Short report

Subarachnoid haemorrhage in children caused by cerebral tumour

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SUMMARY Subarachnoid haemorrhage in children is uncommon. In a review of 110 children with an intracranial tumour over a 20 year period there were four patients (3.6%) who presented with the typical features of a subarachnoid haemorrhage. During the same period of time there were 15 children who presented with subarachnoid haemorrhage of which 26% were secondary to a cerebral tumour. This study suggests that cerebral tumour is a common cause of subarachnoid haemorrhage in children.

Intracranial berry aneurysm is the commonest cause of subarachnoid haemorrhage in adults.¹ By contrast, subarachnoid haemorrhage is uncommon in children, and the underlying pathology is frequently a cerebral tumour.² We have reviewed the case notes of both children with brain tumours and children presenting with spontaneous subarachnoid haemorrhage over a 20 year period at Princess Margaret Hospital.

Case reports

Case 1

A 12-year-old boy experienced a sudden onset of severe headache in 1969 and on examination shortly afterwards was confused with mild neck stiffness but no focal signs. Lumbar puncture confirmed a subarachnoid haemorrhage with 40 000 erythrocytes/cmm, but four vessel angiography was normal. After recovery he was reviewed two months later and found to be suffering from increasing frontal headaches. Examination revealed bilateral papilloedema and left homonymous hemianopia. Repeat four vessel angiography demonstrated tumour in the right posterior parieto-occipital region. A subsequent craniotomy revealed a glioblastoma multiforme. The patient died 11 months later.

Case 2

A 12-year-old boy had a sudden onset of headache and vomiting 3 days prior to admission in 1973. On examination

he was alert, with no neck stiffness or focal signs. Lumbar puncture confirmed a subarachnoid haemorrhage with 38 000 erythrocytes/cmm, but four vessel angiography was normal. Sixteen months later he returned with a second subarachnoid haemorrhage and on examination was stuporose but with no focal signs. His conscious level improved within 72 hours, and repeat four vessel angiogram was normal. He gradually improved and on discharge he was normal. At 15 years of age he presented with a third subarachnoid haemorrhage. On examination he was stuporose with signs of hypothalamic disorder shown by obesity, hyperpyrexia and inappropriate secretion of anti-diuretic hormone. His condition progressively deteriorated and he succumbed. Necropsy revealed a hypothalamic oligodendroglioma with haemorrhage into the third ventricle.

Case 3

An 11-year-old boy, presented with a sudden onset of headache in 1972, and when examined was found to be confused and had neck stiffness, but no focal signs. Subarachnoid haemorrhage was proven by lumbar puncture which showed 8500 erythrocytes/cmm, but an isotope brain scan and four vessel angiography were normal. Four months later he had a second subarachnoid haemorrhage. Air encephalography and iophendylate ventriculography suggested an infrathalamic space occupying lesion. Bilateral ventriculo-peritoneal shunts were inserted. A computed tomographic scan when available in 1976 showed a mass lesion in the anterior end of the third ventricle. The patient is still alive and well ten years after the initial subarachnoid haemorrhage.

Case 4

A 4½-year-old girl presented with a three week history of headache and vomiting and in the 24 hours before her admission her conscious level suddenly deteriorated. On admission in 1974 she was stuporose, exhibiting bilateral

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Table Causes of subarachnoid haemorrhage in children

	Number	Percentage
1. Arterio-venous malformation	3	20%
2. Aneurysm	5	34%
3. Tumour	4	26%
	2 glioblastoma	
	1 oligodendroglioma	
	1 unknown	
4. Unknown	3	20%

papilloedema, opisthotonos and a left Babinski reflex. Four vessel angiography revealed hydrocephalus and a thalamic tumour. A ventricular drain was inserted and heavily blood stained CSF was obtained. The patient succumbed within 48 hours of admission. Necropsy revealed glioblastoma multiforme of the third ventricle and hypothalamus with intra-ventricular haemorrhage.

Results

During the period 1958–79 there were 110 children up to the age of 16 years with intracranial tumours, of which 4 (3.6%) presented with subarachnoid haemorrhage, the case histories being described above. During the same period of time there were 15 children with subarachnoid haemorrhage of which 26% were due to a cerebral tumour (table). These cases exclude germinal plate haemorrhage, trauma and coagulation disorders. The commonest tumour site (three cases) was related to the third ventricle, and the commonest tumour histology (two cases) was glioblastoma.

Discussion

These results show that a cerebral tumour is a commoner cause of subarachnoid haemorrhage in childhood (26%) than in adults (1–6%). Similarly, Laurent² found in a survey of 72 children presenting with subarachnoid haemorrhage that 15% were secondary to a cerebral tumour of which medulloblastoma was the most common. They also found a high incidence of spontaneous haemorrhage in childhood brain tumour (10%) which is higher than in our series (3.6%). One reason for the high incidence of cerebral tumour in children is the extremely low incidence of hypertension and aneurysm which in adults accounts for a large percentage of subarachnoid haemorrhage. 3.6% of the paediatric brain tumours in this series presented as subarachnoid

haemorrhage which is comparable to the incidence in adults (1–6%): 4.9%—Glass and Abbott,³ 6%—Little,⁴ 3.7%—Oldberg,⁵ 1.5%—Russell,⁶ 1.2%—Yasargil.⁷

The pathogenesis of spontaneous haemorrhage is related to a number of factors. The first is the abnormal vascularity of cerebral tumours.^{8,9} Pathological examination of glioblastoma, medulloblastoma and metastasis reveals small and large fistulous vessels. The second is tumour invasion of the vessel wall resulting in occlusion and necrosis of the tumour tissue with subsequent haemorrhage. A further cause of haemorrhage is the stretching of thin walled blood vessels in the softened brain surrounding the tumour.⁸

These case reports are of clinical importance because they demonstrate that brain tumours are a common cause of subarachnoid haemorrhage in children. The diagnosis may be rendered difficult by the position of the tumour and the patient may have multiple subarachnoid haemorrhages before the diagnosis is made. Computed tomography should alleviate this diagnostic problem.

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