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Variable Filling of an Arteriovenous Malformation During Carotid Angiography

A Case Report

By

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With 4 Figures

Summary

An 11-year-old girl was operated on for a frontal arteriovenous malformation in 1978; a postoperative carotid angiogram showed no filling of the AVM. The patient still had epilepsy. In 1981 a carotid angiogram showed no AVM. Some months later a new carotid angiography was done. In the first lateral series no AVM was seen but on the second injection with one more millilitre of contrast medium a large frontal AVM became apparent. The reasons for such variable filling are discussed.

Keywords: Arteriovenous malformation; brain; carotid angiography.

Arteriovenous malformations (AVM) of the brain are developmental anomalies in the capillary segment of the vasculature. Anomalous vascular channels are nearly always identifiable angiographically⁴.

We present a patient who had been operated on for a frontal AVM. Three years later a carotid angiogram showed no AVM. Some months later, however, a new carotid angiography was done and on the first injection no AVM was seen but on the second injection a frontal AVM filled well.

⁶ Acta Neurochirurgica, Vol. 70, Fasc. 1-2

Case Report

An 11-year-old girl had had epileptic seizures, and a right frontal AVM was found in 1978 (Fig. 1). The AVM was operated on the same year; a postoperative carotid angiogram showed no filling of the AVM (Fig. 2).

Because of persistent epilepsy, a right carotid angiogram was made under general anaesthesia in another hospital in 1981. It showed no AVM, but it did show a large, late frontal vein. In the same year the patient was admitted to the neurosurgical department, and right common carotid angiography was performed under local anaesthesia by direct puncture of the common carotid artery (4 ml Citanest 1% without vasoconstrictive agent, Astra: 8 ml Isopaque cerebral 280 mg I/ml. Medica) and an automatic injector with an injection rate of 10 ml/second. Twelve films were exposed: 2 films/second for 2.5 seconds, 1 film/second for 1 second, and 1 film/2 seconds for 4 seconds). In the first lateral series no AVM was seen, only a large, late vein (Fig. 3). Because the basal part of the cerebrum was not visualized another lateral series was taken after five minutes. Nine millilitres of contrast medium were now used. This time a large frontal AVM with many early draining veins became visible. The feeding arteries were from branches of the pericallosal and middle cerebral artery (Fig. 4). The AP projection subsequently showed the AVM as well. The AVM was in the region which was totally visible in the first lateral projection too.

So far the patient has not been re-operated.

Discussion

In our case there are two strange points: 1. the first carotid angiogram in 1981 showed no AVM and 2. the second carotid angiogram at first did not show the AVM but a second, larger injection of contrast medium revealed it.

Arteriovenous malformations of the brain can be seen in serial angiograms in 95% of cases. Non-filling is usually caused by a haematoma compressing a small AVM or thrombosis of the AVM, or because the angioma is cavernous^{1,3-6,8}. An embolus may also block the malformation¹⁰. Transient disappearance of an AVM has been described after subarachnoid haemorrhage¹², epsilon-aminocaproic acid treatment⁷ and postoperatively⁹. An AVM with a very rapid or very slow circulation may also remain undetected in serial angiography⁵. In technically poor angiograms AVMs can be missed, *e.g.*, if the injection goes mainly into the external carotid artery or into vessels not feeding the malformation². Selective injection of 10–15 ml of contrast medium into the internal carotid artery shows up the intracranial veins best, and also shows up the AVMs¹¹.

Our case does not fit into any of these reasons because the quality of the angiograms was good. So the reason for the non-





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Figs. 2 a and b. Postoperative right carotid angiography February 17, 1978: a) arterial, b) venous phase. No filling of the AVM

Variable Filling of an Arteriovenous Malformation



Figs. 3 a and b. Right carotid angiography October 20, 1981: a) arterial, b) venous phase. No AVM can be seen but a large, late vein



Figs.4a and b. Right carotid angiography October 20, 1981 five minutes after Fig.3 injection: a) arterial, b) venous phase. Good filling of the large AVM

filling of the AVM during angiography in another hospital is unknown. In the carotid angiogram done later in the same year in the neurosurgical department there were also no methodological differences between the first injection, during which the AVM did not fill, and the second injection, during which the AVM filled well, except for one more millilitre of contrast medium in the second injection. The reason for improved filling may have been a change in the tone of the walls of the afferent arteries caused by the contrast medium or the local anaesthetic. A further but rather theoretical possibility is changes in the intracranial pressure through a Valsalva effect.

Our case shows that carotid angiography may be unreliable in AVM patients and therefore postoperative angiography in these patients should be done with at least 10 ml of contrast medium, and preferably using a selective technique. If such an angiogram no longer shows the AVM but the patient still has symptoms, another control angiography may be necessary with at least the same amount of contrast medium.

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- 88 M. Porras et al.: Variable Filling of an Arteriovenous Malformation
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