Lack of Evidence for Arterial Ischemia in Transient Global Amnesia

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Background and Purpose—Lesions in diffusion-weighted imaging (DWI-L) have been commonly described in transient global amnesia (TGA). We investigated a possible relationship between brain ischemia and TGA.

Methods—Twenty-eight patients underwent transcranial and carotid Doppler ultrasonography (including microembolus detection) and MRI within 24 hours of TGA onset (including DWI, perfusion-weighted imaging and angio-MRI). MRI was repeated at 48 to 96 hours (21 patients) and 30 days (18 patients).

Results—Punctate DWI-L were observed in 16 patients (57%) and were not attributable to perfusion abnormalities, arterial stenoses or underlying cardioembolic disease. MRIs performed between 12 and 72 hours showed the highest frequency of DWI-L (88%; P<0.001). No pathological findings were observed at 30 days.

Conclusions—These results suggest that TGA is not related to cerebral arterial ischemia. (Stroke. 2008;39:476-479.)

Key Words: brain ischemia ■ neuroimaging and MRI ■ transient global amnesia ■ transient ischemic attack

In transient global amnesia (TGA), previous MRI studies have revealed a high incidence of delayed hippocampal lesions in diffusion-weighted imaging (DWI-L) after TGA onset. Cerebral ischemia, the presence of right-left shunt (RLS), and carotid arteriosclerosis have been proposed as etiology of TGA. MRI studies assessing cerebral perfusion in TGA are, however, lacking. We sought to investigate a possible relationship between common causes of arterial ischemia and TGA.

Patients and Methods

We enrolled 28 patients from May 2004 to January 2006 with TGA onset within the previous 24 hours, TGA was diagnosed according to Caplan criteria (modified by Hodges and Warlow). Patients or relatives provided informed consent as approved by the Local Ethics Committee.

All patients were evaluated by a neurologist and underwent transcranial and carotid Doppler (TCD), including an RLS test. The TCD examination was performed by a certified sonographer with 1-channel, 2-MHz equipment. A standard set of diagnostic criteria was applied to diagnose arterial stenoses. The RLS was classified according to the procedure agreed on in the Consensus Conference of Venice. MRI was performed in all patients within 24 hours of TGA onset. Most patients had serial MRIs between 48 and 96 hours (MRI-2) and at 30 days (MRI-3; Table). All MRI examinations were obtained using a 1.5-T scanner. Images obtained at all serial MRIs included T2-weighted spin-echo, Fast-Flair gradient, and DWI sequences. We calculated the apparent diffusion coefficient from the DWI. At MRI, we also performed a perfusion-weighted gradient-echo sequence acquired using dynamic susceptibility contrast imaging and MR angiography (MRA) using 3-dimensional time-of-flight sequence.

Results

The mean age of the patients was 64.4±9.8 years (46% male). The average duration of TGA was 6.4±4.95 hours. Hypertension in 12 patients and dyslipemia in other 11 were the most prevalent vascular risk factors. Eight patients had common migraine and 2 more migraine with visual aura. Five patients described previous TGA. Fifteen patients (54%) completed the serial MRI protocol. MRI-0 and MRI-2 were completed in 6 of the remaining patients (21%; Table). DWI-Ls were found in 16 of 28 patients (57%), most frequently observed in the right hippocampus. The presence of DWI-L was not correlated to the duration of TGA or to vascular risk factors (Table).

We analyzed the results of the 3 MRIs separately. In MRI-0, 12 of 28 patients (43%) showed DWI-L (Table). The later MRI-3 was performed, the higher the frequency of DWI-L that
were observed ($t$ test $P<0.001$). In MRI₀, DWI-L appeared with higher frequency after 12 hours since TGA onset (ROC-curve: sensitivity 67%; specificity 94%). Fourteen of 21 MRI-2 patients (67%) showed DWI-L (Table). In contrast with MRI₀, DWI-Ls were significantly more frequent when MRI-2 was obtained within 72 hours since TGA onset ($t$ test $P<0.001$; ROC-curve: sensitivity 93%; specificity 71%). Taking into account both MRI₀ (28) and MRI-2 (21) DWI-L were more likely to be detected between 12 and 72 hours (21/24; 88%; Pearson $\chi^2$, $P<0.001$; Figure 1). There was no
evidence of residual lesions in any of the MRI-3, including in patients with previous DWI-L at MRI0 or MRI-2 (Table; Figure 2). The perfusion-weighted imaging (PWI) defects at MRI0, observed in 4 patients were not topographically correlated to DWI-Ls. PWI abnormalities were absent in the 7 patients who underwent MRI0 during the TGA (Table). TCD findings were in agreement with MRA abnormalities. Neither examination revealed any significant stenoses or abnormal flow patterns related to the presence of DWI-L (Table). Cardiologic exams were normal in all but one patient who had patent foramen ovale with septal aneurism. The presence of RLS in 5 patients was not significantly associated with the presence of DWI-Ls (Table).

Discussion

In accordance with previous studies, we observed a relevant frequency of reversible DWI-Ls in TGA patients (57%), with the highest probability in those MRIs obtained between 12 and 72 hours after TGA onset.2,3 Disagreement with previous reports about the timing of DWI-L may depend on MRI definition or the time to MRI performance.2 Limitations of this study include the small sample size and the proportion of patients who underwent serial MRIs.

The presence of delayed and reversible DWI-Ls in diverse vascular territories not associated with PWI or MRA abnormalities, as well as the lack of significant carotid atherosclerosis and the low prevalence cardioembolic disorders in our series, differ from what is usually observed in patients with TIA or minor stroke. Moreover, MRIs in TIA usually show acute DWI-L associated with the duration of the symptoms, reversible in only 20% of cases and persistent PWI defects in 34%.7,8

In summary, although we may not exclude minimal cerebral perfusion changes, our findings cast doubt on the hypothesis of arterial ischemia as the cause of TGA.
Disclosures

None.

References

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