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**MR-ANGIOGRAPHY OF THE VERTEBROBASILAR SYSTEM**
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**INTRODUCTION:**
The frequency of neurologic symptoms and the clinical problems in distinguishing from structural damage are a challenge to the noninvasive diagnosis of the vertebrobasilar arteries. We used magnetic resonance angiography in 71 patients who presented with symptoms of the posterior circulation without alteration of consciousness.

**METHODS:**
All examinations were performed on a 1.5 Tesla imaging system (Siemens, Magnetom) using a circular polarized head-coil (FOV = 25 cm). T1 and T2 weighted images were acquired for morphological diagnosis and followed by a 3D-FFT-FISP gradient motion refocussing flow sensitive high resolution sequence which allows the delineation and projectional postprocessing of arteries with normal blood flow. If required additional 2D-images with selective presaturation to encode flow were performed.

**RESULTS:**
The 71 patients were 13 to 75 years of age with a mean of 53 years. The final diagnosis was basilar migraine in 9, vertebrobasilar TIA in 22, vertebrobasilar reversible ischemic symptoms with minimal parenchymal damage in 12 and brain stem / cerebellar stroke in 28 patients. There was excellent correlation between MR-angiography and X-ray-angiography in occlusion of the vertebro- and basilar artery (n = 10). Branch occlusions of the PICA (n = 4) were not seen on MRA, however, the typical infarct distribution on MRA allowed the diagnosis prior to X-ray-angiography. The meaning of normal variants, like hypoplastic vertebral artery, persistent trigeminal artery or feeding of the posterior cerebellar artery by the posterior communicating artery which was observed in 50% of the patients with basilar migraine and vertebrobasilar TIA remains to be determined in further studies.

**CONCLUSION:**
The main advantage of MR-angiography is its inherent dependence on flow and simultaneous capability to visualize morphologic structures. As the modality can be performed together with routine imaging it improves diagnosis of vertebrobasilar ischemic disease. Although MRA will not replace X-ray-angiography but improve the selection of patients for interventional therapy and will reduce the need for diagnostic X-ray-angiography in future.

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**CASE REPORT ON REOPENINGS OF ICA OCCLUSIONS UNDER H.E.L.P. APPLICATION, REVEALED BY DOPPLER/DUPLEX**
W. Waler, B. Waler, H. Lechner, S. Horn, K. Niederkorn

Acute and chronic cerebrovascular disease are connected with changes in the hemorheologic profile. In this connection an increase of whole blood and plasma viscosity, but also hyperfibrinogenemia, enhanced aggregation and reduced filterability of red blood cells have to be mentioned. Even the impact of an altered lipid profile on the hemorheologic parameters has been reported. By means of a Heparin mediated Extracorporeal LDL <cholesterol, triglycerides, fibrinogen> Precipitation (H.E.L.P.) System possibility is given to interfere in the hemorheologic profile. Therefore clinical studies in acute thrombembolic stroke and in multiinfarct dementia had been carried out. In this connection the following observations could be made in two cases of complete occluded ICA's, objectified by Doppler and Duplex sonography. In one case with left ICA occlusion, a reopening of the vessel was found after 12 apheresis. In the other case a disappeareing of the stenotic process in the right ICA could be seen after seven apheresis.

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**SERIAL TCD MEASUREMENTS IN ACUTE SUPRATENTORIAL ISCHEMIC STROKE — CORRELATION WITH CLINICAL OUTCOME AND OTHER NEUROIMAGING PARAMETERS**
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Eleven patients (6 men, 5 women, mean age 66 years) were studied within 48 hours after the onset of a focal neurological deficit caused by cerebral ischemia. The objective of the study was to assess possible changes of the MCA and basilar artery velocities in the time course of stroke from the acute to the subacute to the chronic state, their correlations to the clinical status and to metabolic and morphologic changes demonstrated by SPECT and MRI. Initially, a neurologic scale (Adams et al., Stroke 18:665), CT-Scan, MRT of the brain (Gyroscan, 1.5T), extracranial Doppler and Duplex-Scanning (Vingmed CPM 700), TCD (Transcran, EME), and SPECT (Tomomatic 564, 1-123 IMP), were performed. These examinations were repeated on days 7, 21 and after 6 months. Hematocrit and blood pressure remained comparable between studies. Five patients had a very good prognosis, 6 ended up with a moderate neurologic deficit at day 21 (fair prognosis). In patients with good clinical outcome a clear tendency towards hyperemia was observed in the symptomatic, and in a lesser degree, in the asymptomatic MCA on day 7. This was confirmed by SPECT and may be an early predictor of good clinical outcome in acute stroke.

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The C(1)/C(2)-bypass study group demonstrated the ineffectiveness of selecting patients for surgery only by clinical criteria. In order to avoid similar failings in patients subjected to carotid surgery, two main considerations must be taken into account:

-1) Most strokes in carotid artery stenosis are due to plaque embolization.

-2) The local luminal narrowing of carotid artery stenosis or occlusion gives only insufficient information about the hemodynamic effect on the cerebral circulation.

Therefore a reliable diagnostic tool to select a subgroup of patients with elevated "hemodynamic risk" would be of great importance.

In 1986 Hidd and Pauli introduced a new technique based on the 

\[ \text{CO}_2 \text{-dependence of the cerebral blood flow} \]

The measurement of the \[ \text{CO}_2 \text{-reactivity of the flow velocity in the middle cerebral artery} \]

To evaluate the hemodynamic relevance and the amount of the collateral supply of an extracranial stenosis.

Due to methodological reasons there are several difficulties limiting the diagnostic value of this method in daily practice:

- Uncertain definition of subgroups with normal, moderate or severe "hemodynamic risk".
- Effects influenced by the investigator's experience.
- Large expenditure of time for each examination.
- No ultrasonic window or obstructive long disease, especially in patients of high age.

In spite of these limitations this rather new technique is a valuable additional component in the preoperative diagnostic process. So far collected data are encouraging that there is more precise selection of patients who might benefit from carotid surgery will be possible using this hemodynamic functional test.

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EFFECT OF CEREBRAL BLOOD FLOW ON CEREBRAL BLOOD FLOW.

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The visualization of cerebral blood flow (CBF) by \[ \text{Tc}^{99m}\text{-HMPAO-SPECT} \] can be used to demonstrate global and regional impairment of cerebral blood supply in patients with vascular disease. The aim of the present study was not only to show CBF-distribution in patients with severe stenosis of the internal carotid artery, but also to look at the effect of a carotid endarterectomy on CBF and to estimate the vascular reactivity pre- and postoperatively by applying acetazolamide (Diamox).

We investigated ten patients (8 males, mean age 65a) with carotid stenosis, who had at least one ischemic incident on the corresponding side in their history, with \[ \text{Tc}^{99m}\text{-HMPAO SPECT} \] two times preoperatively (within and one week later with Diamox previously) and at least once approximately three months after the vessel operation. Six patients could be examined additionally with Diamox again. The SPECT results were analysed visually first. Then the global and hemispheric uptake as well as the uptake in 34, mainly cortical regions of interest (ROI) were calculated in % of injected dose per 100 ml of brain tissue.

The visual examination revealed no changes postoperatively. Significant increases of global, hemispheric and all regional uptakes were found pre- and postoperatively after Diamox administration. Comparing the global and hemispheric uptake levels before and after the carotis operation, a significant decrease of \[ \text{HMPAO uptake} \] could be seen in the investigation without Diamox, but no significant uptake changes occurred after Diamox administration. Also no significant correlation existed between Diamox induced uptake increase preoperatively and changes of \[ \text{HMPAO uptake} \] after the operation.

The carotis endarterectomy seemed to cause no improvement of cerebral \[ \text{HMPAO uptake} \], on the contrary, a decrease occurred. But as the provocation of vascular reactivity yielded similar results as preoperatively, the operation can at least result in an elevation of the vascular reserve capacity.

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FREQUENCY, LOCATION, AND CT-CHARACTERISTICS OF SILENT STROKE.

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Previous brain infarctions seen by means of CT are common in the absence of a history of stroke. 12% of patients (57/476) without a history of a prior stroke had ischemic lesions on their first CT, unrelated to the presenting stroke. The files of the Klosterneuburg Stroke Data Bank (a single-center hospital-based stroke registry) were reviewed to determine the occurrence, location, and CT characteristics of silent/unreported stroke events. The CT lesions were registered by means of a pretested documentation with a high interrater reliability. Most frequent were small deep infarctions (28 cases). Others were infarctions involving areas of the cortex (5), borderzone areas (7), incomplete territorial infarctions (3), deep, large infarctions (2), and infratentorial, bilateral or median lesions (13). Most locations were in brain regions known to harbor silent lesions. No association with the etiology or known risk factors was found for this group with silent/unreported stroke when compared to the group with single lesions that were related to the presenting stroke.

MRI SIGNAL ABNORMALITIES IN MIGRAINE PATIENTS.

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There is ample evidence of vascular phenomena in association with migraine headaches. In order to look for possibly related MRI evidence of parenchymal damage we reviewed the scans of 38 migraine patients without current neurologic symptoms (mean age 35.8 +/- 11.9 years). In addition, we compared the findings in those 24 migraineurs under 50 years without major cerebrovascular risk factors (mean age 30.1 +/- 9.0 years) to that in 14 headache and risk factor free volunteers (mean age 37.8 +/- 5.3 years). Overall, focal areas of hyperintense signal were seen in 15 (39%) patients. Lesion prevalence varied according to the type of headache. Signal abnormalities were seen in 18% of migraineurs without aura, in 53% of migraineurs with typical aura, and in 38% of patients with basilar migraine. The subset of migraine patients under 50 years exhibited MR signal abnormalities more than twice as often than controls (33% vs. 14%). Punctate white matter hyperintensities were the predominant finding and were seen in 10 of 15 individuals with MR lesions. More striking signal abnormalities consisted of symmetrical areas of hyperintensity lateral to the posterior horns in two 24 year old patients and of extensive white matter damage with lacunar infarcts in a 59 year old woman.

Our findings indicate a higher prevalence of MR lesions in a mixed group of migraineurs than in headache free individuals. Signal abnormalities are most often uncharacteristic, however, and their occurrence relates to the type of migraine.

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