Assessment Techniques for Vestibular Evaluation in Pediatric Patients

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KEYWORDS

- Pediatric vestibular evaluation • Videonystagmography
- Video-oculography • Rotary chair testing
- Computerized dynamic posturography
- Vestibular evoked myogenic potentials

The area of pediatric vestibular evaluation has become popular in audiology and otolaryngology clinics in recent years. As early identification of hearing impairment has unfolded, so too has early identification of vestibular disorders. With regard to both audiology and otolaryngology, the earlier the identification, the earlier remediation strategies can be implemented. Researchers and clinicians have contributed valuable information related to vestibular disorders in the pediatric population. There has been a paucity of both clinical and research work related to vestibular evaluation techniques useful for young children. This review focuses on adaptation of adult vestibular evaluation techniques for use with pediatric patients, beginning with the medical/physical examination and progressing through major tests of vestibular function. An important concept recurring throughout is that the use of pediatric normative data is crucial, so that results obtained after testing a pediatric patient are not compared with adult normative data.

HISTORY AND THE MEDICAL EVALUATION

Many clinicians who perform vestibular evaluations have remarked that the case history is one of the most important diagnostic tools available when evaluating a dizzy patient. Although the author firmly believes that this premise also holds true with

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pediatric patients, a need exists within the profession for development of a reliable case history instrument. On searching the literature regarding vestibular evaluation in children, one may view several different bodies of work. On one hand, Physical Therapy and Occupational Therapy studies document evaluation and remediation techniques utilized with such disorders as autism, motor delay, learning disability, and behavioral disorders.[1–7] While fascinating, these evaluative tools are very different from those discovered within the Audiology and Otolaryngology bodies of literature. Many studies within this latter group link vestibular disorders to such entities as migraine syndrome, benign recurrent vertigo of childhood, otitis media, and sensorineural hearing loss.[8–13] Additional research is needed regarding other syndromes associated with childhood dizziness including CHARGE association, Cogan syndrome, and Usher syndrome, among others.[14–16] As evaluative tools and remediation strategies are also variable among disciplines, greater understanding of other disciplines and greater degree of collaboration are worthy goals.

Many challenges exist with regard to vestibular evaluation of children. For example, pediatric patients may not be able to thoroughly describe dizziness and other symptoms, necessitating the development of appropriate checklists and parent questionnaires. Another challenge related to vestibular evaluation is that the cost of many pieces of technologically advanced equipment is prohibitive, regardless of patient age. This article highlights adaptation of adult screening techniques for pediatric patients, and describes the relative ease of performance of these tests in an office setting with minimal equipment.

PHYSICAL EXAMINATION

Within an office setting, the clinician may begin by checking for any spontaneous and/or gaze-evoked nystagmus that may be present. One simple method is to have the child look straight ahead, if able to follow such verbal commands, and then to follow an examiner's finger as it moves to the right and left and in upward and downward directions. Mental alerting is important with regard to many vestibular measures, and must be geared to the child's age and capabilities. In this case and especially in viewing spontaneous nystagmus, informal conversation and establishing rapport should suffice. It may be possible to use Frenzel lenses for magnification and alleviation of visual fixation suppression, depending on the child's age. At this point the clinician may also briefly check to determine that the eyes are moving conjugately.

As the clinician approaches a dynamic evaluation, consideration may be given to testing "head-shake nystagmus" (HSN). According to Fife and colleagues,[17] the vestibulo-ocular reflex (VOR) should be readily observable by the age of 9 to 12 months in typically developing infants. Visualization may be enhanced via Frenzel lenses, electro-oculography (EOG), or infrared video. As with adults, the child's head may be gently rotated back and forth in a rhythmic, horizontal manner. Theoretically, symmetric vestibular function will not induce symptoms, although some children may not be in a developmental position to verbalize the presence of such symptoms. HSN will not be seen in patients with symmetric peripheral vestibular function, although it may be observed in the presence of a vestibular asymmetry. HSN screening may be advantageous in situations where bithermal caloric irrigations and/or rotary chair testing may not be feasible. If the child is able to perform these tests, HSN screening may provide complementary information by incorporating higher frequencies of head motion.

Head-thrust testing (HTT) may also be performed with young children as part of a medical/physical workup. This procedure is based on the VOR, which as previously