

## CASE REPORT

### Objective Tinnitus Due to Voluntary Palatal Myoclonus in an 8-year-old Girl with Attention Deficit Hyperactivity Disorder

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A rare case of objective tinnitus due to voluntary palatal myoclonus in an 8-year-old girl with Attention Deficit Hyperactivity Disorder is reported. This case appears to be the third pediatric case reported with objective tinnitus resulting from voluntary palatal myoclonus. In cases with objective tinnitus due to essential-isolated palatal myoclonus, it should be kept in mind that it can be psychogenic or a tic disorder and relieves simply by reassurance without any further intervention.

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## Introduction

Tinnitus is the perception of a sound in the absence of an external acoustic stimulus. Tinnitus can be categorized as objective or subjective. Subjective tinnitus is perceived only by the patient and objective tinnitus is also heard by others. Objective tinnitus is rare and caused by a sound in the body<sup>[1]</sup>. Somatosounds producing objective tinnitus include vibrations produced by muscular contractions, vascular pulsations, breathing sounds transmitted to the ear by a patulous Eustachian tube. Another form of objective tinnitus results from spontaneous otoacoustic emissions from the inner ear<sup>[2]</sup>.

Objective tinnitus caused by muscular contractions can be due to palatal myoclonus or middle ear myoclonus. Palatal myoclonus is characterized by rhythmic contractions of the soft palate and usually bilateral. It is thought to be opening sound of the Eustachian tube

orifice, occurring as a result of tensor veli palatini contraction.

## Case report

An 8 year old girl presented with 4 month history of bilateral objective tinnitus, which is described as “clicking” by her parents. The patient was a previously healthy child with normal growth and development, except being on methylphenidate treatment 27 mg/day for one year with the diagnosis of ADHD (Attention Deficit Hyperactivity Disorder). Father expressed that the sound was not audible during sleep.

On physical examination, tympanic membranes were intact, there was no movement of the tympanic membrane. A snapping sound was audible near the patient without a stethoscope. Clicking sound was at a rate of 60-80 clicks per minute. The sound was

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sometimes faster and sometimes slower and was not synchronous with patient's pulsation. Endoscopic examination revealed no palatal, laryngeal or pharyngeal muscular contraction, but an enlarged adenoid. During the examination of the oropharynx the sound typically stopped. No visible contraction was noticed. There was no other neurologic deficit or abnormal systemic findings.

Pure tone audiometry, tympanometry and acoustic reflexes were normal. Cranial MRI was normal. During the audiologic examination it was noticed that the patient controlled the sound. She said she can produce the sound intentionally and sound never appears unless she wanted. But she stated that she couldn't help herself from producing the sound. Endoscopic examination through flexible nasopharyngoscope was repeated and the patient instructed to produce the sound. Palatal contraction synchronous with the clicking sound was seen. Diagnosis of objective tinnitus secondary to voluntary palatal myoclonus was made. After psychiatric evaluation, this palatal myoclonus is supposed to be psychogenic in origin. The patient and her parents were reassured, no further intervention was done. She was free of symptoms after two weeks of gradual improvement. The girl was totally symptom free after 4 months follow up.

## Discussion

Objective tinnitus (OT) is a rare entity in children. The causes of the OT mainly are, vascular, muscular and

spontaneous acoustic emissions from the inner ear. Contraction of the middle ear muscles, palatal muscles and laryngeal muscles can produce OT.

Palatal myoclonus (PM) is defined as the involuntary rhythmic contraction of the palatal musculature. This contraction results in a "clicking" sound, which is usually bilateral. PM has two forms of disease: symptomatic and essential PM. The etiology of either form is still not clear. Symptomatic PM is more common and proposed to result from a lesion of the connections between dental nucleus, red nucleus and inferior olivary nuclei (the so-called Gullian Mollaret triangle)<sup>[3]</sup>. Essential PM is thought to be functional analogue. Patients with essential PM usually have objective earclicks as their typical complaint and they are younger. The rhythm of Essential PM is influenced by sleep, coma and anesthesia<sup>[4]</sup>. In the literature, 13 pediatric cases with OT resulting from essential PM have been documented (Table 1)<sup>[5-16]</sup>. In five cases, OT reported to disappear during sleep, in three cases OT is persisted during sleep and in rest of the cases it is not reported whether OT disappears during sleep or not. In five of the cases, patients can stop their OT by valsalva or opening the mouth.

Salim et al. described a case of 9-year-old boy presented with OT resulting from voluntary PM. The patient had a left sided palatal myoclonus which appeared after an upper respiratory tract infection. He had an enlarged adenoid not encroaching the opening of the Eustachian

**Table 1.** Essential Palatal Myoclonus with Objective Tinnitus in Children

Authors, year	Age, sex	Disappearance during sleep	Voluntarily induced	Voluntarily stopped
Herman et al, 1967	12, M	unknown	unknown	unknown
Quarry, 1972	6, M	yes	unknown	unknown
Coles et al, 1975	11, F	yes	unknown	unknown
Jacobs et al, 1981	7, M	no	yes	yes
Litman et al, 1982	6, M	unknown	unknown	unknown
Tanaka et al, 1984	6, M	yes	unknown	unknown
Siegel et al, 1987	12, F	unknown	unknown	unknown
Fox and Baer, 1991	8, F	unknown	unknown	yes
Jero and Salmi, 2000	12, F	no	unknown	unknown
Krause et al, 2006	10, F	yes	unknown	yes
MacDonald, 2007	5, M	no	unknown	yes
Salim et al, 2009	9, M	unknown	yes	yes

tube. Two weeks later, signs of upper respiratory tract infection, clicking tinnitus and palatal myoclonus completely disappeared but the patient learned to induce and stop PM intentionally by focusing his attention<sup>[16]</sup>.

Although Salim et al. claimed their patient as the first reported pediatric case with OT secondary to voluntary PM, in 1981 Jacobs et al. reported a case of 7-year-old girl whose PM and OT began after general anesthesia for tonsillectomy. Her PM persisted during sleep. Few months later she learned to induce PM voluntarily<sup>[8]</sup>. Three adult cases of OT secondary to voluntary PM have been reported. Heller presented a 26-year-old man producing palatal muscular contractions to relieve him of fullness in the left ear<sup>[17]</sup>. Seidman reported a 39-year-old man who was able to control his PM. The patient learned to open and close his Eustachian tubes during scuba diving and able to produce OT for 15 years<sup>[18]</sup>. Nabuo et al. described a case of 26-year-old man who could induce his PM and OT voluntarily<sup>[19]</sup>.

Our patient is the third pediatric case of OT secondary to voluntary palatal myoclonus in the English literature. She also had an enlarged adenoid as Salim's patient. She had the diagnosis of ADHD and had been treated with methylphenidate. A number of children with ADHD develop comorbid tic disorders during school years<sup>[20]</sup>. Stimulant drugs used for the treatment of ADHD also can cause motor tics and mannerisms. These side effects may emerge at any stage of the treatment and they are transient, usually subtle tics<sup>[21]</sup>.

In 1968 Leventon et al. presented five cases with isolated PM which was attributed to a tic. In all their cases an underlying psychiatric entity was established. The authors claimed that, when PM appears as an isolated phenomenon it is always psychogenic<sup>[22]</sup>. Octavian et al. described two cases one of which was a 12-year-old boy, exhibiting rhythmic, repetitive palatal movements accompanied by a synchronous clicking sound which was partially suppressible and absent during sleep<sup>[23]</sup>. Both patients had associated ADHD and some other neuropsychiatric comorbidities such as obsessive compulsive disorder, impulsivity and Tourette syndrome with motor tics. Authors defined their cases as having tics rather than having essential PM. In our case OT due to palatal muscle contraction is also attributed to be

psychogenic. Since there is no clearcut distinction between psychogenic PM and palatal tics, it is difficult to differentiate it from tic disorder which may be a comorbid condition of ADHD or side effect of methylphenidate in our case.

In cases with OT due to essential-isolated PM, it should be kept in mind that it can be psychogenic or a tic disorder and relieves simply by reassurance without any further intervention. Objective tinnitus can be produced voluntarily and can be learned after being somewhat aware of Eustachian tube function. Upper respiratory tract infection, an enlarged adenoid, tonsillectomy or valsalva maneuver may increase this awareness. Authors think that it may be more appropriate to use the term "palatal muscle contraction" instead of "palatal myoclonus" "when it is voluntary, since palatal myoclonus is involuntary by definition.

**Conflict of interest:** The authors declare that they have no conflict of interest or any financial support

This material has never been published and is not currently under evaluation in any other peer-reviewed publication.

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