

# Confusion vs Broca Aphasia: A Case Report

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## ABSTRACT

**Introduction:** Broca aphasia presents with impaired expression of spoken and/or written language and is often caused by infarction in the Broca area in the frontal lobe. We present a case of Broca aphasia that was initially interpreted as confusion.

**Case Presentation:** A 76-year-old woman was brought to the Emergency Department because of confusion and slurred speech that began in the morning. The patient had an extensive history of alcohol abuse, hyperlipidemia, and hypertension and had recently quit drinking 5 days earlier. The patient appeared confused, answering questions with “I don’t know,” but had no signs of agitation. Magnetic resonance imaging of the brain confirmed a recent infarct involving the left frontal and occipital lobes, coinciding with the Broca area. The patient was able to communicate via writing and eventually made an uneventful recovery of speech.

**Discussion:** This case demonstrates a patient without the display of stereotypical signs of stroke, yet that was the underlying condition leading to her aphasia. It is important for clinicians to be aware that a stroke can present with isolated findings such as language deficit or confusion.

## INTRODUCTION

Broca aphasia presents as nonfluent, interrupted, impaired expression of spoken and/or written language.<sup>1,2</sup> Severity of the condition may range from mild and transient aphasia, with complete ability to write, to severe cases of complete loss of ability to speak.<sup>2</sup> Certain habitual expressions may be easier to elicit. Comprehension of language is usually still intact; thus, patients will have insight of the condition, leading to frustration.<sup>1</sup> Broca aphasia occurs because of infarction in the posterior inferior frontal gyrus of the dominant hemisphere (often the left side) in Brodmann areas 44 and 45, also known

as the Broca area.<sup>1</sup> Some causes of Broca aphasia include traumatic brain injury, tumors, brain infections, and degenerative illnesses. However, the most common cause of infarct is a thrombus or emboli in the middle cerebral artery or the internal carotid artery.<sup>2</sup> We present a case of Broca aphasia that was initially interpreted as confusion.

## CASE PRESENTATION

### Presenting Concerns

A 76-year-old, right-handed woman was brought to the Emergency Department (ED) because of confusion and slurred speech. The patient had an extensive history of alcohol abuse, hyperlipidemia, hypertension, and asthma. According to her family, the patient drank 1.9 L (0.5 gal) of whiskey every 3 days for the last 50 years. The patient stopped drinking 5 days earlier since falling and hitting her head. The family denied noticing any tremors, seizures, or hallucinations from the patient since the abrupt cessation of drinking. The patient had not been eating since she stopped drinking. Her baseline performance, according to her family, was coherent, self-ambulatory, able to care for herself, and no speech problems.

On examination, the patient appeared confused, was unable to provide her own name or birthday, had some mild slurring in her speech, and was noted to have difficulty finding words. She would frequently say “I don’t know” and look frustrated when asked questions. No signs of agitation, facial droop, or distress were observed. The patient was able to follow basic commands and was able to move both her upper and lower extremities. Muscle strength was equal bilaterally (5/5) in the upper and lower extremities. She did not report any vision changes.

### Therapeutic Intervention and Treatment

Initial management included intravenous fluids with thiamine, folic acid, and magnesium because there was concern for possible alcohol-induced encephalopathy

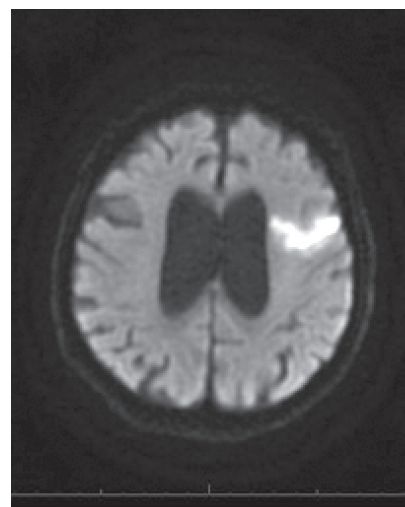


Figure 1. Axial magnetic resonance imaging of the brain showing recent infarct.

(Wernicke encephalopathy, alcohol withdrawal) caused by her extensive history of alcohol abuse. Findings of the initial laboratory workup in the ED are shown in Table 1. Her initial electrolyte abnormalities were corrected by the next morning after completion of intravenous fluid therapy. Results of a computed tomography scan of the head showed “no acute intracranial hemorrhage, mild to moderate cerebral atrophy, mild small-vessel ischemic changes of bilateral periventricular deep white matter and subcortical white matter, [and] slight interval increase in the sizes of the ventricles, which may be secondary to interval progression of the volume loss.”

Although the patient’s social history was suggestive of an alcohol-related cause, she continued to appear calm with no signs of agitation, contrary to what was expected for alcohol withdrawal. Further workup was deemed needed. On neurologic

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Table 1. Laboratory findings	
Test	Result
White blood cells, × 1000/mcL	8.5
Hemoglobin, g/dL	12.4
Hematocrit, %	36.4
Platelets, ×1000/mcL	205
Sodium, mEq/L	133
Potassium, mEq/L	2.7
Chloride, mEq/L	88
Carbon dioxide, mEq/L	31
Blood urea nitrogen, mg/dL	11
Creatinine, mg/dL	1.02
Glomerular filtration rate, mL/min/BSA	53
Random blood glucose, mg/dL	166
Neutrophils, %	66.2
Absolute neutrophil count, ×1000/mcL	5.61
Monocytes automated count, × 1000/mcL	1.67
Monocytes %	19.7
Basophil differential, %	0.7
Troponin, ng/mL	< 0.2
Basophil count, ×1000/mcL	0.06
Anion gap, mEq/L	14
Calcium, mg/dL	9.7
Ethyl alcohol, mg/dL	< 10.0
Salicylate, mg/dL	< 4.0
Acetaminophen, mcg/mL	< 10
Albumin, g/dL	2.6
Alanine aminotransferase, U/L	7
Alkaline phosphate, U/L	40
Bilirubin, total, mg/dL	0.6
Aspartate aminotransferase, U/L	16
Ammonia, mcmol/L	56 ≥ 24
Drug screen	Negative

BSA = body surface area.

examination, the National Institutes of Health Stroke Scale score was 4 because she was unable to answer questions of the month and her age correctly, and she had mild to moderate aphasia and some dysarthria. The patient was able to move both her upper and lower extremities but did have decreases in strength, balance, and endurance, requiring use of a front-wheeled walker. Magnetic resonance imaging (MRI) of the brain was ordered, which showed a recent infarct in the left frontal and occipital lobes, coinciding with the Broca area (Figures 1 and 2). Speech evaluation by a speech therapist found some dysarthria within functional limits and minimal verbal responses but no obvious slurring. Given the option to write, the patient was able to answer basic questions in writing while she was struggling to answer verbally. Questions asked included her name, birthday, and her children’s names.

Her case was discussed with a neurologist, who agreed with the assessment of stroke presenting with Broca aphasia and the conservative treatment of starting the patient on statin and aspirin therapy. Tissue plasminogen activator therapy was not recommended by the neurologist because the patient was out of the time window. Speech therapy was offered to the patient on discharge; however, she declined.

**Follow-up and Outcome**

The patient made an uneventful recovery, with improved, clear speech and little word-finding difficulty by the time she followed-up with her primary care

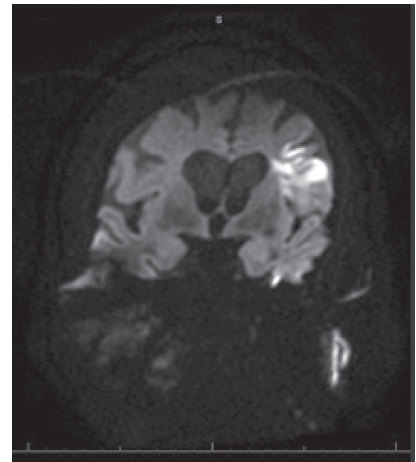


Figure 2. Coronal magnetic resonance imaging of the brain showing recent infarct.

physician 1 week after discharge from the ED. She was back to baseline 2 weeks after discharge. Her strength and coordination also improved by 2 weeks after discharge; she no longer used the front-wheeled walker in the home, rather only as needed while outside. Her primary care physician did note some weakness of the extremities but found no speech change at 2 weeks after discharge. Table 2 presents a timeline of the case.

**DISCUSSION**

Data on the specific incidence of Broca aphasia are limited, but it is estimated that about 170,000 new cases of aphasia related to stroke occur in the US annually, with global aphasia being most common.<sup>3</sup> This

Table 2. Timeline of the case			
<b>A 76-year-old woman with a history of alcohol abuse, hyperlipidemia, and hypertension was admitted on 2/25/18 for encephalopathy. She was noted to have a stroke in the Broca area on MRI of the brain. She was started on aspirin and statin medication. No tPA was given.</b>			
Date	Summaries from initial and follow-up visits	Diagnostic testing	Interventions
2/25/18	Patient presented with slurred speech and confusion	Head CT on 2/25/18 provided negative results for bleed Results of brain MRI on 2/26/18 showed recent infarct	Aspirin and statin medication were added. No tPA was given because it was outside of the window Physical therapy was provided in the hospital Patient was counseled on alcohol cessation
3/9/18	PCP posthospital follow-up showed the patient had improved speech and little word-finding difficulty, continued to have some weakness that required a walker, and had stopped drinking alcohol	Ultrasonography of carotid was ordered, but patient failed to keep appointment	Patient continued aspirin and statin medication; declined further physical therapy or speech therapy; and was counseled on alcohol cessation
4/13/18	PCP follow-up showed patient was compliant with medication and had stopped drinking alcohol; her strength and coordination improved, near baseline prior to stroke	No additional tests were given	Patient continued aspirin and statin medication; she was counseled on healthy diet and medication compliance

CT = computed tomography; MRI = magnetic resonance imaging; PCP = primary care physician; tPA = tissue plasminogen activator.

incidence of aphasia comes out to be about 21% of the 795,000 stroke cases each year in the US.<sup>4</sup> Treatment of aphasia includes speech therapy, with peak recovery within the first 4 to 6 weeks for Broca aphasia, making it the best prognosis for language recovery compared with other aphasias.<sup>5</sup>

On the basis of the functional MRI and structural MRI studies, Broca aphasia can have varying degrees.<sup>6,7</sup> At one end of the spectrum, the damage is in the Broca area extending along the sylvian fissure and surrounding frontal fields with the underlying white matter and basal ganglia.<sup>6,7</sup> This damage will present with drastic loss of speech fluency (loss of melodic modulation as seen in normal speech, articulation, naming, and morphology) and slow speech, with more pauses than actual words. Words such as nouns will be intelligible and appropriately selected. However, verbs and grammatical words may be less accurate. Additionally, there is an inability to repeat sentences verbatim, with the patients confused about why they are unable to repeat a sentence.<sup>6</sup> There is a loss of ability to organize words into grammatically correct sentence structure.

When the infarct is restricted to the Broca area alone, this produces fewer permanent deficits, presenting with mild and transient aphasia.<sup>6,7</sup> There is disturbance to speech, but not to language. Because the understanding that the presence of varying degrees of Broca aphasia is based on extent of the infarct, the concept of language and the multiple aspects that make up language (eg, grammar, syntax, comprehension,

articulation) have become an area of interest.<sup>7</sup> As such, the varying degrees of Broca aphasia can present in various ways.

The patient described in this case report is likely to have had an infarct restricted to the Broca area because of her transient aphasia that improved during the course of 3 days while in the hospital as well as her brain MRI showing the infarct not affecting surrounding frontal fields.

## CONCLUSION

Confusion is a common initial presentation, often requiring broad workup, in elderly patients. This patient had a social history suggestive of an alcohol-related cause, but her clinical presentation suggested otherwise. A high clinical suspicion is needed for other causes of confusion when patients do not improve after initiation of appropriate treatment. This case demonstrated a patient without the display of stereotypical signs of stroke, yet that was the underlying condition leading to her aphasia, which was initially interpreted as confusion. It is important for clinicians to be aware that a stroke can present with isolated findings, such as language deficit or confusion. In such a scenario, a high suspicion for stroke is warranted, so that a proper neurologic examination and workup are completed, thereby allowing for appropriate treatment. ❖

## Disclosure Statement

*The author(s) have no conflicts of interest to disclose.*

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