Susceptibility-Weighted Imaging in the Diagnosis of Isolated Cortical Vein Thrombosis

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Dear Sir,

We read the recent article entitled ‘Isolated cortical vein thrombosis: a widely variable clinico-radiological spectrum’ by Xue et al. [1], published in *European Neurology*, with great interest. The authors evaluated the variable clinico-radiological spectrum of isolated cortical vein thrombosis, which is a clinico-radiological diagnostic challenge. They concluded that neurological features and brain imaging findings of isolated cortical vein thrombosis are highly variable, which might be partly responsible for the underestimation of isolated cortical vein thrombosis. Moreover, the authors stated that direct signs of thrombosis on computed tomography and magnetic resonance imaging (MRI) may be subtle or missing, and even digital subtraction angiography may fail to detect them because of a variation in number, size and location of the cortical veins. At this point, we would like to make a suggestion regarding the usefulness of susceptibility-weighted imaging (SWI) which is a relatively new MRI sequence and seems to be helpful in the early and easy diagnosis of isolated cortical vein thrombosis.

SWI is a new MRI technique that is based on high-spatial-resolution, three-dimensional, fully flow-compensated gradient-echo sequences using both magnitude and phase information. The cerebral venous visualization is based on the paramagnetic effects of deoxyhemoglobin due to full flow compensation. The deoxyhemo-

globin serves as an intrinsic contrast agent for cerebral veins which contain deoxygenated blood. Other extravascular blood degradation products with paramagnetic properties such as methemoglobin, hemosiderin and ferritin also create a contrast in SWI. In this sequence in order to increase the visualization of the smaller veins, a phase mask obtained from the magnetic resonance (MR) phase images is multiplied with magnitude images. After the postprocessing, susceptibility-weighted images can be displayed with the minimal intensity projection algorithm [2, 3].

SWI has become a useful method to evaluate cerebral venous sinus and isolated cortical vein thromboses by depicting direct signs of thrombus and demonstrating indirect signs such as venous stasis and collateral slow flow. Cortical vein thrombosis causes an increase of the deoxyhemoglobin concentration in the involved veins. This clearly and distinctly appears as prominent hypointense signal intensity in the affected vein on SWI [4]. The comprehensive study performed by Idbaih et al. [5] showed that T2*SWI is of additional diagnostic value for clot detection in cerebral vein thrombosis in conjunction with conventional MRI and MR venography, particularly in the acute phase of thrombosis and in cortical cerebral vein thrombosis. They also stated that conventional MRI sequences and MR venography techniques are usually insuffi-

cient for the diagnosis of isolated cortical venous thrombosis. The two main limitations of MRI are flow artifacts and the absent or subtle hyperintense signal on T1-weighted spin-echo (SE) images at the onset of acute thrombosis. During the first 3–5 days of cortical venous thrombosis, the thrombus is isointense on T1-weighted SE sequences and hypointense on T2-weighted SE sequences, which makes it extremely difficult to differentiate it from the normal vein signal. However, due to the increased amount of deoxyhemoglobin in the acute thrombus, SWI provides an early, clear and distinct signal drop within the thrombotic vein in the early acute phase. The persisting decreased signal on SWI is generated by secondary accumulation of methemoglobin after a few days which is replaced by hemosiderin after several weeks [5].

Recently, SWI has been increasingly used in brain imaging especially in trauma, stroke and tumor patients and has been adopted in the routine brain MRI protocol in many institutions. We believe that this new imaging method can be useful to overcome the radiological diagnostic difficulty of the isolated cortical vein thrombosis.

Disclosure Statement

The authors declare that they have no conflict of interest.

References

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