Isaac Counts

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CLINICAL/SCIENTIFIC NOTES:
Crossed aphasia elicited by direct cortical stimulation
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Correspondence published:

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Crossed aphasia elicited by direct cortical stimulation

Hans O. Lüders,
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I read with interest the manuscript by Oishi et al. [1] They report a patient with a right frontal tumor who was strongly right handed...
(Edinburgh Handedness Inventory) but had aphasic seizures and was dominant for speech on the right hemisphere by WADA test. They inserted subdural electrodes and were able to show that during electrical stimulation of one electrode placed over the right inferior frontal gyrus the patient was unable to speak (count numbers, speak spontaneously, or name objects) with totally intact auditory comprehension (he was able to point at requested objects). They concluded that the electrode was placed over Broca's area, in a case of crossed aphasia.

Unfortunately, the evidence presented by the authors is not sufficient to conclude that they localized language by cortical stimulation. In a high percentage of cases, electrical stimulation in the inferior frontal area immediately anterior to the primary motor area (MI) of the face produces negative motor signs with inability to move the tongue, the eyes or other "distal" muscles of the face or extremities.

Negative motor areas exist on the dominant and on the non-dominant frontal lobes. [2,3] A negative motor effect on tongue movements always is associated with inability to speak but intact comprehension. Therefore, in cases where stimulation of the inferior frontal gyrus produces inability to talk, it is essential to check for a negative motor effect by asking the patient to move the tongue from side to side while stimulating. We can only conclude that stimulation produced aphasia (as opposed to a negative motor effect) if the patient is unable to speak but has no difficulty in performing alternating tongue movements.

In addition, almost invariably stimulation of language areas produces a mixed expressive and comprehensive aphasia independent if you stimulate Broca's area, Wernickes area or the basal temporal language area. [4] Therefore, their findings of an electrode at which stimulation produced selective inability to speak without any comprehension difficulty suggests primarily that they identified a negative motor area. Identification of the electrode that produced inability to talk as an aphasia (as opposed to a negative motor phenomenon) would have required testing for ability to produce rapid alternating tongue movements during stimulation.

References


Disclosure: The author reports no conflicts of interest.

**Crossed aphasia elicited by direct cortical stimulation**

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Oishi et al discuss [1] "crossed aphasia" as determined by direct cortical stimulation. This report confirms earlier observations involving electrophysiological demonstration of crossed laterality of the "speech center" in right handers. [5,6] However, the authors interpretation of these finding shares the current misconception which is the confounding of neural and behavioral handedness. As recently reported, there is a disparity between the above modes of laterality in an estimated 20 percent of the public. [5]

It has been shown that it is the laterality of the command center that determines which of the two hemispheres controls actions in general including speech. Overwhelming evidence points to speech as the marker of hemisphere of action wherein all commands are initiated regardless of the behavioral handedness of an individual subject, with those destined for the nondominant side implemented by the minor hemisphere after it receives the commands just issued by the major hemisphere (via the corpus callosum). [7,8] Because of the approximate 90 vs 10 percent ratio of right to left handers in the population, the total number of those with disparity of neural and behavioral laterality is higher for the right-handed group while the percentage of them is higher among left handers (an estimated 10 versus 50%). [5,7,8]

The new understanding, i.e. that directionality of callosal traffic underpins laterality of motor control, allows lateralization of the command center by measuring the simple reaction time. Effectors contralateral to the major hemisphere (thus defined) have reaction times shorter than those of the ipsilateral, by an amount equal to the inter-hemispheric transfer time. This sharing of resources within the major hemisphere explains occurrences of apraxia ipsilateral to the major hemisphere upon injury or intracarotid anesthesia of that hemisphere (due to inter-hemispheric diaschisis).

In conclusion, there is nothing "crossed" in crossed aphasia or crossed nonaphasia except for the confounding of neural and behavioral (ostensible) handedness resulting from the disparity that affects a large minority of humans. [5,7,8] This finding has substantial surgical implications in ascertaining laterality of seizure onset and essential tremor (e. g. ablation, deep brain stimulation) since only the major hemisphere can initiate any movement.

References

5. Derakhshan I. Nonconvulsive status epilepticus with an unusual
EEG: a fresh look at lateralities of motor control and awareness.
Epilepsy Behav. 2006; 9:204-210.


Disclosure: The author reports no conflicts of interest.

Reply from the Authors

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Makoto Oishi, et al.

We appreciate Dr. Luders' and Dr. Derakhshan's comments and the opportunity to further explain our article. [1] Dr. Luders comments on how to evaluate the language symptom elicited by cortical stimulation. We regret that because of the limited word count of our article it was not adequately described. Dr. Derakhshan gave his original opinion on the concept of "crossed aphasia."

During the evaluation of language function by direct cortical stimulation, we paid careful attention to the propagation of electrical stimulation to the primary face and tongue motor areas, and also negative motor activation causing the inability to move subject's mouth or tongue, as suggested by Dr. Luders. [2] Actually, the patient was evaluated by performing tasks to protrude or move his tongue during stimulation at the same electrode. We concluded that the elicited symptom was typical expressive aphasia rather than negative motor function.

Dr. Luders also mentioned the difficulty of obtaining pure expressive or comprehensive aphasic symptoms even during cortical stimulation to Broca's or Wernicke's area. [4] However, we have been able to easily distinguish the expressive and perceptive aphasic symptoms in the majority of our cases. In this case, the symptom was not as specific as motor aphasia elicited by stimulation in our experience. In future trials, we will better determine differences among tasks, stimulation parameters, and differences among native languages. Regardless, all implanted electrodes were carefully stimulated one by one with a maximum intensity of 15.0 mA to identify the exact language distribution for this patient whose exclusive right-hemisphere language dominance can be safely said by the Wada test. No other area seemed to be indicative of the language-related symptoms. Finally, we still believe the symptom elicited by cortical stimulation in this patient as the expressive component of crossed aphasia.

We read Dr Drakhshan's comments and his related articles [5,8] with great interest and found his concept meaningful and
reasonable. Several authors still use the term "crossed aphasia." We needed to specifically determine the speech center prior to surgical resection in this patient whose exclusive right dominant hemisphere was confirmed by the Wada test.

Disclosure: The authors report no conflicts of interest.