

Carmen Agra-Tuñas^{a,b,c,d,*}, Silvia Aranda-García^{c,e,f},
Graciela Gómez-Silva^{a,c}, Verónica Izquierdo^{c,d,g},
Antonio Rodríguez-Núñez^{a,b,c,d,g}

^a *Sección de Pediatría Crítica, Cuidados Intensivos y Paliativos Pediátricos, Área de Pediatría, Complejo Hospitalario Universitario de Santiago, Santiago de Compostela, Spain*

^b *Grupo de Investigación CLINURSID, Departamento de Psiquiatría, Radiología, Salud Pública, Enfermería y Medicina, Universidad de Santiago de Compostela, Santiago de Compostela, Spain*

^c *Grupo de Investigación SICRUS, Fundación Pública Galega Instituto de Investigación Sanitaria Santiago de Compostela, Santiago de Compostela, Spain*

^d *Facultade de Enfermería, Universidade de Santiago de Compostela, Santiago de Compostela, Spain*

^e *Grupo de Investigación GRAFAIS, Institut Nacional d'Educació Física de Catalunya (INEFC), Universitat de Barcelona (UB), Barcelona, Spain*

^f *Faculty of Health, University Camilo José Cela, Madrid, Spain*

^g *Red de Investigación Colaborativa Orientada a los Resultados en Salud (RICORS): Intervenciones de atención primaria para prevenir enfermedades crónicas maternas e infantiles de origen perinatal y del desarrollo (RICORS), RD21/0012/0025, Instituto de Salud Carlos III, Madrid, Spain*

* Corresponding author.

E-mail address: Carmen.Agra.Tunas@sergas.es
(C. Agra-Tuñas).

<https://doi.org/10.1016/j.anpede.2024.09.006>
2341-2879/ © 2024 Asociación Española de Pediatría. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Characterization and management of vertigo in the pediatric population: comprehensive study on the most common etiology, audiovestibular, and psychosomatic manifestations



Caracterización y manejo del vértigo en la población pediátrica: estudio integral sobre la etiología, manifestaciones audiovestibulares y psicósomáticas más frecuentes

Dear Editor:

Vertigo is described as the illusion of intrinsic or extrinsic swaying or spinning motion of either the surroundings or the self. It is a relatively common condition in the paediatric population with an estimated prevalence of 5.20% and 6.00% and with a predominance of the female sex.¹

These symptoms can result in delayed maturation of postural balance, coordination problems and the development of paroxysmal torticollis (head tilt) to compensate for the deficit.² Challenges in the clinical evaluation, anxiety and the lack of communication ability can delay the ordering of vestibular function tests and therefore the definitive diagnosis.³

The aims of this study were basically twofold: first, to characterize the most frequent causes of vertigo in childhood from a comprehensive audiovestibular perspective and, second, to assess the potential association with anxiety and depression symptoms in patients with vestibular disorders.

We designed a cross-sectional retrospective observational study in a tertiary care centre. The sample included 46 patients who were followed for 4.32 years (range, 2–7), with a mean age of 10.19 years (SD, 6.10; range 6–14) and a predominance of female patients (71.73%; n = 33). The statistical analysis was performed with the software R Studio, version 1.4.1106.

In the otoneurological examination using video nystagmography goggles (VideoFrenzel Interacoustics, Denmark), 28.26% of patients (n = 13) tested positive for spontaneous nystagmus, with abnormal visual fixation indicative of a vestibular or central cause. The video head impulse test (vHIT, GN Otometrics, Denmark) yielded abnormal results in 15.21% (n = 7), that is, detected impairment in the vestibulo-ocular reflex indicative of problems coordinating eye movements with head movements. Vestibular evoked myogenic potential testing (VEMPS, Eclipse, Interacoustics, Denmark) detected abnormalities in 45.65% (n = 21), indicating impairment of the otolithic organs responsible for stabilising linear motion and maintaining balance and posture.

The mean pure tone average (PTA) (AC40, Interacoustics, Denmark) was 25.54 dB (SD, 3.64), indicative of mild hearing impairment or loss. From an audiometric perspective, patients with a diagnosis of Ménière disease stood out on account of the aggressive progression typically observed in childhood-onset cases of this disease. However, the patients with the most severe hearing impairment were those with third window syndrome, such as perilymphatic fistula or enlarged vestibular aqueduct, 3 of whom required placement of cochlear implants.

Some of the diagnoses made in the patients with the results of the audiovestibular tests can be found in [Fig. 1A](#), [Fig. 1B](#) summarises the management, and [Table 1](#) provides a comprehensive summary of diagnosis and treatment.

It is worth noting that 16 of these patients (34.8%) had a previous diagnosis of depression or anxiety disorder. In fact, 10 of them (62.50%) were currently in treatment with

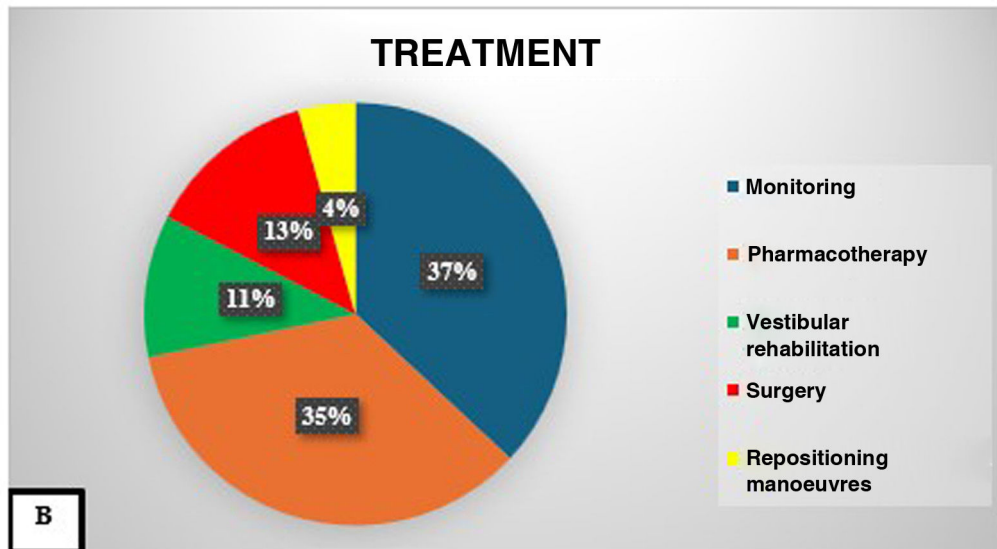
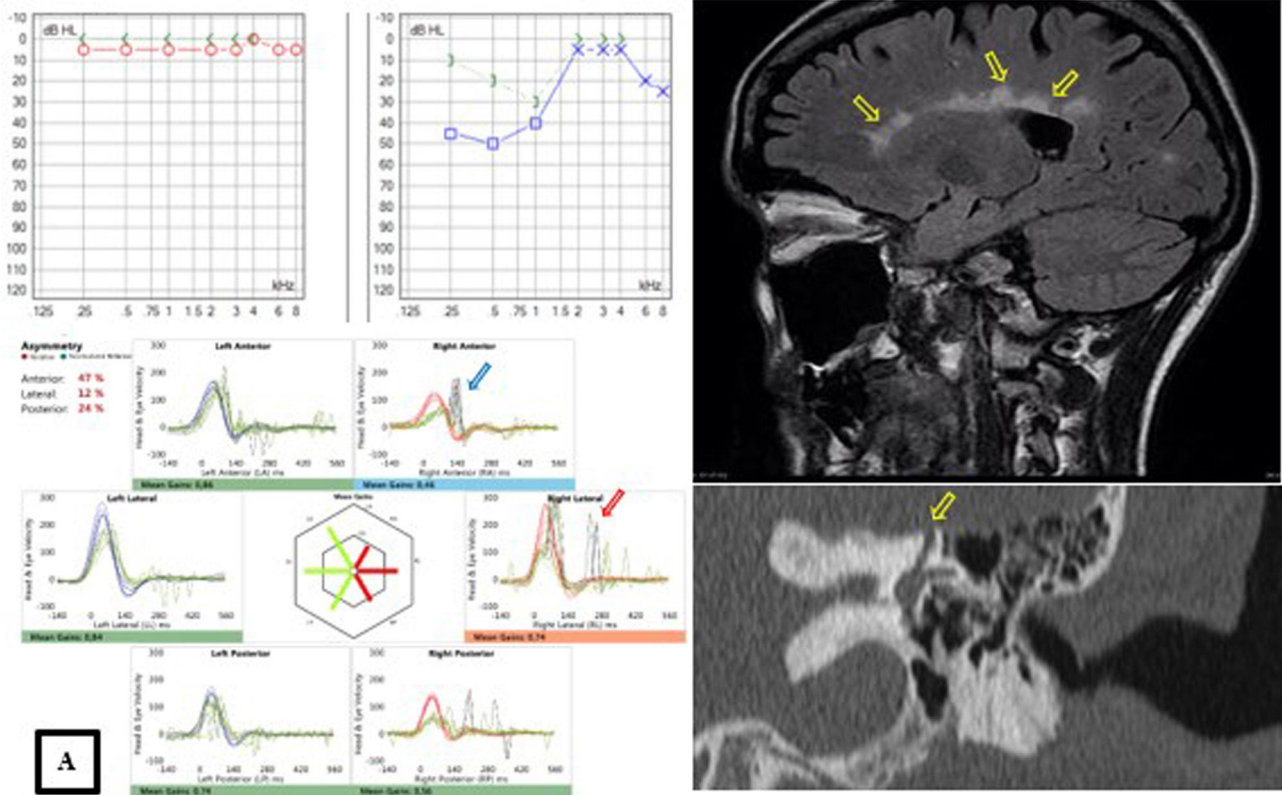


Figure 1 (A) Images of different diagnostic tests performed to make the diagnosis. The top left image shows the audiogram of a patient with Ménière disease of the left ear, with the characteristic pattern of low frequency hearing loss. The bottom left image corresponds to the vHIT of a patient with vestibulopathy of the right ear, with impaired function on the right side and presence of both covert (blue arrow) and overt (red arrow) saccades. The top right image shows an MRI scan of a patient with vertigo and hearing loss due to multiple sclerosis, with the characteristic feature of Dawson fingers (yellow arrows). Lastly, the bottom right image corresponds to a patient with third window syndrome due to superior semicircular canal dehiscence (yellow arrow). (B) Summary of the treatments used to manage the diseases of the patients in the cohort.

Table 1 Summary of the diagnoses, testing results and treatments for the entire cohort of patients.

Diagnosis	Frequency	Spontaneous nystagmus	Abnormal vHIT	Abnormal VEMPS	PTA medio	Treatment
Vestibular migraine	20 (43.47%)	2 (4.35%)	1 (2.17%)	6 (13.04%)	16.37 dB	11 Monitoring 6 Flunarizine 2 Topiramate 1 Triptanes
Recurrent vertigo of childhood	9 (19.56%)	2 (4.35%)	0 (0%)	2 (4.35%)	9.56 dB	5 Monitoring 2 Antihistamines 2 Vestibular rehab
Third window syndrome	5 (10.87%)	3 (6.52%)	2 (4.35%)	5 (10.87%)	89.12 dB	3 Cochlear implant surgery 1 Acetazolamide 1 Monitoring
Motion sickness	3 (6.52%)	0 (0%)	0 (0%)	0 (0%)	5.50 dB	3 Rehab. vestibular
Ménière disease	3 (6.52%)	2 (4.35%)	2 (4.35%)	2 (4.35%)	59.75 dB	2 Cochlear implant surgery 1 Acetazolamide
BPPV	2 (4.35%)	2 (4.35%)	0 (0%)	0 (0%)	3.75 dB	2 Repositioning manoeuvres
Vestibular paroxysmia	2 (4.35%)	0 (0%)	0 (0%)	1 (2.17%)	2.5 dB	2 Oxcarbazepine
Central vertigo RRMS	2 (4.35%)	2 (4.35%)	2 (4.35%)	2 (4.35%)	47.26 dB	1 Surgery + RTx
Astrocytoma CNS						1 Natalizumab

CNS, central nervous system; Rehab, rehabilitation; RRMS, relapsing-remitting multiple sclerosis; RTx, radiation therapy.

antidepressant agents and/or psychotherapy at the time of the assessment of their vestibular manifestations. Thirty-five percent of patients with vestibular migraine (VM) ($n=7$) had psychosomatic symptoms, a proportion that increased to 44.44% ($n=4$) in patients with recurrent vertigo of childhood (RVC).

As we observed in our sample, VM or RVC are considered the main causes of episodic vertigo in the paediatric population with a corresponding reduction in the frequency of benign paroxysmal positional vertigo (BPPV), which may be due to anatomical differences that favour the trapping of otoconia in children,⁴ and ischaemic stroke, two of the most common causes in adult of both acute and chronic vertigo. What we propose is the investigation of whether childhood vertigo is frequently associated with an underlying anxious-depressive component. According to Erbek et al., there is a bidirectional relationship between neurological and psychiatric disorders, since the symptoms of vestibular disorders tend to have an impact on the biopsychosocial domain. Symptoms may lead patients to withdraw with the aim of avoiding triggering stimuli, which in turn gives rise to anxiety, depression and/or behavioural disorders, causing emotional stress.⁵

In summary, the challenges met in the diagnosis of childhood vertigo often lead to the attribution of presenting symptoms to psychosomatic disorders rather than their more common causes, such as MV or RVC. The limitations to daily living that result from these symptoms cause an emotional stress that may mask an underlying vestibular disorder or a central nervous system disorder for which medical or surgical treatment is available, so audiovestibular testing should always be performed to avoid overlooking disorders that, with proper treatment, may have a minimal impact on the patient's quality of life.

Funding

This research did not receive any external funding.

Informed consent

We obtained written informed consent for all the participants in the study.

The study protocol was reviewed and approved in April 2024 by the Ethics Committee of the Clínica Universidad de Navarra (file CEI 2024.168). In addition, the study was designed and conducted in adherence to the declarations of the Declaration of Helsinki de 1975.

Conflicts of interest

The authors have no conflicts of interest to declare.

References

- Li C-M, Hoffman HJ, Ward BK, Cohen HS, Rine RM. Epidemiology of dizziness and balance problems in children in the united states: a population-based study. *The J Pediatr*. 2016;171:240–7.e3.
- Taylor J, Goodkin HP. Dizziness and vertigo in the adolescent. *Otolaryngol Clin North Am*. 2011;44:309–21.
- Balatsouras DG, Kaberos A, Assimakopoulos D, Katotomichelakis M, Economou NC, Korres SG. Etiology of vertigo in children. *Int J Pediatr Otorhinolaryngol*. 2007;71:487–94.
- Femia P, González del Pino B, Pérez-Fernández N. Exploración vestibular de niños con alteraciones del equilibrio (I): métodos de la exploración clínica e instrumental. *Acta Otorrinolaringol Esp*. 2011;62(4):311–7.
- Erbek SH, Erbek SS, Yılmaz I, Topal O, Ozgirgin N, Ozluoglu LN, et al. Vertigo in childhood: a clinical experience. *Int J Pediatr Otorhinolaryngol [Internet]*. 2006;70(9):1547–54.

Joan Lorente-Piera^{a,*}, Eduardo Arnaus Martín^b,
Christian Espinoza-Vinces^c, Beatriz Remon-González^b,
Carla Rodríguez-Zanetti^a, Raquel Manrique-Huarte^a

^a *Departamento de Otorrinolaringología, Clínica Universidad de Navarra, Pamplona, Spain*

^b *Departamento de Pediatría, Clínica Universidad de Navarra, Pamplona, Spain*

^c *Departamento de Neurología, Clínica Universidad de Navarra, Pamplona, Spain*

* Corresponding author.

E-mail address: jlorentep@unav.es (J. Lorente-Piera).

30 June 2024 15 July 2024

<https://doi.org/10.1016/j.anpedi.2024.09.007>

2341-2879/ © 2024 Asociación Española de Pediatría. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Use of topical antibiotic therapy in acute otitis media with otorrhea: Results of a national survey



Uso de antibioterapia tópica en otitis media aguda con otorrea: resultados de una encuesta nacional

Dear Editor,

Suppurative acute otitis media (AOM) is defined as the acute and symptomatic presence of exudate and inflammation in the middle ear. The presence of otorrhea in AOM is considered a risk factor and an indication for prescribing systemic antibiotherapy. The use of topical antibiotherapy is widespread in both inpatient and outpatient emergency departments, in spite of the fact that the most recent evidence only supports its use in patients with tympanostomy tubes (TTs), which is what is recommended in current protocols.¹ Topical ciprofloxacin is the first-line agent, and the use of local steroids is not recommended due to the lack of standardised clinical trials evaluating their efficacy.

The aim of our study was to analyse the use of topical antibiotherapy in suppurative AOM by paediatricians, and whether it conforms to the current recommendations of scientific societies. To this end, we developed an online questionnaire with 9 questions and conducted a survey of medical intern-residents in paediatrics, primary care paediatricians and hospital-based paediatricians from 6 hospitals (2 of which were tertiary care centres) and 3 primary care centres between November and December of 2023. We used the Google Forms platform to upload the questionnaire as an online form, and provided access to it to potential participants through the distribution of a QR code.

We received 265 valid responses. Of this total, 69.8% (185/265) were submitted by paediatricians and 30.2% (80/265) by medical intern-residents. In addition, 18.8% worked in primary care and 81.1% in hospital. Of all respondents, 44.9% (119/265) reported using topical antibiotherapy in patients with suppurative AOM who did not carry TTs, a percentage that increased to 61.2% in medical intern-residents ($P < 0.001$). In the case of patients with

TTs, the percentage rose to 69.1% (183/265), with no significant differences based on the care setting or professional category (Table 1). Furthermore, 4.2% reported prescribing topical antibiotherapy alone, without the addition of a systemic antibiotic. Ciprofloxacin was the most frequently used topical antibiotic, prescribed as monotherapy (71.5%) or combined with steroids (41.6%). Last of all, 65.2% of respondents considered that topical treatment improved outcomes in cases of suppurative AOM.

Our study evinces the heterogeneity among health care providers in the use of topical antibiotherapy for AOM. Almost half of respondents, independently of the care setting, did not adhere to current recommendations, especially in the group of physicians in training. The use of topical antibiotics, alone or in combination with systemic antibiotics, for management of suppurative AOM remains controversial. The protocol of the Sociedad Española de Infectología Pediátrica (Spanish Society of Paediatric Infectious Disease)¹ and updated treatment guidelines published in Italy based on recent evidence² do not recommend prescription of topical antibiotherapy for suppurative AOM in the general paediatric population. However, the latest consensus documents on the management of AOM published in Spain barely address topical treatment.^{3,4} The most recent paediatric otorhinolaryngology guideline from 2022 only recommends it for use in patients with TTs.⁵ A multicentre study demonstrated the superiority of the combination of topical antibiotic and steroid therapy over oral antibiotherapy, so this could be considered a valid treatment option in this particular group of patients.⁶ Otorrhea is a common complication in patients with TTs following their insertion, and it usually results from a viral infection with bacterial superinfection and biofilm formation, for which treatment with topical antibiotics is effective; however, these outcomes should not be extrapolated to patients without TTs who present with spontaneous perforation.

Ciprofloxacin was the topical antibiotic respondents prescribed most frequently for suppurative AOM, and up to 41.6% reported prescribing it combined with topical steroids, a combination that is not currently recommended in clinical guidelines.

The main limitation of our study is the small sample size, it was challenging to assess the degree of participation bias since it was an online survey and respondents' answers may have differed from actual clinical practice. Nevertheless, the results suggest that the prescription of topical antibiotics for suppurative AOM is a widespread prac-