



## CASE REPORT

# Pulsatile tinnitus related to progestin from intrauterine device<sup>☆</sup>



## Zumbido pulsátil relacionado a progestágeno de dispositivo intrauterino

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### Introduction

Patients with pulsatile tinnitus (PT) should be evaluated with different criteria than those suffering sensorineural tinnitus, as this feature suggests, in most cases, a specific etiology (Table 1). The most common cause of vascular PT is atherosclerotic disease due to endovascular flow changes, passing from a laminar to turbulent state and generating the sound perceived by the patient.<sup>1,2</sup> The use of contraceptive methods has become popular, and the side effects of hormone exposure should always be considered.<sup>3</sup>

The aim of this study is to report the case of a female patient who had pulsatile tinnitus related to a progestin (levonorgestrel)-containing intrauterine device.

### Case report

CLP, a 32-year-old Caucasian woman born in São Paulo, for about 1 year had experienced pulsatile tinnitus in the right

ear that was synchronous with her heartbeat. The patient related the onset of symptoms to months after the birth of her son. She denied head trauma, dizziness or hearing loss; she experienced difficulty sleeping due to the intensity of the tinnitus (score = 8 on a visual analogue scale, VAS), and reported discreet evening swelling of her lower limbs. As to her personal history, this patient denied systemic diseases such as hypertension, diabetes, hyper- or hypothyroidism. The patient had an intrauterine device (IUD) placed about 6 months previously.

On physical examination, the patient was normotensive and with normal bilateral otoscopy. She reported decreased tinnitus during cervical compression maneuver over large vessels on the right, but with no change on head rotation. Cervical auscultation revealed no thrills or murmurs with the stethoscope. Laboratory workup: hemoglobin 14 g/dL, hematocrit 41%, normal levels for total cholesterol and its fractions, triglycerides and thyroid hormones. This patient exhibited normal pure tone and speech audiometry and impedance tests.

An imaging evaluation (Doppler ultrasound of carotid and vertebrals, tomography of temporal bones, magnetic resonance of inner ears and cranial angioresonance) was performed, with no identified abnormalities (Fig. 1).

After the most frequent causes of vascular PT were ruled out, it was hypothesized a relationship with her progestin-containing intrauterine device. Our patient

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**Table 1** Causes of pulsatile tinnitus.

Vascular causes	
Arterial	Atherosclerotic disease; aberrant carotid in middle ear; dehiscence of internal carotid in the middle ear; persistent stapedial artery; intrameatal vascular loop
Venous	Venous hum; dehiscent or high jugular bulb in middle ear
Tumors	Paraganglioma; arteriovenous malformations
Muscular causes	
Myoclonus	Soft palate; pharyngeal muscles; middle ear muscles
Eustachian tube	
	Patent Eustachian tube
Third window syndrome	
	Superior semicircular canal dehiscence; vestibular aqueduct syndrome; perilymphatic fistula

received instructions regarding the cause of tinnitus, and was treated with a beta-blocker (metoprolol 50 mg/day) with significant improvement of symptoms. The patient started to sleep better (score=3 for tinnitus in VAS) and

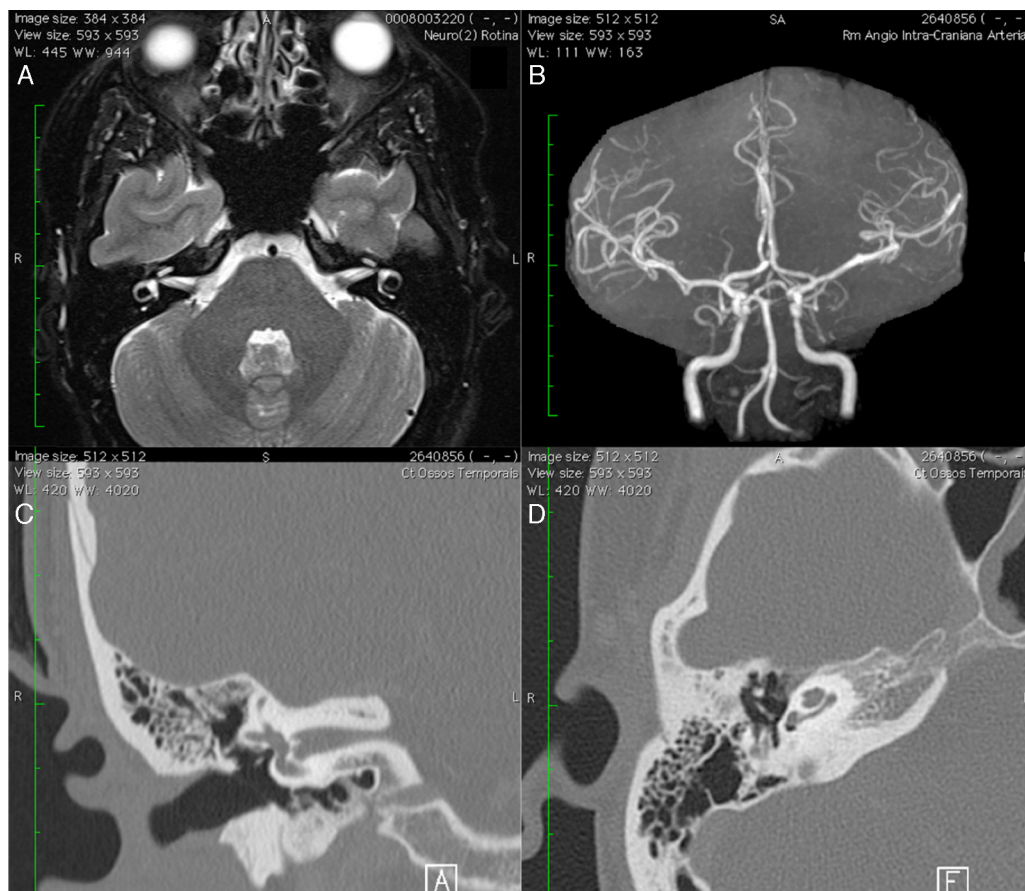
discontinued the medication after two months, resulting in increased intensity of tinnitus. Because of the persistence of considerable discomfort, removal of the IUD was carried out, with complete remission of tinnitus.

## Discussion

Levonorgestrel is a progestin (synthetic progesterone) widely used as hormonal contraceptive, with efficacy and safety already defined. The agent can be administered orally or as an intrauterine implant.<sup>4</sup>

Progesterone in larger quantities increases the reabsorption of sodium, chloride and water in distal renal tubules with consequent change in the blood crisis and in its dynamics and endovascular flow. A search with imaging methods (p. ex., Doppler ultrasound, MRI and angio-MR) is the most appropriate choice.<sup>2,5</sup> In the present case, the absence of lesions that could justify the presence of PT reinforced the hypothesis of hemodynamic change, secondary to the use of levonorgestrel.

The inner ear is very susceptible to hormonal changes and fluctuations; nevertheless, we do not believe that this is the mechanism of tinnitus generation, since specific progesterone receptors have not been identified in the cochlea.<sup>3</sup> The use of oral contraceptives was associated with vestibular disorders, with alterations in vestibular examination



**Figure 1** Magnetic resonance (A), magnetic resonance angiography (B) and computerized tomography of temporal bones in coronal (C) and axial slices, without vascular changes that could justify a complaint of pulsatile tinnitus.

and tinnitus,<sup>5</sup> but our search did not find studies with intrauterine devices in the literature review.

The great diversity of diagnoses related to PT requires a thorough investigation; and this is time-consuming and demands financial resources.<sup>1,6</sup> The American Academy of Otolaryngology (AAO-HNS) review recommends investigation in cases of unilateral tinnitus, pulsatile tinnitus, focal neurological abnormalities (focal neurological symptoms), or asymmetric hearing loss.<sup>7</sup>

In this case, of those factors that would be associated with the generation of vascular pulsatile tinnitus, we emphasize hypertension, atherosclerosis, thyroid hormones or blood crisis changes, and changes in endovascular flow dynamics caused by fluid retention related to progestin. Considering that clinical and ancillary (laboratory and imaging) tests ruled out primary causes, and in view of an improvement of symptoms with a low-dose beta-blocker, we suggested discontinuation of the contraceptive agent. With tinnitus improvement after the removal of the intrauterine device, we realized that the progestin was associated with the generation of the problem, even without having reintroduced the drug to evaluate its effect.

### Final considerations

The investigation of PT with imaging methods should be clear-sighted, in search of that injury justifying its generation, and with the choice of a specific treatment. Good clinical data and a judicious history are equally important to establish the diagnosis. The side effects of contraceptive

medications should be considered as possible causes of pulsatile tinnitus.

### Conflicts of interest

The authors declare no conflicts of interest.

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