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Objective venous tinnitus
A case report

by

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Introduction

Objective tinnitus is a noise in a patient's ear which can be recorded by the examiner and therefore represents true sound-wave energy.

Objective tinnitus can be caused by vascular bruits, muscle spasms, nasopharyngeal sounds and clicking jaws (Atkinson, 1947).

Pulsatile objective tinnitus can be divided in arterial and venous tinnitus (Engström and Graf, 1952; Hentzer, 1968; Coles *et al.,* 1975). The cause of arterial tinnitus can often be demonstrated by arteriography (Ward *et al.,* 1975; Holgate *et al.,* 1977), which is negative in venous tinnitus. It is characteristic of venous tinnitus that it most often affects women, and most frequently the right ear. Furthermore, head movements often change the intensity of the tinnitus (Engström and Graf, 1952; Hentzer, 1968): the intensity decreases when the head is turned to the affected side, and increases when turned in the opposite direction. Gentle pressure on the neck stops the tinnitus because of occlusion of the internal jugular vein.

Culforth *et al's.* (1970) investigations and the treatment results of Ott (1977) and Ward *et al.* (1975) indicate that venous tinnitus is caused by turbulence in the internal jugular vein.

Case Report

A 37-year-old woman was admitted to the ENT department in August 1980 for right-sided conductive hearing impairment. She had had right-sided purulent otitis media several times in her childhood and a couple of times as a grown-up. Otoscopy was normal except for light scarring of the right tympanic membrane. An audiogram showed a right-sided air-bone gap of 30 db., with a speech reception threshold of 50 db. hearing level. She had no tinnitus or vertigo pre-operatively.

Under local anaesthesia, an exploratory tympanotomy was performed. An otosclerotic focus localized to the anterior part of the stapedial footplate was found, and stapedectomy was performed. At check-up one month post-operatively, the air-bone gap was closed, but the patient complained of right-sided pulsatile tinnitus which had lasted since the operation. Auscultation of the right ear canal revealed a whistling sound synchronous with the pulse which could be heard nowhere else.

Two months later, the intensity of the tinnitus suddenly increased and became so annoying to the patient that it interferred with her work and sleep. On one occasion it had been so loud that it could be heard by a person in her proximity. By auscultation, a sound synchronous with the pulse was now heard all over the head, but loudest in and around the right ear. The tinnitus decreased when she bent the head to the right, and ceased with light pressure to the right side of the neck. Oto-neurologic examination was normal except for a higher threshold by electrogustometry on the anterior part of the right side of the tongue (right: 398μ A; left: 40μ A.); probably a sequela of the operation for otosclerosis. The audiogram still showed a closed air-bone gap. Common carotid and vertebral arteriography on the right side was normal, and so was internal jugular retrograde phlebography. Cranial CT scan was normal.

The tinnitus was recorded on a tape-recorder and analysed by one-third octave band filtering. The result is shown in Fig. 1. The maximum intensity of the tinnitus is seen to be 38 db. SPL

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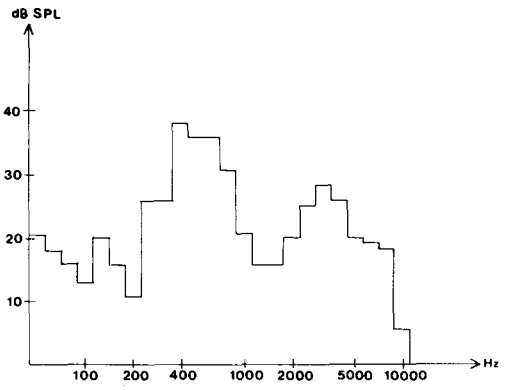


FIG. 1

Frequency analysis of the tinnitus with one-third octave band filtering.

(re 20μ Pa.). The tinnitus could be masked with white noise at 45 db. hearing level.

Under general anaesthesia the right side of the neck was explored. The tinnitus disappeared totally with occlusion of the internal jugular vein, judged by auscultation of the right ear canal, and the vein was ligated.

On awakening, the patient had no tinnitus and no side-effects. At check-up one year post-operatively, she was still without tinnitus.

Comment

In this case it is remarkable that the tinnitus began immediately after surgery for otosclerosis. This might imply that the tinnitus was 'masked' until the sound transmission in the middle ear was improved by operation. But it might be expected that the sound vibrations from the internal jugular vein could reach the cochlea *via* bone conduction because of the intimate contact between the vein and the temporal bone. Consequently, the subjective début of the tinnitus would be independent of the former conductive hearing impairment.

Venous tinnitus has a tendency to subside spontaneously, and so Engström and Graf (1952) and Hentzer (1968) advised expectant treatment. Ott (1977) advocated ligation of the internal jugular vein; Cary (1961), in one case, has used a prosthetic device which provided a light pressure on the neck, and thus also on the internal jugular vein. The choice between expectancy and ligation must depend on how troublesome the tinnitus is for the patient.

In our own patient, the tinnitus was very annoying when its intensity increased. Like one of the cases referred to by Ward *et al.* (1975), the intensity of the tinnitus was so loud on one occasion that it could be heard by a person in her immediate surroundings. Coles *et al.* (1975) have described a case in which the intensity was measured to be 30 db. sensation level (SL). These intensities are high compared with the intensities of subjective tinnitus; in the majority of the cases, this does not exceed 10 db. SL (Goodwin and Johnson, 1980).

Objective tinnitus is relatively rare compared with subjective tinnitus, but it is important to elucidate the cause of objective tinnitus, because it is sometimes possible to cure the patient, as in the present case.

Summary

A case of objective venous tinnitus with onset just after an operation for otosclerosis is presented. The maximum intensity of the tinnitus was measured at 38 db. SPL. The tinnitus disappeared after ligation of the internal jugular vein on the affected side. It is concluded that, even if objective tinnitus is uncommon compared with subjective tinnitus, it is important to elucidate its cause, because it is sometimes possible to cure the patient.

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