

## Hydrocephalus with Spontaneous Regression in a 14-year-old Girl

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### Abstract

We report on a 14-year-old girl with hydrocephalus that underwent spontaneous regression without any specific treatment, such as ventriculoperitoneal shunt surgery. A 14-year-old girl was referred to our hospital with severe headache, dizziness, nausea, and vomiting. Computed tomography and FLAIR-MRI findings on admission showed markedly dilated lateral, third and fourth ventricles with periventricular hyperintensity and downward displacement of the tonsils induced by dilatation of the fourth ventricle. We diagnosed hydrocephalus of unknown etiology. Although no specific treatment for hydrocephalus was performed, the symptoms gradually improved. One year after onset, the patient was completely free of neurological symptoms, and findings of physical examination and magnetic resonance imaging of the brain had returned to normal. The etiology of the spontaneous regression is unclear, but the following mechanisms are discussed: 1) rupture of ventricular diverticulum, 2) head injury causing skull-base fracture with leakage of cerebrospinal fluid, 3) extremely radiosensitive neoplasms diminished by X-p exploration, and 4) cerebrospinal fluid leakage due to lumbar puncture.

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**Key words:** hydrocephalus, spontaneous regression, children

### Introduction

The main causes of hydrocephalus are post-encephalitis, meningitis status<sup>1</sup>, subarachnoid hemorrhage, and head injury<sup>2,3</sup>. Here, we report on a 14-year-old girl with hydrocephalus that underwent spontaneous regression without specific treatment, such as ventriculoperitoneal shunt surgery.

### Case

A 14-year-old girl with no relevant medical history

was referred to our hospital with severe headache, dizziness, nausea, and vomiting. The dizziness first occurred during volleyball practice and was followed by headache and by vomiting after every meal. Dizziness occurred with quick body motions and the start of body movement and was characterized by vertigo and a floating sensation. Because of the severe dizziness, headache, nausea, and vomiting, the patient was unable to eat and lost 5 kg in body weight (from 51 to 46 kg) in 1 month. She never lost consciousness, and her hearing remained unimpaired during these episodes.

On admission, her consciousness was clear, and

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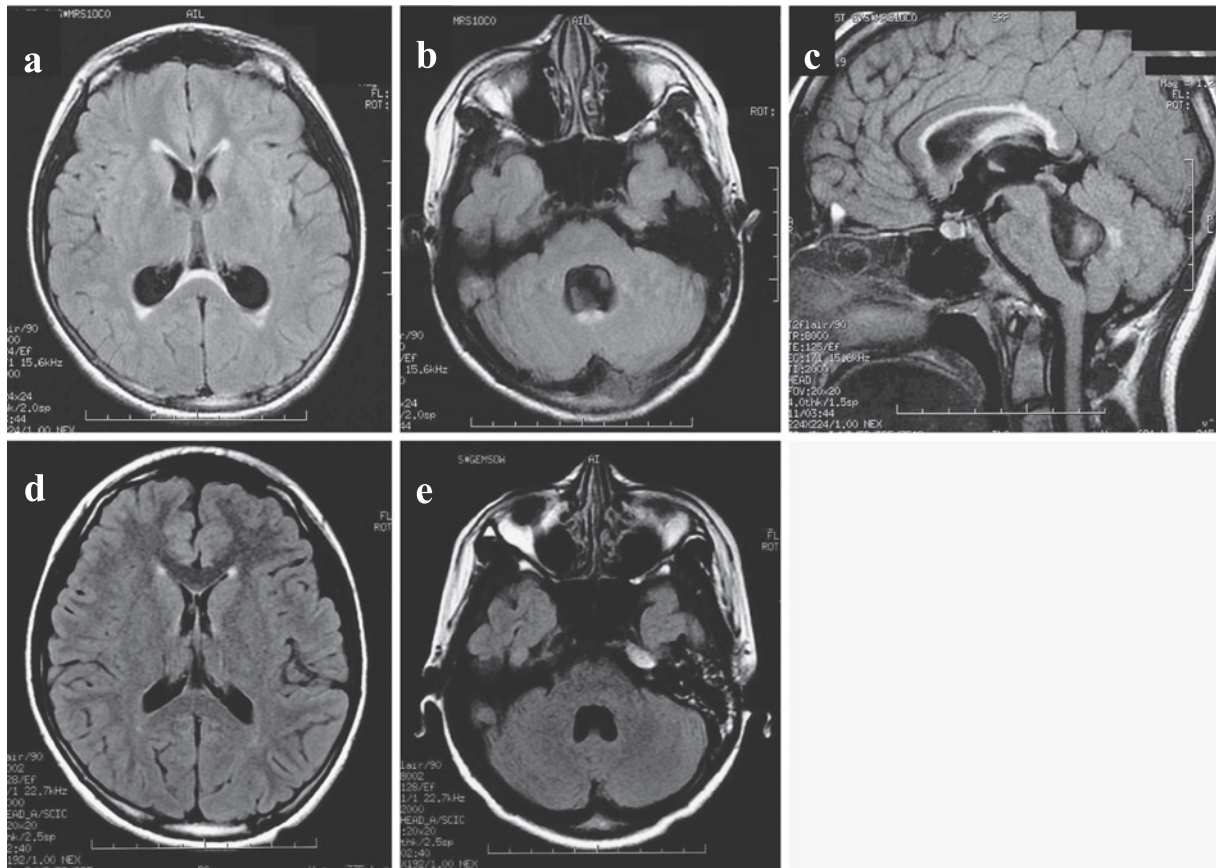


Fig. 1 MRI findings with fluid-attenuated inversion recovery image on admission (a, b, c) and on resolution (d, e). Enlarged lateral, third, and fourth ventricles were noted with periventricular hyperintensity in the lateral ventricle (a, b, c). All findings that were recognized on admission were resolved (d, e).

physical examination, including neurological examination, showed no abnormalities. There was no papillary edema or papillary redness. Hematological, biochemical, and urinalysis data were all normal. Results of cerebrospinal fluid (CSF) examination were also normal. She exhibited primary lateral gaze nystagmus bilaterally, and the positional nystagmus test showed a rightward fixed horizontal and rotational nystagmus without hearing impairment. Fluid-attenuated inversion recovery-magnetic resonance imaging (MRI) on admission showed marked dilation of the lateral, third, and fourth ventricles with periventricular hyperintensity (**Fig. 1**). Increased ventricular dilatation of the fourth ventricle induced downward displacement of the tonsils. Neuroimaging possibly showed obstruction at the outlet of the fourth ventricle, but this finding was unclear. However, we were not able to find any intracranial lesions, such as a brain tumor, that would cause hydrocephalus. We diagnosed

hydrocephalus of unknown etiology and began treatment with intravenous infusion of physiological saline. Although we did not administer any specific treatment for the hydrocephalus, the symptoms gradually improved. On day 13 after admission, high-resolution fast imaging employing steady-state acquisition cine-MRI, showed no changes in flow speed and no turbulence of CSF in the fourth ventricle, cerebral aqueduct, or foramen of Magendie. Diffusion-weighted image MRI also showed no abnormal high-intensity signals, thus indicating no findings suggestive of epidermoid tumors, along with improved hydrocephalus. Because the symptoms resolved fully, the patient was discharged on day 14 of admission. One year after symptom onset, she is free of neurological symptoms, and findings of physical examination and MRI have returned to normal (**Fig. 1**).

## Discussion

Spontaneous regression of hydrocephalus sometimes occurs. Several etiologies have been discussed so far.

1) In severe hydrocephalus, a ventricular diverticulum may rupture into the subarachnoid space. This is called spontaneous ventriculostomy and is observed only in obstructive hydrocephalus. Because MRI findings indicated that the present case was unlikely to have involved rupture of a ventricular diverticulum, we consider this etiology to be of low likelihood.

2) Head injury can cause skull-base fracture, which then leads to leakage of CSF and resolution of the hydrocephalus. In the present case, fluid was visible in the left mastoid air cells (**Fig. 1e**) and suggested head trauma. Because symptoms began during volleyball practice, we believe this etiology is likely. This etiology can occur in the presence of communicating hydrocephalus.

3) Obstruction may be released by subtle management in some cases. Extremely radiosensitive neoplasms, such as germinoma and medulloblastoma, may be diminished by radiological exploration<sup>4</sup>. Moreover, some tumors, such as lymphoma, germinoma, neurosarcoïdosis, and demyelination, spontaneously regress and are known as “intracranial vanishing tumors.” These tumors might cause communicating and obstructive hydrocephalus, depending on their size and location. Although gadolinium-enhanced MRI (especially

around the fourth ventricle) did not show tumor, and cytologic examination of the CSF was negative, this etiology was also possible.

4) Lumbar puncture can cause CSF leakage at the puncture site. This procedure will cause CSF to drain, as in the case of postpuncture traction headache.

In this case report, it would be recommend to argue above-mentioned etiologies, especially 2 and 3, because MRI findings suggested head trauma and the presence of an extremely radiosensitive brain tumor is possible in this case.

In conclusion, we reported a case of spontaneous regression of hydrocephalus.

**Conflict of Interest:** The authors declare no conflict of interest.

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