Renewed bleeding of a posterior inferior cerebellar artery aneurysm during vertebral angiography

P. J. DRURY
F.R.C.R.

T. POWELL
M.R.C.P., F.R.C.R.

Hallamshire Hospital In-patient X-ray Department, Glossop Road, Sheffield S10

Summary
The perangiographic rupture of a posterior inferior cerebellar artery aneurysm is described and discussed. Only 2 other cases of perangiographic rupture of posterior fossa aneurysms have been found in the literature, and there are fewer than 60 reports of ruptures of aneurysms at all intracranial sites.

Introduction
The rupture of an intracranial aneurysm during cerebral angiography is generally accepted to be an uncommon event (Taveras and Wood, 1976; Sutton, 1975). Fifty-three cases have been reported in the literature (Hayakawa et al., 1978) only 2 of which involved aneurysms in the posterior cranial fossa (Hoff and Potts, 1969; Gerlock, 1975). This is indeed a low number relative to the large number of angiograms performed following subarachnoid haemorrhage. Authors differ in their views as to whether perangiographic aneurysmal rupture is related to the investigation, or is purely coincidental.

Case report
A 52-year-old housewife was admitted to hospital as an emergency following the sudden onset of severe headache, vomiting and blurring of vision whilst watching television. On examination, she had marked neck stiffness and a large subhyaloid haemorrhage of the right fundus. The clinical diagnosis of subarachnoid haemorrhage was confirmed at lumbar puncture when uniformly heavily blood-stained cerebrospinal fluid was obtained.

She made fairly steady clinical improvement over the next 4 days. She was fully alert on the 4th day, her initial level of consciousness having been fluctuating, although she still had a headache. On the 5th day she underwent several apnoeic episodes, and her level of consciousness deteriorated. The arteriography that had been planned for her was performed as an emergency procedure. Her condition did not improve subsequently, and she was maintained on mechanical ventilation until her death 3 days later.

Angiography
Bilateral carotid angiography was performed uneventfully by direct puncture, under general anaesthesia. This revealed only generalised arterial spasm, and moderate ventricular dilatation. Transfemoral catheterization of the left vertebral artery was then performed by the Seldinger technique, a polyethylene 205 end-hole catheter being introduced no more than one cm beyond the orifice of the left vertebral artery under fluoroscopic control. A test injection of contrast medium confirmed the position of the catheter, and that it was not occluding the vertebral artery. The catheter was irrigated intermittently and frequently with heparinized saline (2000 i.u./l) between contrast injections. Two hard injections each of 8 ml of meglumine iothalamate 60% (Conray 280) were made. At the first injection, antero-posterior (AP) films were taken, followed approximately 4 min later by the lateral series. Immediately after the second injection, the patient developed a transient cardiac arrhythmia which was reported by the anaesthetist; the catheter was then withdrawn forthwith from the vertebral artery.

Radiological findings
A berry aneurysm arising from the origin of the left posterior inferior cerebellar artery was demonstrated on the AP series (Fig. 1). No contrast leakage was evident at this stage. The lateral series of films, however, show extensive extravasation of contrast medium into the pontine cistern (Fig. 2), ascending the suprasellar cisterns in the late arterial phase (Fig. 3), and spreading in the subarachnoid space over the tentorium on a delayed film taken 5 min later (Fig. 4).

Presumably the aneurysm ruptured either during the period between the first and second injections, or during the second injection.

Discussion
The angiographic demonstration of extravasation from an intracranial aneurysm indicates a very poor
Fig. 1. Initial anteroposterior vertebral angiogram shows an intact left posterior inferior cerebellar artery aneurysm.

Fig. 2. Contrast medium is leaking into the pontine cistern (about 4 min after the anteroposterior series).
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**Fig. 3.** One sec later, there is further subarachnoid spread of the extravasated contrast medium.

**Fig. 4.** Five min later, contrast medium (and blood) has diffused over the cerebellar hemispheres and over the tentorium.
prognosis (approximately 80% mortality, Allan and Witcombe, 1977).

As with the case here described, all previously reported cases of perangiographic aneurysm rupture were recognized by contrast extravasation during the examination. The extravasation is usually into the subarachnoid space, but has been observed to occur intracerebrally (Hayakawa et al., 1978), and even subdural extravasation has been reported. The fact that only 2 other cases of ruptured posterior fossa aneurysms have been reported probably reflects the relative infrequency of aneurysms sited here. Only 5-5% of all single, bleeding aneurysms arise from the vertebrobasilar system (Locksley, 1966).

Hoff and Potts (1969) demonstrated an arteriosclerotic basilar artery aneurysm by direct needle puncture of the left vertebral artery. Early films demonstrated an intact aneurysm, with subarachnoid leakage later becoming apparent. They concluded that the bleeding was probably caused by the transient increase of pressure in the aneurysm when contrast medium was injected into the vertebral artery.

Gerlock (1975) in his report of the rupture of a right posterior inferior cerebellar artery aneurysm during angiography by selective catheterization reached the opposite conclusion, that perangiographic extravasation should be regarded as coincidental to the procedure.

There is no uniform view, therefore, as to whether perangiographic ruptures of aneurysms are purely coincidental, or related to the procedure. The subject has been well reviewed by several authors (Allan and Witcombe, 1977; Murray and Wortzman, 1977; Waga et al., 1973). Some recent reports suggest that this occurrence is, in fact, more frequent than reported (Hayakawa et al., 1978; Liliequist, Lindquist and Probst, 1976) and until more data are received it seems unlikely that this question will be resolved.

Briefly to restate the arguments: Bakay and Sweet (1952) recorded no change in pressure in the internal carotid artery during the forceful injection of saline in 5 human subjects. Lin, Krichef and Chase (1964), however, demonstrated an increase in the brachial and carotid arteries when fluid was injected into the brachial artery. As has been pointed out by other authors, the fact that communicating vessels often opacify in the circle of Willis, and that reflux of contrast down the opposite vertebral artery usually occurs during angiography, indicates that a transient rise in pressure occurs during an intra-arterial injection.

The carotid circulation, with its external branches and many ramifications, is probably better able to absorb this rise in pressure than is the vertebrobasilar system.

In the present case, as with Gerlock’s (1975), the aneurysm lay at the origin of the posterior inferior cerebellar artery, approximately 10 cm distal to the tip of a catheter in the origin of the ipsilateral vertebral artery. One imagines that an aneurysm in this situation would be subjected to the full pressure and turbulence arising from the injection. Furthermore, an aneurysm that has recently re-ruptured must be especially vulnerable, being sealed, presumably, only by newly formed thrombus.

It is difficult to resist the conclusion that the rupture of the aneurysm here described was caused by the angiogram. This does not necessarily mean that the technique was at fault, nor that the procedure was contra-indicated; good quality angiographic pictures are an essential contribution to the surgical management of subarachnoid haemorrhage. The prognosis is relatively poor when bleeding recurs after an initial haemorrhage (Uttley, 1978), and the history suggests that this one had done so before angiography. The procedure did not therefore necessarily affect the eventual outcome. By meticulous attention to technique, and awareness of this (and other) potential hazards of angiography, one hopes to minimise the morbidity of the procedure.

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References