

Introduction of modern audio-vestibular diagnostic methods in the Faculty of Dental Medicine, Medical University – Varna

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Introduction. Audio-vestibular diagnostics is an important and modern field of the ENT-specialty. Due to the stressful everyday life it could be said that there is an epidemic of patients with audio-vestibular problems – reduced hearing ability, tinnitus, dizziness, vertigo.

The audiovestibular laboratory of the University Medical and Dental Center in the Faculty of Dental Medicine was established in 2020. Its purpose is to diagnose, treat and prevent hearing, balance and sleep disorders in patients of all ages.



Objectives: To present our experience in the field of providing patients with full diagnostics and treating features in the field of the audio-vestibular disorders in the newly established Audio-vestibular laboratory.

Material and methods. For the time period September 2020 – May 2021, 120 patients (including hearing screening of 30 children up to the age of 10), aged between 2 and 80 years, had audio-vestibular examinations in the Audio-vestibular laboratory in the University Medical and Dental Centre.

Tests implemented according to the different clinical cases were audiometry, tympanometry, OAE, SERA, ASSR, caloric tests, vHIT, videonystagmography, virtual reality. All patients received a thorough ENT-examination and consultation. All signed written consent forms.

Results and discussion.

Findings from the audiological and vestibular examinations conducted

- ✓ Of the tested 120 patients – 80 were over the age of 18 (adult group), 40 were under the age of 18 (pediatric patients)
- ✓ Hearing screening (SERA) was performed on 30 patients up to the age of 10 – in 10 cases of which a pathology was diagnosed and patients were referred for a re-test and possible cochlear implantation. 10 patients (aged 10-17) received audiometry, in 5 – hearing loss was detected. They were referred for hearing aids usage.
- ✓ From the 80 adult patients tested, depending on the clinical case – 35 received audiological and 45 received vestibular examinations. The most frequent audiological disorder was tinnitus (25 cases), following different hearing losses (including geriatric cases). From the vestibular disorders 20 cases of vertigo were diagnosed (benign positional, neuronitis type, Meniere's disease, labyrinthitis, medicine caused).
- ✓ 10 patients were diagnosed with vestibular disorders (dizziness, vertigo) after a COVID-19 infection.

OtoAccess® Database is a computer application for management of patients' information, evaluation of the examinations performed, maintenance of profiles of each patient with all the diagnostics done so far. The database is an interface integrating audiological and vestibular modules from different manufacturers.

SERA module is a multifunctional device which target population are newborns in need of hearing screening. This module performs and records an automatic auditory response of the brainstem. It is used for testing and documentation of hearing and neurological disorders, using auditory potentials from inner ear, auditory nerve and brainstem.

AD629—a Diagnostic Hybrid Air-Bone Audiometer is a device that allows the diagnosis of a hearing loss. Output signals—strength and frequency depend on the clinician and may vary. Speech audiometry is also included. Patients are of all ages, genders and health conditions. It can also be controlled from a laptop—this makes it a hybrid, like the tympanometer.

Titan—a Tympanometer with an Impedance Meter is an electroacoustic testing device that produces controlled levels of test tones and signals intended for use in the diagnostic assessment of hearing conduction and to assist in the diagnosis of possible otological diseases. It allows the examination of patients of all ages.

Air Fx—a Caloric Irrigator injects cold or warm liquid—distilled water, to perform caloric tests to diagnose the vestibular apparatus. Water flow is directed to the tympanic membrane through the patient's ear canal, creating a difference in temperature in the ears, which leads to the manifestation of a nystagmus in the patient's eyes. The responses to the irrigation are compared to determine which vestibular sensor—left or right—is affected. This examination is performed on children and adults with normal external auditory canal, anatomy of the middle ear, without the presence of any active infections, open wounds, earwax, perforation of the eardrum.

EyeSeeCam—vHIT allows the examination of patients with dizziness. Head Impulse Tests (HIT) are performed to measure the vestibulo-ocular reflex (VOR). Impulses to the head should be movements with a small positional amplitude but with high acceleration and speed. Suitable for examination are patients 5 years and older, physically healthy, seeing the red dots visible on the wall opposite.

VisualEyes 515/525 is a complex software platform, which provides an opportunity to study the nystagmus manifested by the patient's videonystagmography. Patients examined are recommended to be 5 years and older.

Eclipse Module—a Multifunctional System for Diagnostic Screening, a Combination of Several Subsystems: is designed to test vestibular evoked myogenic potentials (cVEMP, oVEMP), transitory evoked and distortion product otoacoustics emissions (TEOAE, DPOAE), auditory evoked potentials from inner ear, auditory nerve and brainstem (ABRIS).

ASSR—Auditory Steady-State Response allows for binaural testing—4 frequencies in each ear at the same time. The technology is completely objective, based on statistical probability. ASSR provides an estimate of the pure tone audiogram, used for rehabilitation.

Virtual SVV – glasses for virtual reality This module uses virtual reality glasses and is designed to measure the subjective visual vertical and the patient's ability to align it. Patients must be 8 years of age or older.

Conclusion. Clinicians should work tirelessly so as to present their patients with clear examination and treating protocols. More measures should be implemented to make the examinations affordable to the wide range of patients.

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