Crossed Wernicke's Aphasia After Aneurysmal Subarachnoid Hemorrhage: A Case Report

Olgu Sunumu: Subaraknoid Kanama Sonrası Çapraz Wernicke Afazisi

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ABSTRACT

Crossed aphasia (CA) refers to aphasia occurring after right brain damage in right handers. In the literature, numerous CA cases following cerebral ischemia have been reported, but few met the criteria for a prompt diagnosis. The authors present the case of a 52-year-old woman with SAH caused by a right middle cerebral artery (MCA) saccular aneurysm who developed non-fluent aphasia characterized by reduced verbal output, word-finding disturbances and phonemic paraphasias in both oral and written language. 99mTc-HMPAO SPECT was also consistent with right parieto-temporal and fronto-parietal ischemia with crossed cerebellar diaschisis on the right cerebellum. A diagnosis of CA was made. One year follow-up showed improvement in communication skills but persistent right fronto-temporo-parietal ischemia. Cerebral vasospasm after aneurysmal SAH symptomatology may vary from motor and sensory disturbances to cognitive disabilities. Aphasia developing after cerebral ischemia of the right hemisphere in a right-hand dominant patient following vasospasm may be a misleading symptom for the localization of the insult. Keeping a high index of suspicion may help in making the correct diagnosis. The changes in the perfusion patterns of cerebellum as assessed by SPECT study during the acute and recovery phases suggests the involvement of cerebellum in language functions.

KEYWORDS: Crossed aphasia, Subarachnoid hemorrhage, Cerebral vasospasm, SPECT, Cerebellum

ÖZ

Çapraz Wernicke afazisi (ÇWA), sağ elli insanlarda beynin sağ tarafının hasarı sonrası görülen bir afazi tipidir. Literatürde serebral iskemi sonrası ÇWA vakaları nadir olarak görülmekle birlikte, tanı koymadaki zorluklar belirtilmektedir. Yazarlar, 52 yaşında, sağ orta serebral arter anevrizmasına bağlı subaraknoid kanama geçiren bir hastada, azalmış konuşma, kelime bulma güçlüğü ve parafazi ile seyreden akıcı-olmayan afazi saptamışlardır. Wernicke afazi tanısı düşünülen hastada, beyin Doppler USG incelemesinde, sağ orta serebral arterde belirgin vazospazm saptandı. Sekiz gün sonra 99mTc-HMPAO SPECT incelemesinde sağ temporoparyetal ve frontoparyetal loblarda iskemi ve sağ serebellar hemisferde çapraz diaşisiz saptandı. Çapraz Wernicke afazi tanısı konan hastanın bir yıl sonra, afazisinde ciddi iyileşme görülürken, frontoparyetotemporal iskeminin radyolojik olarak sebat ettiği saptanmıştır. Subaraknoid kanama sonrası görülen vazospazm, hastalığın sonuçları açısından en önemli faktörlerden biridir. Serebral vazospazmın sonucu olarak, iskemi görülen olgularda, ÇWA tanısı kolaylıkla gözden kaçabilir. EEG ve SPECT gibi laboratuar ve radyolojik çalışmalar ayırıcı tanıda yardımcı olabilirler. Ayrıca olgudaki, SPECT ile saptanan, serebellumun perfüzyon paternindeki değişiklikler, serebellumun dil fonksiyonlarındaki rolünü göstermesi açısından önemlidir.

ANAHTAR SÖZCÜKLER: Çapraz Wernicke afazisi, Subaraknoid kanama, Serebral vazospazm, Serebellum

INTRODUCTION

Crossed aphasia (CA) in dextrals –i.e. aphasia following a right hemisphere lesion in right handers- is rare. It was first described by Byrom Bramwell in 1899. The precise incidence of crossed aphasia is unknown but it is variably estimated between 0.38 and 13% (5,11,13). We report CA in a strongly right handed woman who, after experiencing severe vasospasm secondary to an aneurysmal subarachnoid hemorrhage, developed Wernicke's aphasia.

CASE REPORT

Clinical course

This 52-year-old woman was brought to the emergency service with severe headache and brief loss of consciousness. She was lethargic and had slight nuchal rigidity on neurological examination. Motor and sensory findings were normal. Initial computed tomography (CT) of the brain revealed subarachnoid hemorrhage (SAH), more prominent in the right Sylvian fissure. There were no findings suggestive of an ischemic insult (Figure 1). She was hospitalised with a diagnosis of subarachnoid hemorrhage. She had no known developmental or childhood neurological disorders. Upon admission, a TCD revealed a mean middle cerebral artery (MCA) velocity of 82 cm/sec on the right and 65 cm/sec on the left side. A cerebral angiogram showed an MCA bifurcation aneurysm. Her neurological examination was normal and TCD values were within normal limits for the next two days. On the third day of her admission, she developed non-fluent aphasia characterized by reduced verbal output, word-finding disturbances and phonemic paraphasias in both oral and written language. Left hemianopsia and spatial neglect were found on confrontation testing. She also had left hemiparesis and hemihypoesthesia. Cranial CT and electroencephalographic study were normal. Mean MCA velocities were elevated to 185 cm/sec on the right and 90 cm/sec on the left side. Post-SAH vasospasm-related ischemia and crossed Wernicke's aphasia were diagnosed. She was followed up with intravenous fluid administration, hemodilution and hypertension. In the meantime, TCD values gradually returned to normal levels. SPECT findings were also consistent with right parieto-temporal and fronto-parietal ischemia with crossed cerebellar diaschisis on the right cerebellum (Figure 2). A diagnosis of crossed aphasia was confirmed.

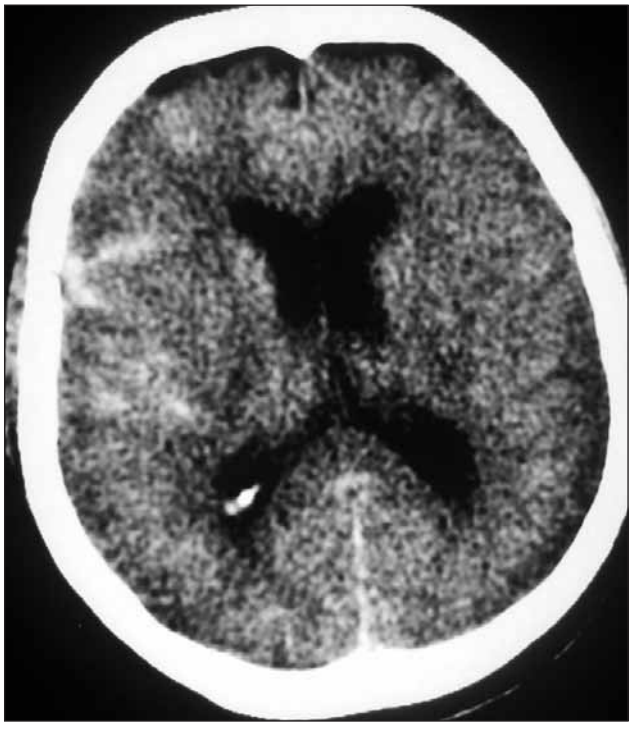

Figure 1. *Axial CT scan taken during admission showing SAH in the right Sylvian fissure.*

Operation, postoperative course and follow-up

The patient was operated on a week after her admission. Aneurysm of the MCA bifurcation was clipped via a right pterional craniotomy. Her postoperative course was uneventful. Postoperative cranial CT showed right insular ischemia (Figure 3).

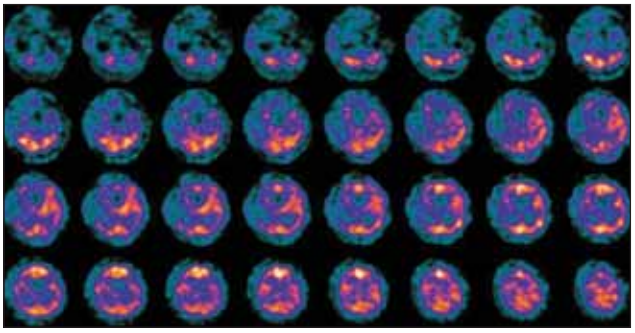

Figure 2. *Transaxial brain perfusion ^{99m}Tc-HMPAO SPECT images taken during the acute phase. Cerebral cortical HMPAO uptake is heterogenous and globally decreased in the right cerebral hemicortex. Severe hypoperfusion is present in right frontoparietal, parietal, parietotemporal, parietooccipital cortical regions, and the right thalamus. There is also mild hypoperfusion in the basal ganglion. Hypoperfusion observed in left cerebellar hemisphere is compatible with crossed cerebellar diaschisis.*

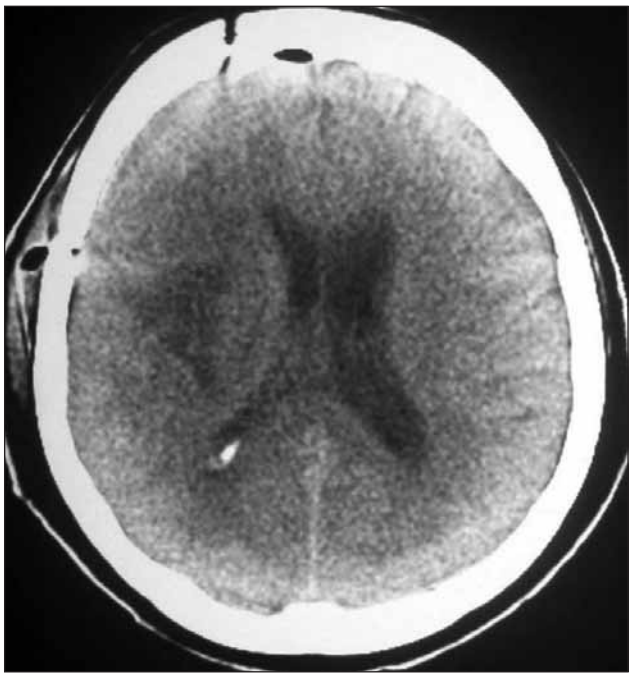

Figure 3. *Postoperative CT scan showing right insular ischemia.*

One year after SAH, her motor and sensory examinations were normal. She was tested for handedness, in order to determine hemispheral dominance, using the hand preference questionnaire developed by Chapman and Chapman (7). This questionnaire was adapted to Turkish and tested for validity and reliability (15). The patient's score was consistent with strong right-handedness. She also had no family history of left-handedness. In the linguistic examination, her language skills had improved and her overall communication effectiveness was only mildly impaired. She had mild difficulty in word finding, with impaired naming skills. Her written expression was also improved with occasional perseverative jargon. Auditory comprehension was intact for spoken paragraphs and for auditory comprehension skills for following instructions. Reading comprehension was mildly impaired for sentences. She had mild constructional apraxia and anosognosia. Neurological examination for right-left discrimination, finger agnosia, acalculia and agraphia (four cardinal symptoms of Gerstmann's syndrome) yielded negative results. A psychiatric examination ended up with a diagnosis of major depression.

An MRI taken three months after the insult showed that the ischemic area was actually larger, including right temporal and parietal lobes and right insular area (Figure 4). A follow-up SPECT revealed persistent ischemia of the right frontoparietal region (Figure 5). Interestingly, hypoperfusion of the left cerebellar hemisphere was no longer observed.

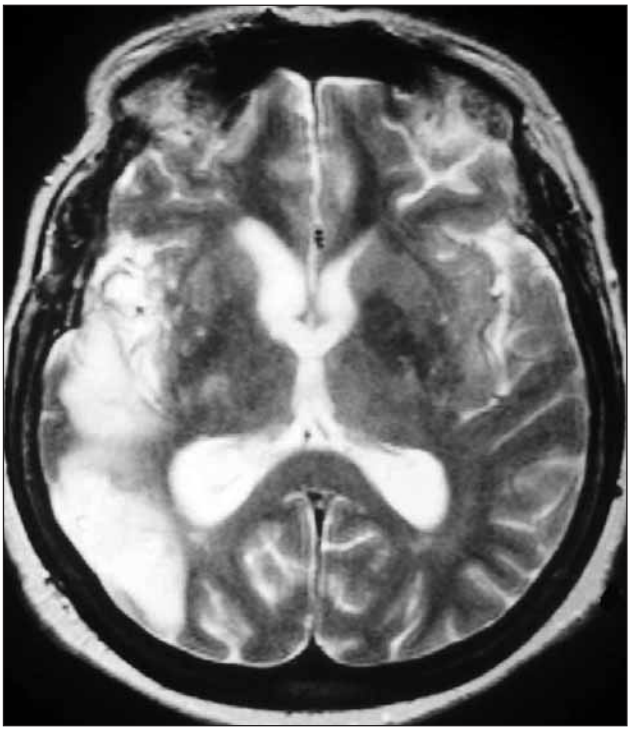

Figure 4. *An MRI taken three-months after the insult showing the ischemic area including right temporal and parietal lobes and right insula.*

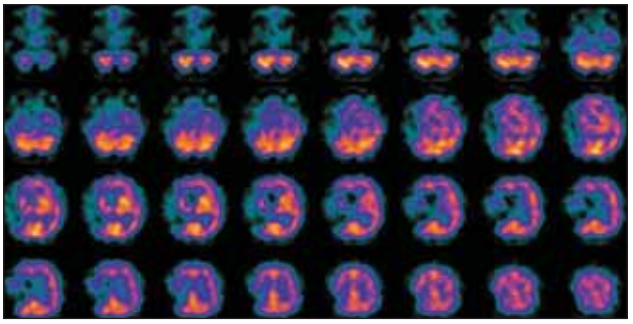

Figure 5. *Transaxial brain perfusion 99mTc-HMPAO SPECT images taken one year later. There is no significant difference in brain perfusion in other cortical and subcortical regions. Left cerebellar perfusion is normalized with resolution of crossed cerebellar diaschisis.*

DISCUSSION

Crossed aphasia refers to aphasia occurring after right brain damage in right-handers. In order to eliminate the ambiguity about localization, the diagnosis of CA is usually suggested in patients without a history of developmental delay or previous neurological insults (12,13). Alexander and

Annett described the specifications needed to diagnose and report a case of CA (2). They stated that, in order to be useful, the case report should describe language in clinical detail, examine limb praxis, assess qualitative patterns of visuospatial impairments, and publish lesion images. To be completely useful, a clinical assessment of affect was added to the previous list (2).

Electroencephalographic (EEG) examination is needed for the differential diagnosis in CA. A right hemispheric lesion could be masked by a left hemispheric dysfunction which may account for the aphasic manifestations (6). In our case the EEG was normal. The integrity of the left hemisphere was also shown by the SPECT study.

Several theories have been proposed to clarify the mechanisms that underlie this phenomenon. Mirror image hypothesis suggests complete reversal of the left hemispheric language function (3,10). In the acute phase, our patient had left hemiparesis and hemihypoesthesia and testing for Gerstmann's syndrome would be unreliable. However, later neurological examination failed to reveal findings of Gerstmann's syndrome, which suggested that the left hemisphere did not "replace" the right hemisphere.

Other proposed explanations include incomplete or independent lateralization and Annett's genetic hypothesis which may account for cases of anomalous organization of cognitive functions (2,4). Patients with left brain damage were observed to have normal verbal functions (crossed nonaphasia) (8). Furthermore, some patients with right hemispheric lesions expressed limited language deficits despite large lesions in perisylvian areas. Based on these findings, Alexander and Annett (2) suggested that the anomalous organization of cognitive functions could best be explained by random lateralization of cognitive functions in a small subset of population. In our patient, findings which may be attributed to the non-dominant hemisphere such as visuo-spatial neglect, constructional apraxia and anosognosia in addition to aphasia suggests anomalous lateralization of language function rather than mirror image hypothesis.

Crossed aphasia have been suggested a transient phenomenon, however, it has been shown that the proportion of CA cases associated with rapid recovery only represented a minority (<9%) (13). Our patient still showed mild aphasia one year after the insult. The mechanism for recovery is not well understood. However, a SPECT study obtained one year later revealed normal perfusion of the left cerebellum, which showed crossed diaschisis with the right hemispheric ischemia during the acute phase. It is tempting to speculate about the role of the cerebellum in both the acute phase and in the recovery phase. There are reports indicating the role of the cerebro-cerebellum (the lateral part of the cerebellar hemispheres) in cognitive functions such as language (1,9,14). The cerebellum acts as a subcortical circuit for hemispheric language functions (16). Therefore, reversal of cerebellar circulation to normal level might be suggested to take part in the partial recovery of language functions.

CONCLUSIONS

Cerebral vasospasm after aneurysmal subarachnoid hemorrhage is one of the most important factors affecting the patients' prognosis. Its symptomatology may vary from motor and sensory disturbances to cognitive disabilities. Aphasia developing after cerebral ischemia of the right hemisphere in a right-hand dominant patient following vasospasm may be a misleading symptom for the localization of the insult. Keeping a high index of suspicion may help the correct diagnosis. Laboratory and radiological studies such as EEG and SPECT provide additional help in making the differential diagnosis by assessing the integrity of the contralateral hemisphere. The changes in the perfusion patterns of cerebellum as assessed by the SPECT study during the acute and recovery phases suggest the involvement of cerebellum in language functions.

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