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Case Series

Intracranial Hemorrhage in Intoxicated Patients: A High Degree of Suspicion Leads to the Diagnosis

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Abstract

Head injuries in intoxicated patients are a challenge for the treating clinician. A reliable assessment can be jeopardized by a lack of communication and missing evidence of the trauma circumstances. A high degree of suspicion is required to decide which patient should be referred to further imaging as time is crucial for the prognosis in intracranial hemorrhage (ICH). We present cases with unexpected results following a suspected head trauma where the circumstances were unclear.

Keywords: *Intracranial Hemorrhage; Brain Injury; Head Injury; Intracranial Hemorrhage in Intoxicated Patients*

Introduction

Intracerebral haemorrhage, if unrecognised, can result in a devastating prognosis. The 30-day mortality rate ranges from 35% to 52%. It is estimated that only 20% recover fully after 6 months [1]. Almost half of the fatal events occur within the first 24 hours [2]. This highlights the importance of early and effective detection followed by treatment in an Emergency Department.

Case Reports

Case 1

A 62-year-old man has been found sitting on the side of a road at 23.00 pm. Passers-by involved the ambulance. The patient had no memory of the events and complained of pain in his right hand. On presentation in causality, he was conscious and was able to move all limbs. He was communicative but lacked memory of the events until the ambulance attended the scene. The patient complained of pain in his right thumb.

He had no relevant past medical history, lived alone and admitted regular moderate use of alcohol on the weekends.

On examination, the patient revealed a 4 cm superficial contusion mark to the left forehead. There was no tenderness on percussion or palpation of the skull. The neurological examination was normal. GCS 15/15. Lab results revealed an alcohol level of 1,3 ‰.

While the patient was waiting for the blood results, it could be observed that he behaved in an inappropriate manner. He had a constant urge to move on the bed, got up, walked and appeared disorientated. He asked why he was in casualty but followed recommendations to lie down. He got up again after minutes repeating the process.

The patient underwent CT scans. The images revealed an intracerebral bleeding with signs of compression.

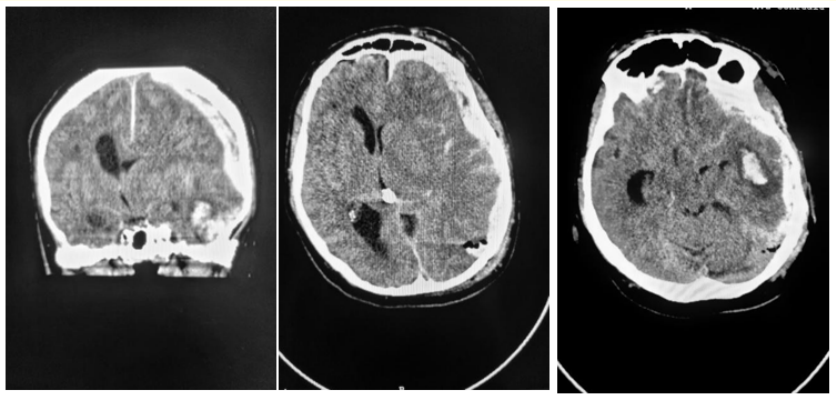

Figure 1: *Case 1: 62 years, male.*

The patient was referred to the neurosurgeons where he underwent a hemicraniectomy and drainage followed by ICU monitoring. He remained in a coma for 14 days before he could be transferred to the ward. A neurological rehab followed from which he could be discharged after 4 weeks into outpatient rehabilitation.

Case 2

An 87-year-old man fell at home. He had a meeting with friends and enjoyed "some glasses of beer". He left his friends and stepped out of the apartment. Some minutes later, his friends followed and found him on the pavement. They struggled to get him back on his feet. For them, he appeared normal. He complained of a mild headache with a small laceration to the scalp for which reason the ambulance was called.

On presentation in casualty, the patient appeared far asleep. Contact could be made intermittently before he fell into sleep again. He had no memory of the events and was unaware that he was in hospital. He complained of a localised headache. A lacerated wound of approximately 3 cm was found over the right parietooccipital aspect of the skull. There was no bony tenderness on palpation.

The neurological examination was difficult to obtain but the patient was cooperative with good communication skills and able to move all limbs on command. GCS 15/15.

There was a history of regular alcohol abuse but no relevant comorbidities or use of anticoagulants.

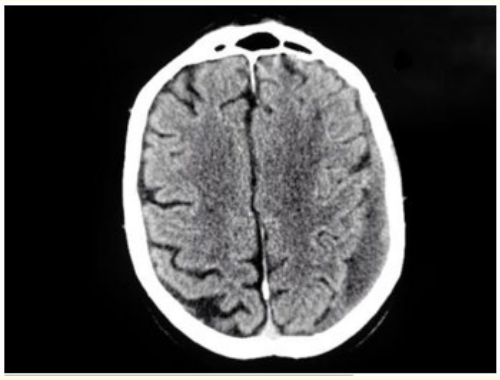

Figure 2: *Case 2: 87 years, male.*

The client underwent CT imaging. His scans revealed a parietotemporal subarachnoidal hemorrhage for which he underwent trepanation. He recovered well without neurological deficit and could be discharged into a geriatric facility for the time of recovery.

Case 3

A 76-year-old female was found by her carer after she did not respond to calls for the last two days prior to admission. She was lying in the living room. The ambulance was called. The paramedics described that the patient could respond to their questions. Following her account she had an episode of extensive drinking on the day before. She could not recall if she fell. However, she was unable to get up on her own. The paramedics found her alert but slow in her responses. They related this to the alcohol consumption. No signs of injury could be found.

The patient has a history of ischemic heart disease for which she took aspirin.

On admission, her neurological had changed. She appeared to be in a daze and could only answer with difficulties. However, she moved her limbs. Neurological check revealed normal pupil size responding to light and normal muscle tone. GCS 14/15. The skull revealed some minor soft tissue thickening over the temporoparietal aspect. Vitals were normal.

Figure 3: *Case 3: 76-year-old female.*

In light of a possible head injury after a fall with advancing neurological sequelae, the patient underwent a CT scan. In the course of the preparation, she started to develop additional left arm paraplegia. The images showed a massive bleeding necessitating emergency craniotomy and drainage. Her bloods came back with an alcohol level of 0,3 ‰. The patient survived. After 5 days on ICU, she could be transferred into neurological rehabilitation where she stayed for 6 weeks. She could be discharged with improving minor functional impairments with her left arm.

Case 4

A 35-year-old man was found in the door frame of a closed mall reportedly unable to respond to passers-by. An ambulance was called and the patient transferred to the hospital. During the transport, the patient woke up and became agitated insulting the crew members and the staff in casualty. He got up from the bed, walked around and hardly followed commands to lie down and rest. In the ambulance, an alcohol level of 3,5 ‰ could be confirmed on the breathalyzer.

The patient was a known alcohol dependent with frequent visits to the hospital for reasons of caring citizens rather than medical reasons. Usually, after an examination, he would spend the night in casualty before he would set off home the following morning. He had no relevant past medical history. He always presented in a clean and tidy condition without signs of self-neglect.

The examination did not reveal signs of a trauma. He appeared without neurological deficits. Speech was slurry but he appeared orientated to person, time and location. However, his memory for the time before he had been found was vague. Bloods confirmed an alcohol intake of 3,4 ‰.

The patient's mood settled. He fell asleep on a stretcher under the watchful eyes of the nurses. He kept sleeping in silence for 4 hours. During that time he kept changing positions frequently. Then, he started vomiting. On re-examination, he was fast asleep or rather unconscious as he could not be wakened up. The neurological check revealed equal pupils but no adequate pain response. The following CT scan revealed the onset of a subarachnoidal bleeding. The patient was transferred to ICU and, later, surgery for drainage. He could leave the hospital after 2 weeks without neurological deficits resulting in an alcohol withdrawal rehab.

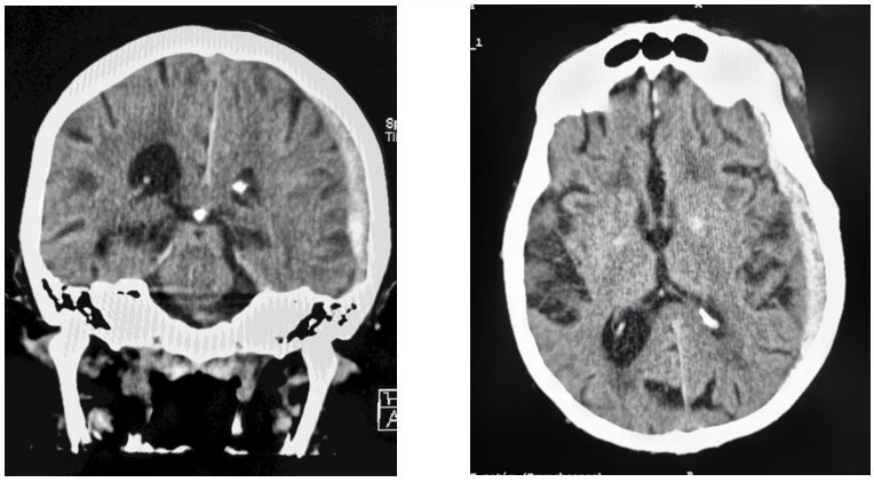

Figure 4: *Case 4: 35 years, male.*

Discussion

Intracranial hemorrhage (ICH) is an extravasation of blood into the cranial cavity or the brain parenchyma. In the majority of cases, they occur as a result of a stroke. Traumatic events are less frequent but follow the same prognosis. Clinically, it is sometimes debatable if the trauma follows the spontaneous event of a stroke or if the trauma is the main cause for the ICH.

Risk factors for ICH have been identified, in particular alcohol and drug abuse. Mild-to-moderate alcohol consumption has been linked to a decreased risk for stroke and CVD, but regular excessive use is associated with an increased risk for intracranial hemorrhage and cardiomyopathy [3-6]. Cocaine and amphetamines have also been associated with cerebral infarction, intracranial hemorrhage, myocardial infarction, cardiomyopathy,

and cardiac arrhythmias [7-9]. The likely mechanism for intracranial complications is that of a focal hypertension or vasoconstriction. Unfortunately, this involves all age groups [7,10]. In a traumatic event, these factors may increase the risk of potential complications.

Treatment requires early detection of the ICH as the prognosis gets worse as the ICH progresses. In up to 40% of cases, the hemorrhage continues to extend into the ventricles resulting into an obstructive hydrocephalus [11]. Other limiting factors are large hematoma volumes (> 30 mL), location in the posterior fossa, older age, and high arterial blood pressure [12,13].

In intoxicated patients, a reliable assessment regarding the circumstances of the accident together with a physical assessment is more than challenging. Available information forms the process of decision making especially when it comes to requesting further investigations. Ideally, in patients with head injury, the combinations of history and physical examination should result in clinical decision rules to identify patients with minor head trauma at low risk and those with severe intracranial injuries [14]. However, the patient's past medical history or the history of events is not always available. It may remain uncertain if the patient has been struck by a vehicle, beaten by a blunt object or fallen on a hard surface. Remember that it is not important if the patient fell but on what the patient landed. A concrete surface is more likely to cause injury than sand.

Therefore, the most important aspect is the physical examination. The clinical presentation and an objective assessment in an intoxicated person require a good scope of experience. The patient's communication skills may be compromised as well as the behaviour and may be misinterpreted. There are objective criteria that can support the clinician's assessment. Symptoms, e.g. amnesia, headaches, nausea, vomiting may are regarded as classical clinical signs of a head injury but may also be present as side effect in drug abuse.

The neurological examination may fail due to the patient's lack of cooperation. However, at that stage, it can already be difficult to distinguish a lack of cooperation from a neurological deficit. On observation, the patient may simply be "not right". Repetitive questions with the same wording, a memory deficit, disorientation, a constant urge to move or the disability to follow repeat orders can indicate an intracranial pathology. If the patient is accompanied by family members or friends, they may advise that the patient behaves differently or that the personality is "weird". The patient may present as if being in a loop without being able to reflect the past and present events.

The physical examination should find the patient undressed. Contusions and bruises may be the only signs of injury. Contusions to the head should attract the clinician's attention and should be questioned. In our cases, findings were very minor and, as such, would not have resulted in CT scans if the patient would not have showed additional symptoms.

Besides, it may well be that the toxicological screen may not be consistent. A low alcohol level or the absence of drugs should raise suspicion for a major head injury.

Symptoms, e.g. coma, seizures, neck stiffness, signs of skull fracture or GCS score of 13, in contrast, are serious clinical signs and should provoke immediate action.

The Canadian CT head rule and the New Orleans Criteria can support the process of decision making for further CT imaging. However, from our experience, age is crucial as it should not be regarded as the sole criteria.

Canadian CT Head Rule
Age ≥ 65 years; ≥ 2 vomiting episodes, amnesia > 30 minutes, pedestrian struck or ejected from vehicle, fall > 1m, suspected skull fracture, or GCS score < 15 at 2 hours
New Orleans Criteria findings
Age > 60 years, intoxication, headache, vomiting, amnesia, seizure, or trauma above the clavicle

Table

Differentials of a traumatic event need to include an ischemic stroke. Symptoms are largely the same with headache, nausea, seizures and focal or generalized neurologic symptoms. A raised diastolic blood pressure may be indicative. It increases the likelihood of an atraumatic intracerebral hemorrhage compared to ischemic stroke, but only neuroimaging can provide a definitive diagnosis [15].

Normal CT findings on admission do not exclude progression of a possible contusion into a manifest bleeding. The need for a follow-up CT scan usually follows the clinical presentation of the patient. If the patient is admitted for observation, monitoring of symptoms is essential. Chances for a presentation or progress into neurological deterioration with the onset or progression of headaches, vomiting, neurological symptoms are high within 24 hours of admission [16]. Flaherty [17] concluded in a review of 2950 patients that in patients with a suspected head trauma, age over 55 years, Glasgow Coma Scale 14 to 15, negative initial brain CT, and no other abbreviated injury scale injuries > 2 a repeat CT scan is not regarded as useful.

The severity of a head injury, as indicated by physical signs of injury, does not always correspond to the risk of a brain hemorrhage. Determining the likelihood of bleeding based solely on the clinical examination findings is not possible. Circumstances of the accident may not always be provided or provided correctly by the patient due to their impaired consciousness under the influence of alcohol or drugs. Also, an external medical history may not always be available. Additional criteria, especially the mechanism of injury, are needed for an accurate assessment. However, if the circumstances remain unclear, we include a CT scan in our assessment to exclude intracranial hemorrhage.

In both of our cases, the head injuries could be regarded as minor, so the need for a CT scan arose only from the patient's noticeable behavior.

Conclusion

The obvious severity of the head injury in intoxicated patients does not need to correspond to the risk of an ICH. Determining the likelihood of a possible ICH based solely on the clinical findings is not possible. Additional criteria, especially the mechanism of injury, are needed for a more accurate assessment. However, if the assessment is not safe and complete a CT scan would be regarded as beneficial to exclude intracranial hemorrhage.

Acknowledgements

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