Introduction
Allergen immunotherapy has traditionally been administered by subcutaneous injections, but regular injections for a period of 3–5 years are often required for efficacy. Conversely, sublingual immunotherapy (SLIT), first described in 1986,1 is given as a tablet or a liquid extract. Since then, its use has been growing globally, representing an alternative to subcutaneously administered immunotherapy in the treatment of allergic rhinitis. The safety profile of SLIT is superior to that of subcutaneously administered immunotherapy, as side effects are less severe and frequent.2 Furthermore, SLIT can be self-administered. The clinical efficacy in allergic rhinitis due to house dust mite (HDM) allergens is well established.3,4 Mild side effects are frequent primarily in the initial period of SLIT treatment and include both local and systemic manifestations. Anaphylaxis has been reported, but it is considered as extremely rare.5 The most common local side effects are of oropharyngeal and gastrointestinal in nature, for example, itching, swelling, irritation, ulceration of the oropharynx and nausea, abdominal pain, diarrhoea, and vomiting. More severe side effects are dominated by systemic and respiratory tract manifestations.

Case study
The SLIT dosage regimen of the current case was initiated as one tablet a day (ACARIZAX 12 SQ-HDM, Dermatophagoides pteronyssinus and Dermatophagoides farinae 50%/50%; ALK-Abelló, Hørsholm, Denmark) for a planned 3 years. A 35-year-old male with known allergic rhinitis due to HDM (Dermatophagoides pteronyssinus specific IgE 11 × 10³ IU/L), diagnosed using a radioallergosorbent test, received the first tablet (ACARIZAX 12 SQ-HDM) at an outpatient facility. The dose was held sublingually for 1 min before any swallowing was permitted. The treatment was performed in the morning. During the first few minutes, only discrete oropharyngeal itching was present. After 30 min, the itching had subsided. However, 1 h post treatment, a debilitating right-sided, high-frequent, subjective buzzing noise with constant intensity started. The sound was independent of position of the head. There was no concomitant hearing loss. No exposure to loud, high noises was reported, and there was no history of use of...
Discussion

Tinnitus is the debilitating subjective sensation of sound in the absence of actual acoustical stimulation. It can affect one or both ears and may be permanent, intermittent, or transient. Since otological conditions, particularly hearing loss, represent one of the most frequent causes of tinnitus, the auditory phantom sensations are often thought to be neuroplastic responses to sensory deprivation. The pathophysiology of tinnitus is intricate and not simply a correlate of the disportion of firing patterns across the tonotopic pattern of the damaged cochlea, because the sound perception can persist even when input is eradicated by denervation of the auditory nerve. Although cochlear abnormalities could be the initial source of tinnitus, the subsequent neural changes centrally in auditory system is more likely to sustain the condition.

Common causes of intermittent tinnitus include infection, for example, otitis media and mastoiditis, whereas sensorineural causes, for example, hearing loss, presbycusis, and noise exposure, are believed to be permanent in their nature. Furthermore, Ménière’s disease and vestibular vertigo may also cause intermittent tinnitus. Mechanical causes like impacted cerumen, temporomandibular joint disorder, or otosclerosis are common; however, the latter is a permanent condition. Neurological diseases, such as migraine, multiple sclerosis, and epilepsy, may also play a prominent role in the cause of tinnitus, although only migraine is of intermittent character. Cardiovascular diseases, such as hypertension, could cause tinnitus, yet again, this would be permanent or at least long-standing until appropriate treatment is administered. Moreover, psychiatric disorders, for example, anxiety, depression, or emotional trauma, are often a cause of intermittent tinnitus. Analgesics, antibiotics, antineoplastic drugs, corticosteroids, diuretics, immunosuppressive drugs, and non-steroidal anti-inflammatory drugs may cause pharmacologically induced tinnitus. A short escalation in dose could potentially circumvent the initial side effects; ACARIZAX is, however, only available in 12 SQ-HDM, but other SLIT products are also available. Taken together, the pathophysiological mechanisms of monosymptomatic transient tinnitus induced by SLIT with HDM allergen remain unknown, as none of the enumerated causes fit the current case. Mechanical distortion of the inner ear due to mild swelling of the mucosal membrane may provide a theoretical explanation.

Conclusion

The details of this case provide important insights for clinical practice, as tinnitus has not been previously reported as a side effect of SLIT with HDM allergens. Although side effects may occur, SLIT remains efficacious and safe. Informing patients receiving SLIT remains an important component of prescribing SLIT and should include information regarding risks of both local and systemic side effects including transient tinnitus.

Declaration of conflicting interests

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Ethical approval

Our institution does not require ethical approval for reporting individual cases or case series.

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Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

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