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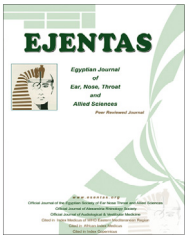

ORIGINAL ARTICLE

Role of vestibular testing in deciding treatment strategies for children with otitis media with effusion

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KEYWORDS

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Balance;
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Abstract *Background:* Several studies have indicated that during an episode of otitis media the child's balance deteriorates and the child may become clumsy and fall more often.

Objectives: The aim of this work was to assess the balance and vestibular system in children with otitis media with effusion prior to and after treatment.

Methods: Fifty children with bilateral OME (5–11 years old, 28 females and 22 males) were involved as a study group. The control group consisted of 30 healthy children age- and sex-matched (12 females/18 males). All subjects underwent Balance subset of Standardized Bruininks–Oseretsky test of motor proficiency (BOT-2), a test of static and dynamic balance and modified Clinical Test of Sensory Interaction for Balance (m-CTSIB) were done. Objective tests of vestibular end organ function including both Electronystagmography test ENG and both air conducted (AC) & bone conducted (BC) vestibular evoked myogenic potentials(VEMP) were recorded. These tests were performed two times: 1 day prior to and 4 weeks after management.

Results: Only 8 children had history of vertigo or balance disorders. There were statistically significantly poorer scores in some balance subtest items of BOT-2 as in SOL with eye closed either on a line or on a balance beam as compared to the control group with significant improvement after management. Peripheral vestibular (ENG) abnormalities were recorded in 64% of children with statistically significant higher than the control group (10%) with significant improvement after management. Prior to treatment, AC-VEMPs were present in 12 (12%) ears while BC-VEMPs were recorded in 78 (78%) ears that mean ABG was 12.15 ± 2.75. After treatment most children showed

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nearly closure of ABG within 10 dB HL, AC-VEMPs were present in 72 (72%) ears and BC-VEMPs were recorded in 90 (90%) ears.

Conclusions: Recurrent or persistent otitis media with effusion impairs the functioning of the vestibular system in children.

1. Introduction

Otitis media with effusion (OME) is the most common otological diseases of childhood for which medical care is sought, hearing loss is the most frequent complication or sequela of OME and it is the major reason for the parents to consult an ENT specialist or a pediatrician. Some researchers considered it to be the primary cause of vestibular disturbances in children.[1,2]

Exactly, how eustachian tube dysfunction and OME affect the vestibular system is still unclear. Hamidi[3] assumed that the ear is a very intricate organ and the change of pressure inside the middle ear influences the flow of inner-ear fluids. Fukuda,[4] in 1984, reported that changes in middle ear pressure alter the firing rates of the vestibular nerve fibers. Other authors suggested that toxins present in the effusion of the middle ear leaking to the inner ear cause inflammation of the cochlea. There are also suggestions that electrolytes can be transferred into the inner ear and may affect the vestibular receptors.[5,6]

Hamidi[3] concluded that vestibular disorders not only affect the child physically as this child will continuously encounter attacks of vertigo, being unable to play sports, or engage in other activities with children, have significant negative effects on their social participation but also academically, causing a decrease in the intellectual abilities of the child, the child will not be able to pay attention as readily as the other students in his or her class because of the typical symptoms of vestibular disorders; vertigo and these children have poor gaze stability that affects reading as a consequence of vestibular deficits.[7]

While extensive effort is expended to prevent hearing loss in children, coexisting or consequent vestibular disorders are often ignored, consequently, vestibular dysfunction is an overlooked entity and intervention to ameliorate these impairments is not provided. One primary reason for the difficulty in detection is that children are unable to express their symptoms as well as adults and the vertiginous problems in children are usually attributed to troubles in behavior or lack of coordination.[8]

Although young children with bilateral OME recorded significant impairment of balance, based on standardized testing, their parents did not notice or report any problem unless their children were presented with acute symptoms (e.g. vomiting, nausea, vertigo).[9]

Denning and Mayberry noted that younger children with frequent incidents of otitis media presented impaired vestibulo-spinal reflexes reflected by poor results in walking tests.[10] The integrity of the vestibular apparatus is critical for motor development, early onset of disease may have a more adverse effect on vestibular and balance function than late-onset disease.[11]

Vestibular function was evaluated using ENG, and development using the Bruininks–Oseretsky test of motor proficiency, of children with OME. These investigators found aberrant ENG and motor development results in a majority of the children, with resolution of the impairments in most following tube insertion.[12]

After the OM has completely been treated and cleared, a team of professionals' works with the pediatric patient in order to achieve the best possible functional improvement via participation in vestibular rehabilitation focused on substitution and adaptation exercises.[3]

Aim of this study

1- To assess the vestibular system and balance deficits in children with bilateral otitis media with effusion
2- To determine the efficacy of intervention for OME (medical or surgical) on resolution of these deficits.

2. Materials and methods

This study was conducted in collaboration between ENT department and audiology unit of Assiut University hospitals between January 2014 and January 2015. A total of 62 children with bilateral OME were tested, but 12 were excluded from this analysis owing to several factors, some of them refused electrodes, others were uncooperative or due to time constraint of parents. Fifty of them (study group) completed the study, aged between 5 and 11 years, (28 females/22 males) with bilateral OME, diagnosis of OME was made at our department by the otoscopic examination showing typical OME signs in all the selected subjects and type B flat tympanogram curves.[13]

All participants followed these exclusion criteria;

Sensory-neural hearing loss or conductive hearing loss not caused by OME, children with neurological diseases or any other serious illness and children with an unreliable medical history or whose behavior had been reported as uncooperative.

Children in the current study group were evaluated at two stages of the treatment:

Stage I – prior to treatment called G1.
Stage II – 4 weeks after the fluid was removed from the ear with appropriate treatment called G2.[14] They were treated either with antibiotics, mucolytic agent combinations or myringotomy with or without insertion of ventilation tubes after at least 3 months of conservative treatment (proved to be ineffective).

The parents were fully informed of the procedure of the tests and in each case they expressed their formal agreement