Recovery from conduction aphasia depends on contributions from the right hemisphere: A case study

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Introduction

Conduction aphasia is an impairment for repeating language that cannot be attributed to difficulties with either comprehension or production1,2,3,4,6. Here we report a case of ‘pure’ conduction aphasia caused by surgical resection of the arcuate fasciculus. In the weeks and months after surgery the patient’s language repetition abilities recovered. The patient’s behavioral recovery was yoked to an increase in functional connectivity between left Broca’s area and right hemisphere regions.

Clinical Profile & Methods

Clinical Profile: 26 year old male (AE) who underwent an awake neurosurgical procedure to remove a left temporoparietal tumor.

Behavioral Tasks: AE came in for three testing sessions, one before surgery, one a month after surgery, and a second session 2 months later. During each session AE repeated a large battery of language, praxis, motor, perceptual (and other) tasks.

fMRI: During each session, AE performed resting state fMRI, and DTI. Before surgery, AE performed a Word Generation task during fMRI; that preoperative study was used to define ROIs for left Broca’s and Wernicke’s area.

Healthy Subjects: The patient’s diffusion data were compared to 61 undergraduates. The normal data were used to estimate the likelihood of the observations of the patient.

Results

• AE’s performance on repetition tasks was severely impaired after surgery, but improved over several months.

• Reconstruction of the arcuate fasciculus was accomplished with functionally derived ROIs. The tumor infiltrated the left arcuate fasciculus and after resection reconstruction of the tract was affected.

• We compared the size of AE’s arcuate fasciculus to 61 healthy subjects to quantitatively assess this damage.

Conclusions

One mechanism by which patients with conduction aphasia caused by a disconnection of the left arcuate fasciculus may recover: the right hemisphere may mediate the transfer of information from posterior to anterior left hemisphere language areas.

Future Directions: Testing a disconnection model of disrupted language function using functional and structural connectivity, in the context of neurosurgery.

References