

# “Locked-in State” Following Anterior Circulation Aneurysmal Subarachnoid Hemorrhage

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## Dear Editor,

Quadriplegia, facial diplegia, and horizontal gaze palsy are clinical manifestations of a locked-in state (LIS). Typically, consciousness is retained, and the patient communicates through vertical eye movement or eye blinking. The involvement of the ventral pons in basilar artery occlusion or basilar artery aneurysm frequently results in LIS.<sup>1,2</sup> We report a rare case of LIS following an anterior circulation aneurysmal bleed that was misdiagnosed as low Glasgow coma scale (GCS).

A 60-year-old hypertensive woman who was apparently well presented with a severe headache and altered sensorium. She was unresponsive when she arrived at a nearby hospital with dilated pupils. The computed tomography (CT) scan revealed a diffuse subarachnoid and intraventricular hemorrhage. She had an external ventricular drain (EVD) procedure and was discharged to home care at the request of her family. At discharge, a GCS-3 with a reactive pupil was documented in the medical record. The patient was brought to our hospital for further evaluation 2 days after receiving home care. The clinical examination revealed flaccid quadriplegia, with the patient responding only with eye blinks and without any facial expression. The pupils were 2 mm in size and responded slowly to light. Serum electrolytes, liver, and renal parameters were normal. The cerebral angiogram revealed an 18 × 16 × 13 mm left distal internal carotid artery saccular aneurysm with no abnormalities in the bilateral vertebrobasilar system. Under general anesthesia, she successfully underwent stent-assisted coiling of the aneurysm and was ventilated electively for 48 hours. She remained quadriplegic with spontaneous eye opening and responded with eye closure, blinks, and vertical eye movements. The raw electroencephalographic recording showed alpha waves without any abnormalities. The cerebrospinal fluid analysis did not reveal any abnormality. The clinical features led to the diagnosis of LIS. The diffusion and perfusion-weighted imaging, on the other hand, revealed no brainstem abnormalities. Three days post-coiling, flickers of movement were observed at the wrist and ankle. Transcranial motor evoked potentials showed absent proximal muscle response and minimal responses in the distal muscles in all four limbs. The patient was tracheostomized and weaned off the mechanical ventilator gradually. Two weeks after the initial event, the patient began regaining motor power in all of her limbs and was able to turn her head sideways in the rehabilitation unit.

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A locked-in state is extremely rare after an anterior circulation aneurysmal bleed, and detecting it early is critical. In our case, the patient improved and developed the LIS after EVD placement at the local hospital, but the LIS was misinterpreted as a poor GCS, and definitive treatment was withheld. A locked-in state can also occur in the absence of a detectable pontine abnormality on magnetic resonance imaging (MRI), which could be attributed to rostrocaudal migration of the brain stem caused by an increase in intracranial pressure (ICP).<sup>3</sup> Furthermore, when the ICP equalizes the mean arterial pressure, it can compromise the blood supply to the brainstem transiently, leading to LIS. Our case is unique in that the patient developed LIS following the rupture of an anterior circulation aneurysm with no discernible brainstem or vertebrobasilar system pathology on the imaging. Furthermore, there was no evidence of rostrocaudal brainstem migration in MRI, and we believe the LIS was caused by a transient ICP surge, which resulted in transient brainstem ischemia and neuronal dysfunction.

Clinicians should be aware that LIS can occur following anterior circulation aneurysmal bleed without any obvious brainstem pathology on imaging.

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## REFERENCES

1. Aryasinghe L, Kazim Y, Obeid HF, Hashim H. The hyperdense basilar artery sign: A case of locked-in syndrome. *Int J Emerg Med* 2016;9(1):12. DOI: 10.1186/s12245-016-0104-9.
2. Khan SI, Beaujon W, Ross ED. Interpeduncular basilar aneurysm causing progressive locked-in syndrome: To coil or not to coil. *Eur Neurol* 2008;60(3):159–161. DOI: 10.1159/000145335.
3. Luxenberg EL, Goldenberg FD, Frank JI, Loch Macdonald R, Rosengart AJ. Locked-in syndrome from rostro-caudal herniation. *J Clin Neurosci* 2009;16(2):333–335. DOI: 10.1016/j.jocn.2007.10.009.