The usefulness of the Convexity of APPArent Hyperperfusion (CAPPAH) sign in the perfusion SPECT study for the diagnosis of iNPH

Takahiko Tokuda, MD
Associate professor of Molecular Pathobiology of Brain Diseases (Neurology), Kyoto Prefectural University of Medicine

Imaging of Hydrocephalus

Kei Yamada, MD
Professor of Radiology, Kyoto Prefectural University of Medicine
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The revised Japanese guidelines for idiopathic normal pressure hydrocephalus (iNPH) indicate that tight high-convexity on magnetic resonance (MR) imaging is important for the diagnosis of iNPH. However, there are occasional patients with ambiguous MRI findings for the detection of high-convexity tightness. We investigated the specific pattern of cerebral blood flow (CBF) in iNPH patients and its usefulness for the diagnosis of iNPH. Thirty-one iNPH patients who met probable iNPH criteria of Japanese guideline, 34 patients with Alzheimer’s disease (AD) and 19 age-matched controls were subjected to N-isopropyl-p-[123I] iodoamphetamine (IMP) single photon emission computed tomography (SPECT). In the iNPH patients, 27 out of 31 (87%) showed apparent hyperperfusion in their high-convexity due to the passive elevation of the upper half of the brain tissue. We named this finding in IMP-SPECT as the Convexity APPArent Hyperperfusion (CAPPAH) sign. The CAPPAH sign was present only in 2/34 cases (5.9%) in AD and 0/19 cases (0%) in control groups. The CAPPAH sign was evident on visual inspection of SPECT images, but less evident in the SPECT images analyzed with three-dimensional stereotactic surface projections (3D-SSP). The tomographic analysis of anatomically standardized SPECT images (iSSPTomo, Nihon Medi-Physics Co., Ltd.) dramatically improved the detection rate of the CAPPAH sign. We consider that the CAPPAH sign would be helpful to support the clinical diagnosis of iNPH and the differential diagnosis between iNPH and AD. The iSSPTomo analysis is much more useful for the detection of the CAPPAH sign than 3D-SSP analysis.

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Kei Yamada, MD  
Professor of Radiology, Kyoto Prefectural University of Medicine

MR imaging of the hydrocephalus is not always straightforward. Especially, when evaluating elderly patients with cognitive impairment, ventricular dilatation is a common feature, and this can make the diagnosis of normal pressure hydrocephalus challenging. In this presentation, tips of the image interpretation of hydrocephalus will be addressed. More specifically, imaging features such as Evans index, aqueductal flow voids, callosal angle, disproportionately enlarged subarachnoid-space hydrocephalus (DESH) will be discussed. Case based review will be also performed at the latter half of this presentation.