A Juvenile Case of Cerebellar Arteriovenous Malformation with Gradual Onset of Dysphoria and Headache

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SUMMARY – A 25-year-old woman was admitted because of frequent vomiting and headache which had lasted over one week. She had initially clear consciousness but slowly progressive mild headache and dysphoria. Emergency cranial CT revealed a 4 cm haematoma in the left cerebellar hemisphere. CT angiography showed a 2×2 cm nidus of an arteriovenous malformation (AVM) in the left hemisphere fed from the left posterior inferior cerebellar artery and draining into the inferior hemispheric vein. We performed a surgical resection of the AVM after decompression therapy to counteract the brain oedema. She recovered completely without any neurological deficits. This case recalls the importance of cooperation between diagnostic neuroradiology and neurosurgery in emergency, considering AVM, even if infrequent, among possible diseases.

Case Report

We describe the case of a 25-year-old woman who had slowly progressive mild headache and dysphoria with initially clear consciousness lasting over one week. Due to the mild clinical symptoms she was treated with pharmacological therapy by a general physician for three days and subsequently referred to our hospital because there were no improvements in symptoms. Dysphonia and progressive reduction of clear consciousness were found on neurological examination. Emergency cranial CT revealed haemorrhage in the left cerebellar hemisphere (Figures 1 and 2) while CT angiography (Figures 3 and 4) confirmed an arteriovenous malformation (AVM). We performed a surgical resection of the AVM using a paramedian suboccipital craniectomy and the microsurgical technique by the senior author (SC): AVMs and the underlying parenchyma were first inspected to identify the superficial arterial inflow and venous outflow correlating with the preoperative CT and angiogram. Dissection was facilitated by the gliotic plane, which usually forms between the AVM and normal tissue, as well

as by previous haemorrhage cavities. Care was taken to spare large veins draining the vascular malformation, with dissection often continuing under or around such vessels. Following complete dissection of the AVM and interruption of all arterial inflow, venous drainage can then be safely divided and the AVM removed. A ventricular catheter was placed to prevent hydrocephalus.

The patient was monitored at the intensive care unit. Routine cranial CT scans were performed 48 hours (Figure 5) following the operation and revealed cerebellar decompression. Cerebral angiography performed 72 hours after haemorrhage showed the absence of any residual AVM (Figure 6). The ventricular catheter was removed seven days after surgery. The patient recovered without neurological deficits.

Discussion

Posterior fossa arteriovenous malformations (AVMs) supplied by the vertebrobasilar system are traditionally regarded as rare lesions and originally thought to comprise only 7-15% of

Figure 1

Figure 2

Figures 1 and 2 Cranial CT revealed haemorrhage in the left cerebellar hemisphere.

Figure 3

Figure 4

Figures 3 and 4 Cerebral CT angiography confirmed an arteriovenous malformation.

Figure 5 Routine cranial CT scans were performed 48 h following surgery and revealed cerebellar decompression.

A

B

Figure 6 Cerebral angiography performed 72 h after surgery showed the absence of any residual AVM.

malformations in the major series of patients. Multivariate analyses designed to elucidate the relationship between infratentorial location and haemorrhagic presentation found that posterior fossa AVMs are more likely to present with haemorrhagic or cerebellar findings and are rarely accompanied by seizures.

Particularly in younger patients, the most common initial symptom of AVM is haemorrhagic stroke with high mortality and morbidity rates. This was in contrast to the mortality rate for supratentorial AVM, whose outcome has improved significantly since 1970 because of better diagnosis, after the introduction of CT angiography, and improved neurosurgical and anaesthetic techniques.

In the absence of clinical trials in this field, data derived from clinical series suggest that the level of consciousness, the size of the haematoma, the presence of hydrocephalus and the compression of the posterior fossa CSF spaces are the main criteria to be considered when deciding case management. Fourth ventricle compression seems to be the best indicator of the last of these parameters^{1,2}.

Current treatments for AVMs include microsurgical resection only, preoperative endovascular embolization followed by microsurgical resection, stereotactic radiosurgery only, preprocedural endovascular embolization followed by radiosurgical treatment, endovascular embolization only, and observation only^{1,3-5}. Khaw et al.⁶ demonstrated that posterior fossa AVM

with haematomas with any threatened mass effect should be operated on an urgent basis, but decision-making in the management of these haematomas requires careful consideration and interpretation of the various criteria. The configuration of the fourth ventricle on CT scans is a useful measure for the selection of the appropriate surgical procedure, compared with estimation of the size of the haematoma and/or evaluation of the quadrigeminal cistern. In our experience, the ideal treatment for posterior fossa AVMs with haemorrhage is microsurgical excision because of the correlation between haematoma volume and outcome. Neurological outcome following surgical treatment of cerebellar AVM with haematoma is dependent both on the haematoma size and anatomical position, and the AVM nidus to be excised. Radiosurgery is not therapeutically effective for all lesions. AVMs in or adjacent to functional brain tissue have a higher risk of radiation injury, and the effect of radiosurgery may need more than two years to be really useful. For these reasons we believe that radiosurgery should not be indicated in patients with ruptured AVM associated with haematoma, that needs removal to avoid neurological deficits due to the mass effect. The possibilities and risks of embolization are well-known. In this kind of situation embolization can be useful as a preparation to surgery, but will not solve the problem of the haematoma mass effect that should be alleviated urgently as only neurosurgery can do.

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