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***Correlation between magnetic resonance imaging classification
of endolymphatic hydrops and clinical manifestations
and audiovestibular test results in patients with Ménière's disease***

Dissertation for the academic degree of doctor of medical sciences in
the field of medicine

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Introduction

Ménière's disease is a chronic inner ear disorder characterized by vertigo episodes with fluctuating low-frequency hearing loss, tinnitus, and aural fullness. Its etiology remains unknown, but the endolymphatic hydrops is considered underlying pathology. Due to the recent development of magnetic resonance imaging (MRI), visualization of enlarged endolymphatic space in patients with Ménière's disease symptoms is possible. MRI assessment of the endolymphatic hydrops is relatively new (publications on this subject have started appearing recently) and not yet published in Poland.

Manuscript #1

Jasińska A, Lachowska M, Wnuk E, Niemczyk K. Magnetic resonance imaging of the inner ear in the diagnostics of Ménière's disease. Otolaryngol Pol 2021;75(2):1-8. DOI: 10.5604/01.3001.0014.6176

The article presents in detail the methods of assessing the endolymphatic hydrops in MR after intravenous contrast administration. It provides a thorough literature review on the subject supported by our experience and figures presenting MR scans showing the described changes in the cochlea and vestibule in our patients. Over the last decade, several studies concerning MR imaging of the inner ear were completed using rearranged methods and protocols. Two different gadolinium-based contrast material delivery methods can be distinguished: intratympanic and intravenous injection. Several endolymphatic hydrops imaging evaluation methods already exist and can be divided into qualitative, semi-quantitative, and volumetric techniques. Inner ear MRI examinations facilitate diagnostics of patients with incomplete clinical presentation of Ménière's disease. In the treatment course, follow-up MRI scans enable assessing individual treatment modalities' efficacy in terms of the severity of lesions within the inner ear.

Manuscript #2

Jasińska A, Wnuk E, Pierchala K, Niemczyk K. Wodniak śródchłonki potwierdzony przy użyciu 3-teslowego skanera MR u pacjentów z obrazem klinicznym choroby Ménière'a. Polski Przegląd Otorynolaryngologiczny 2019;8(3):20-23.

The manuscript presents a study of two patients with endolymphatic hydrops confirmed by MRI. MRI visualization technique of the inner ear with a presentation of assessment scale of endolymphatic hydrops in the affected ears showing widening of the endolymphatic spaces proposed by Barath et al. are presented and illustrated by a detailed description of two Ménière's disease cases with different disease duration and clinical manifestations.

Manuscript #3

Jasińska A, Lachowska M, Wnuk E, Pierchala K, Rowiński O, Niemczyk K. Correlation between magnetic resonance imaging classification of endolymphatic hydrops and clinical manifestations and audiovestibular test results in patients with definite Ménière's disease. Auris Nasus Larynx, Ahead of print, DOI: 10.1016/j.anl.2021.03.027

Thirty-eight patients with unilateral definite Ménière's disease were enrolled in this study. The severity of the main clinical symptoms, audiovestibular tests, and MRI were evaluated. Endolymphatic space dilatation was assessed using Barath and Bernaerts grading systems. The purpose was to evaluate MRI classification of endolymphatic hydrops with clinical features, audiological and vestibular tests in patients with Ménière's disease. Using the Barath system, cochlear hydrops was visualized in 81.6% of affected ears, while vestibular in 63.2%. Sensitivity increased to 94.7% in the case of vestibular hydrops using Bernaerts' modification. Vestibular hydrops involving the utricle was present only among patients with cochlear and saccular endolymphatic space dilatation. The grade of the hydrops correlated neither with the duration of Ménière's disease nor with the severity of main clinical symptoms. There was a significant relationship between the hearing level threshold and the vestibular hydrops degree in the Bernaerts scale found, which confirms endolymphatic space dilatation's role in the hearing loss in ears affected by Ménière's disease.

Conclusions

Our studies proved MRI to be a sensitive diagnostic tool in Ménière's disease. Assessing vestibular hydrops in MRI, the Bernaerts scale was found to be significantly more sensitive than the Barath scale. Several correlations between the MRI visualization of endolymphatic hydrops and clinical data were found.