



Abstract

Objective:

Define rates of successful completion and identify factors predictive of cooperation with vestibular testing in pediatric patients. Characterize the spectrum of diagnosis in children referred for vertigo / dizziness.

Methods:

Retrospective review of vestibular battery tests performed on patients less than 18 years old at a tertiary care center from 2004 – 2015.

Results:

188 patients that underwent testing were identified. When grouped by age, there was a statistical difference in ability to complete testing ($p < 0.0001$). 17/30 (56.6%) of patients less than 10 years old, 60 / 70 (85.7%) ages 10 – 15, and 84 / 88 (95.5%) more than 15 years completed full testing. Patients that were uncooperative were significantly younger than those that were cooperative (10.7 yrs vs. 14.5, $p < 0.001$). Dithermal caloric testing was the most commonly omitted component of the vestibular battery. Failure to cooperate during the vestibular battery limited full interpretation of results in 8 of 27 (29.6%) encounters. Migraine is the most common diagnosis in children referred for vestibular battery evaluation, while BPVC is the most common peripheral vestibulopathy.

Conclusions:

Vestibular testing can be successfully completed in pediatric patients; however certain components have limited tolerability. In patients younger than 10, an abbreviated battery omitting poorly tolerated components can be adopted with higher likelihood of obtaining useful diagnostic information.

Introduction

Pediatric vestibular disorders may present with a wide variety of symptoms including motor delay, torticollis, clumsiness, recurrent vomiting, and vegetative inactivity.^{1,2} The differential is diverse and differs markedly from adult vertigo.^{3,4} Children may lack the language skills to adequately convey their symptoms to the clinician, adding a layer of complexity to the diagnosis. Workup of pediatric vestibular disorders may include a careful history, standardized questionnaires, routine physical examination, imaging, and more sophisticated testing included in the standard vestibular battery.⁵

The vestibular battery is the gold standard for evaluation of the dizzy child. Furthermore, a thorough vestibular assessment is often indicated in cases of congenital hearing loss, such as prior to cochlear implantation. Vestibular testing in children presents significant challenges for the clinician. Testing may invoke unpleasant feelings of vertigo and nausea. Equipment such as the rotatory chair and video oculography goggles can be intimidating. A skilled clinician must establish a rapport with the child and caregiver, anticipate potential problems, and conduct the battery accordingly.

Currently, there is a paucity of literature on the topic of comprehensive pediatric vestibular testing. The objective of our study is to define rates of successful completion and identify factors predictive of cooperation with vestibular testing in pediatric patients

Methods and Materials

A Retrospective review of vestibular battery tests performed on patients less than 18 years old at a tertiary care center from 2004 – 2015. At our institution, the vestibular battery is composed of 12 components. Testing was performed following a standard approach and interpreted by single reviewer. Regardless of age, all testing began with a behavioral assessment including evaluation of gait and postural control. Following this objective testing was attempted. Not all components were attempted on every patient. Patients were referred for further subspecialty (e.g. neurology, ophthalmology) evaluation as needed. All individual procedural reports were reviewed and data was collected including patient demographics, testing compliance / cooperation, testing results, and final diagnosis. Testing success was defined as completion of all attempted components. Testing was considered incomplete if patient did not cooperate with 1 or more attempted components.

Summary statistics were calculated. Using Fischer's exact test, tolerability of testing among age groups ≤ 10 , 10 to ≤ 15 , and 15 years and older was compared.

Results

188 patients that underwent testing were identified. 19 patient underwent testing in the setting of cochlear implantation, the remainder were tested after presenting for potential vestibular issues. 35 children had abnormal test results. The most common final diagnosis were non-vestibular in origin (Fig 1). A diagnosis was reached in 139 of 169 patients presenting with vestibular complaints. Patients unable to complete the full battery could still complete an average of 7.9 components. When grouped by age, there was a statistical difference in ability to complete testing ($p < 0.0001$). 17/30 (56.6%) of patients less than 10 years old, 60 / 70 (85.7%) ages 10 – 15, and 84 / 88 (95.5%) more than 15 years completed full testing. Patients that were uncooperative were significantly younger than those that were cooperative (10.7 yrs vs. 14.5, $p < 0.001$). Dithermal caloric testing was not obtained in 31 (16.5%) encounters and was the most commonly omitted component within the vestibular battery (Fig 2). Failure to cooperate during the vestibular battery limited full interpretation of results in 8 of 27 (29.6%) encounters.

Fig 1: Diagnosis in Children Referred for Vestibular Battery Testing

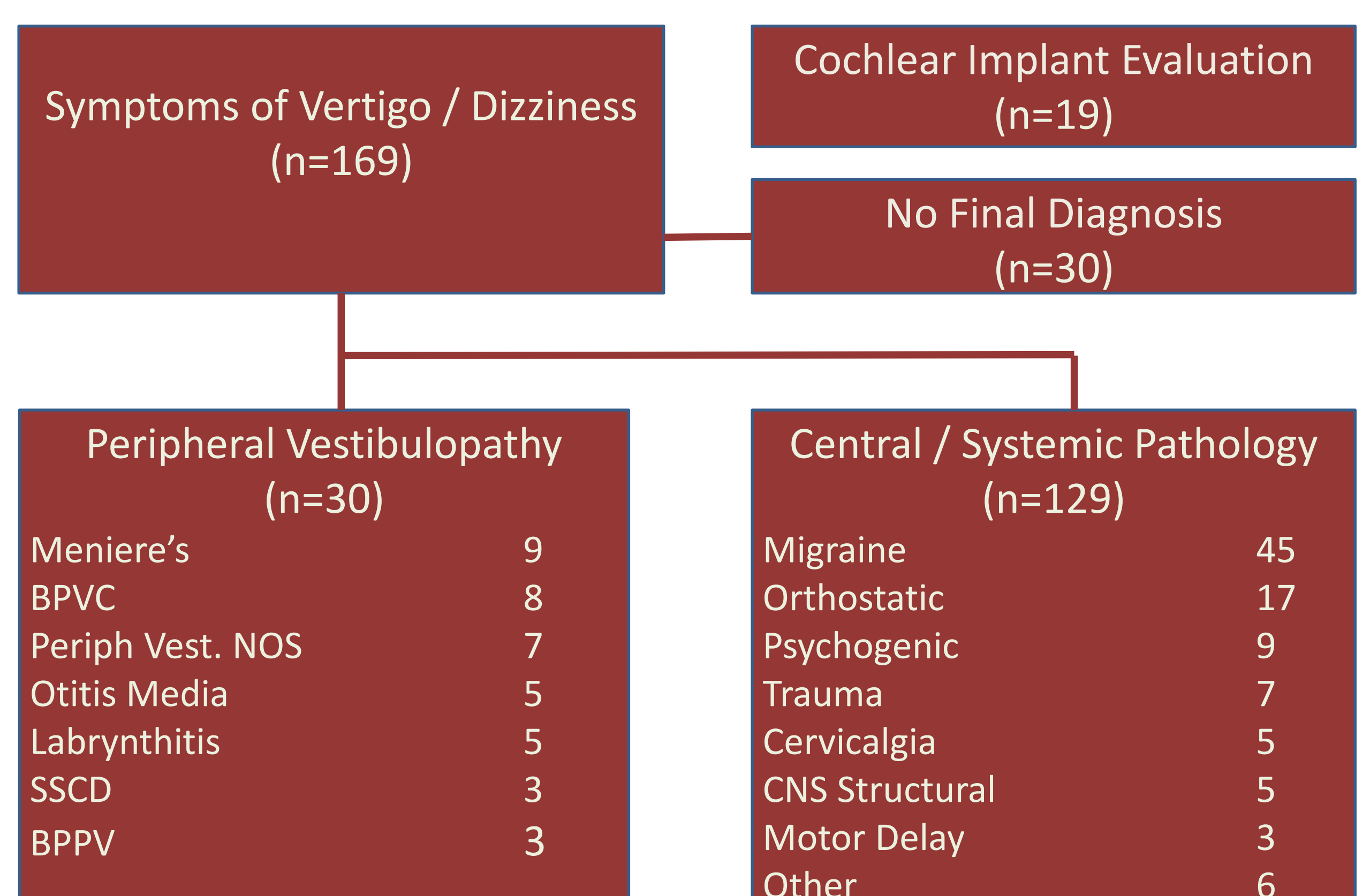
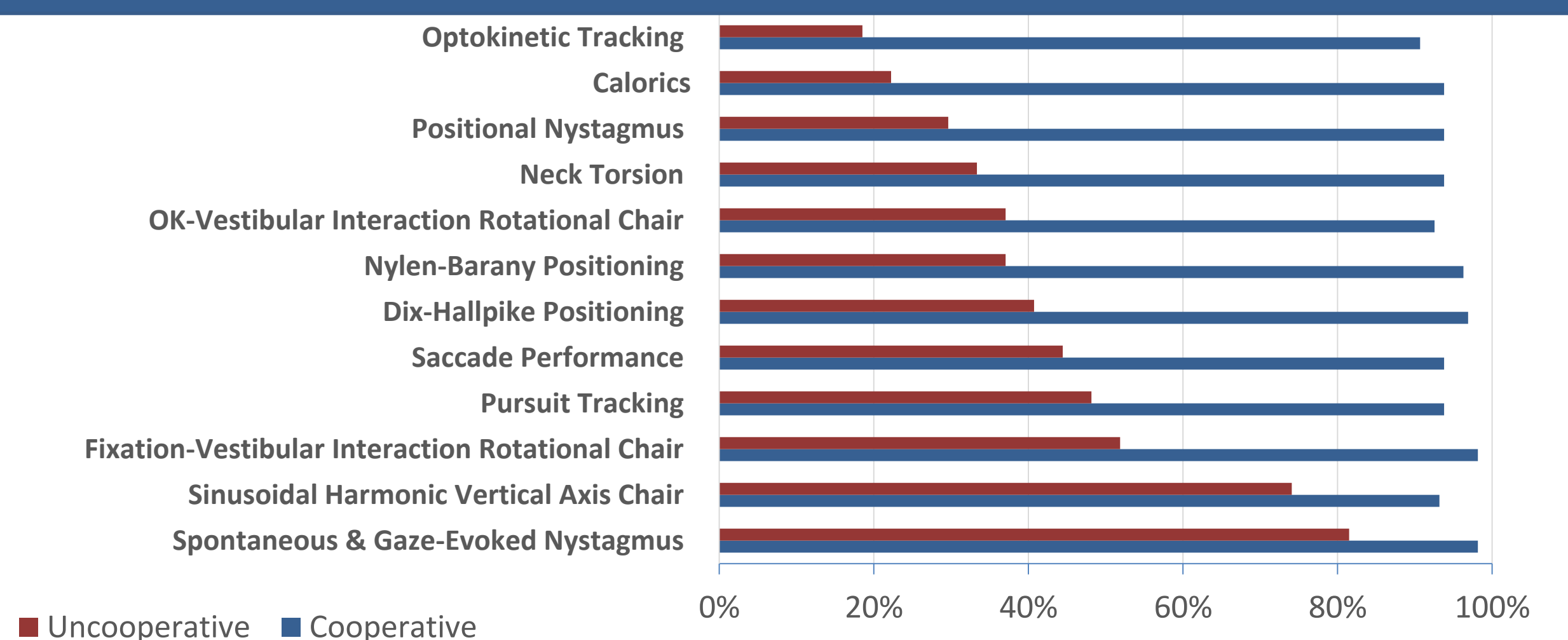


Fig 2: Completion of Vestibular Battery Components in Cooperative vs Uncooperative Children



Conclusions

Consistent with existing literature, migraine represents a significant percentage of pediatric vertigo / dizziness, while Meniere's and Benign Paroxysmal Vertigo of Childhood (BPVC) are the most common peripheral vestibulopathies.¹ The spectrum of disease evaluated in our practice as compared to previously published results reflects institutional practices and regional referral patterns.

A significant majority (81%) of children referred for vestibular battery have normal findings on testing. Poor cooperation with full vestibular battery rarely limits the ability to arrive at a diagnosis.

Clinicians should consider direct vestibular battery testing based on the age and expected cooperation of the child. Consider performing components that are better tolerated such as spontaneous and gaze-evoked nystagmus testing, before attempting calorics or tests that require oculography goggles. There are emerging technologies such as video head impulse testing (VHIT) that achieve meaningful results in children that do not require darkened-rooms or the provocation of dizziness. VHIT evaluates all six semicircular canals and is a viable alternative to rotary chair testing.⁶

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