Effects of Sedative Drugs on Otoacoustic Emissions: Experimental Study?

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Introduction: Otoacoustic emission (OAEs) measurements become widely used in new-born hearing screening and audiologic evaluation (1). The aim of this study is to find out the effects of ketamine, midazolam and dexmedetomidine on OAEs in order to define the best sedative agent during OAE measurements.

Material and Metods: Sixteen healthy adult Wistar Albino rats included in the study following Local Animal Ethics Committee approval. All rats had undergone an otoscopic ear evaluation before experiment. Rats were divided into 3 groups, Group Ketamine (Group K, n=6), Group Midazolam (Group M, n= 5) and Group Dexmedetomidine (Group=D, n= 5,). All rats received intraperitoneal Xylazine 10mg/kg. Group K received 90mg/kg Ketamine (Ketalar®), Group M had Midazolam 5 mg/kg (Dematrac®) and Group D was given Dexmedetomidine 50µg/kg (Precedex®) intraperitoneally. SpO₂, heart rate (HR) and noninvasive blood pressure (AP) were monitored. When adequate sedation achieved (approx. 5 min) rats were taken into the sound isolated room and distortion product otoacoustic emissions (DPOAEs) were measured by the use of Madsen Capella-otoacoustic emissions testing OAE system module version 2.12 software (Denmark) at 3-12 kHz levels at each ear (Group K n=12, Group M n=10, Group D n=10) (Figure 1)

Figure 1

Results: AP were significantly lower in Group M (MeanAP 95.8±32.7 mmHg) and Group D (MeanAP 48±4.55 mmHg) whereas Group K had a higher MeanAP (118.7±28.2 mmHg) (p<0.05). HR and SpO₂ were similar in all groups (p>0.05). DPOAEs were measurable at all kHz levels in all groups, measurement of one ear in Group D was neglected while the DPOAE measurement was less than 6 dB SPL of Signal/Noise ratio (Group D DPOAEs n=9). When comparisons between groups were performed there was a statistical difference only in 3 kHz level (p<0.05). There was no difference between groups at 4-12 kHz DPOAEs measurements.

Discussion: During OAE measurements some patients may require sedation and anesthesia. In order to neglect the drug effects on measurements through systemic or direct effects best agents should be defined(1,2). Three sedative drugs used in this study have no effects on DPOAE measurements while they decrease blood pressures in rats. Ketamine, midazolam and dexmedetomidine can be used for sedation according to the experience of anesthesiologist during OAE measurements.

References:

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2. Smith JL et al.Effects of anesthesia on DPOAE level and phase in rats. Hear Res 2008;235(1-2):47-59.