**Solving technical and non-technical issues in intra-operative monitoring of hearing**

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Intra-operative monitoring of auditory function has the potential to provide a surgeon with timely feedback during cerebellopontine angle surgery or middle ear surgery, but it is technically very difficult. This is partly due to contamination of the (sub-)microvolt responses by biological noise and electrical stimulus artifact, and by electrical interference from surrounding equipment. The most feasible evoked responses are the larger cochlear responses at the round window (ECochG), and the smaller auditory brainstem response (ABR) measured across the skull. While larger and faster, round-window ECochG requires reliable round-window electrode contact, which can be difficult to establish and maintain during surgery. The contact is also compromised by changes in electrical pathways due to middle ear pathology and fluid movements during surgery. For this reason, ABR (or its variant the auditory steady-state response; ASSR) is more easily and reliably obtained. Here we discuss the technical approaches we have used to obtain good quality evoked response waveforms with air- and bone-conduction stimulation in what we believe is the shortest possible time. We have used a small custom-built bioamplifier, which is optically-coupled and battery-powered. Its input leads are very short and shielded, reducing interference to a minimum. We have used 40/s 4ms up-chirp stimuli (2kHz-20kHz or 6kHz-20kHz), delivered through custom-built air- and bone-transducers, allowing artifact-free responses up to 85dB nHL, with contralateral acoustic masking noise. However, even after the technical challenges have been overcome, there are more generic problems with intra-operative monitoring. Deciding upon the test protocol can be difficult, because of the complex audiological profile of many patients. There are also physical and timing constraints during surgery. It can take at least 30 seconds for each averaged waveform, and two minutes for a montage of four waveforms (and replicates are desirable). This requires a team member dedicated to the intra-operative monitoring, provided with audiometry and case background well before testing. Moreover, the tester may be on-call for much of the day, due to uncertainties in the surgical list and in the duration of each procedure. Extensive offline analysis may also be required. Together, these constraints make intra-operative monitoring not only difficult, but expensive. Finally, we will discuss the additional processes we are developing to provide faster real-time feedback to the surgeon, with a minimum of equipment and technical assistance.