

Ménière's Disease and Various Types of Vertigo in Children

Gottfried Aust¹ and Miroslav Novotný²

¹ Center for Deaf Children, Berlin-Neukoelln, Germany, and ² Ear, Nose and Throat Clinic of St. Anne Hospital, Brno, Czech Republic

Abstract: Vertigo in children is less frequent than in adults, and examiners of patients showing these symptoms must rely on parents' or relatives' observations and details. Besides the equilibrium disorders caused by hereditary malabsorption syndromes or lesions in the peripheral and central vestibular structures, we know of typical diseases that are associated with vertigo and hearing problems and develop during childhood. One of them is Ménière's disease. Careful examinations are necessary to differentiate these illnesses from other vestibular disturbances accompanied by vertigo. Neurootological examinations in children, especially in small children, are more difficult than in adults. The reasons are the time-consuming examination necessary in the case of children and the problems connected with a plethora of troublesome individual tests. Our study gives an overview of Ménière's disease and related vestibular disturbances occurring during childhood.

Key Words: children; Ménière's disease; neurootological examination; pediatric audiology; vertigo

Vertigo in children is less frequent than in adults. However, besides equilibrium disorders caused by hereditary malabsorption syndromes or lesions in the peripheral and central vestibular structures, we know of typical diseases that are associated with vertigo and hearing problems and develop during childhood. In children, one can also see vertigo in the form of attacks that may be accompanied by hearing problems. Examiners must rely on parents' or relatives' observations and reports when it comes to an affected child's history, as such children cannot provide detailed descriptions of their symptoms. Once such children reach school age, their own statements become more precise. This article presents case observations of children with various types of vertigo. These children were examined in the Ear, Nose, and Throat Clinic of the medical faculty of Masaryk University, Brno, Czech

Republic, and in the Advice Centre for Children with Hearing Disabilities in Berlin-Neukoelln, Germany.

NEUROOTOLOGICAL EXAMINATION

During neurootological examinations and while evaluating test results, examiners must consider a child's age, development, and cooperation throughout the tests. Several neurootological tests can be used: vestibular tests, vestibuloocular reaction, oculomotor tests, vestibulo-spinal tests, visuo-vestibular interaction analysis, and visuoproprioceptive interaction analysis.

Examination time in children is limited, depending on the aforementioned conditions. For very small children, recordings of only spontaneous eye movements and a rotatory test are possible. Caloric tests usually cause discomfort in babies and small children, but they continue to be unpleasant also for children of preschool and school age. The caloric stimulus is uncomfortable and leads to resistance in children. After the uncomfortable procedure of the caloric stimulus, the observation or registration of the nystagmus reaction is difficult or even impossible, owing to affected children's crying and agitation. Sometimes, the vertigo sensation after calorization leads to panic and agitation in these small patients.

Reprint requests: Dr. Gottfried Aust, Beratungsstelle für Hoerbehinderte, Paster-Behrens-Strasse 81 D-12359 Berlin, Germany. Phone: +49 30 2196 3300; Fax: +49 30 2196 3301; E-mail: gottfriedaust@online.de

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In all children, and also in babies, examinations with Bartels/Frenzel's glasses are valuable for looking for spontaneous nystagmus or positional nystagmus. Registration of spontaneous eye movements with electronystagmography or videonystagmography provides more detailed information [1–5].

Certain tests are specifically tailored in respect of affected children's ages. They include such audiometric tests as behavior audiometry, play audiometry, and normal pure-tone audiometry, otoacoustic emissions (transient evoked otoacoustic emissions, distortion product otoacoustic emissions), and auditory brainstem response.

Behavior audiometry is normally used in children younger than age 2. The use of play audiometry is possible from 2 to 6 years of age. In play audiometry, children are conditioned to perform a game (e.g., to set up a series of plastic cups after hearing sound signals). After conditioning, we start with free-field measurement, followed by measurement of bone conduction, and then threshold measurement with headphones. Normal pure-tone audiometry is suitable for use with school-age children. Measurement of otoacoustic emissions and auditory brainstem response can be performed for all age groups [6–8].

TYPES OF CHILDHOOD VERTIGO

Various causes can trigger vertigo. They include different types of nystagmus (spontaneous, gaze, and positional); disturbances of the labyrinth and central vestibular structures; lesions in the visual and vestibulospinal systems caused by heredity or by toxic agents (ototoxic, cytostatic); and brain tumors, meningitis, encephalitis, otitis, fistulas of the labyrinth or head trauma, and the like.

In addition, we know of a type of vertigo typically appearing only in childhood. This type of vertigo manifests in the form of short vertigo attacks. Such attacks are different from long-lasting vertigo conditions (as described heretofore) and are also different from the so-called vertigo in children with coordination problems [9–12].

Morbus Ménière

In the Ear, Nose and Throat Clinic of Brno, a total of 400 patients were listed with diagnosed Ménière's disease. These patients' ages ranged between 7 and 79 years (190 males [47.5%] and 210 females [52.5%]). The maximum appearance of Ménière's disease occurred during the fifth and sixth decades of life. However, of this group of patients, eleven (2.75%) were children aged between 7 and 15 years: three 7-year-olds, three 9-year-olds, and five 15-year-olds. All 11 children showed the

typical history of rotatory-type vertigo attacks lasting a few hours, with fluctuating hearing disorders and tinnitus. The older children also reported feelings of fullness in the affected ear. Additional symptoms during the attacks were nausea and vomiting.

The audiological findings showed fluctuating hearing loss on one side. In cases in which children were able to explain, we discovered that tinnitus was most apparent in the lower frequencies. The electronystagmography showed mainly dysrhythmical nystagmus patterns, with the tendency to hyperreflexia on the affected side. Spontaneous eye movements were not systematically directed to one side. The complex diagnostic workup, including neurology, ophthalmology, internal medicine, and computed tomography, showed no pathological findings [13–15].

Benign Paroxysmal Vertigo in Childhood

During the last several years, we examined 137 children with vertiginous complaints. The medical history in 12 of these children was characterized by turning-vertigo attacks with a falling tendency in duration, lasting seconds or minutes. Vestibular function was normal in all these cases; in only four children was weak spontaneous nystagmus recorded. Audiological disturbances were not combined with this type of vertigo. The complex diagnostic workup, including neurology, ophthalmology, internal medicine, and computed tomography, showed no pathological findings. The vertigo attacks ceased during the course of a few years.

In neurootological literature, this type of vertigo is called *benign paroxysmal vertigo of childhood*; it is seen between the first and fourth years of life. A migraine mechanism is assumed to be the causative factor, because a transition to migraine was observed. Special treatment is not necessary; the course is benign, and it leads to spontaneous remission [16,17].

Benign paroxysmal torticollis is probably an early special form of migraine and is seen between the first and fifth years of life. We observed one child with this problem several years ago, but we did not perform vestibular testing.

Basilar Migraine

A further childhood illness is basilar migraine, with incidences between the first and tenth years of life. The symptoms are visual problems, standing and walking ataxia, vertigo and nausea, headaches in the occiput, and neurological symptoms.

Differential diagnosis is necessary for patients with benign paroxysmal childhood vertigo and vestibular

epilepsy. In all types of childhood vertigo, one should take familial periodic vertigo into consideration [16,17].

Spasmus Nutans

Spasmus nutans appears only in childhood. It is characterized by the triad of lesion in the supranuclear oculomotorius in the form of a fixating pendular nystagmus, a tremorlike head shaking, and ocular torticollis. The symptoms begin between the fourth and eighteenth months of life and show spontaneous remission until the third year of life. Its etiology is unknown, and therapy is not necessary, owing to its spontaneous remission. In some cases of early tumors in the third ventricle and the optic chiasm, differential diagnosis is necessary. In our clinic, however, we have not seen any patient with this syndrome for the last 23 years [16–19].

THERAPY

In cases of true illness, the cause must be treated (e.g., operative repair of a fistula, removal of a tumor, or antibiotic therapy for an infectious disease). Antivertiginous and antiemetic drugs have a symptomatic effect and are important for the reduction of severe vertigo and nausea in acute labyrinthine lesions or attacks and during motion sickness. One of the unwanted side effects of these drugs is the delay of compensation and habituation processes. Physical training is of great importance in the treatment of disturbances of the vestibular system in children (e.g., Bobath, Jeane Ayres, and others). The aim of this therapy is activation of the physiological moving ability to normal levels and stabilization of the body's equilibrium. Habituation training with special and individual training patterns is one possibility for treatment of acute labyrinthine loss [9, 13,20].

Treatment in children with Ménière's disease should include a dietary plan, supplementing with the vitamin B complex, sedatives and tranquilizers (depending on an affected child's complaints), and vasoactive drugs. The authors also recommend looking at the consequences of the disease for further development of an affected child (e.g., to take into consideration the selection of the child's future occupation).

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