New insights in diagnostic and therapeutic maneuvers for BPPV

Impact of this thesis

Scientific impact

This thesis provides a model of BPPV based on physics. This allows to visualize and quantify in 3D the movement of the debris and associated eye movements during diagnostic and liberatory maneuvers. The scientific impact is that various parameters that are expected to influence the debris movement and eye movements, like debris size and amount, multiple debris locations, precise angulation, angular velocity, timing of the different steps, the individual orientation (anatomy) of labyrints in the head, can now relatively easy be studied and visualized in detail. New maneuvers introduced in the literature can be easily verified and examined. Additionally, some findings of this thesis (based on the model), pave the way for future clinical studies: they should be verified in real-life settings.

Clinical impact

The BPPV model and visualization developed in this thesis, allow to optimize existing diagnostic and therapeutic manoevres, and allow development of more effective maneuvers. For example, based on this thesis, the order of testing (lateral canal first) should be changed to facilitate a higher detection rate of lateral canal BPPV. Furthermore, the existing Yacovino maneuver should be adjusted to facilitate maximum

effect. It also explains certain types of eye movements obtained during clinical testing, which were previously not described (e.g. unidirectional nystagmus in lateral canal BPPV).

These findings also imply that, based on this thesis, new guidelines for optimal diagnosis and treatment of BPPV should be developed.

Societal and educational impact

The model clearly visualizes BPPV in a way that can easily be understood by the general lay audience, but also for students and all professionals that are involved in the management of BPPV. This can improve understanding of BPPV for a broad audience.

Commercial impact

It was shown in this thesis that a precise detection and analysis of eye movements is crucial for a correct diagnosis. It therefore supports the use of video eye trackers and especially supports the applied research to develop low-cost video eye trackers. Furthermore, it was shown that precise angulation of the head during a liberatory maneuver is only possible with a guidance system that provides visual feedback. This system should be incorporated in commercially available vestibular testing equipment.

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