Limitations of object naming task for intraoperative language mapping: report of two clinical cases

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Introduction

Intraoperative direct electrical stimulation (DES) is considered to be the gold standard procedure for language mapping in patients with lesion within eloquent brain areas (Mandonnet, 2010). DES allows a surgeon to maximize the extent of resection while reducing the risk of permanent language deficit (Duffau, 2005; De Witt Hamer et al., 2012). The two tasks most commonly used during DES are counting and object naming. However, multiple brain areas are involved in distinct stages of language processing, some of which (e.g. auditory speech perception) cannot be tested with object naming or counting. In the study we demonstrate limitations of traditional object naming task for intraoperative language mapping by presenting two clinical cases.

Methods

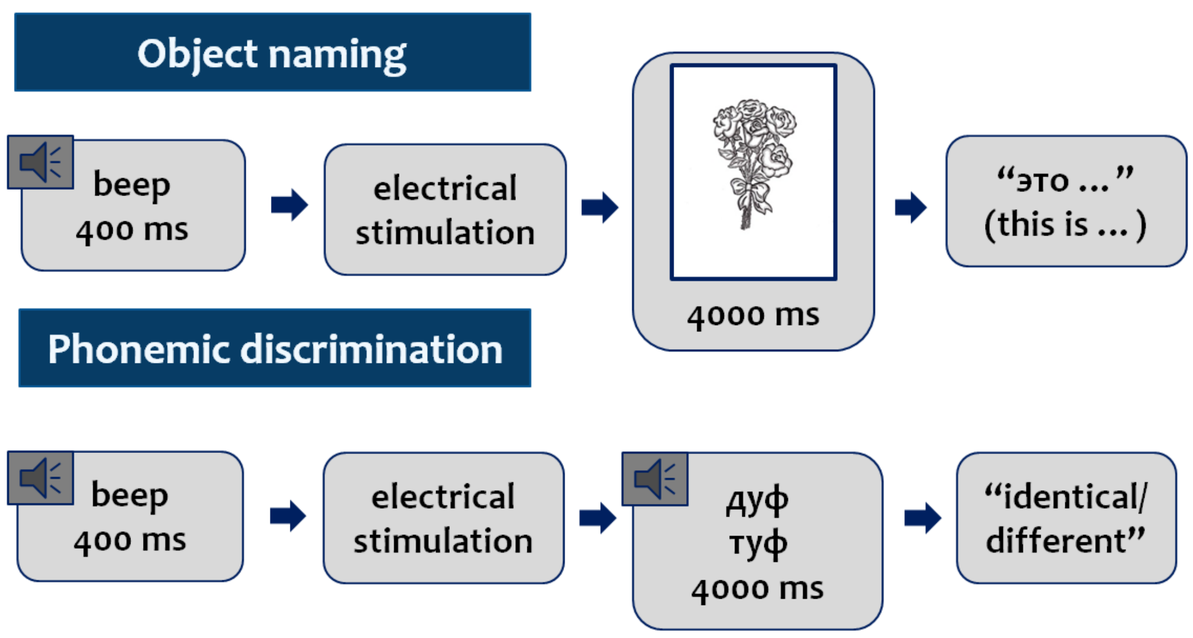
Clinical Cases

- L.G. (female, 59 y/o) and I.K. (female, 46 y/o)
- right-handed native Russian-speakers
- diagnosed with drug-resistant epilepsy associated with cavernous angioma and mesial temporal sclerosis, respectively
- Russian Aphasia Test (Ivanova et al., 2016) administered 1 day before and 4-5 days after the surgery.
- left temporal lobe was partially resected in both cases during awake surgery

Procedure

Before the resection, electrical mapping was performed at the cortical level to identify critical language sites. Intraoperative language mapping was performed using a bipolar electrode (at 12mA) and two language tests: object naming and phonemic discrimination. Each accessible site was stimulated three times.

Language Tests



Results

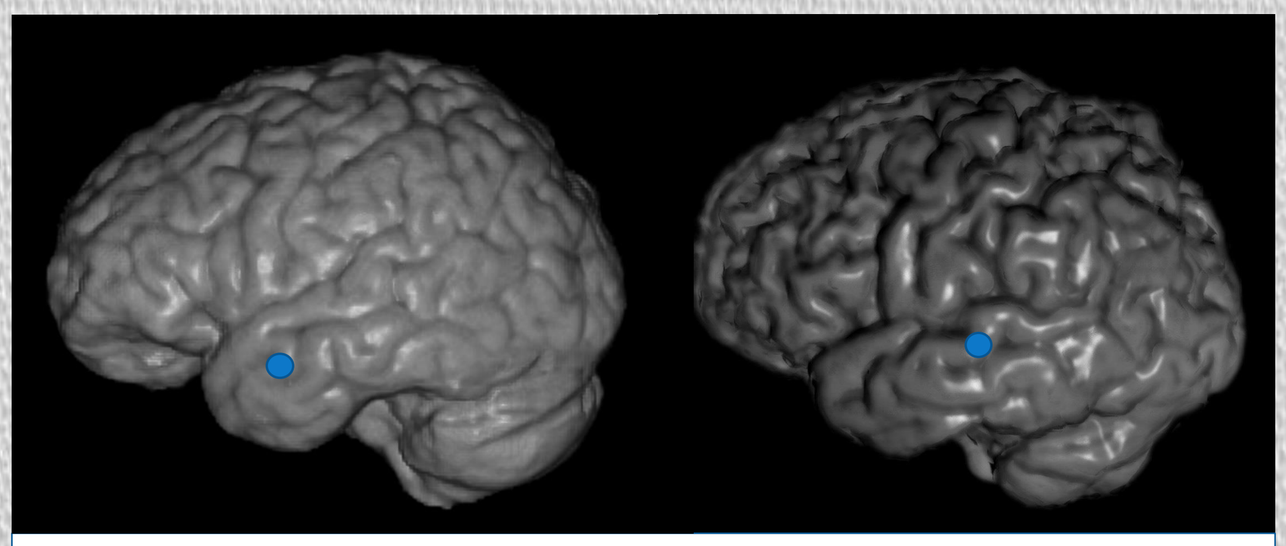
Object naming did not allow us to identify any critical language areas in both cases.

Phonemic discrimination turned out to be more sensitive:

- L.G. – anterior superior temporal gyrus. The site was removed during resection for medical reasons.
- I.K. – middle superior temporal gyrus

Language status:

- L.G. – developed language deficit (sensory aphasia)
- I.K. – no acquired language deficit



Positive language sites found using phonemic discrimination task: left – L.G., right – I.K.

Discussion

Our results suggest that the traditional object naming test may lack sensitivity for mapping particular language functions, such as auditory speech perception. Therefore, its use should be accompanied by other tasks (e.g. phonemic discrimination for superior temporal areas), which have to be selected individually for each patient, based on preoperative neuroimaging data (lesion localization, fMRI, DTI, etc.) and preoperative language status.

References

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