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# Cognitive impairment and dysphagia following postoperative hydrocephalus pseudomeningocele after C1–2 fusion: a case report

Pureum Kim, M.D., Sook Jung Lee, M.D., Ph.D
The Catholic University of Korea Daejeon St. Mary`s Hospital , Department of Rehabilitation Medicine

## Introduction

Posterior cervical fusion is commonly performed for cervical spine instability and fracture. However, dural injury may result in cerebrospinal fluid (CSF) leakage, pseudomeningocele, and rarely hydrocephalus. These complications can lead to significant neurological deterioration, including cognitive impairment, dysphagia, and profound functional decline. We report a case of severe cognitive impairment and dysphagia caused by postoperative CSF leakage–associated hydrocephalus after C1–2 fusion, highlighting the role of comprehensive rehabilitation in functional recovery.

## CASE REPORT

A 67-year-old woman sustained a type III odontoid fracture and was initially treated with halo-vest immobilization. Due to nonunion, posterior C1–2 fusion was performed. One month after surgery, she developed gradually decreased mentality, including confusion, disorientation, severe memory impairment, and dysarthria.

Brain CT revealed progressive hydrocephalus, and cervical spine MRI demonstrated a large posterior fluid collection suggestive of CSF leakage and pseudomeningocele. Revision surgery and ventriculoperitoneal shunt placement were performed. Despite neurosurgical management, the patient remained bedridden with persistent vomiting, severe cognitive impairment, and dysphagia, and generalized deconditioning, requiring L-tube feeding and supportive care.

Three months after revision surgery, neurological deterioration stabilized, and comprehensive rehabilitation was initiated. Initial evaluation revealed severe cognitive impairment (Mini-Mental State Examination score: 5), disorientation, and direct silent aspiration on Videofluoroscopic swallowing study (PAS score: 8), along with gastroesophageal reflux. Intensive individualized rehabilitation was provided, including cognitive rehabilitation, swallowing therapy with VitalStim®, oromotor facilitation, postural and compensatory techniques, and medical management for reflux.

After three months of intensive rehabilitation, cognitive function improved significantly, with Mini-Mental State Examination score increasing to 19. Follow-up swallowing evaluation demonstrated resolution of aspiration, allowing progression to a regular oral diet. Functional status and overall neurological condition gradually improved

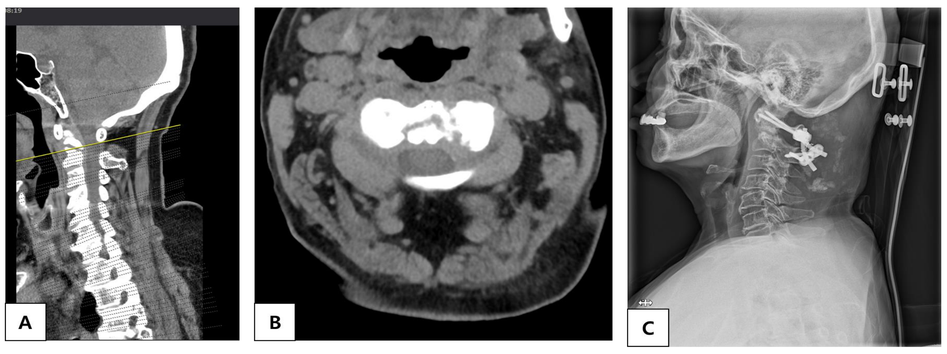


**Figure 1.**
C-spine CT showed fracture with Nonunion at the C2 dens and extending C2 body (type III odontoid fx). (A,B).
Post op C-spine X-ray, C1-2 fusion (C)

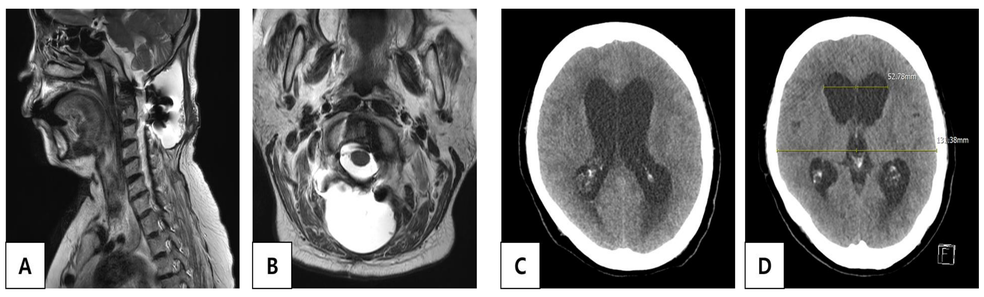


**Figure 2.**
C-spine MRI showed large amount fluid collection along the posterior neck along the surgical fixation device(about 8×3×3.7cm sized) (A,B).
Axial brain CT demonstrating marked ventricular dilatation consistent with obstructive hydrocephalus.(Evans ratio : 0.40) (C, D)

**Figure 3**
VFSS study demonstrating definite aspiration on thin liquid (PAS 8), and gastroesophageal reflux was also observed.

## CONCLUSION

Hydrocephalus secondary to CSF leakage and pseudomeningocele is a rare but serious complication following cervical fusion and may result in severe cognitive impairment, dysphagia, and functional decline. This case demonstrates that comprehensive, personalized rehabilitation—including swallowing and cognitive therapy—can facilitate meaningful neurological and functional recovery even after prolonged neurological complications and immobilization