Bleeding thunderclap headache

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INTRODUCTION

Thunderclap headache, a term applied to instantaneous headache associated with unruptured cerebral aneurysms (Day and Raskin, 1986), is benign in most cases (van Gijn and Rinkel, 2001). However, subarachnoid haemorrhage (SAH) should always be excluded.

Acute severe headache accounts for 1–2% of casualty admissions (Ward et al, 2001). SAH causes 25% of acute severe headache seen in the community and 68% of SAH patients in a hospital series presented in this manner (van Gijn and Rinkel, 2001). Headache is instantaneous in 50% of cases but develops over 1–5 minutes in 19% (van Gijn and Rinkel, 2001). About 51% of patients suffering aneurysmal SAH die and about a third who survive are left severely disabled and dependent (van Gijn and Rinkel, 2001).

This article describes two cases of acute severe headache where failure to investigate resulted in delayed neurological assessment. SAH can be diagnosed non-invasively and management of aneurysmal SAH carries low risks, emphasizing the need for appropriate investigation of thunderclap headache.

DISCUSSION

It is estimated that 12% of patients with the 'worst headache ever' and a normal neurological examination have had a SAH (Edlow and Caplan, 2000).

Although impossible to prove, it is highly probable that the first case had suffered a SAH and the second case had a definite aneurysmal SAH. At discharge from casualty both patients had a 65% risk of rebleeding and only a 53% chance of a satisfactory outcome at 6 weeks, compared to 91% if they had been initially correctly diagnosed (Edlow and Caplan, 2000).

All patients presenting with acute thunderclap headache require an urgent unenhanced computed tomography (CT) brain scan with 3 mm cuts through the skull base. The sensitivity of CT scanning decreases from 100% within the first 12 hours of onset to 93% within 24 hours (Edlow and Caplan, 2000). If a CT scan is normal, equivocal or technically unacceptable and there are no contraindications then lumbar puncture should be performed immediately (Edlow and Caplan, 2000). SAH is indicated by uniformly bloody CSF within the first 12 hours after headache onset or xanthochromia (determined by bilirubin spectrophotometry on a fresh CSF sample) between 12 hours and 2 weeks after onset. Delaying CSF sampling to 12 hours after headache onset to allow xanthochromia to develop incurs a minimal risk of early rebleeding (Edlow and Caplan, 2000).

Up to 20% of lumbar punctures result in a traumatic tap, leading to diagnostic uncertainty (Edlow and Caplan, 2000). CSF from a traumatic tap should contain 1 white blood cell per 1000 red blood cells in the absence of anaemia and leucocytosis (Adams et al, 1997). Sequential clearing of an initially bloodstained sample is an unreliable indicator of a traumatic tap and the final CSF sample should always be analysed for xanthochromia. Ideally the sample should be protected from light and delivered by hand as vacuum tube systems can cause haemolysis.

CASE REPORT 1

A 54-year-old farmer suddenly developed a severe generalized bursting headache lasting an hour without associated symptoms. Childhood trauma had resulted in a blind right eye. His father had died following a massive subarachnoid haemorrhage. He was immediately taken to the local casualty department where the headache eased with intramuscular morphine. Physical examination was normal except for an amaurotic right eye. He was discharged without investigation or follow up and the headache resolved over the next day.

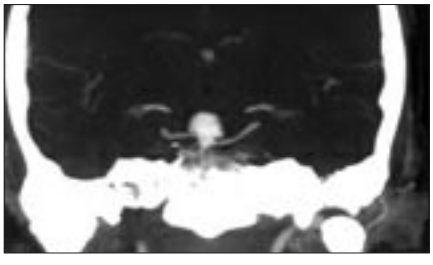
After routine GP referral he was seen urgently in the neurology clinic and underwent, some 3 months after onset of the headache, a computed tomography angiogram which showed a 1 cm basilar tip aneurysm (*Figure 1*). The aneurysm was treated endovascularly using 12 platinum coils (Guglielmi detachable coil) in combination with a Trispan (Boston Scientific Limited, St Albans, UK) coil device (*Figure 2*) and he was discharged with no new neurological deficit.

CASE REPORT 2

A 29-year-old woman suddenly developed severe left retro-orbital pain with radiation to her neck and vomiting. When examined in the casualty department there were no physical signs and she was discharged without undergoing investigation.

Two weeks later she experienced an identical abrupt onset headache and subsequently developed a left complete third nerve palsy with pupillary involvement. An urgent unenhanced computed tomography brain scan was normal but visual inspection of a CSF sample showed xanthochromia with 400 red cells/ml on microscopy. A computed tomography angiogram of the brain revealed a 9 mm broad-necked posterior communicating artery aneurysm which was treated endovascularly using four platinum coils (Guglielmi detachable coil).

Figure 1. Computed tomography angiogram of the brain showing a broad-necked aneurysm of the basilar tip.



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CSF bilirubin spectrophotometry is not available in many general hospitals and visual inspection for yellow discolouration is unreliable if a traumatic tap has occurred. If xanthochromia is absent visually in a bloody CSF sample and spectrophotometry is not available then neurosurgical advice is necessary. If CSF results are confusing or ambiguous then neurological or neurosurgical advice should be obtained.

Management of patients who present more than 2 weeks after thunderclap headache is more controversial. The gold standard investigation is cerebral angiography but it has a complication rate of 1.8% for transient or permanent neurological sequelae (van Gijn and Rinkel, 2001) and the subsequent rebleed rate in the following 6 hours is about 5% (Saitoh et al, 1995). Digital subtraction angiography (DSA) is not available in most general hospitals.

Magnetic resonance angiography (MRA) is available in most district hospitals and has a sensitivity of >95% in detecting all aneurysms over 6 mm diameter, falling to 56% for aneurysms under 5 mm diameter (Wardlaw and White, 2000). CT angiography (CTA) needs an iodine-based contrast agent but is faster than MRA (may be advantageous in a claustrophobic or agitated patient or if MRA is contraindicated). Comparative studies of CTA *vs* DSA suggest that CTA is at least equivalent to MRA with overall aneurysm detection rates of 85–95% (Molyneux et al, 2002). CTA can also detect aneurysms missed by DSA (van Gijn and Rinkel, 2001).

Detachable platinum coils can be placed directly into an aneurysm using an endovascular route (Lempert et al, 2000; Molyneux et al, 2002). The International Subarachnoid Aneurysm Trial compared surgical clipping *vs* endovascular coiling in patients with ruptured saccular aneurysms. The majority of the 2143 randomized eligible subjects had a good preoperative neurological status and small anterior circulation aneurysms. The study was halted after interim analysis indicated a relative risk reduction of death or dependency at 1 year of 22.6% with endovascular coiling (Molyneux et al, 2002).

TABLE 1.
Differential diagnosis of acute severe (thunderclap) headache

Secondary headache syndromes	Vascular	Subarachnoid haemorrhage (aneurysmal or perimesencephalic)
		Arteriovenous malformation
		Carotid or vertebrobasilar arterial dissection
		Cerebral venous thrombosis
		Vasculitis
	CNS infection (pyrexia and leucocytosis if immunocompetent)	
	Pituitary apoplexy	
Primary headache syndromes*	Idiopathic thunderclap headaches	
	Crash migraine	
	Benign exertional/sex headache	
	Cluster headache and other trigeminal autonomic cephalgias	

*Primary headaches are only diagnosed after considering and excluding causes of secondary headache

CONCLUSIONS

SAH can be excluded by a normal CT brain and negative CSF spectrophotometry. Aneurysms can be identified non-invasively and treated semi-invasively with low risk. All acute headaches warrant investigation to exclude potentially life-threatening causes (*Table 1*). HM

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Figure 2. a. Cerebral angiography confirms that the neck incorporates the origin of both posterior cerebral arteries. b. A Trispan (Boston Scientific Limited, St Albans, UK) coil is used as well as platinum (Guglielmi detachable coil) coils to preserve patency of the basilar tip during endovascular treatment. c. Final result of endovascular therapy.