Head injury induced diagnostic error

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Abstract:
Any disease, neurological or systemic, capable of causing sudden loss of consciousness can lead to an accident, and one would expect this to be seen occasionally in trauma patients. However the presence of a significant injury can sometimes blind us to this possibility and misdiagnosis is possible. We report a case where the diagnosis of a tumour was initially overlooked in a patient with a severe head injury.

Keyword:
Head injury, CT scan, diagnostic error

Head injury induced diagnostic error: Case Report:
History and Examination
A 38 year old male was found on the edge of a National Highway beside his badly damaged motorcycle and brought to the Emergency Department. There were no eyewitnesses available. He was unconscious from the time he was found, with no observed seizures. Repeated questioning of all available family members did not yield any history of headache, seizures, higher function abnormality or neurological deficit prior to the accident. He required immediate intubation and ventilation. There were multiple lacerations and abrasions over the face and limbs. There was no eye opening, verbal or motor response (Glasgow Coma Scale score 3/15) with dilated and non-reactive pupils. After stabilization the patient was transferred to the ICU, and a plain CT of the brain was performed en route.

Radiology (Figures 1 and 2)
The CT scan showed a 4 X 5 X 4.5 cm right fronto temporal hyperdense lesion with a linear fracture overlying it and a subgaleal hematoma. There was evidence of traumatic subarachnoid hemorrhagic with blood in the interhemispheric fissure and along the tentorium cerebelli. There was mass effect on the ipsilateral ventricle with a contralateral midline shift. The neurological residents and junior faculty, as well as the radiology resident on duty interpreted the hyperdensity in the right fronto-temporal region as hemorrhagic contusions, though some confusion was expressed at the lack of “whiteness”.

**Management:**
The blood pressure could not be maintained even with ionotropic support. No surgical intervention was contemplated in view of the poor clinical condition, and within a few hours the patient had a cardiac arrest and was declared dead. Just before the patient died a more senior member of the neurosurgical faculty reviewed the scan, and the image was considered to be inconsistent with a contusion. It appeared quite well defined with a uniform hyperdensity with a possible attachment to the lateral sphenoid wing. A twist drill free hand biopsy of the lesion was performed, and the specimen was reported as consistent with a meningioma.

**Discussion:**
In this case, all clinical indications and several radiological features pointed towards a significant head injury. The patient was absolutely asymptomatic before the incident. He was found on a highway beside a damaged motorcycle and had multiple abrasions and lacerations. The CT scan showed an obvious fracture overlying the hyperdensity, evidence of subarachnoid hemorrhage and other injuries to the brain. The incidence of error when CT scans are interpreted by residents or general radiologists rather than by staff or trained neuroradiologists has been reported to be about 2%. The identification of a tumour in this patient is simple with hindsight, but the circumstances under which the patient was initially seen obscured the correct diagnosis. In this case it did not change our management due to the poor neurological status of the patient but if this were a salvageable patient and a decision on surgery was made the junior doctor would have been caught off guard.

In the last decade there has been a reduction in this diagnostic error. More recently, Miyakoshi et al evaluated the accuracy of preliminary interpretations of emergency neurologic CT scans after hours by on-call radiology residents. The preliminary interpretations by on-call residents with final analyses by attending neuroradiologists during a 12-month...
period for both traumatic and non-trauma cases were analyzed. There were 252 cases (3.7%) with disagreements among 6,852 total cases. Of those, 226 (3.3%) were confirmed as resident errors, which included 171 (2.5%) that were significant. There were 73 (1.1%) acute intracranial, 77 (1.1%) acute extracranial, and 21 (0.3%) non-acute misinterpretations. Among the 171 significant cases, 105 (1.5%) had no changes in clinical management, and 55 (0.8%) required some change. They concluded that these errors had a minimal impact on clinical outcomes and continued monitoring of residents’ performance was important to maintain or improve patient safety.

**Conclusion:**
The possibility of coexisting pathology of the brain should always be kept in mind when interpreting trauma CT scans, and any feature not compatible with a traumatic etiology must be explained satisfactorily.

**References:**


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**Figure legends:**
1. Image just above the level of the lesser wing of the sphenoid showing a hyperdense lesion with some hypodensity within it. Note the fracture underlying the lesion and the hemorrhage adjacent to the midbrain.

2. Image at a higher level with the lesion showing similar characteristics. The scalp hematoma and fracture adjacent to the lesion are clear.