Lesson of the week

Spectrophotometry of cerebrospinal fluid in suspected subarachnoid haemorrhage

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Spectrophotometry should be used to confirm the absence of haem pigments in cerebrospinal fluid

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BMJ 2005;330:138

To underline the importance of correctly examining cerebrospinal fluid, we describe two patients with subarachnoid haemorrhage for whom cranial computerised tomography was normal and on whom lumbar puncture was subsequently done. Both had clear and colourless cerebrospinal fluid, but subsequent spectrophotometry showed bilirubin. Cerebral angiography then showed a ruptured aneurysm in each patient.

Case reports

Case 1

A 28 year old woman presented with nausea and diplopia. She had global headache which had awoken her 14 days before. This was associated with neck pain and stiffness, vomiting for two days, and photophobia for five to six days. On examination, severe bilateral papilloedema, and signs of a VIth nerve palsy were present. Cranial computerised tomography showed no abnormality. Lumbar puncture was done. Cerebrospinal fluid contained 79 red cells and five white cells per cubic millimetre. The supernatant was clear and colourless on visual inspection when held up to light. Nevertheless, spectrophotometry detected bilirubin (0.021 absorbance units). Subsequent cerebral angiography showed a ruptured right middle cerebral artery aneurysm.

Case 2

A 47 year old woman presented with a history of headache which had begun 10 days before. She reported the start as a few minutes of severe pain shooting up her neck to her head. The pain was associated with some vomiting and neck stiffness but no photophobia. Examination was unremarkable. Cranial computerised tomography showed no abnormality. Lumbar puncture was done on the eleventh day after the onset of headache. Cerebrospinal fluid contained 125 red cells and six white cells per cubic millimetre. The supernatant was clear and colourless on visual inspection when held up to light. Despite this, spectrophotometry of cerebrospinal fluid detected bilirubin (0.009 absorbance units). Subsequent angiography showed a ruptured left posterior cerebral artery aneurysm.

Discussion

Computerised tomography can miss some cases of subarachnoid haemorrhage. Diagnostic sensitivity has been reported to decrease from 92% on the day of the bleed to 58% on day five.¹ Because of this, it has been recommended that where subarachnoid haemorrhage is suspected but computerised tomography is normal, lumbar puncture should be done to exclude the presence of haem pigments (bilirubin and oxyhaemoglobin) in cerebrospinal fluid.² After subarachnoid haemorrhage, haemolysis of subarachnoid erythro-

cytes releases haemoglobin, which is converted to bilirubin. Bilirubin concentration reaches a maximum at about 48 hours and may last for two to four weeks after extensive bleeding.³

In the two cases described here, spectrophotometry found increased bilirubin in cerebrospinal fluid providing evidence that subarachnoid haemorrhage had occurred; in each case the appearance of cerebrospinal fluid was normal. Without spectrophotometry the diagnosis may have been missed. Recent published guidelines have emphasised the poor sensitivity of visual inspection of cerebrospinal fluid for xanthochromia (yellow or reddish discolouration), and the importance of spectrophotometry.⁴ Many laboratories, however, continue to report the absence of haem pigments based on visual inspection.⁵ Spectrophotometry should be used to confirm the absence of haem pigments in cerebrospinal fluid. After lumbar puncture, the least blood stained sample of cerebrospinal fluid should be protected from light and sent immediately to the laboratory for spectrophotometry.

Contributors: All authors had the idea. Details of each case were provided by RB. The paper was written by AC and RB. AC is guarantor.

Funding: None.

Competing interests: None declared.

Ethical approval: Not needed.

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- 2 Wasserberg J, Barlow P. Lumbar puncture still has an important role in diagnosing subarachnoid haemorrhage. *BMJ* 1997;315:1598-9.
- 3 Fishman RA. *Cerebrospinal fluid in diseases of the nervous system*. London: WB Saunders, 1980.
- 4 UK National External Quality Assessment Scheme for Immunochimistry Working Group. National guidelines for analysis of cerebrospinal fluid for bilirubin in suspected subarachnoid haemorrhage. *Ann Clin Biochem* 2003;40:481-8.
- 5 Edlow JA, Bruner KS, Horowitz GL. Xanthochromia. *Arch Pathol Lab Med* 2002;126:413-5.

(Accepted 25 September 2004)

Endpiece

A physician who is constantly busied

A physician who is constantly busied [150 patients daily in his own rooms], sees too much, and does not think enough.

Patterson W.

Remarks on some of the opinions of Dr Rush respecting the yellow fever which prevailed in the city of Philadelphia in the year 1793. Londonderry: G Douglas, 1795:viii

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