MEASUREMENT OF CEREBROVASCULAR REACTIVITY BY HMPOA-1-SPECT AFTER CAROTID ENDARTERECTOMY


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By using quantitative Tc-99m-HMPAO SPECT we investigated the cerebrovascular reactivity before and months after carotid endarterectomy. 13 patients (11 men, 2 women) participated into the study who did not have previous anamnesis of cerebral circulation injury and had contrast angiography proven, at least unilateral significant (more than 70%) carotid artery stenosis. In 6 patients we performed right sided, in 6 patients left sided internal carotid artery endarterectomy (2 patients were not operated because of their cardiac status). Postoperative complications occurred in 2 cases. The control examinations were performed mean 22.9 months after surgery. Before operation the patients underwent both basic and acetylsalicylic acid challenge cerebral perfusion SPECT examination with Tc-99m-HMPAO. During the follow-up we performed only acetylsalicylic acid results. In the patient with carotid stenosis there was no difference between the baseline level and the values measured during acetylsalicylic acid stimulation (p > 0.1). In healthy acetylsalicylic acid provocation produced mean 20% perfusion increase whereas in carotid stenosis patients reserve capacity was not detectable. During follow-up we did not observe significant improvement in cerebrovascular reactivity of carotid patients.

Our result suggests, that despite the embolisation preventive effect of the carotid endarterectomy, it seems not to have any beneficial effect on the improvement of cerebral perfusion reserve capacity.

THE ROLE OF CSF-SPECT AND ICBF-SPECT IN THE PRESURGICAL EVALUATION AND FOLLOW-UP OF PATIENTS WITH ENDOCANAL FENESTRATION OF THE THIRD VENTRICLE

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Objective: Our purpose was to determine the role of Tc-99m-DTPA CSF-SPECT combined with Tc-99m-HMPAO/ECO brain perfusion SPECT studies in the preoperative evaluation and postoperative follow-up of patients who underwent endoscopic fenestration of the third ventricle.

Material and methods: 5 patients were studied pre-and postoperatively, with a standard technique due to occlusive hydrocephalus. The results of combined SPECT studies were correlated with CT, MRI, clinical and surgical findings. Results: In 4 cases the preoperative CSF-SPECT showed an intraventricular occultosus hydrocephalus (CT/MRI showed aqueduct stenosis in 3 cases, and the adhesion of velum medullare superius to the brainstem in 1 case). In 1 patient with a history of head trauma, the CSF-SPECT showed partially communicating hydrocephalus with asymmetrically enlarged lateral ventricles. The preoperative ICBF SPECT demonstrated perfusion abnormalities of different extent, localization, and severity, partly depending on the enlargement of ventricles. In the postoperative CSF-SPECT studies, 4 patients demonstrated high tracer activity in the third ventricle and lateral ventricles on early SPECT images. In 1 patient, there was no ventricular reflux and this patient underwent a short ventriculostomy in two visits. There were no signs of changes in size of the ventricles as demonstrated by CT/MRI during follow-up studies. Also, there were no significant changes in ICBF in the first two months by follow-up ICBF-SPECT studies. However, the last (1.2 years) follow-up studies showed improved ICBF of different extent and grade.

Conclusions: The sensitivity and specificity of CSF-SPECT is higher than that of CT/MRI in differentiating communicating versus non-communicating forms of hydrocephalus, and in the evaluation of abnormalities of CSF hydrodynamics. The combined ICBF-SPECT and CSF-SPECT are useful not only in the presurgical selection of candidates for endoscopic fenestration of the third ventricle, but also in timing and follow-up of surgical intervention. Additionally, due to strong correlation of ICBF-SPECT patterns with clinical findings, the method is an important tool in patients follow-up.

ACETAZOLAMIDE-ENHANCED Tc-99m-HMPAO SPECT IMAGING OF CEREBRAL BLOOD FLOW CHANGES IN PATIENTS SUFFERING FROM AUTOIMMUNE DISEASES AND ASSOCIATED ENCEPHALOPATHY

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Objective: Our purpose was to evaluate the role of acetylsalicylic acid enhanced ICBF-SPECT in the patient management of patients suffering from Hashimoto thyroiditis, SLE and multisystemic autoimmune diseases associated with different neurologic manifestations.

Material and methods: Four patients (2m:2f, 1 with a history of Hashimoto Thyroiditis, 2:1 and multisystemic autoimmune disease (1 study were included). The assessment included CT/MRI, pre- and posttreatment acetylsalicylic acid-enhanced ICBF SPECT studies and neurological examination. Tc-99m-HMPAO SPECT studies were carried out with a standard technique, and the results were compared to the clinical findings and morphological data. SPECT data were analysed visually and by a special region of interest (ROI) program. Circular ROIs were placed over the substantia nigra, thalamus, frontal, temporal, parietal, occipital cortex, and cerebellum. ROIs were normalized to the whole brain average. Results: The acetylsalicylic acid-enhanced ICBF-SPECT studies showed a typical cerebral ICBF pattern, typical for encephalopathies, with wide interindividual variability. There was a reduced cerebrovascular reserve capacity in all of our patients. The posttreatment ICBF-SPECT demonstrated significant improvement in the baseline ICBF (6-24% region by region), with an increased CVR (the ICBF reduction after acetylsalicylic acid administration decreased from 21% to 5.6% in most of the involved regions) in 2 cases with dramatical clinical improvement. In 2 patients, the post-treatment SPECT demonstrated a deterioration in baseline ICBF with a progression in CVR reduction. SPECT results correlated well with clinical findings in all of the patients.

Conclusions: ICBF SPECT studies showed a strong correlation with clinical findings. Acetylsalicylic acid-enhanced ICBF-SPECT seems to be useful in identifying and evaluating CNS involvement in patients suffering from autoimmune diseases and in follow-up of patients for monitoring the adequate therapy.

IMAGING OF Dopamine TRANSPORTER WITH Tc-99m-TRODAT-SPECT: EFFECTS OF BUPROPION IN DEPRESSION

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Tc-99m-TRODAT, an analog of cocaine, has shown promise as a tracer for the imaging of dopamine transporter activity. We examined the antidepressive effect of bupropion. Bupropion is thought to treat depression by blocking the dopamine transporter (DAT). The purpose of this study was to determine the occupancy of bupropion for the DAT during clinical treatment. We used the Tc-99m-TRODAT-SPECT method to evaluate the occupancy of the DAT during clinical treatment.

Material and methods: We evaluated 7 depressed patients (3 female 4 male, mean age: 46.6±9.31) using Tc-99m-TRODAT-SPECT. Each patient was investigated twice by Tc-99m-TRODAT. First scan was done in drug free state. The Tc-99m-TRODAT-SPECT was repeated four weeks after bupropion treatment had been started. SPECT scans of the brain were obtained 3 hours after administration of 1000 MBq Tc-99m-TRODAT. The reconstructed slices were analysed semiquantitatively: we calculated DAT occupancy ratios. DAT occupancy equals: ([in caudate - occipital/occipital] * 100%)/([in caudate - occipital/occipital] * 100%). The severity of depression was measured by Hamilton Depression scale.

Results: Due to the bupropion treatment 3 patients clinically improved. 4 patients clinical state was unchanged. Between the to groups in relation of initial Hamilton score and Tc-99m-TRODAT nucleus caudatus/occipital activity was no significant difference. In aspect of bupropion effect, DAT occupancy was significantly lower (p < 0.05) in patient group with remission. The DAT occupancy showed a good correlation (p = 0.01) with the Hamilton score changes.

Conclusions: The DAT occupancy in contrast to our expectations decreased during effective therapy. One possible explanation, that the improvement of depression causes a distinct increase of the presynaptic DAT, influencing our results, and so the occupancy only relatively decreased.

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