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Case Report

Hypoplasia of right hemispheric white matter associated with enlarged lateral ventricle

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ABSTRACT

Hypoplasia of white matter in the right hemisphere of cerebrum was observed during routine dissection for undergraduate medical students. The lateral ventricle on that half was enlarged and the enlargement was associated with a very thin layer of corpus callosum forming the roof of the lateral ventricles. The cavity of lateral ventricle also showed a few septa traversing through it. The interventricular foramen was enlarged. The left hemisphere did not have any abnormalities in its ventricle. © **Neuroanatomy. 2008; 7: 43–44.**

Key words [white matter] [variation] [lateral ventricle] [right hemisphere]

Introduction

The two lateral ventricles located within the cerebrum are large C-shaped cavities lined by ependyma and filled with cerebrospinal fluid. Each of the lateral ventricles has four parts; anterior horn, body, posterior horn and inferior horn. Anterior horn is present in the frontal lobe, body in the parietal lobe, posterior horn in the occipital lobe and the inferior horn is located in the temporal lobe.

White matter is composed of myelinated nerve fibers. The fibers in the cerebrum are classified into three groups – association, projection and commissural. Corpus callosum is the largest band of commissural fibers connecting two halves of cerebral hemispheres. There is a topographic organization of callosal fibers that represents the cortical regions to be connected. Corpus callosum is closely related to the lateral ventricle.

We noted a variation in the lateral ventricle, corpus callosum and white matter in general in the right cerebral hemisphere.

Case Report

During routine laboratory practicals for medical undergraduates, we dissected the brain of an approximately 60-year-old male cadaver in the Department of Anatomy, Melaka Manipal Medical College, Manipal, India. After the removal of the brain from the cranial cavity, the right hemisphere of cerebrum was found to be soft when compared to the left. We made a midsagittal section of the cerebrum to demonstrate the third ventricle. The third ventricle was normal but the right lateral ventricle was enlarged (Figure 1). The quantity of the white matter of the right cerebral hemisphere was markedly reduced. The corpus callosum was very thin (Figure 1). The white matter showed a few septa-like extensions across the cavity of lateral ventricle. The interventricular foramen was enlarged on the right side compared to the left. The left cerebral hemisphere was normal with respect to white matter and lateral ventricle but the caudate nucleus had enlarged to some extent.

Discussion

The white matter of the cerebrum can degenerate due to various reasons and this degeneration can lead to functional abnormalities. The metabolic defects and chromosomal abnormalities in children can lead to abnormality of white matter [1].

It has also been reported that this type of white matter abnormality with enlarged lateral ventricle is observed in conditions like schizophrenia, a serious mental disorder that has been described as a disease of insufficient or ineffective communication between different regions of brain [2]. Reports have suggested that the white matter abnormality is also seen in Binswanger's disease or subcortical vascular dementia in which blood vessels affecting cerebral white matter and gray matter undergo atherosclerosis. This can result in defects involving cognitive functioning in elders [3].

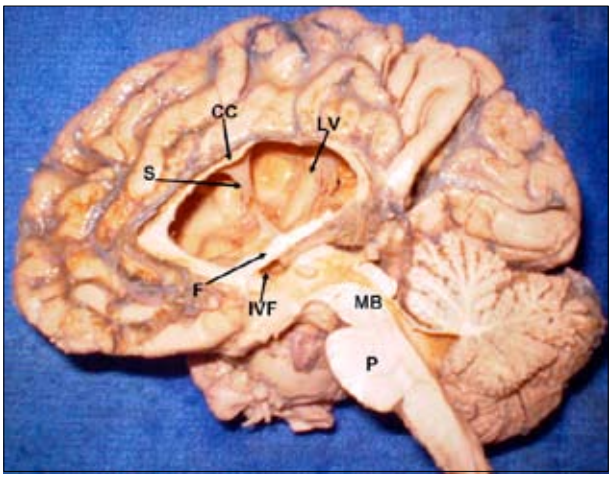

Figure 1. Photograph of medial surface of the cerebral hemisphere showing the enlarged lateral ventricle and interventricular foramen. Color version of figure is available online. *(**CC:** corpus callosum; **LV:** lateral ventricle; **S:** septum of white matter; **F:** fornix; **IVF:** interventricular foramen; **MB:** midbrain; **P:** pons)*

Clinically, white matter disease is often associated with old age, arterial hypertension, diabetes mellitus, heart disease and cardiovascular risk factors [4,5,6]. The studies on experimental animals have reproduced some aspects of human white matter lesions and implicate leaks in blood brain barrier as part of the cause of age related cognitive decline originating from white matter lesion [7]. Altered circulation of CSF might also be an alternative cause of white matter abnormalities [8]. It has also been stated that white matter abnormalities are associated with cognitive impairment, which is associated with disadvantageous processing speed, memory and executive functions [9].

White matter abnormality associated with unilateral enlargement of the lateral ventricle and interventricular foramen has not been reported hitherto. Usually the interventricular foramen becomes enlarged in conditions like hydrocephalus where the lower passages get obstructed. But in the present case, the lower passages were normal. From the earlier reports and from our findings, we could only speculate the significance of this unilateral white matter lesion that it could be due to arterial hypertension, diabetes mellitus, altered CSF circulation or cardiovascular risk factors, which would have affected the cognitive functions of the individual.

References

[1] **van der Knaap MS, Kriek M, Overweg-Plandsoen WC, Hansson KB, Madan K, Starreveld JS, Schotman-Schram P, Barkhof F, Lesnik Oberstein SA.** Cerebral white matter abnormalities in 6p25 deletion syndrome. **AJNR Am. J. Neuroradiol. 2006; 27: 586–588.**

[2] **Kubicki M, Westin CF, McCarley RW, Shenton ME.** The application of DTI to investigate white matter abnormalities in schizophrenia. **Ann. N. Y. Acad. Sci. 2005; 1064: 134–148.**

[3] **Blass JP, Hoyer S, Nitsch R.** A translation of Otto Binswanger's article, "The delineation of the generalized progressive paralyses". 1894. **Arch. Neurol. 1991; 48: 961–972.**

[4] **Bots ML, van Swieten JC, Breteler MM, de Jong PT, van Gijn J, Hofman A, Grobbee DE.** Cerebral white matter lesions and atherosclerosis in the Rotterdam Study. **Lancet. 1993; 341: 1232–1237.**

[5] **Breteler MM, van Amerongen NM, van Swieten JC, Claus JJ, Grobbee DE, van Gijn J, Hofman A, van Harskamp F.** Cognitive correlates of ventricular enlargement and cerebral white matter lesions on magnetic resonance imaging. The Rotterdam Study. **Stroke. 1994; 25: 1109–1115.**

[6] **Liao D, Cooper L, Cai J, Toole J, Bryan N, Burke G, Shahar E, Nieto J, Mosley T, Heiss G.** The prevalence and severity of white matter lesions, their relationship with age, ethnicity, gender, and cardiovascular disease risk factors: the ARIC Study. **Neuroepidemiology. 1997; 16: 149–162.**

[7] **Pantoni L, Garcia JH.** Pathogenesis of leukoaraiosis: a review. **Stroke. 1997; 28: 652–659.**

[8] **Kimura M, Tanaka A, Yoshinaga S.** Significance of periventricular hemodynamics in normal pressure hydrocephalus. **Neurosurgery. 1992; 30: 701–704.**

[9] **Gunning-Dixon FM, Raz N.** The cognitive correlates of white matter abnormalities in normal aging: a quantitative review. **Neuropsychology. 2000; 14: 224–232.**