

Letter to the Editor



Combined Endoscopic Third Ventriculostomy and Lumboperitoneal Shunt Surgery in an Elderly Patient With Complex Hydrocephalus: Mixture of Late-onset Obstructive and Communicating Hydrocephaluses

Sang-Youl Yoon ,¹ Kyunghun Kang ,² Chaejin Lee ,¹ Jeong-Hyun Hwang ,¹ Myoung Hun Hahm ,³ Eunhee Park ,⁴ Ki-Su Park

¹Department of Neurosurgery, School of Medicine, Kyungpook National University, Daegu, Korea

²Department of Neurology, School of Medicine, Kyungpook National University, Daegu, Korea

³Department of Radiology, School of Medicine, Kyungpook National University, Daegu, Korea

⁴Department of Rehabilitation Medicine, School of Medicine, Kyungpook National University, Daegu, Korea



Received: Jan 17, 2023

Revised: Jan 27, 2023

Accepted: Jan 30, 2023

Published online: Jan 31, 2023

Correspondence to

Ki-Su Park

Department of Neurosurgery, School of Medicine, Kyungpook National University, 680 Gukchaebosang-ro, Jung-gu, Daegu 41944, Korea.

Email: kiss798@gmail.com

© 2023 Korean Dementia Association

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ORCID iDs

Sang-Youl Yoon

<https://orcid.org/0000-0003-2207-3481>

Kyunghun Kang

<https://orcid.org/0000-0002-7248-2681>

Chaejin Lee

<https://orcid.org/0000-0002-4089-987X>




Jeong-Hyun Hwang

<https://orcid.org/0000-0002-5306-6922>

Dear Editor,

Obstructive hydrocephalus due to aqueductal stenosis (AS) is a disease that mainly occurs in children. Late-onset obstructive hydrocephalus due to AS can rarely occur in elderly patients.¹ The treatment of obstructive hydrocephalus due to AS by endoscopic third ventriculostomy (ETV) shows good results.² However, ETV alone cannot be used for treating elderly patients with complex hydrocephalus. This complex hydrocephalus may be accompanied by obstructive and communicating hydrocephaluses due to different causes.³ We present the case of an elderly patient with rare complex hydrocephalus, a combination of late-onset obstructive and communicating hydrocephaluses, treated using combined ETV and lumboperitoneal shunt (LPS) surgeries.

A 75-year-old man presented to our hospital for progressive impairments in gait and cognition. The initial examination showed a cognitive decline (**Supplementary Table 1**). Brain magnetic resonance imaging (MRI) showed ventriculomegaly and obstruction of the aqueduct of Sylvius (**Fig. 1A**). Cerebrospinal fluid (CSF) flow dynamic MRI showed no CSF flow through the aqueduct of Sylvius (**Fig. 1B**). He was diagnosed with obstructive hydrocephalus due to late-onset AS. We performed ETV surgery first (**Fig. 1C**). After surgery, his symptoms improved for ten months. However, the symptoms worsened again, and he was re-hospitalized. CSF flow dynamic MRI showed patent CSF flow through the previously penetrated hole (**Fig. 1D**), and his symptoms improved again after a CSF tap test. These findings suggested complex hydrocephalus with a mixture of late-onset obstructive and communicating hydrocephaluses. Even though the CSF bypass was well maintained, the communicating hydrocephalus was considered unresolved. Therefore, LPS surgery was performed (**Fig. 1E**). After LPS surgery, the patient's symptoms improved for ten months (**Supplementary Table 1**).

Myoung Hun Hahm 
<https://orcid.org/0000-0001-9165-6117>
 Eunhee Park 
<https://orcid.org/0000-0001-6553-2321>
 Ki-Su Park 
<https://orcid.org/0000-0002-4829-6299>

Funding

This work was supported by a grant from the Software Medical Device Specialized Support Project from K-medi Hub (2022).

Conflict of Interest

The authors have no financial conflicts of interest.

Author Contributions

Conceptualization: Park KS; Data curation: Yoon SY, Kang K; Investigation: Lee C; Methodology: Hahm MH; Writing - original draft: Park KS; Writing - review & editing: Yoon SY, Hwang JH, Park E, Park KS.

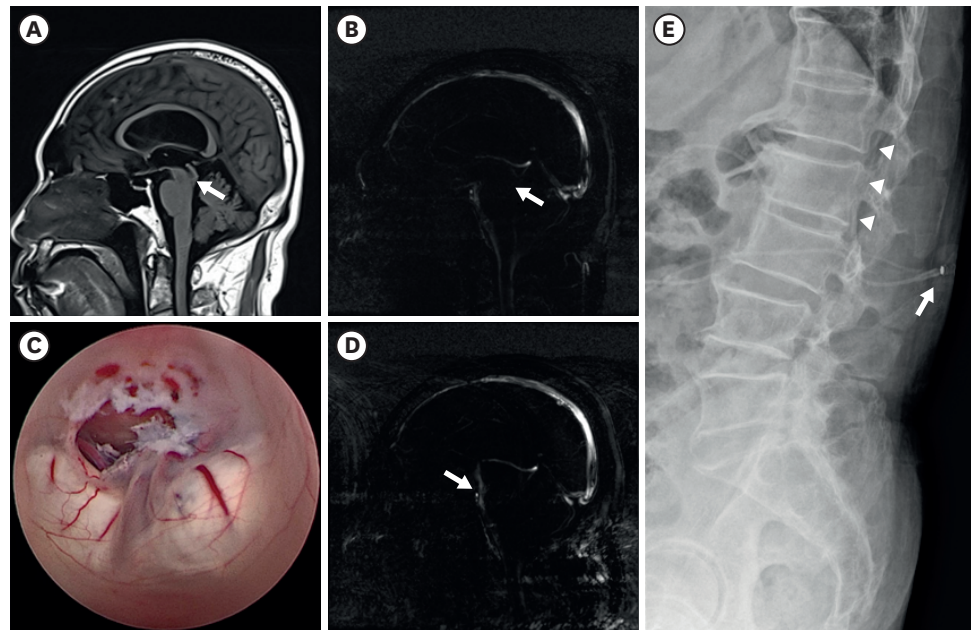


Fig. 1. Radiographic and surgical images of a patient with complex hydrocephalus. (A) Sagittal image of the preoperative brain MRI showed aqueductal stenosis and upstream hydrocephalus (arrow). (B) No flow through the aqueduct of Sylvius was observed on CSF flow dynamic MRI (arrow). (C) Endoscopic third ventriculostomy was performed through the tuber cinereum. (D) CSF flow dynamic MRI performed after ETV showed good CSF flow through the ETV site (arrow). (E) After performing the LPS, a proximal catheter (arrowhead) inserted at the L2-3 level and the shunt valve (arrow) were seen on a lumbar spine X-ray. MRI: magnetic resonance imaging, CSF: cerebrospinal fluid, ETV: endoscopic third ventriculostomy, LPS: lumboperitoneal shunt.

Obstructive hydrocephalus is classified according to its pathology into the congenital type due to aqueductal webs, diaphragms, and gliosis, and acquired pathology, which includes tumors, vascular malformations, hemorrhage, and infection.⁴ Congenital pathology is rarely seen in obstructive hydrocephalus in elderly patients. In most elderly patients, obstructive hydrocephalus has the same clinical features as normal-pressure hydrocephalus (NPH), and the late-onset of symptoms is presumed to be due to enlarged ventricles and a compensatory mechanism by intra-parenchymal CSF transportation.⁵

The first treatment of obstructive hydrocephalus is generally ETV. However, in some cases, when symptoms did not improve with ETV, a ventriculoperitoneal shunt (VPS) was used as a secondary adaptation.⁵ In this case, there is a possibility that the communicating hydrocephalus is present in addition to obstructive hydrocephalus. In particular, since obstructive hydrocephalus in elderly patients is likely to be accompanied by communicating hydrocephalus with poor CSF absorption, like NPH, it may not be resolved by ETV alone in elderly patients, as in our case. Of course, it may be good to perform VPS as the first treatment for obstructive hydrocephalus in elderly patients, but good effects of ETV treatment for obstructive hydrocephalus have been reported.² In addition, due to the concern for destroying the already adapted CSF homeostasis, poor brain expansion, and sequelae, such as subdural fluid collection or chronic subdural hematoma, may occur, the use of direct VPS for the obstructive hydrocephalus in the elderly patient may be limited.⁶ Therefore, as in our case, LPS surgery after ETV in elderly patients with obstructive hydrocephalus can be a new alternative treatment. Moreover, after ETV failure, LPS through local or regional anesthesia is possible instead of VPS surgery under general anesthesia, so it is considered to be a sufficient alternative treatment.

SUPPLEMENTARY MATERIAL

Supplementary Table 1

Neurological examination results before and after CSF tap test and surgeries

[Click here to view](#)

REFERENCES

1. Rodis I, Mahr CV, Fehrenbach MK, Meixensberger J, Merckenschlager A, Bernhard MK, et al. Hydrocephalus in aqueductal stenosis--a retrospective outcome analysis and proposal of subtype classification. *Childs Nerv Syst* 2016;32:617-627.
[PUBMED](#) | [CROSSREF](#)
2. Isaacs AM, Bezchlibnyk YB, Yong H, Koshy D, Urbaneja G, Hader WJ, et al. Endoscopic third ventriculostomy for treatment of adult hydrocephalus: long-term follow-up of 163 patients. *Neurosurg Focus* 2016;41:E3.
[PUBMED](#) | [CROSSREF](#)
3. Beni-Adani L, Biani N, Ben-Sirah L, Constantini S. The occurrence of obstructive vs absorptive hydrocephalus in newborns and infants: relevance to treatment choices. *Childs Nerv Syst* 2006;22:1543-1563.
[PUBMED](#) | [CROSSREF](#)
4. Kahle KT, Kulkarni AV, Limbrick DD Jr, Warf BC. Hydrocephalus in children. *Lancet* 2016;387:788-799.
[PUBMED](#) | [CROSSREF](#)
5. Fukuhara T, Luciano MG. Clinical features of late-onset idiopathic aqueductal stenosis. *Surg Neurol* 2001;55:132-136.
[PUBMED](#) | [CROSSREF](#)
6. Feletti A, d'Avella D, Wikkelsø C, Klinge P, Hellström P, Tans J, et al. Ventriculoperitoneal shunt complications in the european idiopathic normal pressure hydrocephalus multicenter study. *Oper Neurosurg (Hagerstown)* 2019;17:97-102.
[PUBMED](#) | [CROSSREF](#)