Subarachnoid haemorrhage presenting as head injury

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The distinction between subarachnoid haemorrhage and head injury may sometimes be blurred

Headache, nausea, vomiting, and transient loss of consciousness occur in two thirds of people who experience subarachnoid haemorrhage.¹ Loss of consciousness may result in an abrupt fall and trauma to the head immediately after the haemorrhage. The distinction between subarachnoid haemorrhage and head injury may therefore be blurred sometimes, with the spontaneous subarachnoid haemorrhage remaining unrecognised. We believe that this clinical problem has not been properly addressed. We report on four patients with head injury, in whom a spontaneous subarachnoid haemorrhage preceded the trauma, and suggest guidelines for investigating and managing such patients.

Case reports

CASE 1

A 45 year old man became unconscious after he fell 6 m from scaffolding. On admission he was convulsing, with pupils of equal size and reacting to light. He had a laceration of the scalp and an orbital fracture. Computed tomography showed a small amount of subarachnoid blood, which was attributed to the injury. The possibility of a spontaneous cerebrovascular haemorrhagic event as the cause of the fall was raised. Cerebral angiography showed a giant aneurysm in the right middle cerebral artery. At surgery, widespread subarachnoid haemorrhage and substantial recent clotting in the area surrounding the aneurysm confirmed that the aneurysm had recently bled. Despite successful clipping of the aneurysm the patient died three days later.

CASE 2

A 54 year old male engineer fell 6 m from a ladder and hit his head on a concrete surface. On admission he was localising and opening his eyes to painful stimuli, with incomprehensible verbal responses. He had a frontal linear fracture, an orbital haematoma, and a temporal extracranial contusion but no obvious localising neurological deficit. He had a strong family history of spontaneous cerebral haemorrhage. Computed tomography showed a small amount of blood in the anterior interhemispheric fissure. Because of the family history and the unclear circumstances of the fall (no witness, patient unconscious since the event) the possibility of subarachnoid haemorrhage was raised. Cerebral angiography showed an aneurysm in the left middle cerebral artery. Eleven days after the haemorrhage the aneurysm was clipped and found to have recently bled. The patient made a slow, steady recovery, but his recall of the events remained poor. On discharge he had mild difficulties with short term memory and minimal expressive dysphasia.

CASE 3

A 47 year old man fell during sexual intercourse in a standing position and hit his head on a desk in his office. When his colleagues found him he was confused. On admission he had a left temporal fracture and contusion of the scalp. Computed tomography showed a post-traumatic left frontotemporal haemorrhagic contusion and a small subarachnoid haemorrhage in

the anterior interhemispheric fissure. This was initially interpreted as a post-traumatic subarachnoid haemorrhage. After the patient had recovered from the injury, however, cerebral angiography showed an aneurysm in an anterior communicating artery, which was successfully clipped. The operation confirmed that the aneurysm had recently bled. Recovery was uneventful.

CASE 4

A 29 year old man collapsed at his workplace. After a short period of unconsciousness he had retrograde and anterograde amnesia for a few hours and headache. No localising neurological signs were detected. Radiography of the skull showed a small right parietal fracture, and he was treated for trauma. The next day he developed stiffness of the neck, and computed tomography showed a haemorrhagic superficial frontal contusion. A lumbar puncture confirmed frank subarachnoid haemorrhage. Cerebral angiography showed an aneurysm in the pericallosal artery, which was successfully clipped. The operation confirmed that the aneurysm had recently bled. Recovery was uneventful.

Discussion

Our case reports demonstrate that an important risk exists of a subarachnoid haemorrhage remaining undetected as a result of the head injury that may follow it. Small "leaks" from an aneurysm can often cause only a transient alteration of consciousness, collapse, and trauma to the head.

Three quarters of patients who suffer subarachnoid haemorrhage are in a good neurological state on admission and gradually improve after the first bleed.² Thus if neither the spontaneous cerebral haemorrhage nor the head injury have caused an important clinical deficit these patients may recover soon after the haemorrhage and have only headache and retrograde amnesia, with no recollection of the haemorrhage's symptoms before the trauma. Falls and accidents at work or during exercise can be easily attributed to carelessness, loss of balance, or lack of dexterity. The clinical deficits of these patients may be interpreted as resulting from the head injury, and the patients are usually sent home if they have no appreciable systemic injuries and radiography of the skull shows no abnormalities.

In other patients persistent deterioration of the conscious level or other neurological signs, which result from the spontaneous bleed, may also be attributed to the head injury. Lacerations of the scalp, fractures of long bones, or other evidence of systemic trauma may direct treatment to injuries only, and contribute to a spontaneous cerebrovascular event being overlooked. Computed tomography does not minimise the risk of missing a spontaneous subarachnoid haemorrhage when it has been followed by a head injury. A small amount of blood showing in the subarachnoid spaces in the scan can be missed or misinterpreted as traumatic in origin.

A further difficulty may arise. Four to eight per cent of the population harbour incidental unruptured aneurysms.^{3,4} After a head injury such patients may be found to have traumatic subarachnoid haemorrhage on

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computed tomography and an incidental unruptured aneurysm on cerebral angiography. Magnetic resonance imaging may help to differentiate between acutely haemorrhagic aneurysms and the incidental unruptured aneurysms that occur in a patient with trauma. Patients with a haemorrhagic aneurysm need to be operated on as early as possible while those with an unruptured aneurysm should be operated on after they have recovered from the head injury.

Many causes exist of collapse or brief loss of consciousness, which can lead to head injury. Myocardial infarction, cardiac arrhythmias, pulmonary embolism, transient ischaemic attacks, fainting, vasovagal episodes, hypoglycaemia, alcohol consumption, and epileptic seizures should be considered. Systemic examination and routine investigations would probably reveal one of these medical conditions, and a head injury would not conceal them. Subarachnoid haemorrhage and head injury, however, may look similar on computed tomography, and it may be difficult to distinguish one from the other. Lumbar puncture would probably show blood in patients who have either spontaneous or traumatic subarachnoid haemorrhage. More importantly, lumbar puncture may be dangerous in patients with trauma because of possible intracranial haematomas or contusions and an inhomogeneous increase of intracranial pressure; withdrawing cerebrospinal fluid may lead to tentorial herniation and compression of the brain stem.

It is of paramount importance, therefore, to pay extreme attention to detail in taking the medical history, especially from witnesses. Severe headache, neck stiffness, or photophobia that persist in a pattern disproportionate to the severity of the head injury should always be observed critically. Doctors should bear in mind the association between subarachnoid haemorrhage and trauma and use computed tomography more often in patients who may have subarach-

noid haemorrhage. If there is any doubt the history, clinical findings, and results of computed tomography of such patients should be discussed with neuroscientists. Discussion is particularly important because in undifferentiated cases in which investigations are incomplete, recurrent haemorrhages occur in about one third of patients within eight weeks.⁵ The common features in our cases are that all patients suffered a fall, the first two from high up; and all patients had external signs of injury and a fracture on radiography of the skull.

We suggest the following policy for assessing the likelihood of subarachnoid haemorrhage: if the circumstances of an injury are unclear, and a reasonable chance exists of a spontaneous cerebrovascular haemorrhagic event as a cause of the accident then a patient with trauma should have a computed tomography as soon as his or her systemic condition allows, regardless of the severity of the head injury. If the computed tomography shows features suggestive of possible spontaneous cerebral haemorrhage then the patient should have magnetic resonance imaging or cerebral angiography. High quality cerebral magnetic resonance angiography, which is increasingly available, may prove to be a suitable screening investigation for such patients.

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How To Do It

Set up and run an objective structured clinical exam

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Objective structured clinical exams are increasingly used as a way of assessing a range of clinical skills at both undergraduate and postgraduate level. To those planning to introduce such assessments, this article provides basic guidance on their development and structure and the personnel required. For those already using the assessments, our article may provide new ideas or be the impetus for an exchange of ideas. For those who are facing such formal assessment as candidates, we hope this article shows the efforts that are made to achieve the necessary structure and objectivity in this type of examination.

The objective structured clinical exam has come to prominence as a means of assessing undergraduate and postgraduate candidates.¹ Its basic structure is a circuit of assessment stations, where a range of practical clinical skills are assessed by an examiner using a previously determined, objective marking scheme.² This mechanism of assessment is at the "showing how" level of Miller's pyramid of knowledge.³ Compared with clinical "short cases"—where examination candidates see various patients at different times and are assessed by examiners who may not work to identical marking schemes and standards—the

objective structured clinical exam offers the advantages of uniform marking schemes for examiners and consistent examination scenarios for students. It has proved an appropriate means of assessment for the clinical skills now being emphasised in the medical undergraduate curriculum.^{4,5}

This article is designed to give some guidance, derived from our recent personal experience, to those planning to introduce such a type of assessment (box).

Steps in developing an objective structured clinical exam

- Determine skills to be examined
- How many skill assessment stations needed?
- Skill assessments
- Marking schemes
- Space for exam
- Personnel needed:
Examiners
Marshals and timekeepers
Patients or volunteers
- Arrangements on the day of exam
- Review outcome