Cerebral Edema from Electrocution

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Abstract

Severe electrical burns are uncommon. They usually occur on the upper extremities with exit sites on the lower extremities. We present a case of a patient with an electrical burn to the posterior scalp that exited the buttock and ultimately lead to cerebral edema, herniation and death.

CASE REPORT: This was a 33-year-old male who was in a bucket on a fire truck that backed into an overhead power line who sustained a high voltage electrical burn to the posterior scalp. He had cardiac arrest in the field but underwent CPR with return of pulses. He was intubated and transferred to our facility from an outside hospital. On arrival he was hemodynamically normal with a GCS 6T. A complex full thickness burn 9x 3.5 cm was noted on his posterior scalp with full thickness exit site to his right buttock. CT head revealed a 5 mm right parieto-occipital subdural hematoma (SDH), small subarachnoid hemorrhage (SAH) without midline shift and several small foci of pneumocephalus. He was admitted to burn unit and local wound care with silvadene was initiated. Bronchoscopy was done and mild erythema consistent with Grade 1 inhalation injury was noted. Keppra was started for seizure prophylaxis but no hypertonic saline was given at that time. Sedation was weaned and he was able to follow commands with all extremities. A follow-up CT scan of the head 24 hours later revealed no change in the intracranial hemorrhage or edema. A CTA of the head and neck however revealed thrombosis of the superior sagittal sinus and most of the right transverse sinus. Given his acute SDH and SAH a decision was made not to anticoagulate him. He was scheduled for excision of his burns the following day. In the early hours of the next morning he developed acute neurologic decline. A follow-up CT head showed similar SDH and SAH but extensive diffuse cerebral edema with impending tonsillar herniation. CTA revealed no significant change in thrombosis of the sagittal sinus. Hypertonic saline was initiated and neurosurgery consulted. However it was felt no surgical intervention was warranted. His neurologic exam continued to decline and he rapidly progressed to brain death later that day. DISCUSSION: This describes an unusual and unfortunate case of a high voltage electrical burn to the head. Although he initially seemed to have no significant clinical sequelae of the injury to his brain, he later progressed to brain death. Questions regarding his management include the early prophylactic use of hypertonic saline or mannitol and the role of intracerebral pressure monitoring. The use of therapeutic anticoagulation for sagittal sinus thrombosis is also of importance.

Learning Objectives

1) Describe severity of high voltage electrical burns
2) Discuss surgical management of full thickness electrical burns

3) Discuss treatment option of cerebral edema in burns