Injury of the thalamocingulate tract in the Papez circuit by ventriculoperitoneal shunt: A case report

Dear editor,

Since the development of diffusion tensor tractography (DTT), which enables three-dimensional reconstruction of neural tracts, a few studies have reported that passage of a ventriculoperitoneal (VP) shunt caused injury of adjacent neural tracts.1–4

The Papez circuit, described by James Papez in 1937, is involved in memory function, particularly episodic memory.5 The thalamocingulate tract (TCT), a part of the Papez circuit, is located between the anterior thalamic nuclei and the cingulate gyrus.2 A few studies have demonstrated injury of the TCT in patients with cerebral infarct, intracerebral hemorrhage, and traumatic brain injury6–8; however, no study related to VP shunting has been reported so far. In the current study, using DTT, we attempted to demonstrate injury of the TCT by VP shunting in a patient with normal pressure hydrocephalus (NPH).

A 74-year-old female patient who showed gait disturbance, decline of cognition, and urinary incontinence for 3–4 months was diagnosed as NPH. She underwent VP shunt operation approached through the right posterior parietal area in the brain. Brain CT after the shunt operation showed that the VP shunt passed through the upper portion of the anterior thalamus (Figure 1(a)).

DTI data were acquired two weeks after VP shunt operation. The left TCT between the anterior thalamic nuclei and the cingulate cortex was well reconstructed, while the right TCT tract was not reconstructed (Figure1(b)). It appeared that injury of the right TCT resulted from the VP shunt because the VP shunt passed through above the right anterior thalamic nuclei. However, the interval change of the patient’s cognition could not be estimated because this patient’s cognition was so poor that the Mini-Mental State Exam score could not even be checked.

We report on a patient who showed injury of the TCT following VP shunting for NPH, using DTT. We found that DTT would be a useful imaging tool in detection of underlying injury of neural tracts which can be detected on conventional brain MRI after VP shunting. To the best of our knowledge, this is the first study to demonstrate injury of the TCT following VP shunting, although a few case studies have reported on neural injury caused by VP shunting, using DTI.1,3,4

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Sung Ho Jang and Jeong Pyo Seo
Department of Physical Medicine and Rehabilitation, College of Medicine, Yeungnam University, Taegu, Republic of Korea

Corresponding author:
Jeong Pyo Seo, Department of Physical Medicine and Rehabilitation, College of Medicine, Yeungnam University 317-1, Daemyungdong, Namku, Taegu 705-717, Republic of Korea.
Email: raphael0905@hanmail.net

**Figure 1.** (a) Brain CT image after ventriculoperitoneal (VP) shunt operation shows that the VP shunt passes through the upper portion of the anterior thalamus. (b) T2-weighted MR images taken at two weeks after VP shunt operation show a leukomalactic lesion in the left corona radiata due to an old infarct which was diagnosed six years ago. (c) Diffusion tensor tractography. The left thalamocingulate tract between the anterior thalamic nuclei and the cingulate cortex is well reconstructed, while, in contrast, the right thalamocingulate tract is not reconstructed (arrow – the anterior thalamus) compared with that of the left side and a normal subject (72-year-old woman).