

Of OTH patients, 61.3% were women, compared to 45.5% of TYP patients ($p = 0.001$). There were significant differences in the frequencies of all stroke risk factors, especially hypertension, present in 30.3% of OTH and 70.4% of TYP patients ($p < 0.0001$). Clinical severity and frequency of improvement were similar for OTH and TYP patients, although OTH patients had a higher percentage of posterior circulation deficits (26.8% vs 15.0%, $p < 0.0001$).

Conclusions: Patients presenting with acute ischemic stroke due to etiologies of the TOAST - OTH classification tend to be younger, more often female, and have lower frequencies of stroke risk factors. Arterial dissection is the most common etiology in the OTH classification.

Specific Diagnoses in TOAST - OTH Category

		Frequency	Percent
Noninflammatory Vasculopathy	Dissection	38	37.3
	Unruptured Aneurysm	3	2.9
	Moya-Moya disease	3	2.9
	Other Vasculopathy	7	6.7
	Systemic Vasculitis	11	10.8
Inflammatory Vasculopathy	CNS Vasculitis	4	3.9
	CNS Aspergillosis	1	1.0
	Cancer-Associated	16	15.7
Thrombophilia	Thrombophilia		
	Antiphospholipid Antibody	10	9.8
	Sickle Cell Disease	4	3.9
	Other Thrombophilia	3	2.9
Metabolic	Mitochondrial stroke	2	1.9

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Sites of Intracranial Hemorrhage in Adult Moyamoya Disease and Associated Angiographic Findings

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BACKGROUND AND PURPOSE: Adult moyamoya disease often present with intracranial hemorrhages (ICHs), but their sites and cause have not been fully studied. We sought to determine sites of ICHs and detect specific angiographic findings. **MATERIALS AND METHOD:** 165 patients aged over 19 years were diagnosed with this disease in our institution from 1986 to 2001. Subjects were 61 patients whose CT scans at the onset of ICH and cerebral angiograms performed within one month of CT scans were available. According to the sites of origin of ICHs on CT scans, they were classified into 6 groups: 4 groups with parenchymal involvement including the basal ganglia, thalamus, periventricular white matter, and subcortical white matter; 2 groups without parenchymal involvement including ventricular system (confined within lateral and/or third ventricle) and subarachnoid space. The border between periventricular and subcortical white matter was defined as imaginary line 1.5 cm from the ventricular wall. In cases with ICHs extending to both periventricular and subcortical white matter, the primary site of ICH was regarded as subcortical. In order to detect specific angiographic findings presumably related to the ICHs, angiograms of the 61 patients were retrospectively reviewed. **RESULTS:** ICH sites were basal ganglia in 26 (43%) patients, thalamus in 11 (18%), periventricular white matter in 6 (10%), subcortical white matter in 5 (8%), ventricular system in 10 (16%), and subarachnoid space in 3 (5%). Among 48 patients of parenchymal involvement groups, 29 (48%) proved to have associated intraventricular hemorrhage (IVH). Angiograms revealed small aneurysms along dilated perforators (basal moyamoya) distributed to the sites of ICHs near ventricles in 4 patients. Two of them disappeared on follow-up angiograms and were judged as pseudo-aneurysms. **CONCLUSIONS:** ICHs in moyamoya frequently had primary IVHs or secondary IVHs deriving from parenchymal ICHs often characteristically including periventricular white matter. This result and occasional presence of aneurysms near ventricles suggest that most ICHs may be caused by rupture of dilated basal perforators or their junction with dilated medullary artery developed for collaterals at or around the ventricular system.

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The Patterns of Acute Ischemic Stroke in Moyamoya Disease

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BACKGROUND: It has been considered that the presumed cause of cerebral ischemia among patients with moyamoya disease is a gradually progressive hypoperfusion secondary to occlusion of the major vessels. However, the pathogenesis of acute ischemic stroke in moyamoya disease remains elusive. This study was executed to investigate the patterns of acute ischemic stroke in moyamoya disease. **METHODS:** We enrolled 24 consecutive adult moyamoya patients (4 men and 20 women; 32.6 ± 11.0 years, 15 to 55 years) who had a diffusion-weighted imaging (DWI) within 5 days of acute ischemic stroke or TIA onset. Moyamoya disease was confirmed in all patients by conventional angiography, and the patients who had underlying conditions or other ischemic stroke risk factors were excluded. The lesion patterns on DWI were categorized as large territorial, small cortical, superficial perforator, deep perforator, and borderzone (internal or external). Brain diamox SPECT was also analyzed for vascular reserve. **RESULTS:** The acute ischemic lesions were detected in 18 patients (75%); unilateral hemisphere in 12 (66.7%) and bilateral hemispheres in 6 (33.3%). 14 patients (77.8%) had multiple acute ischemic lesions on DWI. There were large territorial lesions in 6 (33.3%), small cortical lesions in 10 (55.6%), superficial perforator lesions in 8 (44.4%), deep perforator lesions in 4 (22.2%), and borderzone lesions in 7 (38.9%). In 4 patients with large territorial lesions (66.7%), another patterns of lesion coexisted which were not located within the same vascular territory. Pure borderzone lesions were found in 2 patients (28.6%), while the other borderzone lesions (71.4%) were combined with other lesion patterns. Furthermore, only 2 patients with bilateral ischemic lesions (33.3%) had borderzone lesions. Among 14 patients with contemporary brain SPECT, the area of decreased vascular reserve was corresponded to acute ischemic lesions in 6 patients (33.3%). **CONCLUSION:** This study suggests that moyamoya disease has various mechanisms of acute ischemic stroke including

not only low perfusion, but in situ arterial occlusion, artery to artery embolization, or their combination. It could provide different therapeutic views of acute ischemic stroke in moyamoya disease.

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Magnetic Resonance Imaging Abnormalities in Sickle Cell Disease Adult Patients Correlate With Transcranial Doppler Findings

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Background and purpose: Brain imaging abnormalities were reported in up to 44% of children with sickle cell disease (SCD). In addition, TCD has become a part of routine care for stroke prevention in these patients. However, the frequency of MRI abnormalities in SCD adult patients and its relationship to TCD findings have not been previously clarified. We assessed the hypothesis that brain imaging abnormalities in SCD adult patients correlates with TCD findings. **Methods:** Thirty neurologically asymptomatic SCD adult patients (9 males; mean age = 26.7 ± 11.23 yo) underwent a complete neurological examination prior to TCD and MRI studies. MR imaging was evaluated to examine the presence of lacunar infarction, encephalomalacia, leukoencephalopathy and brain atrophy. MRA studies were performed to identify possible intracranial arterial stenosis (IAS) and occlusion or major arterial tortuosity. The highest mean flow velocity (maxFV) detected during TCD examinations was also recorded and correlated with the hematocrit performed at the same day. **Results:** The overall frequency of MR imaging abnormalities was 66.7% (leukoencephalopathy=53.3%; brain atrophy=30%; lacunar infarct=10%; encephalomalacia=3.3%) and they were correlated with IAS or arterial tortuosity ($p=0.01$). MRA was abnormal in 53.3% and IAS was observed in 13.3%. The highest maxFV (mean = 147.75 cm/s) were found in patients with lacunar infarct ($p = 0.007$) or IAS ($p=0.01$). There was a correlation between IAS demonstrated on MRA and lacunar infarct ($p=0.004$). **Conclusion:** Prevalence of brain imaging abnormalities in SCD adult patients is higher than that described for children. Although lower than in children with SCD, the max FV in adult SCD patients is correlated with neuroimaging findings. Lacunar infarct seems to be correlated with IAS. In conclusion, TCD findings together with MRI abnormalities may help to identify high risk adult SCD patients that should be enrolled in further stroke prevention trials.

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The Shape of the Infarct in the Penetrating Arterial Territory Is a Major Clue of Stroke Mechanism

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Background and purpose: Conventionally, the discrimination between the small vessel disease vs. large artery disease was made by the infarct size. However the branch atheromatous disease, in which the main pathology is the underlying large artery atherosclerosis, can also make small infarct. So the size-based classification of ischemic stroke infarct can be often inaccurate. We thought that the shape of infarct in the penetrating arterial territory can be a clue about the mechanism of the infarct, and tested the hypothesis. **Methods:** We recruited 205 consecutive patients who 1) had suffered from lacunar syndrome, 2) had been observed within 7 days after the onset of symptoms, 3) underwent diffusion weighted MRI and MR angiography a few days after admission and 4) had infarct in the penetrating arterial territory of middle cerebral or basilar artery. The infarct shape in the penetrating arterial territory of middle cerebral artery (comma vs. round) and basilar artery (wedge vs. round) were assessed using the coronal T2 and diffusion weighted image, respectively. The MR angiographic and clinical features were analyzed. **Results:** One hundred and four patients (50.7%) had the infarct of comma/wedge shape, and 101 patients (49.3%) had round shape infarct. Among the 104 patients with comma/wedge shape infarct, 77 had a parent artery stenosis, whereas 11 of 101 patients with round shape infarct showed stenosis ($p < 0.001$). The diameter of comma/wedge shape infarct (19.7 mm) was also significantly larger than that of the round shape (12.5 mm) ($p < 0.001$). Neurologic deficit at admission and after 7 days were more severe in the patients with comma/wedge shape infarct than the patients with round shape ($p=0.021$, 0.001 , respectively). Hypertension was more prevalent in patients with comma/wedge shape infarct (89.4%) than those with round shape (73.3%) ($p=0.003$). Multivariate analysis revealed that the infarct shape is independently related to the parent artery stenosis ($p < 0.01$). **Conclusions:** In the patients with deep penetrating arterial territory infarct, comma/wedge shape infarct has more underlying artery stenosis than the round shape infarct. The infarct shape can be a clue in the classification of ischemic stroke mechanism.

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Prevalence of Multiple Cortical Lesions in Acute Stroke Patients Visualized by High-Resolution Diffusion-Weighted Imaging

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Introduction: Diffusion weighted imaging (DWI) is sensitivity for detecting acute ischemic stroke, yet suffers from poor resolution, distortion artifact, and low signal-to-noise (SNR). Using a diffusion tensor sequence (DWI-T), we observed a complex pattern of cortical ischemia that is not easily discernable on routine DWI. **Methods:** 28 acute stroke patients admitted over 10 weeks were imaged using both routine DWI (3 directions, $20 \mu\text{l}$ voxels, 28 sec acquisition time) and DWI-T (19 directions, $10 \mu\text{l}$ voxels, 4 min 16 seconds acquisition time) with $b=1000$ s/mm². Lesions were segmented on trace-weighted images, independently for both sequences, by two readers blinded to identifiers. Morphological analysis was performed to examine concordance between the sequences. **Results:** DWI-T had 27% greater SNR (36 vs 28 for DWI), reduced distortion of gyri, improved cortical discrimination, and 50% greater contrast-to-noise (24 vs 16). Motion artifact was minimal despite the longer acquisition time. Concordance between the methods was found in 9/28 patients. In 2/28, lesions were observed only on DWI while in 17/28, a total of 98 discrete lesions were identified only on DWI-T. The average volume