ORIGINAL ARTICLE

Auditory hallucinations in cognitive neurology

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Abstract

Introduction: Different types and localisations of neurological lesions can produce tinnitus and verbal or musical hallucinations (VMH).

Method: These symptoms were screened for in 1000 outpatients at a cognitive neurology clinic, and epidemiological and neuroimaging data were recorded.

Results: Tinnitus was present in 6.9% of the total and VMH in 0.9%. The paracusia group was predominantly female but the difference was not statistically significant. Patients with tinnitus were younger and those with VMH were older than the rest of the sample (mean ages). Hearing loss was more prevalent in the paracusia group (difference was significant in VMH subgroup). There were no intergroup differences in the prevalence of psychotic and obsessive-compulsive disorders, or of leukoaraisosis. Treatment with acetylsalicylic acid was more frequent in the VMH group, whereas other non-opioid analgesics and benzodiazepines were more commonly prescribed to patients with tinnitus. The suspected cause of VMH was dementia with Lewy bodies (n=2, one with vascular disease), Alzheimer disease (n=2, one with vascular disease), isolated cerebrovascular disease (n=3), traumatic brain injury (n=1), and surgical brainstem lesion (n=1). All VMH cases displayed an underlying factor that might prompt this symptom, e.g., hearing loss (n=6), a predisposing drug (n=9), and polypharmacy (n=9).

Conclusions: Treatment with benzodiazepines and non-opioid analgesics was more frequent in the tinnitus group, whereas the VMH group showed a higher prevalence of hearing loss and treatment with acetylsalicylic acid. The causes of VMH were dementia with Lewy bodies, Alzheimer disease, and focal lesions in the mesencephalon, pons, left temporal lobe, or left claustrum.

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Introduction

Tinnitus (which comes from the Latin word tinnitus, meaning "to ring") is an auditory perception in the absence of an external stimulus. Tinnitus may manifest as a wide range of sounds (whistling, hissing, shrieking, buzzing, ringing, sizzling, bubbling, hammering, drumming, gasping, thundering, fragments of music, clanging, sounds resembling waves or downpour, a river flowing, a waterfall, the steam valve on a pressure cooker, trees rustling, a grinder or blender, a train, animal noises, an engine, doorbells, wind, etc.) and may be due to multiple causes (Table 1). 1

Tinnitus that takes the form of more complex perceptions, such as voices, music, or a combination of both, is referred to as either verbal or musical complex auditory hallucinations (CAH). When the person is aware that no external stimulus exists, the perceptions may also be called hallucinosis (acoustic in the case of tinnitus). Tinnitus is called auditory Charles Bonnet syndrome when hearing loss appears to be the only causative factor 2,3 and musical ear syndrome when hallucinations are predominantly musical. 4

CAH may be due to a wide range of aetiologies (Table 2), and it may also occur in healthy individuals. 3,5 Patients with CAH frequently have both predisposing and trigger factors. For example, hallucinations triggered by medications are more likely in patients with hearing loss. In patients with brain lesions, hallucinations coincide with paroxysmal electrical activity. Furthermore, the literature describes the case of a patient with calcifications in the thalamus and striatum who experienced CAH due to low levels of calcium and phosphorus secondary to hypoparathyroidism. Her hallucinations disappeared once the electrolyte balance had been restored. 8 The reduction in cholinergic neurons occurring in old age may also act as a predisposing factor; this process, combined with visual or auditory deficiencies, may cause visual and/or auditory hallucinations (Charles Bonnet syndrome) that may respond to treatment with acetylcholinesterase inhibitors. 9

We searched for patients with tinnitus or CAH in a sample of neurological patients and analysed predisposing factors, neuroimaging findings, and potential pathophysiological mechanisms for the symptoms.

Patients and methods

We used a register of 1000 patients seen at a cognitive neurology clinic to search for patients with tinnitus and/or CAH. We performed a descriptive analysis for age and sex and examined any associations with such potential risk factors as hearing loss and leukoaraiosis. Data on pharmacological treatments were also gathered to check for any associations between tinnitus/CAH and medication use. Patients were considered to be positive for white matter alterations in neuroimaging studies when they had scores ≥2 on Blenow’s scale (CT) or ≥4 on the Fazekas scale (MRI). 10
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