Evaluation of CSF flow dynamics by phase-contrast ultra-high field MRI in different types of hydrocephalus

Prohin Vladimir, *Orlic Anna, Bejenari Oleg

Euromed Diagnostic, Department of Radiology and Imaging
Nicolae Testemitsanu State University of Medicine and Pharmacy, Chisinau, the Republic of Moldova
*Corresponding author: orlic_anna@yahoo.com

Background: The widespread use of mini-invasive neurosurgical methods for correcting cerebrospinal fluid (CSF) dynamics, dictates the need for its accurate evaluation. The study aimed to evaluate the possibilities of ultra-high field phase-contrast MRI for qualitative and quantitative assessment of CSF dynamics in different types of hydrocephalus.
Material and methods: 62 patients were included in the study presenting with either open-type post-traumatic hydrocephalus, normotensive hydrocephalus or occlusion hydrocephalus. A cohort of 20 healthy volunteers served as controls. All patients underwent a brain MRI on a Siemens 3T Magnetom Skyra scanner, using conventional sequences in three projections, phase-contrast MRI protocol and acquiring quantitative and qualitative data: amplitude of the linear velocity (Av) of the CSF flux, ejection volume (VE) and surface of the cerebral aqueduct (A).
Results: CSF flow parameters were within normal values in the control group. In occlusive hydrocephalus forms, CSF flow at the aqueduct level was reduced to a minimum or not detectable at all. Considerable increases in the values of the parameters were determined in patients with open-type post-traumatic hydrocephalus (VE-0.27 ± 0.075 ml, Av-11.95 ± 1.1 cm / s) and normotensive hydrocephalus (VE-0.21 ± 0.0764 ml, Av-13.3 ± 0.8cm / s), as compared to the control group. The recorded CSF flow parameters improved postoperatively, reaching the upper limit of the normal values. This was associated with a decrease in volume of the ventricular system and reduction of periventricular edema.
Conclusions: Phase-contrast MRI is a relevant method for assessing CSF flow dynamics, guiding the treatment strategy, and postoperative follow-up in patients with hydrocephalus.
Key words: Phase-contrast MRI, hydrocephalus, CSF flow parameters.

Presurgical diagnostic work-up in epilepsy

***Moldovanu Maria[1], Miron Ana[2]**

[1]German Diagnostic Center, Chisinau, the Republic of Moldova
[2]North-Eastern Carpathian Epilepsy Center, Sf. Ioan cel Nou County Emergency Hospital, Suceava, Romania
*Corresponding author: maria.moldovanu@german-diagnostic.md

Background: Hippocampal sclerosis is the most common cause of epilepsy in adults. Patients with intractable seizures are evaluated for surgical treatment and preoperative magnetic resonance imaging (MRI) can help localize epileptogenic lesions. Brain MR imaging using a 3 Tesla scanner and a specially designed "Epilepsy Protocol" and MR Spectroscopy help to evaluate hippocampal volume, internal structures and extensive metabolic impairments which are correlated with the extent of neuropathologic changes in mesial temporal sclerosis. Proton MR Spectroscopy has been shown to be useful in the preoperative evaluation of patients with temporal lobe atrophy, confirming the neuronal dysfunction by detecting low N-acetyl aspartate (NAA). N-acetyl aspartate is almost exclusively concentrated in neurons of the nervous system and has been used as a neuronal marker in 1H-MRS studies. Proton MR Spectroscopy has been shown to be able noninvasively to confirm the epileptogenic hippocampus by showing low levels of N-acetyl aspartate.
Content: The presentation reviews the non-invasive epilepsy work-up. Diagnostic work-up in a case of temporal lobe epilepsy from our practice is presented as an illustration. A complex approach including correlation of various factors such as seizure semiology, video-EEG monitoring and brain MRI findings plays a significant role in detecting potential surgical candidates and predicting the outcome of epilepsy surgery.
Conclusions: Brain MRI is an important tool in the presurgical epilepsy diagnosis. Specially designed MRI protocols for investigating epilepsy patients significantly increase the chance of detection of epileptogenic lesions.
Key words: epilepsy, seizure, brain MRI, hippocampal sclerosis.