

Acute paraplegia following a Lightning Strike in a 14-year-old boy: A Case Report

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SETTING

Freestanding Pediatric Hospital

PATIENT

A previously healthy 14-year-old male

CASE DESCRIPTION

The patient was admitted following a lightning strike while walking on the beach. Immediately following the strike, the patient rendered unconscious and was apneic. CPR was performed and ROSC was achieved 45 minutes after the injury. With rising creatine kinase due to extensive burns, fasciotomies were performed in all four limbs. An MRI of the brain and spine revealed a right parietal infarction, cervical spine edema, and multiple grade I compression fractures. As the patient stabilized over the following weeks, he began to suffer from autonomic dysregulation, neurogenic bladder, and abdominal spasms.

ASSESSMENT

The patient presented to a pediatric rehabilitation hospital 21 days after the injury, where he worked with PT, OT, SLP, and Physiatry. Patient demonstrated functional use of his bilateral upper extremities with limits of his endurance. His lower extremities demonstrated no consistent signs of muscle activation and inconsistent toe wiggling. An ASIA impairment rating revealed ASIA B incomplete T8 paraplegic with neurogenic bowel and bladder.

IMAGING



Figure 1.
MRI of L-Spine without intravenous contrast sagittal view of abnormal signal in the central cord down to the level of the conus, typical for ischemic cord injury involving the anterior horns of the central gray.

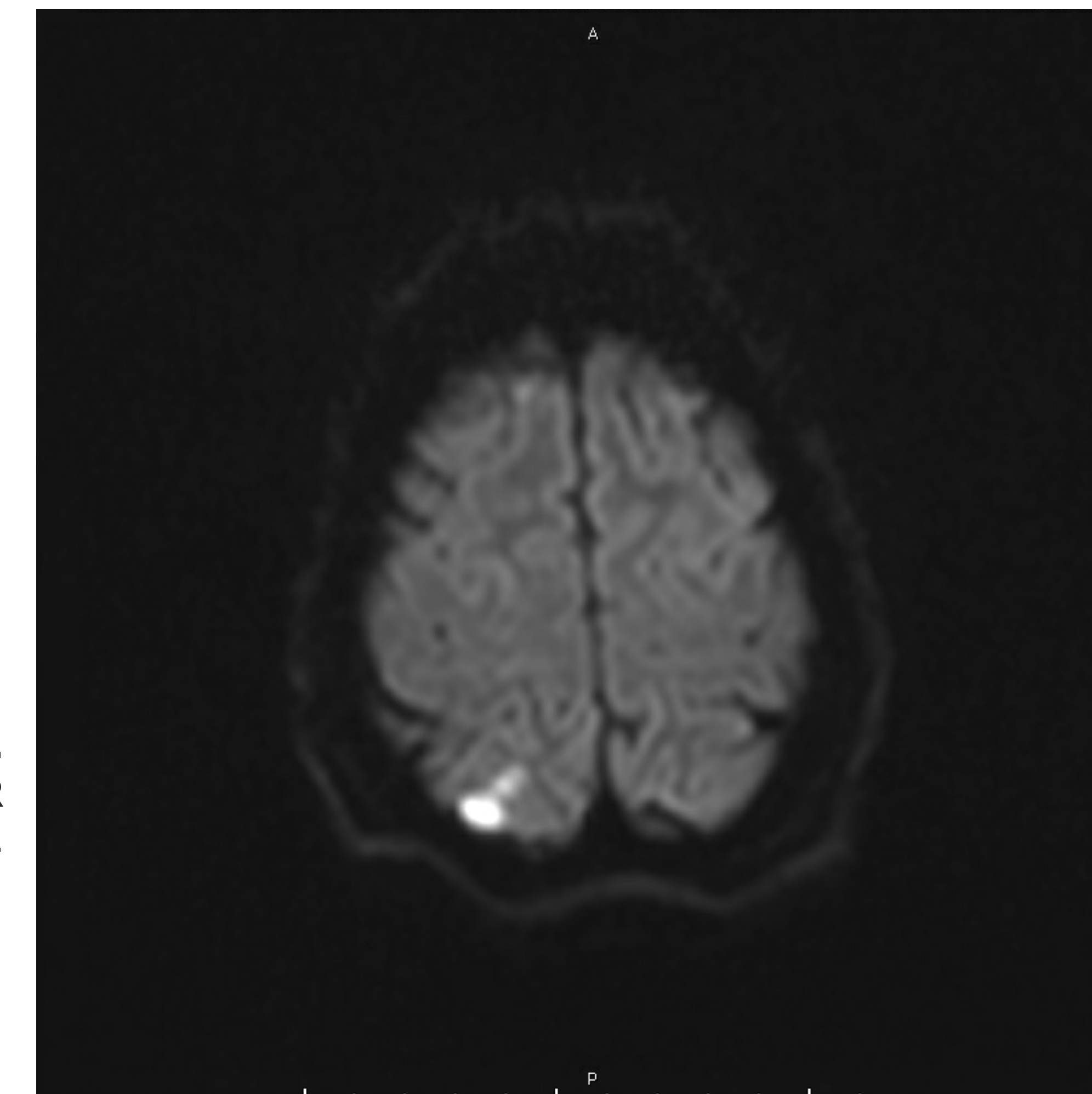


Figure 2.
MRI of Brain with associated T2 and FLAIR hyperintense signal abnormality.

Clinical features specific to lightning strike injuries

- Keraunoparalysis
 - A transient paralytic state that occurs in some lightning strike injuries. The lower limbs are often weaker than the upper limbs.
- Lichtenberg figures
 - A ferning pattern that is transient on the skin, usually fading within 24-36 hours. They are caused by positive charges over the skin.
- Cold tolerance
 - An abnormality of processes that control thermoregulatory responses in humans. The site of lesion is likely hypothalamus.

DISCUSSION

Although direct lightning strikes on humans are rare, it is estimated that 400 lightning injuries occur in the U.S. every year. Transient paralysis lasting <24 hours has been reported, however, in this patient, the symptoms of paraplegia and neurogenic bowel/bladder appear to be permanent. Furthermore, autonomic dysfunction can occur with disturbances in blood pressure, cardiac rhythm, bowel and bladder function.

CONCLUSION

The clinical manifestation of lightning injuries can pose unique challenges to clinicians, particularly in the pediatric population. While the literature on the prognosis of spinal cord injury following a lightning strike is scarce, the post-acute care is crucial to address. The inclusion of rehabilitation and its interdisciplinary approach is important to promote functional improvement and restore function.

RESOURCES

1. Cherington M. (2005). Spectrum of neurologic complications of lightning injuries. *NeuroRehabilitation*, 20(1), 3-8.
2. Davis, C., Engeln, A., Johnson, E. L., McIntosh, S. E., Zafren, K., Islas, A. A., McStay, C., Smith, W. R., Cushing, T., & Wilderness Medical Society (2014). Wilderness Medical Society practice guidelines for the prevention and treatment of lightning injuries: 2014 update. *Wilderness & environmental medicine*, 25(4 Suppl), S86-S95. <https://doi.org/10.1016/j.wem.2014.08.011>
3. Lammertse D. P. (2005). Neurorehabilitation of spinal cord injuries following lightning and electrical trauma. *NeuroRehabilitation*, 20(1), 9-14.
4. Pfortmueller, C. A., Yikun, Y., Haberkern, M., Wuest, E., Zimmermann, H., & Exadaktylos, A. K. (2012). Injuries, sequelae, and treatment of lightning-induced injuries: 10 years of experience at a swiss trauma center. *Emergency medicine international*, 2012, 167698. <https://doi.org/10.1155/2012/167698>
5. Ritenour, A. E., Morton, M. J., McManus, J. G., Barillo, D. J., & Cancio, L. C. (2008). Lightning injury: A review. *Burns*, 34(5), 585-594. doi:10.1016/j.burns.2007.11.006



Figure 3. Lichtenberg Figure on shoulder and chest.

