

Abstract

Proton MR spectroscopy is a non-invasive tool for measuring in vivo concentrations of several metabolites. The aim of this thesis was to test its applicability and reliability in neurosurgical praxis. In the first part of the study multiple MR spectroscopy methods were applied in a group of patients after surgery and oncologic treatment for high-grade glioma to test which method performed best in discriminating recurrent tumor from radionecrosis in the presence of a new enhancing lesion. The best diagnostic yield was achieved by comparison of choline, creatine and lactate between lesion and contralateral side (sensitivity 93.3%, specificity 78.6%). Creatine was significantly decreased in patients compared to controls. The inhibiting effect of ongoing oncologic treatment on cerebral and tumoral metabolism makes differential diagnosis trickier. Therefore, a diagnosis of radionecrosis assessed during ongoing radio- and chemotherapy should be confirmed after its completion. In the second part of the study MR spectroscopy data was compared with MR hippocampal volumetry and transcranial doppler examination in a cohort of patients with unilateral occlusion of the internal carotid artery. The N-acetylaspartate/choline ratio and hippocampal volume were significantly lower in both hemispheres of patients compared to controls. MR spectroscopy proved to be a useful tool to examine subjects with cerebrovascular disease and potentially identify risk factors for future stroke.