Establishing electromyographic recording of the stapedius reflex: preliminary results of a prospective clinical study


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INTRODUCTION AND PURPOSE:

Generally, by measuring acoustic impedance via tympanometry, the stapedius reflex allows us to deduce a patient’s auditory perception without their active collaboration. Electromyography (EMG) of the target muscle is a recognised tool for many reflex measurements. Until now, only Fisch et al. [1] were able to measure an EMG of the stapedius muscle in 1963. EMG recording of SM is a complex procedure due to the small operative space in the tympanic cavity and the poor accessibility of the muscle completely embedded into the pyramidal eminence.

AIM: of this study, was to measure EMG of the stapedius muscle via a novel surgical approach accessing the belly of the muscle from behind (occipital) the mastoid portion of the facial nerve.

RESULTS:

Three patients were included so far. The presurgical segmented high-resolution Dyna-CT helped to determine the ideal retrofacial approach to the stapedius muscle. We were able to record a reproducible intraoperative EMG of the muscle activity (See Fig. 3). It was possible to partially filter the stimulation artefacts caused by CI-electrodes or by direct electric stimulation of the facial nerve in order to allow the EMG evaluation.

CONCLUSIONS:

Direct EMG measurements promise a more detailed insight into the physiology of the stapedius reflex, than those provided by tympanometry. Furthermore, permanent implantations of recording electrodes could be a solution for continuously monitor muscle response and auditory perception.

MATERIAL AND METHODS:

A registered, prospective, acute, monocentric, cross-sectional, observational study with adaptive design was conducted in patients undergoing cochlear implantation (CI). To determine the individual position of the SM, a Dyna-CT was made prior to the operation and segmented for optimal planning of the intraoperative approach (See Fig. 1). Alongside the standard cochlear implantation, the stapedius muscle was exposed via retrofacial approach (see in Fig. 2 lower colourful circle). In evoking a stapedius reflex acoustically through the opposite ear or electrically by stimulating the facial nerve or with the CI, the stapedius muscle could be verified through its contraction. Needle electrodes were inserted into the stapedius muscle for EMG recordings.