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Case Report

A Case of Apperceptive Visual Agnosia Mistaken for Broca Aphasia

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Abstract

The most common method for evaluation of language function at the bedside is confrontation naming task. This is most often done with visually presented objects such as the naming page of the NIHSS questionnaire. Visual agnosia caused by a lesion in visual pathways might lead to mis-localization and delay in diagnosis and care for a patient with acute stroke presenting with visual disturbances.

We present a 69-year-old right-handed male who presented with speech difficulty and was transferred to us for consideration of intravascular intervention for his left ICA occlusion.

After further clinical assessment of his speech, we noted that he had difficulty with naming of visually presented items specially when they needed more visual processing suggestive of visual agnosia although his spontaneous speech was fluent. He also had alexia without agraphia and right sided homonymous hemianopia. Further evaluation of his CTA showed a left P2 occlusion and later his MRI confirmed a left PCA infarct.

Using verbal and tactile stimulation for naming can distinguish difficulty with naming caused by language network dysfunction from visual agnosia. Also testing for writing should be done to clarify the nature of language deficit and distinguish visual processing deficit from a primary language deficit.

Keywords: Visual Agnosia; Aphasia; Alexia; Agraphia; NIHSS

Introduction

The most common method for evaluation of language function at the bedside is confrontation naming task. This is most often done with visually presented objects such as the naming page of the NIHSS questionnaire. Visual agnosia caused by a lesion in visual pathways might lead to mis-localization and delay in diagnosis and care for a patient with acute stroke presenting with visual disturbances. Using verbal and tactile stimulation for naming can distinguish difficulty with naming caused by language network dysfunction from visual agnosia.

Case Report

A 69-year-old right-handed male with history of type II diabetes, hypertension, dyslipidemia, obesity, obstructive sleep apnea (OSA) and nicotine dependence was transferred to our comprehensive stroke center after tPA administration with suspected acute left MCA infarct for consideration of thrombectomy as he was found to have left ICA occlusion on CTA.

On the day of symptom onset, he was at his baseline without any neurological deficit before going out. When he returned home 45 minutes later, he told his wife "I don't feel right". He had diffi-

culty with speech, and it was hard for him to get his words out. He also complained that he was not able to see his wife when she was standing on his right side. He had a dull left sided headache. His wife didn't notice any facial asymmetry and he didn't complain of weakness. His wife felt that he sounded confused and called EMS for help.

He was taken to a hospital as a stroke code for aphasia. Upon arrival to the ED, he was hypertensive (197/85) with mild sinus bradycardia (56). His labs were unremarkable except for hyperglycemia (glucose 188). Systolic blood pressure decreased to 160s after initial assessment without any intervention.

His NIHSS was 5 (2 expressive aphasia, 2 right hemianopia and 1 disorientation to time).

His brain CT was negative for hemorrhage or large established infarct. CTA was positive for proximal LICA occlusion with complete distal reconstitution and no MCA or ACA occlusion. He was given tPA at 7:28PM and was transferred for consideration of an intervention for LICA occlusion as the cause of suspected MCA territory infarct presenting with aphasia.

At the time of arrival to our medical center, approximately two hours after initial bolus of tPA, he was awake and able to attend to both sides of the room. He was disoriented to time. He knew that he was transferred to another hospital but didn't know the name. He did not remember anything from his hospital course thus far.

His speech was fluent without hesitation when he was asked about his history and job, but he was not able to name low frequency items like the palm of the examiner when presented visually. He was not able to recognize any of the drawings on the stroke card, but he was able to identify a pen and locate it in space to take it for writing. He was not able to recognize anything from the cookie theft scene. He was able to name simple colors. He was unable to identify letters and words and was unable to read. However, he was able to write a sentence: "thank you for your help". He was able to repeat single words and two-word phrases but not long sentences. He was able to follow digit specific cross body commands. He was unable to recall any of the given words after five minutes.

Except for complete right sided homonymous hemianopia the rest of his neurological exam was unremarkable.

Based on his physical exam, suggestive of apperceptive visual agnosia, pronounced memory impairment, and pure alexia, we were concerned about bilateral PCA territory infarcts with involvement of bilateral temporo-occipital lobes and splenium of corpus callosum.

Repeat evaluation of the CTA performed at the outside hospital revealed left P2 occlusion; this was confirmed with MRA.

Brain MRI showed left PCA territory infarct with involvement of left occipital lobe, temporo-occipital junction, partial involvement of splenium of corpus callosum and medial temporal lobe. There was no lesion, acute or chronic, in the right PCA territory. There was no lateral temporal lobe or thalamic involvement on the affected side. The DWI images are shown below in figure 1.

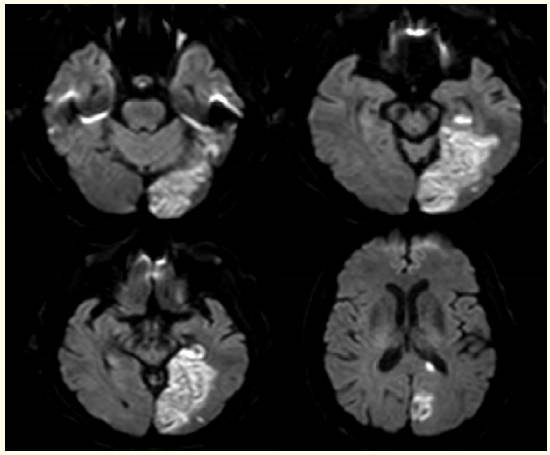

Figure 1

He had an episode of transient atrial fibrillation while inpatient and it was felt to be the cause of his infarct.

His LICA occlusion was probably an incidental finding with full left anterior circulation perfusion through intact circle of Willis.

At our follow up visit in five months, his wife mentioned that he is no longer able to manage his own medications and his episodic memory is profoundly impaired although his remote memory is intact. He was not concerned about his memory as much as his wife.

His speech was fluent. He was still only partially oriented to time, place and situation (he knew he was at a place in Boston for

something related to his health, with multiple choice was able to select "hospital" but didn't remember the name. Only knew the month but not year, date or day of the week).

He was able to maintain attention but was not able to register and repeat more than 2 words at a time. He was not able to recall any of the given words after five minutes. He did not recall any current events.

In confrontation visual field testing, he had right superior quadrantanopia and extinction of the right sided stimulus in double stimulation of lower quadrant for finger counting. There was less visual field deficit within the horizontal meridian. Perceived finger movement in right hemifield was better than finger counting. In line bisection test, he was able to move his head to see the full line and performed relatively well.

On the stroke card, he was able to name all of the items except for the cactus and hammock, which he could describe accurately but was not able to name. Simple calculation, finger recognition and right/left orientation was normal.

He was able to recognize letters and numbers irrespective of their size but had difficulty with overlapping letters. He named O, "zero" multiple times in overlapping letters task. He was unable to recognize the overlapping letters that are underlined in the example below in figure 2.

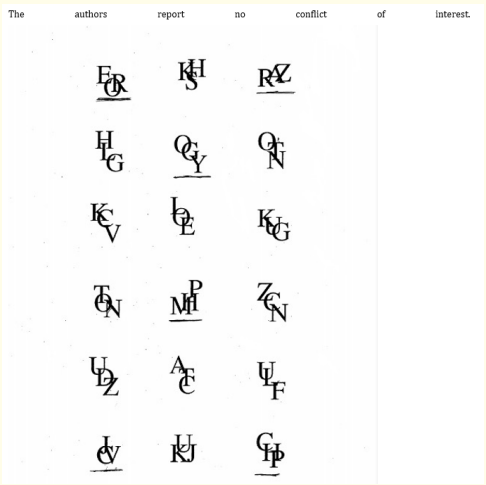

Figure 2

He could read a written word letter-by-letter but was unable to recognize the word as a whole. For spontaneous writing, he wrote: "I hAte Being Hear" (phonemic dysgraphia).

On the clock drawing test, he was able to draw the contour and numbers but was unable to draw the hands. Instead, he wrote "10. 11" inside the circle.

With NAB naming test, he was able to name high frequency items but had anomia for low frequency items: object knowledge remained intact but naming did not improve with semantic or phonemic cues.

On the Poppelreuter-Ghent's overlapping figure, he was able to identify and name the hammer only. He was able to identify and describe the cleaver accurately but was unable to name it. He identified the jar as a cup and was not able to identify the iron.

With Benton visual form discrimination test, he was able to easily match shapes. With Benton facial recognition task, he was able to match a face to the same image in a set of faces but unable to correctly identify the same face when shown from different angles.

When copying drawings, he was able to copy diligently by copying each line and angle without taking the whole picture in mind. Copies were close with frequent missing parts. When copying a drawing of a house with trees around it, he was not able to recognize the drawing of trees and said they are "arrows that are telling you to go up". A sample of his copying is shown below in figure 3.

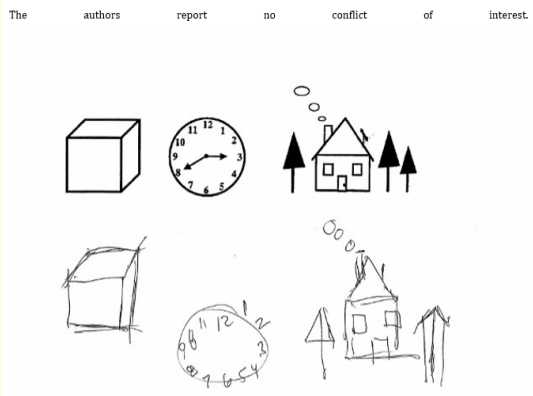

Figure 3

He was able to identify the forest, trees and lake in a simple sketch and was able to describe the cookie theft scene on the stroke card with details which was a significant improvement compared to his prior admission exam. He was able to copy words and nonsense drawings but was not able to draw any of them from memory.

He had frequent errors identifying previously presented objects from a set of drawings, guessing randomly for both verbally and visually presented objects.

Overall, his apperceptive visual agnosia has improved dramatically but his episodic memory deficit for verbally and visually presented objects remained severely impaired. Although he was able to recognize letters which is an improvement from his initial presentation, he was still unable to read whole words consistent with pure alexia [1].

At the time of initial presentation, he was only able to perceive the basic forms but was not able to integrate the whole picture and identify the objects consistent with an integrative visual agnosia as described by Paul Shelton., *et al*. [2].

At follow up, his visual object recognition has improved but he still had difficulty with creating viewpoint independent representation of the objects and has difficulty with distinguishing overlapping letters and objects consistent with transformational visual agnosia. He also had difficulty with association of the correctly identified objects with the semantic knowledge of their name suggesting associative visual agnosia.

Discussion

In this case report we describe a patient presenting emergently after suspected stroke with word-finding difficulty and hemianopia with an unexpected localization. Symptoms were initially attributed to a possible left MCA territory infarct causing Broca's aphasia because he was not able to name any of the items on the stroke card and was not able to read. This hypothesis was supported by a LICA proximal occlusion which turned out to be chronic. Writing was not tested initially as it is not part of the NIHSS assessment. In cases similar to ours with difficulty with visual processing, confrontation naming tests can be misleading especially if using line drawings of objects that require further complicated processing compared to real objects.

Even with real objects, visually presented objects for confrontation naming task can lead to false assumption of language deficit if the patient has visual anomia. The way to avoid this problem is to confirm anomia as a language problem by using other sensory modalities for assessment as well if there is a doubt about visual agnosia (presence of profound hemianopia without any sensory or motor deficit suggestive of posterior circulation involvement, as noted in our case). This means assessing naming with verbal description of an object or using tactilely presented object. With this approach, if naming with other modalities is intact, we confirm that language function and semantic knowledge of the objects are intact. The other helpful test in this situation is writing; our patient was able to write without difficulty which is suggestive of normal language function, but he was not able to read, again in favor of disconnection between visual information and language centers.

Overall, based on previously described cases, apperceptive and associative visual agnosia most often occur in the setting of bilateral lesions involving the ventral or dorsal visual streams.

Apperceptive visual agnosia is divided to 3 subcategories with respect to the level of object recognition deficit: 1) visual form agnosia which is inability to recognize, copy, match or discriminate simple shapes, 2) Integrative agnosia: able to perceive the simple elements but unable to perceive the whole picture, 3) Transformational agnosia: perceptual categorization deficit: unable to create viewpoint independent representation of an object.

Associative visual agnosia is a deficit of higher order processing where the patient is able to reach a viewpoint-independent representation but is unable to match this with the semantic knowledge of objects created by previous experiences [3].

Conclusion

Visual agnosia due to a PCA territory infarct can mimic aphasia and therefore result in false localization which in turn might impact treatment planning in the acute setting. Using verbal and tactile stimulation for naming can distinguish difficulty with naming caused by language network dysfunction from visual agnosia. Also testing for writing should be done to clarify the nature of language deficit and distinguish visual processing deficit from a primary language deficit.

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Disclosure of Interest

The authors report no conflict of interest.

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