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Emergent Epidural Blood Patch: Lifesaving Treatment of Paradoxical Herniation

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A 53-YEAR-OLD WOMAN had an embolic stroke affecting the right middle cerebral artery secondary to atrial fibrillation. Brain swelling developed, and a hemicraniectomy was performed. At discharge to rehabilitation, the patient was interactive but with dense left-sided hemiparesis. After 5 days, she returned with fever (temperature 39.2°C). The duraplasty was soft and elevated to the level of the skull (**Figure, A**). A lumbar puncture was performed in the emergency department as part of the workup for infectious disease. The opening pressure was 19 cm of water with normal cerebrospinal fluid. Over the next 3 days, the duraplasty became progressively depressed, yet mental status remained stable. On day 4, the patient became acutely obtunded with a dilated and nonreactive right pupil (**Figure, B**). She was immediately placed in the Trendelenburg position and treated with intravenous fluid repletion, without improvement in her condition. An emergent lumbar epidural blood patch was applied, resulting in restoration of consciousness and complete reversal of tissue shifts within 6 hours (**Figure, C**). She remained neurologically stable, and the patient underwent elective cranioplasty several weeks later.

COMMENT

Hemicraniectomy exposes the cerebral surface to atmospheric pressure. The subsequent creation of lower pressures within the cranium as a result of lumbar puncture or ventriculoperitoneal shunting may cause a pressure gradient and tissue shifts that are severe enough to cause paradoxical herniation.^{1,2} This is a potentially life-threatening condition³ that is usually manifested by acute deterioration in mental status, pupillary asymmetry, worsening motor signs, and a depressed duraplasty. In some patients, Trendelenburg positioning and intravenous fluid repletion provides symptomatic relief, and these patients eventually undergo cranioplasty.² In other patients, as in ours, ongoing leakage of cerebrospinal fluid may create continuous caudal pressure that requires a lumbar epidural

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blood patch. In previous reported cases, application of the lumbar epidural blood patch was delayed^{3,4} or performed as a secondary measure after cranioplasty was unsuccessful in reversing the negative intracranial pressure.⁵ This has resulted in death secondary to herniation.³ In our patient, the emergent application of the lumbar epidural blood patch was successful in the acute management of paradoxical herniation, eliminating the need for emergent cranioplasty. Immediate application of a lumbar epidural blood patch to treat acute paradoxical herniation has not been reported, but it may be all that is required to treat the underlying condition and prevent death.

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Figure.

Serial head computed tomograms show the temporal evolution of paradoxical herniation. A, On arrival in the emergency department, the patient's brain and duraplasty were elevated to the level of the skull. B, At the time of clinical deterioration, a significant tissue shift and depressed duraplasty was noted 4 days after lumbar puncture. C, Note complete reversal of the tissue shifts 6 hours after application of the lumbar epidural blood patch.