examination did not show any abnormality apart from the obvious hearing loss (figure 1). Magnetic resonance imaging of the internal acoustic meati and cerebellopontine angles was normal. Routine haematological and biochemical profiles showed that the total plasma protein and its IgG fraction were significantly increased and the erythrocyte sedimentation rate (ESR) was 38 mm/h.

Figure 1 Presentation audiogram

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Questions

- 1 What type of hearing loss is apparent on the audiogram (figure 1) ?
- 2 Suggest the possible differential diagnoses in this case.
- 3 What systemic diseases can be associated with this type of hearing loss ?
- 4 What is the recommended treatment and prognosis ?

Answers

QUESTION 1

The audiogram in figure 1 shows sensorineural hearing loss. This type of hearing loss can be caused by diseases of the sensory organ, the cochlea or its neural connections, ie, the acoustic nerve and its central pathways.

QUESTION 2

There are clinical features of a progressive sensorineural hearing loss. It can be associated with viral infections, vascular occlusion, cochlear membrane breaks, autoimmune inner ear disorders, multiple sclerosis, acoustic neuroma, ototoxic drugs and psychogenic causes. Bilateral otological symptoms, no evidence of ototoxic drug intake, a history of ulcerative colitis and results of various investigations make the diagnosis of immune-related hearing loss more likely in this case.

QUESTION 3

Certain auto-immune disorders have been known to be associated with sensorineural hearing loss. These include rheumatoid arthritis, Sjogren syndrome, Wegner's granulomatosis, polyarteritis nodosa, juvenile chronic arthritis, systemic lupus erythematosus and Cogan syndrome. Sensorineural hearing loss has also been reported to be associated with ulcerative colitis.¹ Although, the exact aetiology of ulcerative colitis is still unknown, an immune cause is strongly suspected due to extra-intestinal manifestations like arthritis, pericholangitis and pyoderma gangrenosum. Other indirect evidence for the immune aetiology is provided by the therapeutic effect of immunosuppressant drugs.

QUESTION 4

The treatment of immune-mediated hearing loss includes steroids and cytotoxic agents. The latter include cyclophosphamide, methotrexate and azathioprine. Prognosis is good when the treatment is instituted early in the course of disease. In resistant cases or when immunosuppressant therapy is contra-indicated, plasmapheresis may be considered.

Discussion

Immunologically mediated audiovestibular disorders are a rare clinical entity. The diagnosis is dependent upon a high index of clinical suspicion and early recognition is crucial to successful treatment. Like any other tissue of the body, the inner ear can sometimes be involved in a localised or generalised autoimmune reaction. Different mechanisms described in the literature include both cell-mediated and antibody-mediated pathways, vasculitis involving the inner ear blood vessels, involvement of the endolymphatic sac and stria vascularis, anticollagen II antibodies and mechanisms against the central audiovestibular pathways.²⁻⁵ It has also been suggested that this form of hearing loss may be associated with inheritance of certain human leucocyte antigens, when increased frequencies of Cw7, Cw4 and B35 and decreased frequency of DR4 was noticed in such cases.⁶

The inner ear is one of the places in the human body where a tissue sample cannot be obtained routinely for immune testing. Some specific tests have been described, which involve the use of inner ear tissue obtained from patients undergoing acoustic neuroma surgery. For humoral immunity, the presence of cross-reacting antibodies determined by indirect immunofluorescence or immunoperoxidase techniques indicates autoimmune disease. To determine cell-mediated immunity, leucocyte migration inhibition and lymphocyte transformation tests involve incubating the patient's mononuclear leucocytes with the inner ear tissue extracts. A response is considered positive when migration or transformation is significantly different from those of controls containing medium alone.⁷ These specific tests are expensive and require inner ear antigens. Therefore, they are mainly research tools at present. Various non-specific immunological tests are freely available. These include ESR, serum immunoglobulins, auto-antibodies, serum immune complexes and complement assay.⁸ These tests are inexpensive and helpful when positive. In our case, the high level of

Figure 2 Post-treatment audiogram

serum immunoglobulins and IgG led us to suspect the auto-immune nature of the problem.

The immune-mediated hearing loss can present as a solitary event or as a part of a more generalised auto-immune disorder. It is usually bilateral and symmetrical; vertigo and tinnitus may or may not be present. Since there is no characteristic presentation, such a diagnosis should be considered in a patient presenting with any combination of these symptoms. Certain clinical features should raise the alarm (box).⁷

Steroids and immunosuppressant therapy are the mainstay of treatment. We used azathioprine and obtained a good response. Fluctuations in hearing thresholds were observed during the initial adjustment of the steroid dose. Subsequently, the hearing remained improved to a useful level, despite gradual tapering of the steroids (figure 2). In conclusion, immune-mediated hearing loss is one of the few forms of sensorineural deafness that are treatable by medical means.⁹ The diagnosis can sometimes be difficult due to a wide variation

Features suggestive of immune-mediated hearing loss

- sensorineural hearing loss in early and middle aged adults] [for whom no other cause can be found
- slowly progressive sensorineural hearing loss (weeks or months rather than hours or days)
- sensorineural hearing loss in a person with an already existing auto-immune condition

in presentation and unavailability of a specific diagnostic test. However, a thorough clinical examination and non-specific laboratory tests are needed in all suspicious cases.

Final diagnosis

Immune-mediated sensorineural hearing loss.

Keywords: auto-immune disease; sensorineural hearing loss; ulcerative colitis

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Hypercalcaemia and abdominal pain

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A previously fit 75-year-old woman presented to Accident and Emergency with a 12-hour history of constant upper abdominal pain. Clinical examination revealed pallor but no jaundice and guarding in the epigastrium. Her biochemical results were serum amylase 2878 IU/l (normal <90), bilirubin 33 µmol/l (3-20), alkaline phosphatase 42 IU/l (30-150), aspartate transaminase 354 IU/l (10-50), albumin 38 g/l (35-50), calcium 2.85 mmol/l (2.2-2.6).

Questions

- 1 What is your differential diagnosis for the abdominal pain?
- 2 Comment on the relationship between the serum calcium and amylase levels.
- 3 What further investigations would you request?
- 4 How would you further investigate and manage the hypercalcaemia if it were due to primary hyperparathyroidism?

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