Секция «Тезисы на английском языке»

The properties of auditory evoked potentials during simultaneous registration from scalp and central grey matter in patients after surgical removal of pineal region tumors

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Introduction

A great number of researchers suppose that deep brain structures play an important role in implementation of higher mental functions in humans. Cerebral aqueduct is surrounded by periaqueductal gray (PAG), which is involved in emotion formation and pain modulation. More comprehensive studies of deep brain structures are being held in recent years as a result of the widespread use of stereotactic neurosurgical procedures. The accumulated data suggest PAG participates in processing and analyzing of sensory information, however PAG is not easily accessible due to its deep-seated location.

Objective

The aim of the study is to investigate the role of PAG in processing auditory information through simultaneous potential recording by electrodes placed on scalp and deep brain electrodes placed in cerebral aqueductus.

Materials and methods

The study included 7 patients after surgical removal of pineal region tumors and drainage tube implantation in cerebral aqueductus in order to prevent postoperative noncommunicating hydrocephalus. The unique drain-electrode was developed, which accomplishes a therapeutic function as well as enables to record biopotentials (The Ethical Committee of Neurosurgical Burdenko Institute, Moscow, No1/2016). Biopotentials were simultaneously recorded by 19 scalp electrodes (10/20 system) and deep brain electrodes, incorporated with the drainage tube implanted in cerebral aqueductus. The deep electrodes were filiform (5 patients) or ring-type (2 patients). The biopotentials were recorded during heavy sedation after surgery, during postanaesthetic recovery and in clear consciousness. The registration parameters were: sampling rate 1024 Hz, filters 0,5-70 Hz. An oddball paradigm was used: 80% of standard (800 Hz) and 20% of target (600 Hz) stimuli, a total of 200 stimuli. One patient under heavy sedation performed a novelty paradigm, which consisted of 4 different tones (600 Hz, 800 Hz, 1000 Hz, 2000 Hz), a total of 200 stimuli.

Results

The auditory evoked responses following presentation of auditory stimuli were recorded by deep brain electrodes under the conditions of depression of cortical activity during heavy sedation. The evoked responses had specific features depending on stimuli characteristic. The

responses were different depending on each of the tones. The extraction of these peaks became more difficult during postanaesthetic recovery due to cortical activity onset. The auditory evoked potentials with principal peaks were recorded by scalp electrodes in clear consciousness. Negative peak with latency 60-90 ms and positive peak with latency 150-200 ms were recorded by deep brain electrodes.

Conclusion

The obtained data assume the existence of auditory encoding system in the brainstem in humans and PAG involvement in processing and analyzing of auditory information based on physical parametres of stimuli. The data are discussed in context of multiple overlapping systems of incoming sensory information coding.

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