Symptomatic Anterior Cerebral Artery Vasospasm after Brainstem Hemangioblastoma Resection A Case Report

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SUMMARY – *Diffuse cerebral vasospasm is a rare complication after brain tumour resection as opposed to that following an aneurysmal subarachnoid haemorrhage. Sellar tumours are among the most common pathologies and locations associated with this complication. Removal of posterior cranial fossa lesions is uncommonly associated with vasospasm, with only nine reported cases. We describe a case of diffuse symptomatic vasospasm mainly involving the right anterior cerebral artery, angiographically confirmed, after resection of a haemangioblastoma of the medulla in an adult patient with von Hippel-Lindau disease. The possible pathogenesis of this phenomenon is discussed.*

Introduction

Cerebral vasospasm is a well-known complication after subarachnoid haemorrhage from aneurysmal rupture¹ or severe head trauma. It may be symptomatic causing ischaemic consequences or, in milder cases, only instrumentally detectable. In such clinical framework vasospasm should always be suspected at the occurrence of delayed onset neurological symptoms. The prevention and the rapidity of care may play a key role in patient recovery².

We describe a case of delayed symptomatic diffuse vasospasm especially involving the right anterior cerebral artery, following resection of a posterior fossa haemangioblastoma in an adult patient with von Hippel-Lindau (VHL) disease.

Case Report

A 35-year-old woman with VHL disease (tested by genetic molecular analysis) previously operated for renal clear cell neoplasm 11 years before and for cerebellar and dorsal spinal cord haemangioblastomas ten and seven years

before respectively, harboured other multiple spinal and cerebral localizations. No evidence of pre-existing intracranial vessel hypoplasia was documented on previous neuroradiological imaging. She returned to our attention for weakness of the right hand and swallowing discomfort. MRI showed a growth of a previously known haemangioblastoma of the medulla (Figure 1), with an associated syringomyelia. En bloc microsurgical resection of the tumour was performed through a reopening of a previous midline suboccipital craniectomy, adding a posterior atlas laminectomy in prone position. Surgical removal of the lesion was characterized by profuse intraoperative bleeding, although no blood transfusion was required. At the final stage of the operation some blood clots collected in the fourth ventricle and in the subarachnoid space around the brainstem were evacuated.

In the first post-operative period the patient showed a regular awakening from anaesthesia with a mild right hemiparesis and a severe swallowing impairment that required a protective tracheostomy on day 3 post-op to avoid aspiration pneumonia. Head CT scans obtained the day of the operation showed a slight amount

Figure 1 MRI showing a brainstem haemangioblastoma with an associated syringomyelia.

Figure 2 Post-operative CT showing a slight amount of blood in the subarachnoid pre-pontine and pre-medullary space, including some clots in the ventricles.

of blood in the subarachnoid pre-pontine and pre-medullary space, including some clots in the ventricles (Figure 2).

The patient was admitted to a rehabilitation programme. She showed no cardiac problems, arterial hypotension or temperature variations which may have played a role in the drop of cerebral blood flow. On day 12 post-op she presented a severe neurological deterioration char-

acterized by rapidly progressive tetraparesis, worst on the left side, associated with a comatose state. CT revealed an ischaemic area in the right anterior cerebral artery territory (Figure 3). Transcranial Doppler and angiographic studies demonstrated a diffuse vasospasm involving bilaterally both middle cerebral arteries, both proximal posterior cerebral arteries, with a major expression on the right anterior

← Figure 3 CT showing an ischaemic area in the right anterior cerebral artery territory.

↑ Figure 4 DSA angiography demonstrating a diffuse vasospasm.

← Figure 5 Follow-up MRI showing the right frontal ischaemic area.

cerebral artery (Figure 4). A selective intra-arterial nimodipine infusion was performed with radiographic improvement of the vasospasm. The patient was subsequently transferred to the intensive care unit and treated with triple H therapy. Later she was discharged to a rehabilitation unit for further recovery. The gradual onset of communicating hydrocephalus required a ventriculo-peritoneal shunt. At 15 month follow-up the patient was awake, cooperative and mobilized in a wheelchair with a residual hemiparesis (GOS: 3). Follow-up MRI shows the right frontal ischaemic area. (Figure 5)

Discussion

Vasospasm following brain tumour surgery is a rare occurrence with about 50 cases reported since the patients described in 1960 by Krayenbuehl³. Vasospasm after brain tumour surgery shares the same clinical variables (time interval, causative factors, morbidity and death rates) as vasospasm after aneurysmal subarachnoid haemorrhage. However, more causal factors in the pathogenesis of the phenomenon have been taken into consideration: location of neoplasm, vessel encasement, surgical manipulation, some blood in the subarachnoid space, release of vasoactive substances from the tu-

mour, operative positioning, hypothalamic dysfunction².

Tumours of the sellar region are the most common pathologies associated with this complication likely due to the distinctive anatomical relationship with the major arteries. Only nine posterior cranial fossa lesions resected are described in association with delayed symptomatic vasospasm³⁻¹¹.

In our case, the predominant role seems to be played by the amount of blood shed during surgery in the basal cisterns, demonstrated by post-operative CT. In this case, the pathogenesis of vasospasm therefore has many points in common with that occurring after cerebral aneurysm rupture: the clinical presentation and the timing of onset (12 days after surgery) overlap the framework of typical cerebral vasospasm after aneurysmal subarachnoid haemorrhage.

From a technical standpoint, the accumulation of blood in the fourth ventricle and pre-midline and pre-pontine cisterns during surgery may have been facilitated by the prone position of the patient: retrospectively, a sitting position would have had the advantage of a spontaneous clearance of intraoperative bleeds by gravity-induced drainage out of the operative field.

Despite the therapy performed, the ischaemic damage was irreversible so the patient has not returned to the clinical state prior to vasospasm.

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